



**Analysis of US Patent Referencing to IEEE Papers,
Conferences, and Standards 2003-2022**

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Executive Summary

Prior studies performed by 1790 Analytics have demonstrated a strong relationship between IEEE research and new patent development and have shown that citations to IEEE can often lead to higher impact patents. Specifically, the impact is measured by examining the extent to which patented inventions build upon papers from IEEE journals, IEEE-sponsored conferences, and IEEE standards. This is an update of previous reports and examines US patents issued from January 1, 2003 through December 31, 2022.

The main findings of this report are:

- New technology continues to build upon science, and the dependence is increasing. In this study, the top 50 firms (in 2022) were granted 91,209 patents, which made a total of 622,720 non-patent references (an average of 6.83 non-patent references per patent). Back in 2011 the top 25 firms were granted 51,826 patents. These patents made a total of 205,634 non-patent references, (an average of 3.97 non-patent references per patent) Thus, the number of patents is trending upward but the number of references from those patents is rising at a greater rate. Since many these non-patent references are to scientific articles and conference papers, this suggests that today's technology developments are increasingly linked to developments in published science.
- A large portion of this science base comes from papers presented at IEEE sponsored conferences and published in IEEE journals. The top 50 patenting firms in 2022 have referenced 2,777,921 articles in the last 20 years. About 25% (693,920) of those articles appeared in IEEE journals, IEEE sponsored conferences or IEEE Standards Documents.
- In this study, we also went beyond the top 50 patenting companies and analyzed all patents from the last 20 years in several technology categories of interest to IEEE members and customers. For example, over 30% of all scientific references from Computer Hardware patents go to IEEE publications. The second most referenced publisher is ACM (Association for Computer Machinery) with 17% of the referenced publications. In other Information Technology areas, such as Information Storage, Semiconductor Manufacturing, and Computer Software, the results are similar.
- In Telecommunications technology, IEEE is particularly important. The 706,710 references to IEEE articles, conferences, and standards represents about 35% of all Non-Patent references from Telecommunications patents since 2003. However, Telecommunications references contain a higher number of standards than other technologies which understates the extent to which IEEE provides the science base to this technology. If we remove the standards from the NPRs then of course IEEE loses about 79,000 references to its 802 wireless standards, however the 627,000+ references to IEEE journal articles and conferences represents about 50% of the total science references from Telecommunications patents. In other words, IEEE provides half of the science base for new innovations in Telecommunications.

- Although we've generated reports like this for close to two decades, we try to add technology categories that are currently hot or emerging. In recent years we've added Blockchain and Distributed Ledgers, Cybersecurity, and Virtual and Augmented Reality. In these emerging areas, IEEE enjoys a two-fold lead over second place ACM.
- We also look at several trending technologies that are transforming our world today such as Artificial Intelligence (AI) and Machine Learning, Autonomous Vehicles, and Internet-of-Things related patents. In each of these areas IEEE is the dominant publisher of the science base. In AI, IEEE enjoys a 3-fold lead over second place ACM. In Autonomous Vehicles, IEEE has a dominant lead (10-fold lead) over the second-place entry RELX/Elsevier. In the Internet-of-Things category IEEE has almost a 4-fold lead over second place 3GPP.
- In the Robotics and Intelligent Manufacturing category, 37% of the patent references are to articles published in IEEE journals or in proceedings of IEEE sponsored conferences. Second place RELX receives about one-fourth as many references in the category.
- IEEE is referenced a surprising amount in areas which are not central to its mission.
 - In broadcasting technologies IEEE leads with 30.74% of the references, which is about 2.5 times as many as second place International Telecommunication Union. The latter produces standards documents while the IEEE references are to standards documents as well as peer reviewed scientific papers from journals and conferences.
 - For example, 7.78% of the science references from patents in medical devices go to IEEE publications. This ranks IEEE fourth behind RELX and Wiley, and Wolters Kluwer (with 20.05%, 9.80%, and 8.60% respectively). The latter publishers have hundreds of journals in the medical area, whereas IEEE has only a few, so the 7.78% figure is quite solid for a non-core area and not far behind second place Wiley's 9.80%.
 - Optics is also somewhat surprising. The two optics societies: OSA – The Optical Society of America, and SPIE – The International Society of Optical Engineering sponsor many conferences and have several journal articles, but OSA has only a slight lead over IEEE which has a slight lead over SPIE. Specifically, OSA receives 16.54% of the references, IEEE receives 14.05% and SPIE receives 12.75% of the references from optics related patents.
 - In Measuring, Testing, and Control, IEEE gets 18.84% of all references, which ranks ahead of the 14.54% of second place RELX while, again, RELX has many more journal titles in the space.

- Patents related to Power Systems and Transmission also reference IEEE publications most frequently. The 67,913 references to IEEE journal and proceedings papers are more than the next two top referenced publishers (RELX and Electrochemical Society) combined. We also examined a specialized subset of the Power Transmission category related to smart meters and smart grids. In this category, 54.97% of the scientific references from patents go to IEEE journal or conference papers. The second most referenced publisher is RELX with only 8.40% of all references.
- Several years back we started tracking some green energy categories: Solar and Photovoltaic energy and Wind energy. In the latter category IEEE science has a big advantage over the other publishers with more than 41% of the references. In solar energy, IEEE has a smaller lead over RELX. IEEE leads RELX even though RELX has 50+ journal titles related to the area including several high impact journals such as *Solar Energy Materials and Solar Cells*, *Thin Solid Films*, *Solar Energy*, *Synthetic Metals*, *Journal of Crystal Growth*, and *Solar Cells*, while IEEE has only a few titles.
- It has been shown that high-quality, high-impact, and valuable patents tend to be cited more frequently by later patents. Citation impact is thus often used as a quantitative measure for evaluating patents (see [3]). In this study, we found that the patents that reference IEEE papers are cited more often than patents that do not. This was shown to be true for each of the twenty technology categories we examined. This suggests that, not only do IEEE publications frequently provide the science base for new inventions, but that inventions that build upon IEEE publications are more likely to be valuable in the future than inventions that do not build upon IEEE.
- Although this study concentrates on patents in specific technology areas, it should be noted that the importance of scientific and technical literature to patented technology is increasing in all areas. Our research shows that the average US patent had only 2.76 non-patent references (NPRs) back in 1997. That number jumped to 11.72 by 2022 – a 325% increase. These numbers are for all issued US patents and not just those in the twenty categories covered in this report.¹ This means that in the overall patent system, patented technologies are increasingly referencing scientific articles.
- Since we only look at specific categories of technology plus the top 50 firms, there is no way to know exactly how much referencing to IEEE has increased since 1997. However, we can make an estimate for the whole patent system by identifying any Non-Patent References that mention “IEEE” or “I.E.E.E.” (This will of course miss things like the *Journal of Lightwave Technology* or *Spectrum* which may not have IEEE in the reference, but it will be a reasonable estimate.) If we do a comparison as above, we find that there were just 14,635 patent references with IEEE or I.E.E.E in 1997, but 137,874 in 2022 (an 842% increase). Thus, science referencing and IEEE referencing have both increased greatly since 1997.

¹ Including science intensive areas like Biotechnology, Pharmaceuticals, Chemicals, and other areas where IEEE typically has less influence.

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I. Introduction

In previous studies, it was found that patents reference papers from IEEE journals much more often than papers from other journal publishers. In this report, we update the previous results, and study US patents issued from January 2003 through December 2022. Although this report is an update of previous results, we have made our best efforts to make this report self-contained. The aim of this report, as in previous reports, is to analyze references from patents to journal articles, conferences, and standards documents, in order to assess IEEE's impact upon technological developments.

This report covers twenty subcategories of Technology where IEEE members and readers are active. Many, but not all are related to Information Technology. The categories patent counts are shown below in Table 1.

Table 1: Number of Patents for Each Category Covered in this Study

Category	# Patents 2003-2022
Artificial Intelligence and Machine Learning	44384
Autonomous Vehicles	9701
Blockchain/Distributed Ledger	4978
Broadcasting	221245
Computer Hardware	526783
Computer Software	318565
Cybersecurity	165549
Diagnosis/Surgery/Medical Instruments	264387
Information Storage	129947
IOT/Internet of Things	21111
Measuring, Testing and Control Devices	248999
Optics/Photography/Electrophotography	162858
Power Systems	149122
Robotics and Intelligent Manufacturing	42809
Semiconductors/Solid-State Devices/Electronics	329046
Smart Grid/Smart Meters/Energy Infrastructure	4983
Solar/Photovoltaic	15966
Telecom and Other Communications	765182
Virtual/Augmented Reality	25466
Wind Energy	9729

II. Methodology

This study is based on referencing patterns from patents to prior art documents. When an inventor files a patent for an invention, he/she will typically reference earlier documents to show that the new invention either builds upon, or improves upon, what came earlier. The inventor's patent attorney and/or the examiner may also add prior art references to either clarify or limit the claims of the invention.

As an example, Figure 1 shows the front page of a patent owned by IBM. The prior art references on this patent come in two forms - references to earlier patents, and “other references”. These other references are often to scientific publications, such as those produced by IEEE. In this report we are primarily concerned with these other references, which are also sometimes called “Non-Patent References”.

It has been suggested that patents with many non-patent references are likely to contain new leading-edge ideas, whereas patents that only reference earlier patents are likely to be incremental improvements on earlier patented technologies. For a comprehensive study on various hypotheses surrounding the motivations of inventors in citing other references, see [1].

Patent Sets used in the Analysis

This study is based on two patent sets. Our analysis is based on determining the number of references from these patent sets to publications from publishers such as IEEE, RELX (formerly Elsevier), the American Institute of Physics, and others.

The first set contains patents from the top 50 patenting companies in 2022. Analysis of this patent set provides an insight into how the top tier companies rely upon science from IEEE and other publishers. The second set contains all patents in twenty technology categories from all companies, universities, government agencies, and individuals. The twenty technology categories examined are shown in Table 1 above. Analysis of this patent set reveals the wider influence of IEEE science in these technologies.

Identifying Relevant Non-Patent References

Non-patent references can be to any published document, from comic strips and brochures, to scientific articles and standards documents. The main difficulty in identifying relevant non-patent references for a study such as this is that inventors do not use a standard form for listing references. As an example, Table 2 contains eight different variants for the IEEE Global Telecom Conference. Note that some inventors just use the GLOBECOM shorthand, while others list the entire name. Sometimes IEEE is mentioned and sometimes it is not. When abbreviation variations are included such as Telecom, Tele, Tcom, Proc., Proceed., the number of variants increases further. The same issue exists for variants in journal names and standards documents. For example, there are more than 30 variant spellings of the journal title *Journal Of Thoracic And Cardiovascular Surgery* including numerous misspellings of thoracic and every conceivable way of abbreviating cardiovascular.

Table 2 – Variants for IEEE Global Telecom Conference

Proceedings of Globecom '96
IEEE Global Telecommunications Conference
GLOBECOM '90:IEEE
Proceedings of IEEE Globecom '94
IEEE GLOBECOM 2007 - IEEE Global Telecommunications Conference
IEEE Globecom, Global Telecommunications Conference and Exhibition
Proc of the Global Tele Conf, U.S. New York, IEEE

Conference Identification – to identify conference proceedings among the non-patent references, we first identified references containing keywords such as meeting, symposia, conference, etc. We then used parsing software to identify 2-word and 3-word phrases that appear frequently in this set of papers. The full string was identified for these string sub-sequences to identify frequently cited conferences. In this way, we identified the top conferences referenced in the patent sets, and standardized the names of these conferences (i.e., all the different variants of a conference were collected under a single name). As an example, Table 2 shows 8 of the 95 variant names for IEEE Globecom which are unified to the name ‘<conf> IEEE Global Telecommunications Conference (GLOBECOM)’ in this report and the underlying analysis database.

We look up each of these conferences on the web to determine who is listed as their primary sponsor. For example, many of the conferences are sponsored by organizations such as IEEE, ACM (Association for Computer Machinery) and ASME (American Society of Mechanical Engineers). Some conferences are jointly sponsored by multiple organizations and this is noted as well.

When we first started identifying conferences in the 2005 report, we looked up the top 100 most referenced conferences to identify the primary sponsors or hosts. In this current report we track the top 2,000+ conferences which appear under some 40,000 variant names.

Standards Identification – Standards documents are increasingly referenced, and in general they are easy to identify by looking for strings such as ‘standard’ or ‘std’. Once the records containing the standards were located, it is straightforward to identify the organization that produced each standard (ITU, IEEE, ISO, JEDEC, ANSI, etc.). Further, once the standards bodies are identified, we then identify references to other documents that do not specifically list the words ‘standard’ or ‘std.’ The latter step is necessary since some references look like this “ISO/TC97/SC21/N2066” or “IEEE 802.3” without a specific mention of the word “standard.” As a consequence, we also identify other non-standard documents released from these organizations including draft standards and “requests for comments” documents if they are cited by patents.

Journal Identification – identifying and standardizing journal names is a very difficult process because there are so many different journals, and their names can be abbreviated in many different ways. To make the problem more manageable, we base our analysis primarily to the 45,000+ journals covered by the combined databases of ISI/Clarivate, Elsevier/SCOPUS, and 1790 Analytics, LLC. This is not a severe limitation, since these databases include more than 200 IEEE journals, transactions, and magazines, 3,000+ RELX/Elsevier journals, and 1,200 Wiley journals. In addition, we also identify publishers of about 1,000 non-ISI, non-SCOPUS journals if they appear very frequently in the patent references, but do not appear in these databases.

Once restricted to these 45,000+ journals, we used software that transforms journal names into common abbreviations and then implements string matching. Care must be taken with string matching because, for example, searching for “Urology Journal” will also accidentally identify “Neurology Journal”. Similarly, a search for the journal “Science” would accidentally pick up

any reference with ‘science’ in the paper title as well as any of the 800+ journals with science in their titles such as “Game and Wildlife Science”. Our proprietary software for journal identification (along with some human intervention) deals with these problems, so that we generate an accurate match between the patent references and 45,000+ journals. After identifying all relevant journals, we then used the Clarivate and SCOPUS databases and web research to identify the publisher of each journal

III. Results

References from Top 50 Patenting Organizations

Table 3 shows the 50 firms that were granted the largest number of US patents in 2022. It should be noted that many of these firms consist of multiple subsidiaries, and these firms patent under many names. (For example, General Electric has patents filed under 316 names, of which only a fraction contain General Electric in the name.) We identified all the subsidiary names for each company to ensure that our patent counts are accurate.

We identified the top 50 patenting firms because we want to understand the extent to which the current technology leaders use IEEE science. Figure 2 shows the 20 publishers of science whose publications are referenced most frequently by the 50 firms shown in Table 3. This figure shows that patents issued to the top 50 firms between 2003 and 2022 reference IEEE papers, conferences, and standards 693,920 times. This is nearly three times as many references as the second placed publisher RELX/Elsevier.

IEEE receives 24.98% of the science references from the patents of the top 50 companies. The next closest publisher (RELX/Elsevier) has 8.82% of the total.

Table 4 illustrates the reference distribution of IBM, which is second in patenting in 2022, but holds the most patents for the 20 year period from 2003-2022. This reference distribution is typical of the top 50 firms. The references from IBM to IEEE are to several different IEEE journals and conferences. In this table, IEEE journals are highlighted in yellow and IEEE conferences are highlighted in orange. The top overall reference is to IP.com which has a technical disclosure database of prior art that is often referenced by companies. IBM also references several internet standards frequently.

Notice that 31 of the top 65 journals and conferences referenced by IBM patents are published or sponsored by IEEE. Sixteen of the top 65 journals and conferences are published or sponsored by ACM. (Six of the sixteen are jointly sponsored between ACM and IEEE.) Since it’s primarily a software services firm, IBM tends to reference ACM much more than most of the top 50 firms, but still IBM references IEEE nearly twice as often as ACM as seen in Appendix A-10 (70,855 references to IEEE and 38,708 references to ACM.) The reader may notice the large number of references to ‘IEEE Unseparated’ or ‘Misc ACM’ in Table 4. These are articles that reference IEEE or ACM, but the inventor has not given a reference specific enough to identify the proper journal or conference. A few examples can be found in Table 5 below.

Table 3 – Top-Patenting Firms in 2022

Rank	Full Parent Name	2022 Patent Count	2003-2022 Patent Count
1	Samsung Electronics Co Ltd	8,838	114,628
2	International Business Machines Corp	4,717	127,917
3	Canon Inc	3,081	64,017
4	Taiwan Semiconductor Manufacturing Co.	3,036	27,122
5	Huawei Technologies Company Ltd.	3,016	23,034
6	Toyota Motor Corp	2,888	29,147
7	BOE Technology Group Ltd	2,736	13,963
8	LG Electronics Inc.	2,695	34,452
9	Qualcomm Inc	2,686	33,106
10	Sony Group Corp	2,652	48,353
11	Intel Corporation	2,515	48,096
12	Dell Technologies Inc	2,449	19,298
13	Raytheon Co.	2,334	27,038
14	Apple Inc	2,300	26,519
15	Amazon.com Inc.	2,096	19,491
16	Alphabet Inc. (Google)	2,077	28,815
17	Micron Technology Inc.	1,932	27,116
18	Microsoft Corporation	1,922	46,888
19	Hyundai Motor Co.	1,512	13,111
20	Panasonic Holding Corporation	1,471	48,744
21	Kia Motors Corp.	1,458	6,944
22	Ericsson	1,412	20,642
23	HP Inc	1,380	27,571
24	Honda Motor Co. Ltd.	1,377	19,922
25	Johnson & Johnson	1,363	19,666
26	Ford Motor Co.	1,342	20,191
27	General Electric Company	1,318	33,552
28	Fujifilm Business Innovation Co.	1,316	28,972
29	Medtronic Inc	1,284	22,583
30	Hitachi Ltd	1,260	34,863
31	Seiko Epson Corporation	1,241	26,596
32	Mitsubishi Electric Corp	1,215	19,154
33	Bosch (Robert) GmbH	1,191	20,538
34	Toshiba Corp	1,159	37,756
35	SK Hynix Inc	1,127	15,387
36	Boeing Co. (The)	1,120	16,595
37	Siemens Aktiengesellschaft	1,113	24,931
38	Saudi Arabian Oil Company (Saudi Aramco)	1,096	6,504
39	NEC Corp	1,062	19,248
40	BBK Electronics	1,043	2,926
41	LG Chem Ltd.	1,039	7,651
42	Denso Corp	1,033	18,744
43	Murata Manufacturing Co. Ltd.	1,014	9,289
44	Halliburton Co. (Holding)	965	9,965
45	Cisco Systems Inc.	954	18,454
46	Hon Hai Precision Industry Co. Ltd.	944	39,722
47	AT&T Inc	905	23,057
48	Texas Instruments Inc	878	19,434
49	Koninklijke Philips N.V.	834	18,581
50	Nippon Telegraph & Telephone Corp.	813	6,609

Table 4 – Reference Distribution from IBM Patents 2003-2022

References	Journal/Conference/Standard
15642	IP.Com Prior Art Database tech Disclosure
7879	IETF Network Working Group
5780	Misc ACM
4298	NIST Document
3522	IEEE Unseparated
3286	IBM JOURNAL OF RESEARCH AND DEVELOPMENT
3167	IEEE Int Electron Devices Meeting (IEDM)
2734	ACM SIGPLAN Notices
2664	APPLIED PHYSICS LETTERS
2475	Int Conf on Very Large Data Bases (VLDB)
2395	COMMUNICATIONS OF THE ACM
1800	IEEE tr ELECTRON DEVICES
1700	IETF Document
1606	Proc ann IEEE ACM int symp on Microarchitecture (MICRO)
1605	USENIX Conference Proceedings
1556	IETF Std
1510	IEEE/JPN Soc App Phys - symp on VLSI tech
1504	JOURNAL OF APPLIED PHYSICS
1503	IEEE int conf on Data eng (ICDE)
1464	Proc SPIE
1391	ACM/IEEE Design Automation conf
1384	ACM/IEEE int symp on comp Architecture (ISCA)
1371	Computer (IEEE)
1287	IEEE JOURNAL OF SOLID-STATE CIRCUITS
1267	IEEE ELECTRON DEVICE LETTERS
1236	ACM SIGOPS
1228	IBM SYSTEMS JOURNAL
1214	ACM Conference on Human Factors in Computing Systems (CHI)
1188	Proceedings of ACM SIGMOD
1172	IEEE tr COMPUTERS
1083	JOURNAL OF THE ACM
1082	Proceedings ACM SIGMOD Symp
1020	Usenix conf on File and Storage techogies
989	ACM Conf On Architectural Support for prog Languages and Operating sys (A
951	SCIENCE
934	IEEE int Symp on High Performance Distributed comp
899	comp Architecture News
856	International Conference on Computational Linguistics (COLING)
840	IEEE int symp On High Performance comp Architecture (HPCA)
834	International World Wide Web Conference
803	NANO LETTERS
800	IEEE tr Software eng
784	J Vac Sci tech
781	NATURE
764	IEEE tr comp Aided Design of Integrated Circuits and sys
746	IEEE tr PARALLEL AND DISTRIBUTED SYSTEMS
741	IEEE Int Conf Acous, Speech, and Sig Proc (ICASSP)
741	IEEE Proceedings
735	Proceedings ACM SIGCOMM Symp
731	Misc IEEE
730	IEEE tr KNOWLEDGE AND DATA ENGINEERING
725	IEEE/ACM Int Conf on Software eng (ICSE)
697	IEEE tr MAGNETICS
690	NIST Special Publication
664	IEEE int conf on Distributed comp sys
660	IEEE Misc Conf
647	JOURNAL OF THE AMERICAN CHEMICAL SOCIETY
637	IEEE Electronic Components and tech conf
635	IEEE/ACM Proceedings on Supercomputing (SUPERCOMP)
625	Neural inf proc sys conf (NIPS)
622	IEEE tr INFORMATION THEORY
618	ACSA/IEEE ann comp Security app conf (ACSAC)
618	PHYSICAL REVIEW LETTERS
610	IEEE Comp Soc comp Vision and Pattern Recognition
595	proc IEEE int Solid State Circuits Conf (ISSCC)

These are relatively complete references; it is not clear why the inventors were not more careful about listing the full journal names.

Table 5 – Examples of References Mapped to “IEEE Unseparated”

Patent	NPR #	NPR Text
05692177	3	Lewis et al. "Hashing for dynamic and static internal tables." IEEE, pp. 45-56 Oct. 1988.
05699518	4	"The Design and Implementation of a Reliable Distributed Operating System--ROSE", Ng, IEEE, pp. 2-11, Apr. 1990.
05699518	5	"A service Platform for Distributed Applications", Popescu-Zeletin et al, IEEE, pp. 11-17, Jul. 1992.
05709219	5	Kotoku, Tetsuo et al., "Environment Modeling for the Interactive Display (EMID) Used in Telerobotic Systems," IEEE Nov. 3-5 1991, pp. 999-1004.
05709219	6	Kotoku, Tetsuo, "A Predictive Display with Force Feedback and Its Application to Remote Manipulation System with Transmission Time Delay," IEEE Jul. 7-10 1992, pp. 239-246.
05709219	8	Burdea, Grigore et al., "Distributed Virtual Force Feedback," IEEE May 2, 1993, Atlanta, GA, pp. 25-44.

References from Companies in Twenty Technology Categories

In the previous section, we analyzed the use of IEEE science by the top patenting organizations. Out of all science publishers, IEEE was cited most often by these organizations by a wide margin. However, looking only at the top companies tells an incomplete story. IEEE publishes journals and runs conferences mainly in information technology, electronics, and related areas. It is therefore useful to examine the extent to which IEEE science is referenced by all organizations that patent in specific technologies and not just by the leading companies.

As mentioned in the methodology section, we identified all patents in the twenty technology categories shown above in Table 1. 1790 Analytics has developed a classification scheme that categorizes all patents into 50 broad technology areas based on International Patent Classes (IPCs) and Cooperative Patent Classes (CPCs) which are assigned to each patent as part of the examination process. This scheme was used to identify all relevant patents for the current analysis.

We examined each of the technology areas separately, and the results are summarized in Figures 3-19. The first category shown (in Figure 3) is Artificial Intelligence (AI) and Machine Learning. We identified all non-patent references on patents related to this technology issued between 2003 and 2022. We then determined the science publishers responsible for the largest number of these non-patent references. Figure 3 shows the result of this analysis, namely that IEEE science is referenced far more in AI related patents than science from any other publisher. 31.62% of all science references from these patents go to IEEE journal papers or IEEE sponsored conference papers (the graphs also include standards documents, but most of the references are to journal or conference papers). In second place is the ACM with 9.33% of the references.

AI is currently a very hot area and often written about in the popular press. The same can be said for Autonomous Vehicles which are shown in Figure 4. Here again IEEE dominates in references. In this case almost half (48.2%) of all references are to IEEE in this category. IEEE receives almost 10 times as many references from autonomous vehicles as second place Elsevier.

Blockchain and Distributed Ledgers is a relatively new category with only a few thousand patents (as opposed to AI which is a much more established category with 40,000+ patents). We see in Figure 5 though that over 40% of all science references from these patents go to IEEE.

Figure 6 covers Broadcasting patents, which is a category we first added in 2015. This category consists of US patents in the IPCs for Broadcast Communication and Pictorial Communication (Television). It would seem that this would be an area that is somewhat tangential to IEEE's core mission. However, IEEE leads in references in this category as well with 30.74%. The International Telecommunications Union is a distant second with 13.06% of all references.

Figures 7 and 8 show referencing patterns from Computer Hardware and Software patents. Here IEEE once again receives far more references than the other publishers. In both cases, ACM is the second most referenced publisher, but it receives about half of the references that papers published by IEEE receive.

Figure 9 shows references in the fast-growing area of Cybersecurity. This is a very hot area with a lot of recent patent growth, and again IEEE leads by a wide margin (28.02% of all references compared to 15.31% for second place ACM).

Figure 10 examines the top referenced publishers in the Medical Device field, which covers devices as well as diagnostic tools and surgical instruments. Here, IEEE is a respectable fourth in an area that is outside its core competency. RELX who has more than 400 journals in the field, such as *Annals of Thoracic Surgery*, and the *Journal of the American College of Cardiology* has a substantial lead with 20.05% of all references. Wiley with 9.80% of references and Wolters Kluwer (parent of Lippincott) with 8.60% of references are just ahead of IEEE's 7.78% of references in the category. (IEEE is slightly up from 7.6% of the references in last year's report for this category.)

Figure 11 contains the results for the information storage category. In this area, IEEE is particularly dominant. 41.2% of all the science references from patents in information storage are to papers in IEEE journals or conferences. IEEE's 90,955 references in this category are about six times as many as second place ACM.

Another hot technology area consists of Internet-of-Things patents. As Figure 12 shows, IEEE science is very important to the development of this new and active area of patenting. More than 37% of all science references are to IEEE content. 3GPP (a standards body) is a distant second with 10.94% of all references.

Figure 13 contains the results of patents covering Measuring, Testing, and Control technology. Patents in this category are related to measuring or testing force, pressure, weight, etc. as well as chemically measuring substances (e.g. measuring CO2 levels). The category also contains

control devices since these technologies are often combined. For example, a patent might be related to a valve that adjusts at a certain pressure or at a certain pollution level. Since this type of measuring can be done both mechanically, magnetically, electrically, or chemically, it is not too surprising to see both IEEE and RELX and the Optical and Chemical Societies all near the top of Figure 13. IEEE receives the most references, but the lead is not as dominant as in the Information Technology related technology areas.

The results for the Optics category can be found in Figure 14. This is another area that is slightly outside the IEEE core. In this case IEEE is sandwiched between the two major optics societies. The Optical Society of America (OSA) leads with 37,944 science references, IEEE is second with 32,232 and the International Society of Optical Engineering (SPIE) is third with 29,244 references from optics patents.

Figure 15 contains results for the patents related to power generation and transmission. Although this is a non-information technology category, IEEE leads in references in this category as well. 31.19% of science references from patents in this category go to IEEE publications. RELX is second with 21.45% of all US patent references in the category.

Intelligent Manufacturing and Robotics contains patents related to robotics, and robotics and control systems related to manufacturing. According to Markets and Markets [8], service robotics market is projected to reach USD 103.3 billion by 2026 because of a population explosion in service robots that mow lawns, vacuum floors, and manufacture things.

As this industry grows, new innovations will be patented, and from Figure 16 it looks like those innovations will build upon ideas published in IEEE journal articles or presented at IEEE conferences. We see that 37.14% of all science references from patents in this space refer to IEEE published articles. RELX is the second ranked publisher, but its papers receive only 9.16% of the science references. In this category, IEEE has more references than the next 15 publishers combined.

Figure 17 shows that IEEE is also very strong in the Semiconductor category. Here, the inclusion of conferences gives IEEE a substantial boost. Approximately one-third of the references to IEEE are to conference papers. With conferences excluded, IEEE would be about the same level as the American Institute of Physics in terms of science references from semiconductor patents.

The Smart Meter/Smart Grid category covers patents related to improving the power grid as well as for advanced residential electric meters. This is a relatively small category but as we see in Figure 18, the IEEE provides the bulk of the science base with over half of all patent references.

Solar and Photovoltaic energy results are contained in Figure 19. IEEE holds a lead over RELX in this category in spite of having fewer journal titles. RELX has several strong journals in this category including *Solar Energy Materials and Solar Cells*, *Thin Solid Films*, *Solar Energy*, *Synthetic Metals*, *Journal of Crystal Growth*, *Solar Cells*, plus more than 50 smaller journal titles related to this technology. The references to IEEE science in this category mainly go to the *IEEE Photovoltaic Specialists conference*, the *IEEE World conference on Photovoltaic Energy Conversion*, and *IEEE Transactions on Electronic Devices*.

The Telecommunications category is one of the strongest large categories for IEEE. IEEE articles receive more references than the next six publishers, (four of which are standards bodies). Standards are referenced more frequently in telecommunications than in other categories. About 36% of the 1.8 million total references are to standards documents with the other 64% going to journal and conference articles. In terms of standards documents, the 3GPP General Partnership Project, Internet Engineering Task Force and International Telecommunication Union received the most references in the category. New telecommunications patents are referencing scientific articles to a larger extent than in the past. In last year's report this figure showed 668,000 references to IEEE articles for the 20-year span of 2002-2021. Now as we see in Figure 20, there are more than 706,000+ references to IEEE for telecommunications patents in the 20-year period 2003-2022.

Standards documents are referenced increasingly often in Telecommunications patents. Six of the top 20 referenced publishers are standards bodies. Moreover, of the 706,000+ references to IEEE, about 79,000 are to various IEEE standards (mostly to the IEEE 802 family of standards).

Virtual and Augmented Reality is another relatively small but hot category. We see in this category that again IEEE leads by a wide margin with 30.67% of all science references from patents. ACM is in second place with 17.65% of references.

Wind Energy is another relatively small area where IEEE has a big lead. We see in Figure 22 that in this area 41.41% of all science references from Wind Energy patents go to IEEE journal and conference papers. This is about 3 times as many references as second place RELX receives, despite IEEE having fewer journal titles in the area than RELX does.

Figures 3-22 show aggregate counts of references from all patents in each technology category. Readers who wish to see the firms that reference IEEE publications in each category can consult Appendix B. This appendix contains the 100 organizations that reference IEEE most frequently in each category. Appendix C is similar, except that it contains the organizations that reference IEEE most frequently in the twenty technology categories combined.

Citation Index for Patents Referencing IEEE

In an earlier study (see [2]) it was shown that patents that reference specific IEEE journals perform better on a number of quality metrics. Moreover, it was shown that the results were statistically significant. In this report, we update a key figure from the previous study showing the citation index of patents that reference IEEE papers versus peer patents that do not reference IEEE.

The citation index is a normalized citation metric that takes the number of citations received by a particular set of patents and divides it by the expected number of citations for patents of the same age and technology class. A random set of patents therefore should have a citation index of 1.0. Research has shown that patents cited by many later patents tend to contain important ideas upon which the later patents are building (see [3] and [6]). Citation indicators are also the basis for the

patented financial models (see [4] and [7]) invented by the two 1790 founders Breitzman and Thomas.

Figure 23 contains the Citation Index for the patents in the twenty technology categories that reference IEEE papers and conferences. Also shown is the Citation Index for the set of the remaining patents in each category that do not reference IEEE. Note that the set of all patents in each category have an expected citation index of 1.0. Thus, we see that the patents that reference IEEE are cited sometimes 40% or 50% or higher than expected, while the patents that do not reference IEEE are cited up to 10% less often than expected in some categories. This of course does not imply that all patents that reference IEEE are likely to be more valuable than patents that do not reference IEEE, but it does suggest that in general, patented technologies that build upon IEEE published or sponsored science are more likely to be valuable than patented technologies that do not reference IEEE science.

IV. Conclusions

When a patent is filed, it must reference the prior art upon which it builds, as well as any prior art that limits the claims of the new invention. This study and prior studies show that science published by IEEE forms a significant portion of this prior art for new patents.

In this study, we examined two separate patent sets. The first patent set consisted of patents granted between 2003 and 2022 to the 50 organizations with the largest number of US patents granted in 2022. The second patent set consisted of all US patents granted between 2003 and 2022 patents in twenty key technologies: Artificial Intelligence, Autonomous Vehicles, Cybersecurity, and several other categories. In most of these patent sets IEEE is the dominant source of non-patent prior art. In other words, IEEE journals and conferences are key outlets for scientific discoveries relevant to cutting edge technology.

Finally, we conducted an analysis of citation indices for IEEE related patents and non-IEEE related patents. These types of metrics have been shown in validation studies to be good markers for the quality, impact, and potential value of patents [3]. In this study, it was shown that patents that build upon IEEE published science tend to have higher citation indices than patents that do not reference IEEE. This suggests but does not guarantee that patents that build upon IEEE science are more likely to become high-quality, high-impact, valuable inventions than patents that do not build upon IEEE.

Specific key results are identified in the Executive Summary.

V. References

- [1] Branstetter, Lee. "Is Academic Science Driving a Surge in Industrial Innovation? Evidence from Patent Citations," Columbia Business School, Discussion Paper #28.
- [2] Breitzman, Anthony. "IEEE and Patents: An Analysis of Patent Referencing to IEEE Papers, Conferences and Standards", 1790 Analytics, LLC, May 23, 2005
- [3] Breitzman, Anthony and Moge, Mary Ellen. "The Many Applications of Patent Analysis," *of Information Science*, 28, 3, 187-205, 2002.
- [4] Breitzman, Anthony and Narin, Francis., "Method and Apparatus for Choosing a Stock Portfolio, Based on Patent Indicators," US Patent #6,175,824, Jan. 16, 2001.
- [5] Fortune Magazine, "Ten Tech Trends," January 10, 2005.
- [6] Hall, Bronwyn H., Jaffe, Adam B. and Trajtenberg, Manuel., "The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools" (December 2001). CEPR Discussion Paper No. 3094.
- [7] Thomas, Patrick., "System and Method for Producing Technology-Based Price Targets for a Company Stock," US Patent #6,832,211, Dec. 14, 2004.
- [8] <https://www.marketsandmarkets.com/robotics-market-research-112.html>

Figure 1: Sample Patent Front Page

United States Patent
Bulzacchelli, et al.

7,822,114
October 26, 2010

Decision feedback equalizer using soft decisions

Abstract

A decision feedback equalizer (DFE) and method include at least two paths. Each path includes the following. An adder is configured to sum an input with a first feedback tap fed back from a different path. A latch is coupled to the adder to receive a summation signal as input. The latch includes a transparent state, and an output of the latch is employed as the first tap in a feedback path to an adder of a different path, wherein a partially resolved first tap in the feedback path is employed during the transparent state to provide a soft decision to supply correction information in advance of a hard decision of the latch.

Inventors: Bulzacchelli; John F. (Yonkers, NY), Friedman; Daniel J. (Sleepy Hollow, NY)
Assignee: International Business Machines Corporation (Armonk, NY)
Appl. No.: 11/761,586
Filed: June 12, 2007

Current U.S. Class: 375/233; 375/229
Current CPC Class: H04L 25/03057 (20130101); H04L 25/067 (20130101)
Current International Class: H03H 7/30 (20060101)
Field of Search: 375/233,229

References Cited

U.S. Patent Documents

7106099	September 2006	Nix
7539243	May 2009	Toifl et al.
2006/0188043	August 2006	Zerbe et al.

Other References

Grozing, "Sampling Receive Equalizer with Bit-Rate Flexible Operation up to 10 Gbit/s," Proceedings of the 32nd European Solid-State Circuits Conference, 2006, ESSCIRC 2006, Sep. 2006 pp. 516-519. cited by examiner.

Kenney, "A parallel architecture for multilevel decision feedback equalization," **IEEE Transactions on Magnetics**, vol. 34, Issue 2, Part 2, Mar. 1998 pp. 588-595. cited by examiner.

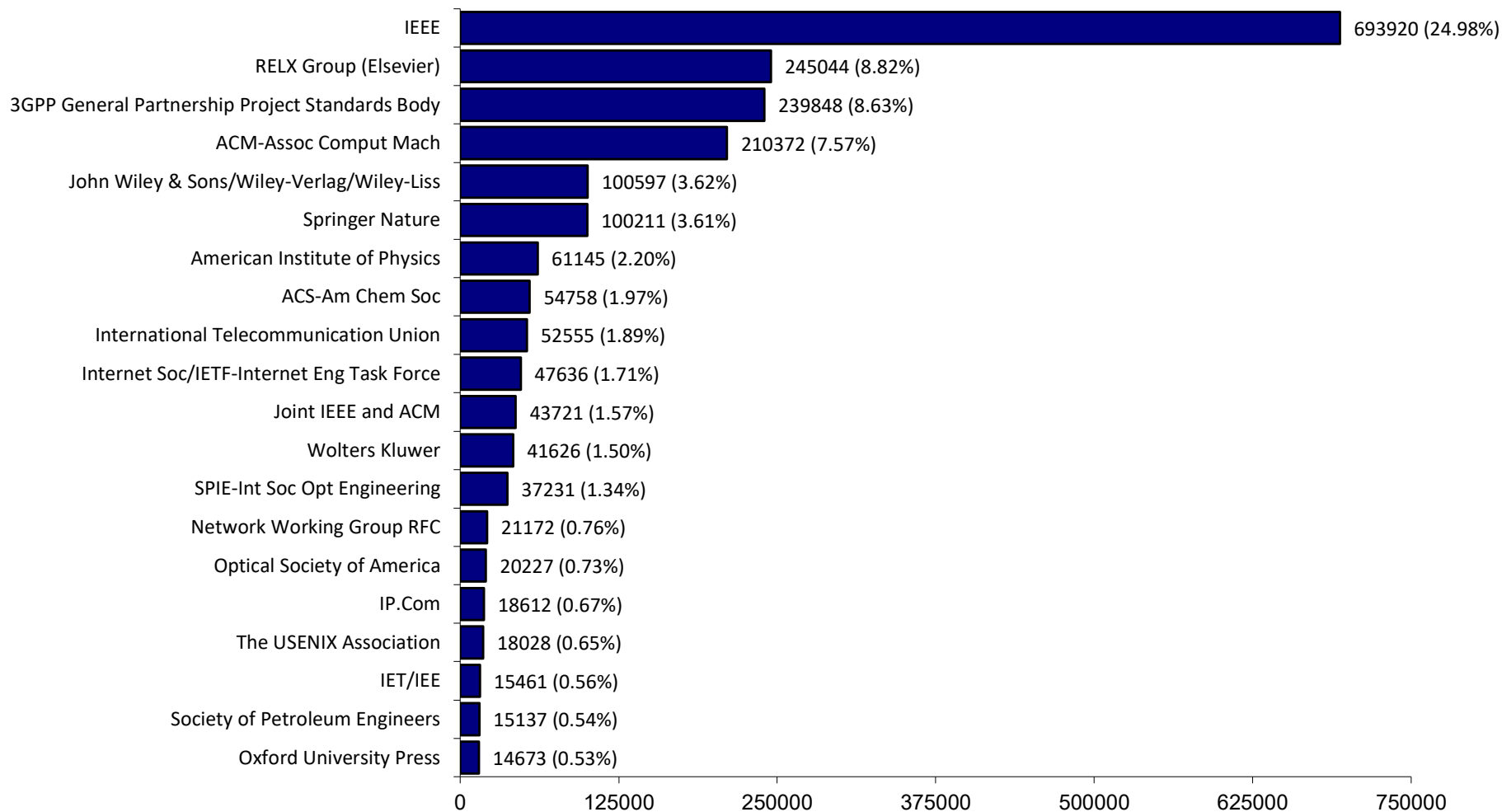
Kenney, "Pipelining for speed doubling in MDFE," 1996 **IEEE International Conference on Communications**, 1996, ICC 96, Conference Record, Converging Technologies for Tomorrow's Applications, vol. 1, Jun. 23-27, 1996 pp. 561-565 vol. 1. cited by examiner.

Varzaghani, "A 6-GSamples/s multi-level decision feedback equalizer embedded in a 4-bit time-interleaved pipeline A/D converter," **IEEE Journal of Solid-State Circuits**, on pp. 935-944, vol. 41, Issue: 4, Apr. 2006. cited by examiner.

Krishna, "A multigigabit backplane transceiver core in 0.13-.mu.m CMOS with a power-efficient equalization architecture," **IEEE Journal of Solid-State Circuits**, pp. 2658-2666, vol. 40, Issue: 12, Dec. 2005. cited by examiner.

Ren, "Performance Analysis of Edge-based DFE", Electrical Performance of Electronic Packaging Oct. 2006 pp. 265-268. cited by examiner.

Figure 2 - # and % of US Patent References from Top 50 Companies to Top 20 Journal Publishers



and % References to Papers/Standards/Conferences from 2003-2022 Patents

Figure 3 - # and % of Science References from 2003-2022 Artificial Intelligence and Machine Learning US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

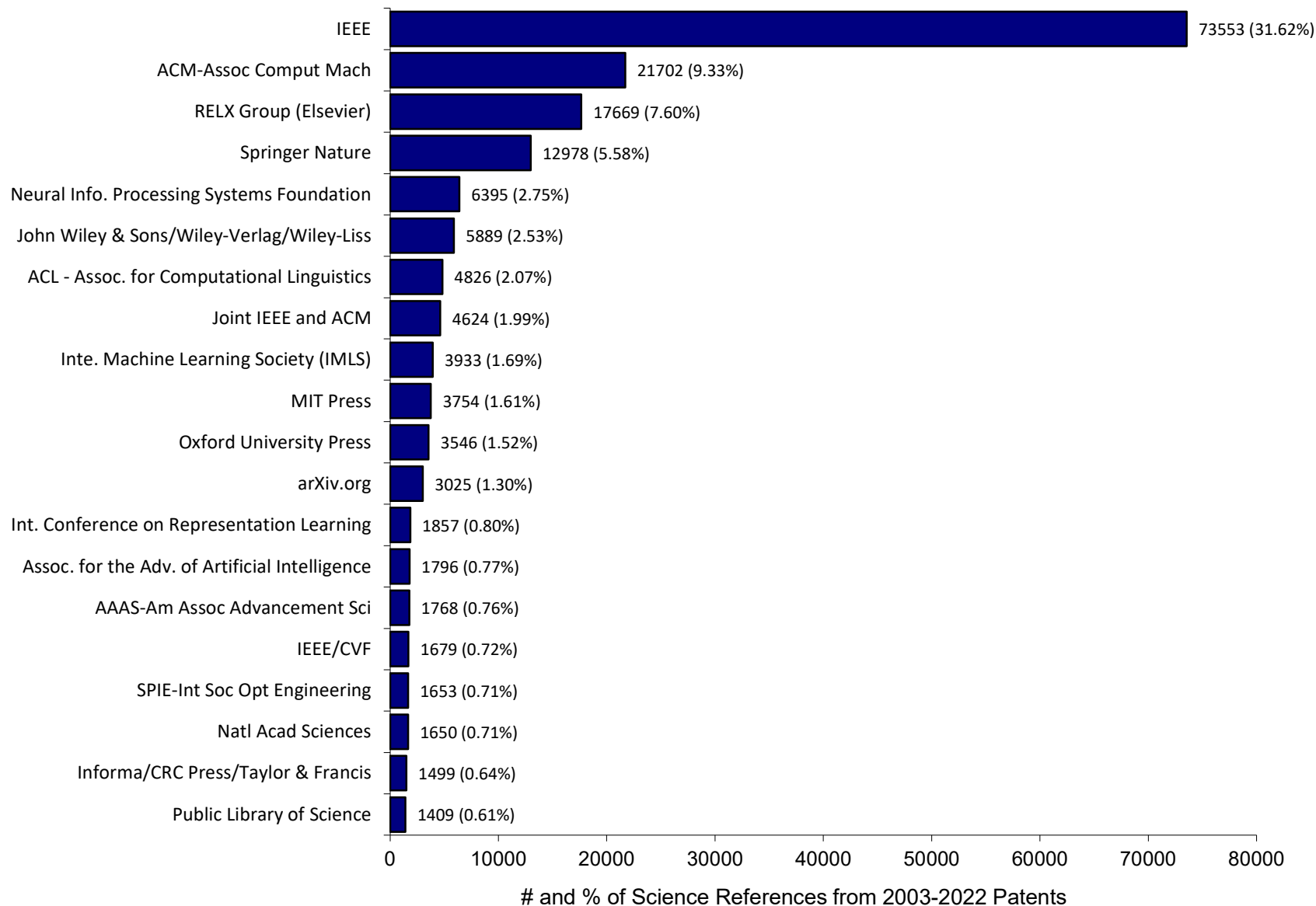


Figure 4 - # and % of Science References from 2003-2022 Autonomous Vehicle US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

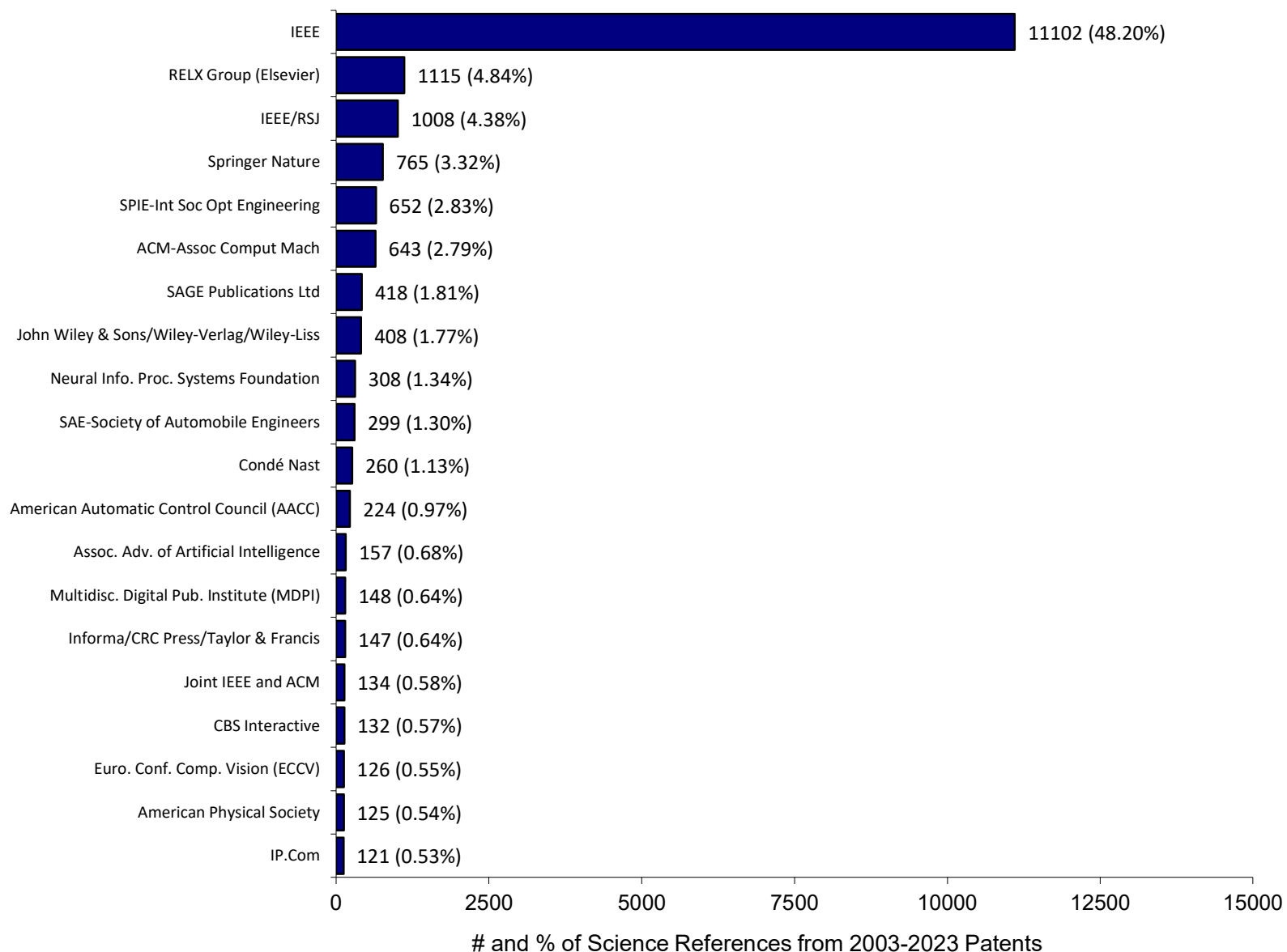


Figure 5 - # and % of Science References from 2003-2022 Blockchain/Distributed Ledger US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

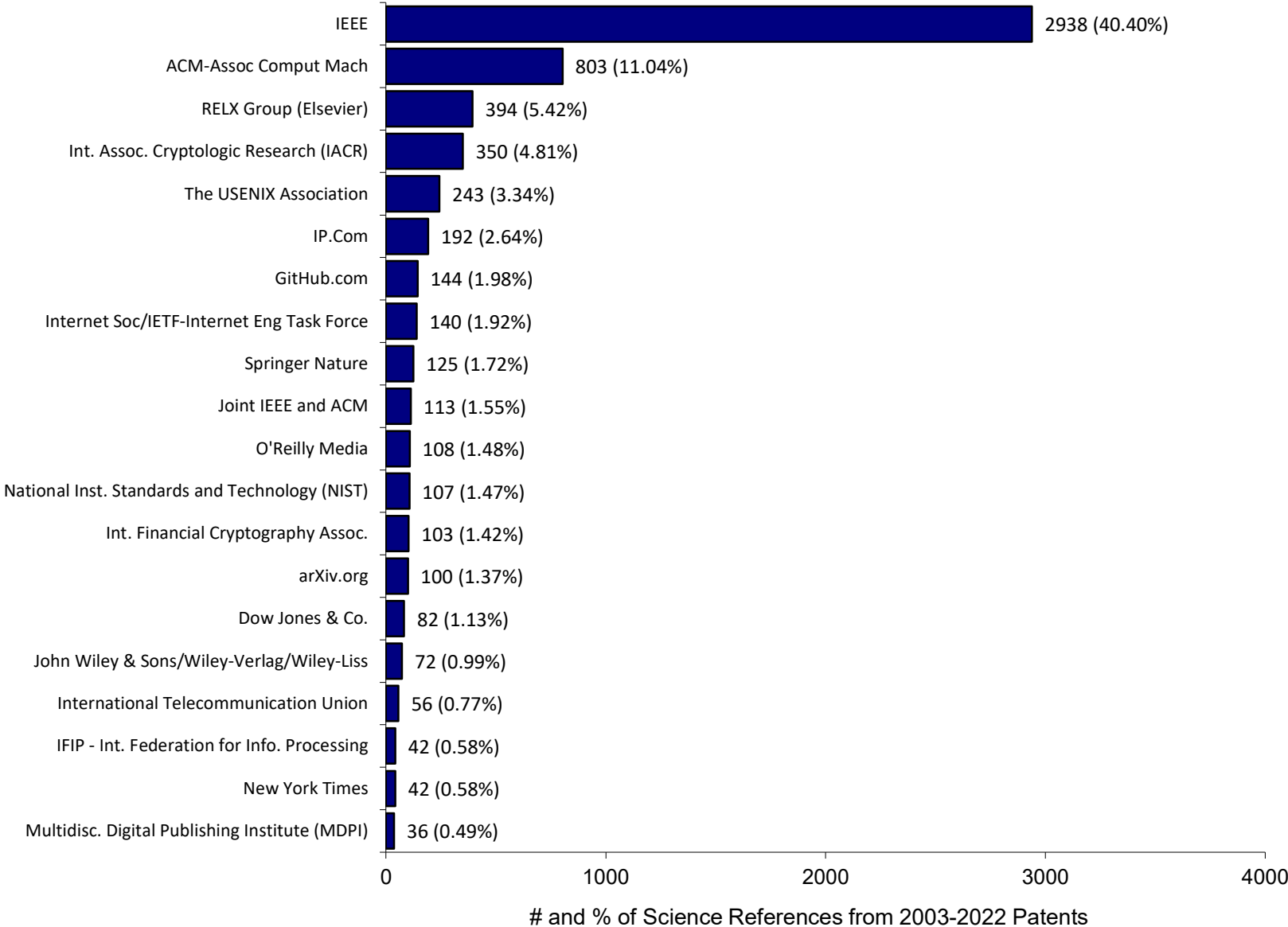


Figure 6: # and % of Science References from 2003-2023 Broadcasting US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

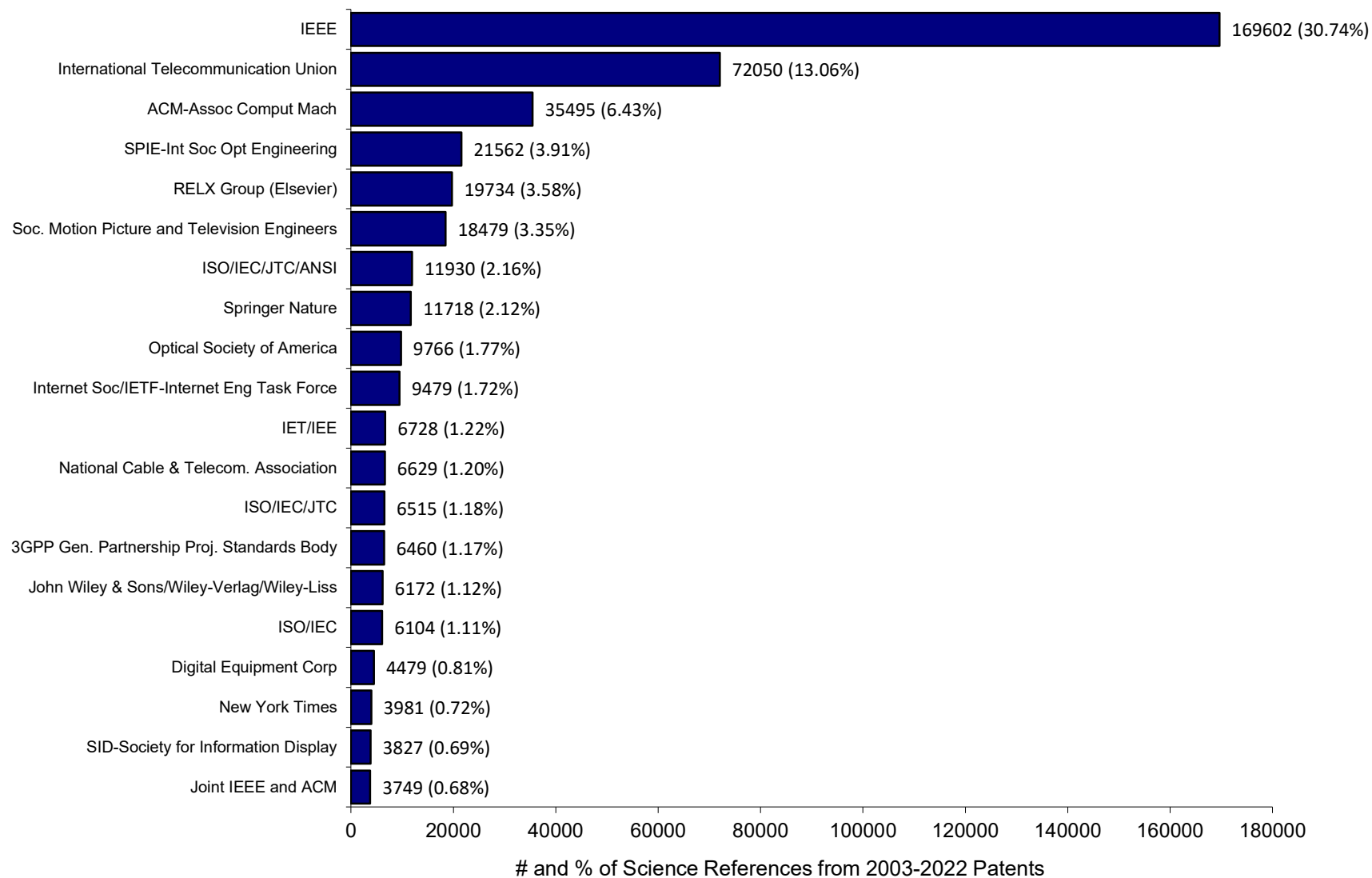


Figure 7 - # and % of Science References from 2003-2022 Computer Hardware US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

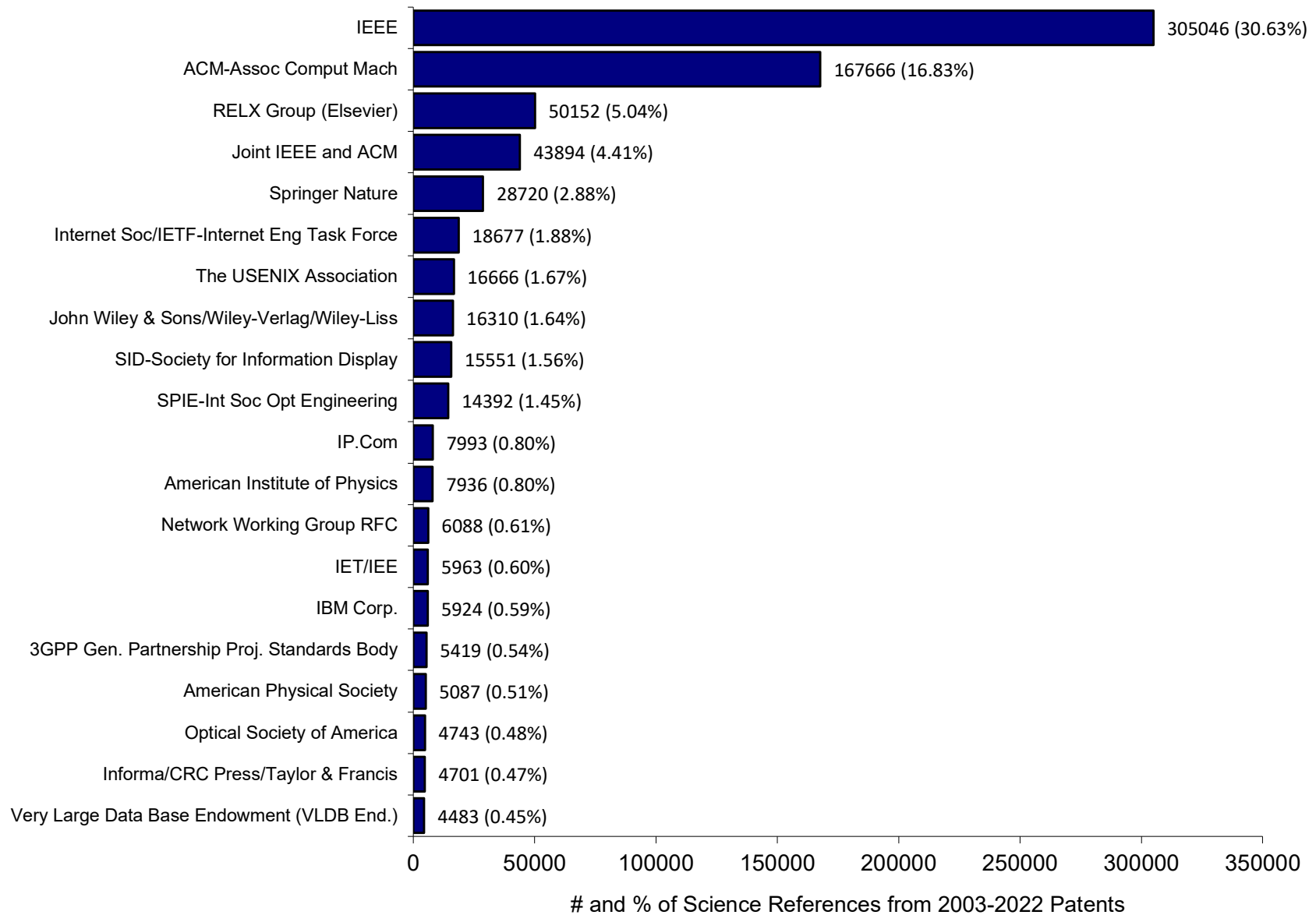


Figure 8 - # and % of Science References from 2003-2022 Computer Software US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

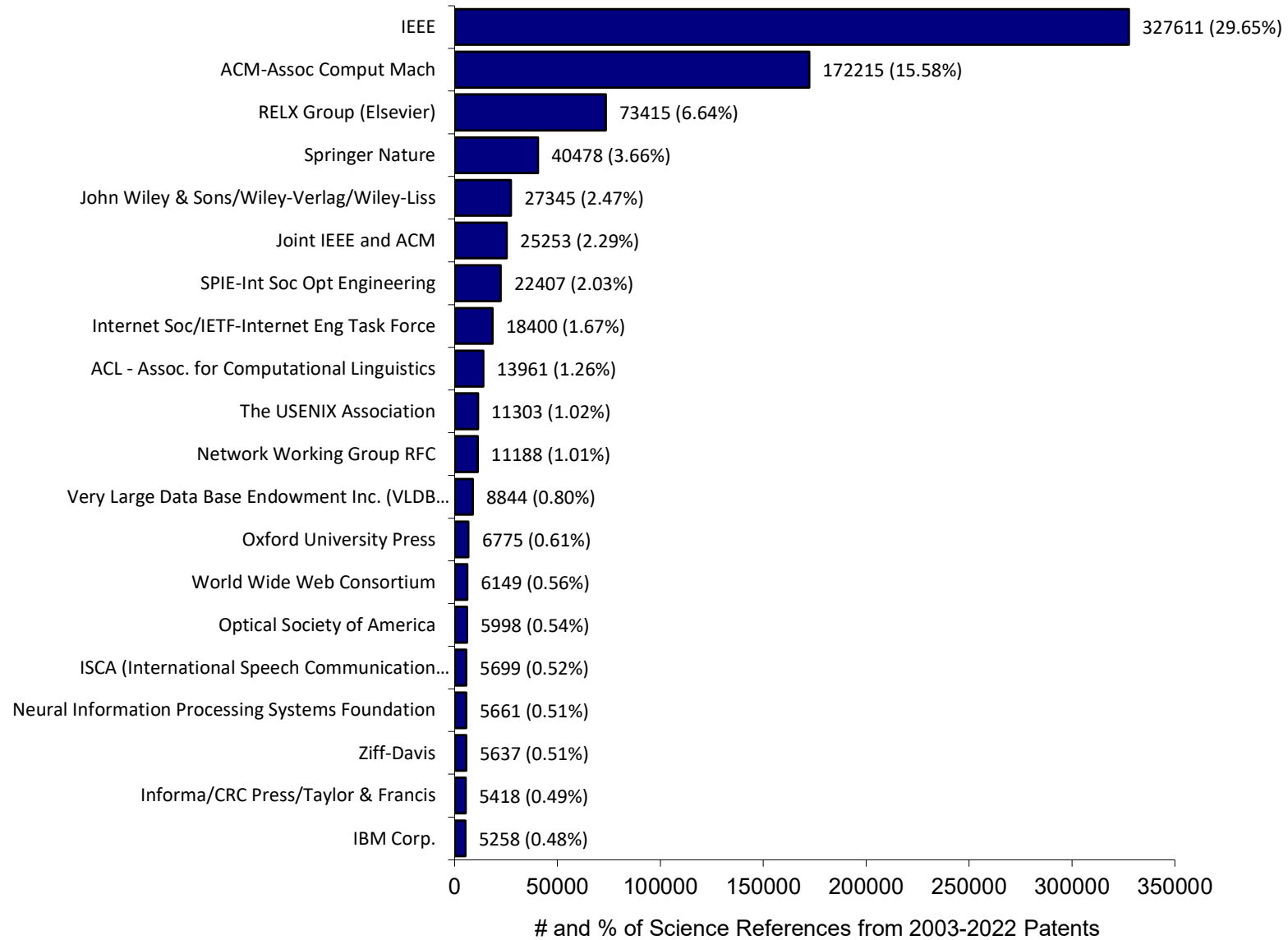


Figure 9 - # and % of Science References from 2003-2022 Cybersecurity US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

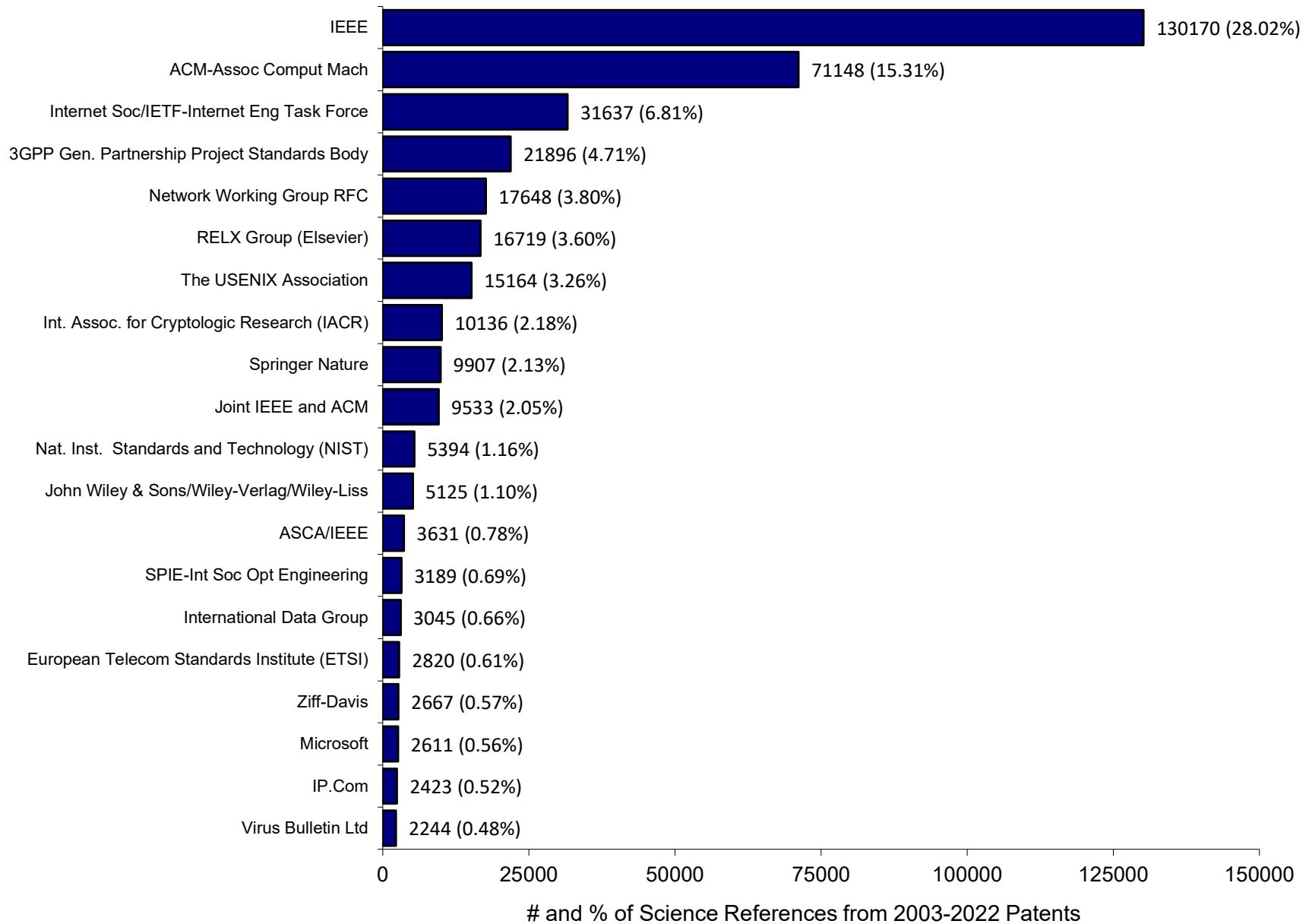


Figure 10 - # and % of Science References from 2003-2022 Medical Device US Patents to Top 20 Publishers and Conference Organizers

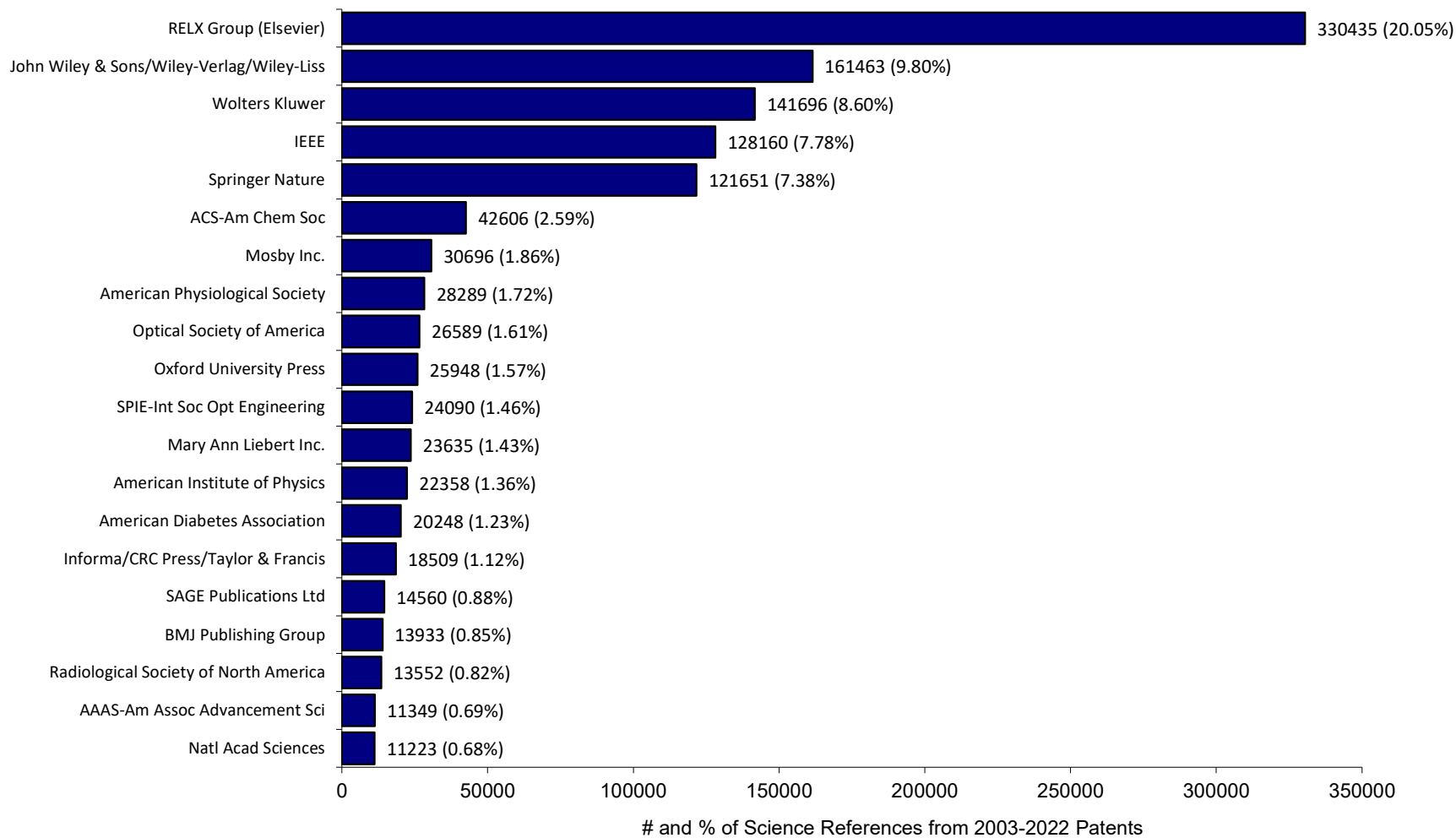


Figure 11 - # and % of Science References from 2003-2022 Information Storage US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

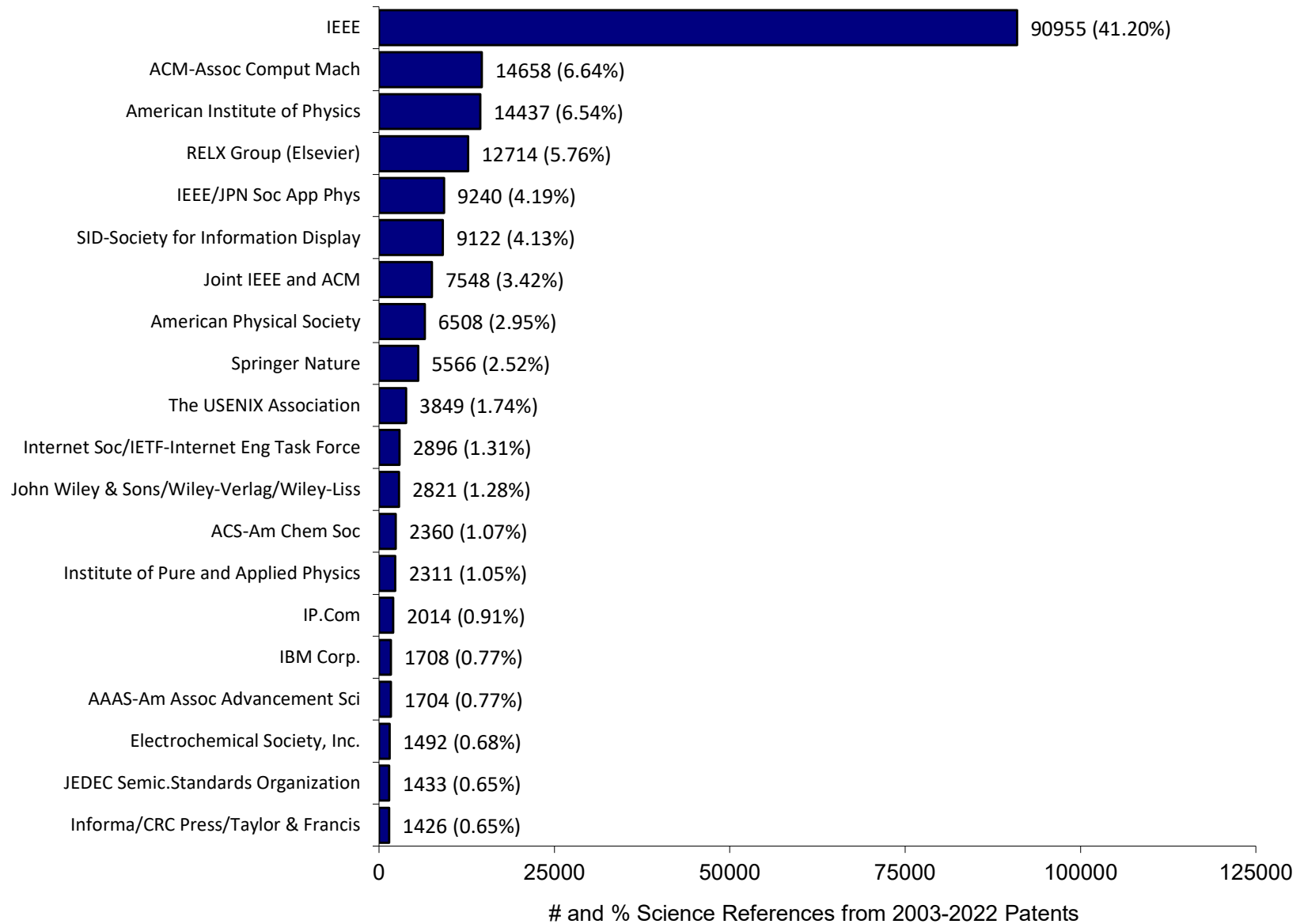
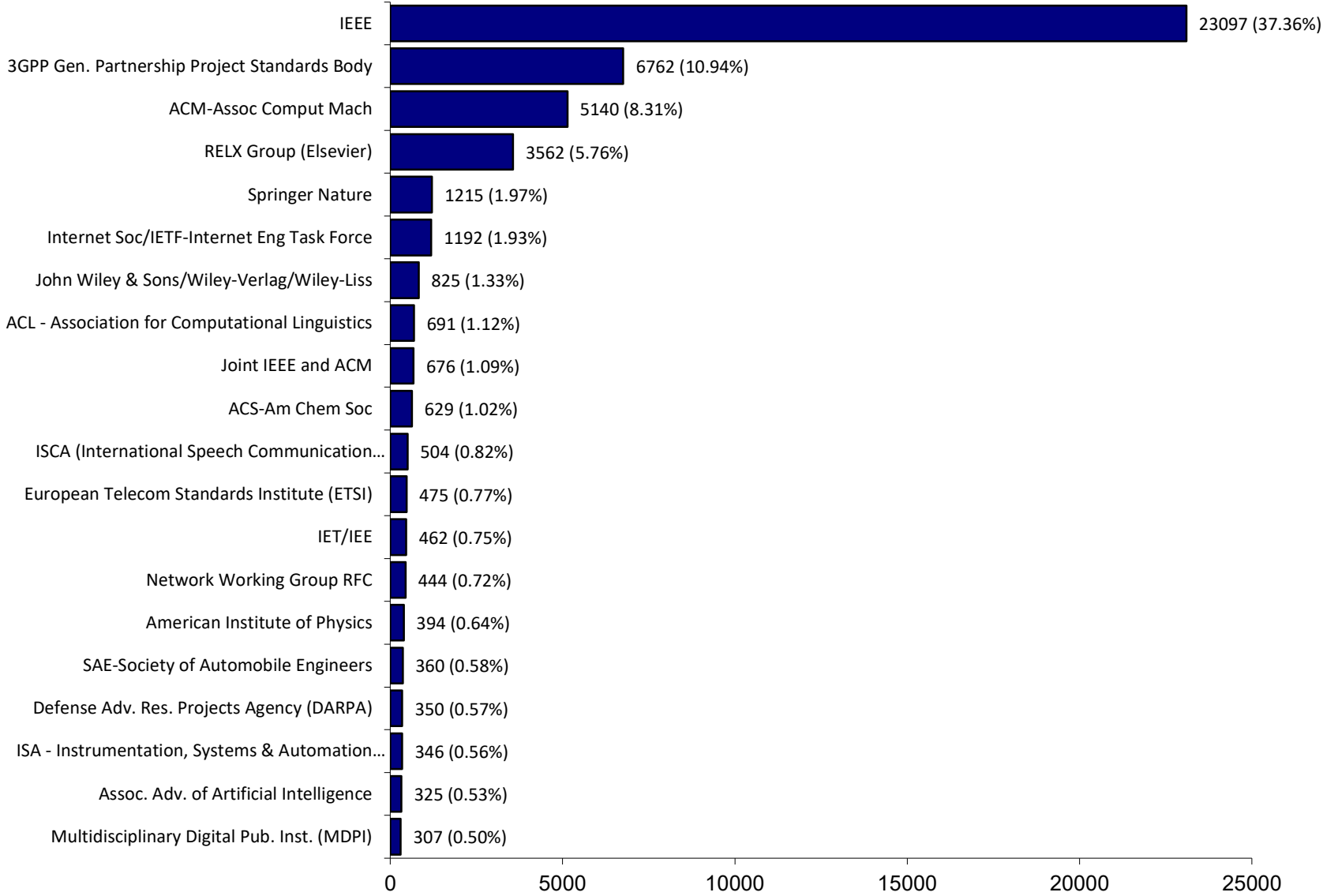


Figure 12 - # and % of Science References from 2003-2022 Internet-Of-Things (IOT) US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations



and % of Science References from 2003-2022 Patents

Figure 13 - # and % of Science References from 2003-2022 Measuring/Testing/Control US Patents to Top 20 Publishers and Conference Organizers

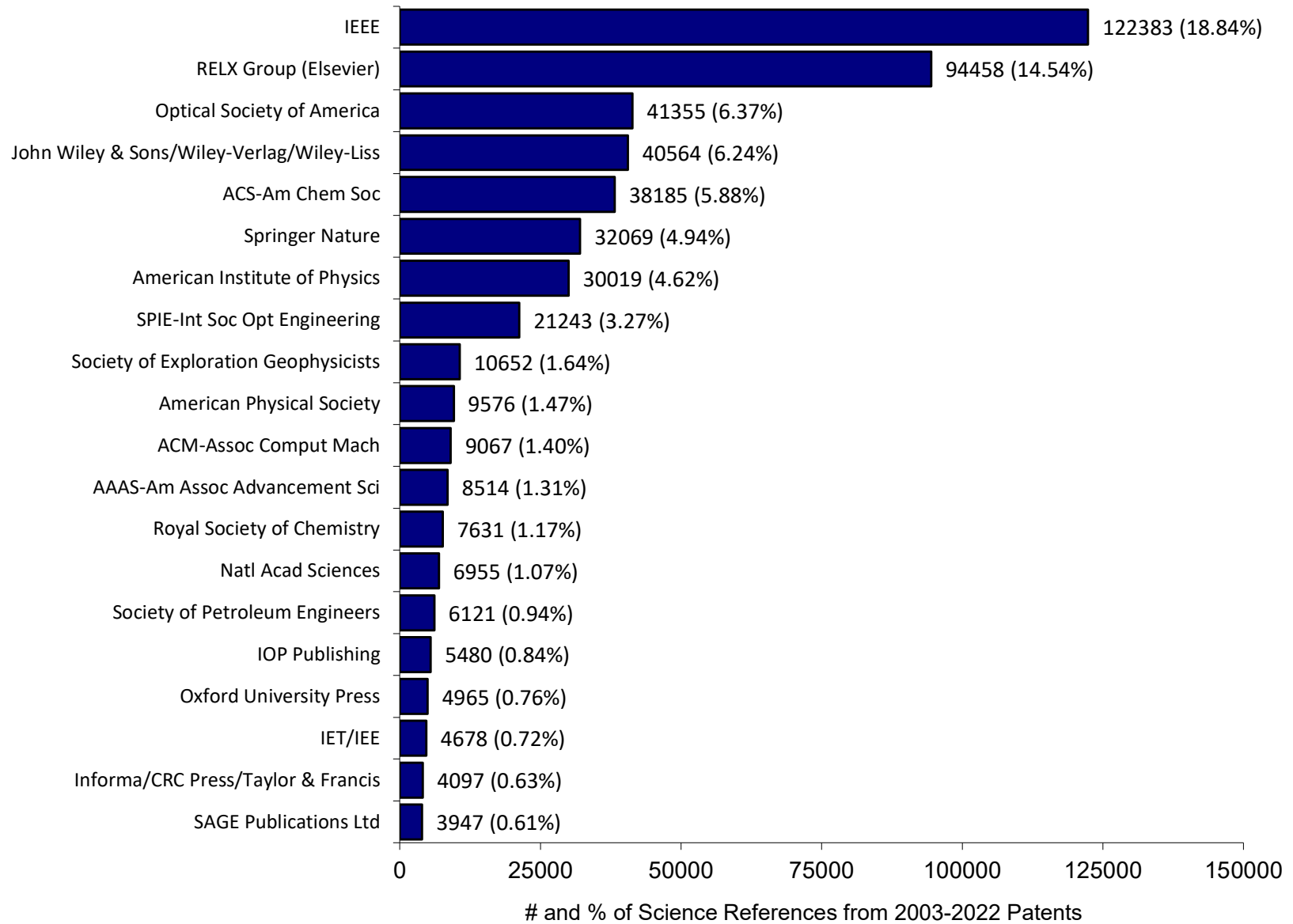


Figure 14 - # and % of Science References from 2003-2022 Optics US Patents to Top 20 Publishers and Conference Organizers

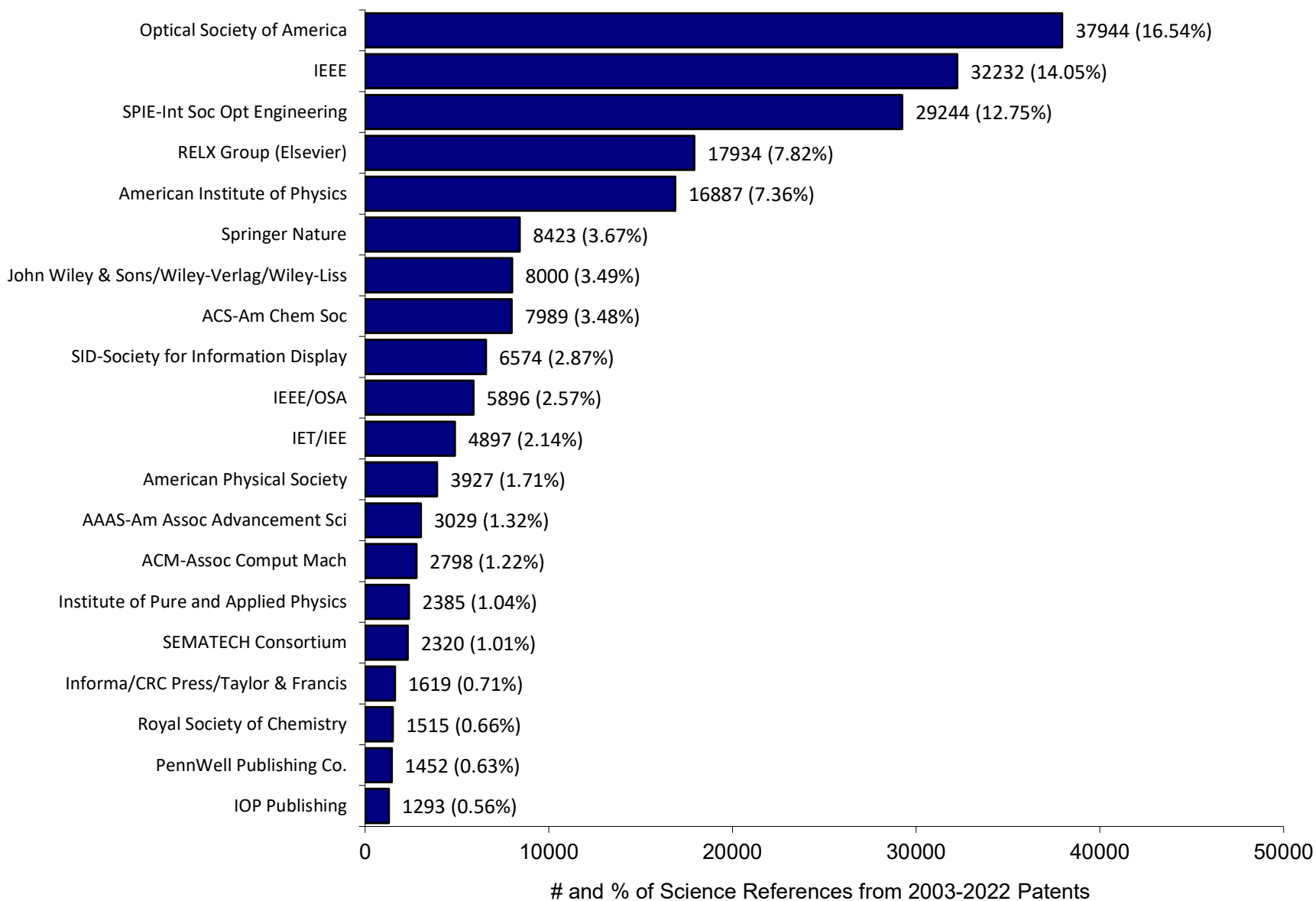


Figure 15 - # and % of Science References from 2003-2022 Power Systems US Patents to Top 20 Publishers and Conference Organizers

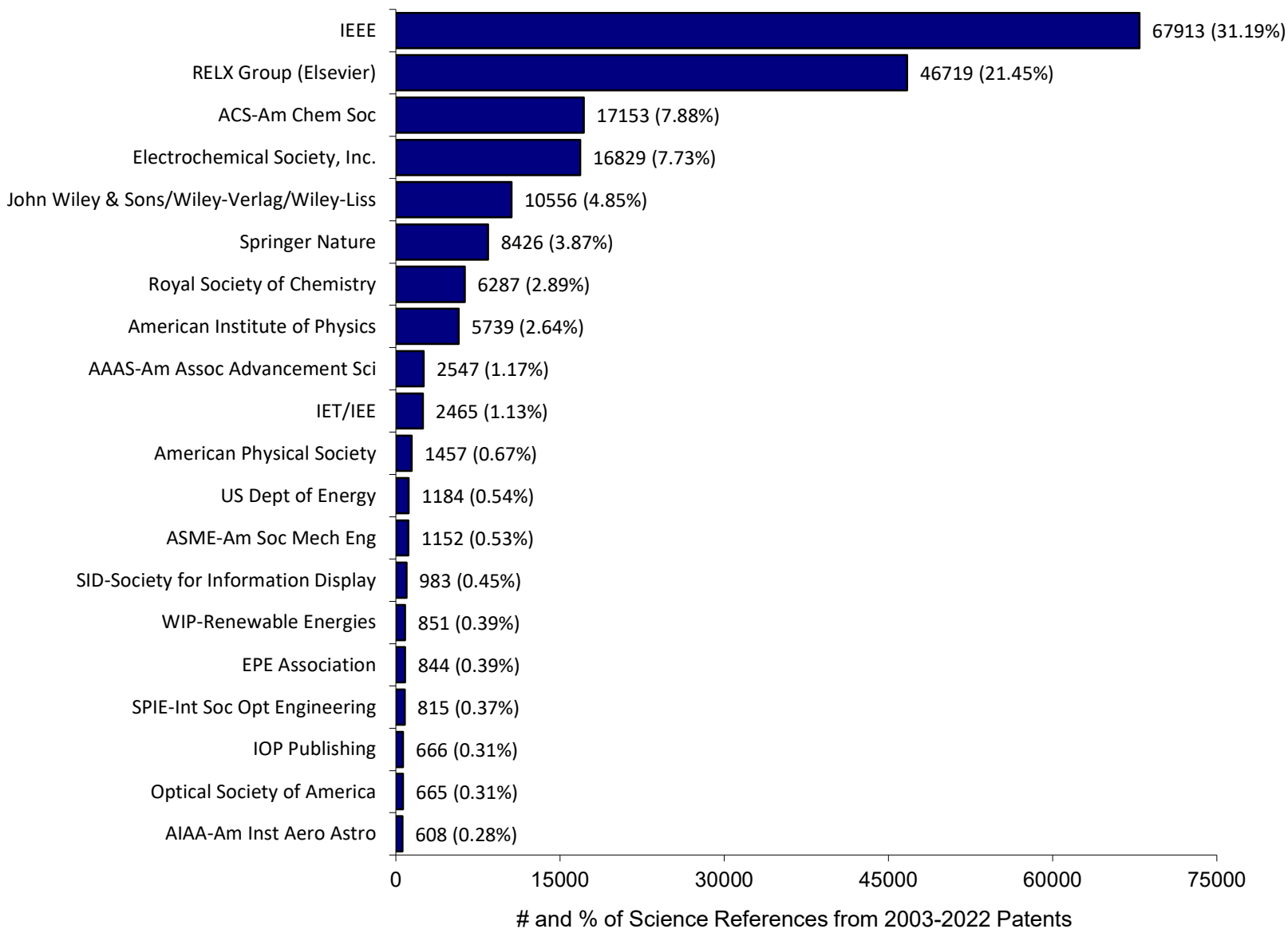


Figure 16 - # and % of Science References from 2003-2022 Robotics and Intelligent Mfg US Patents to Top 20 Publishers and Conference Organizers

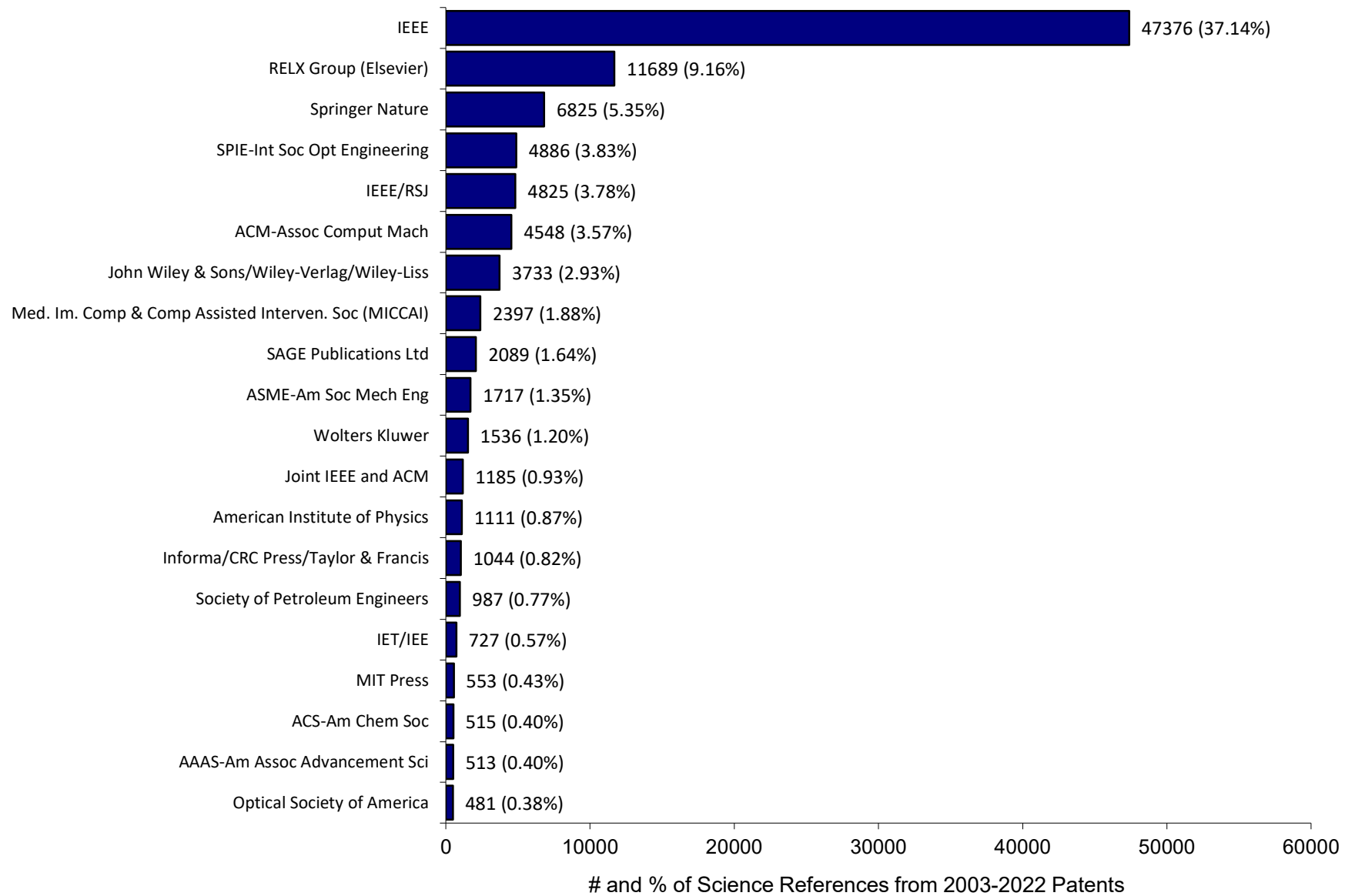


Figure 17 - # and % of Science References from 2003-2022 Semiconductor US Patents to Top 20 Publishers and Conference Organizers

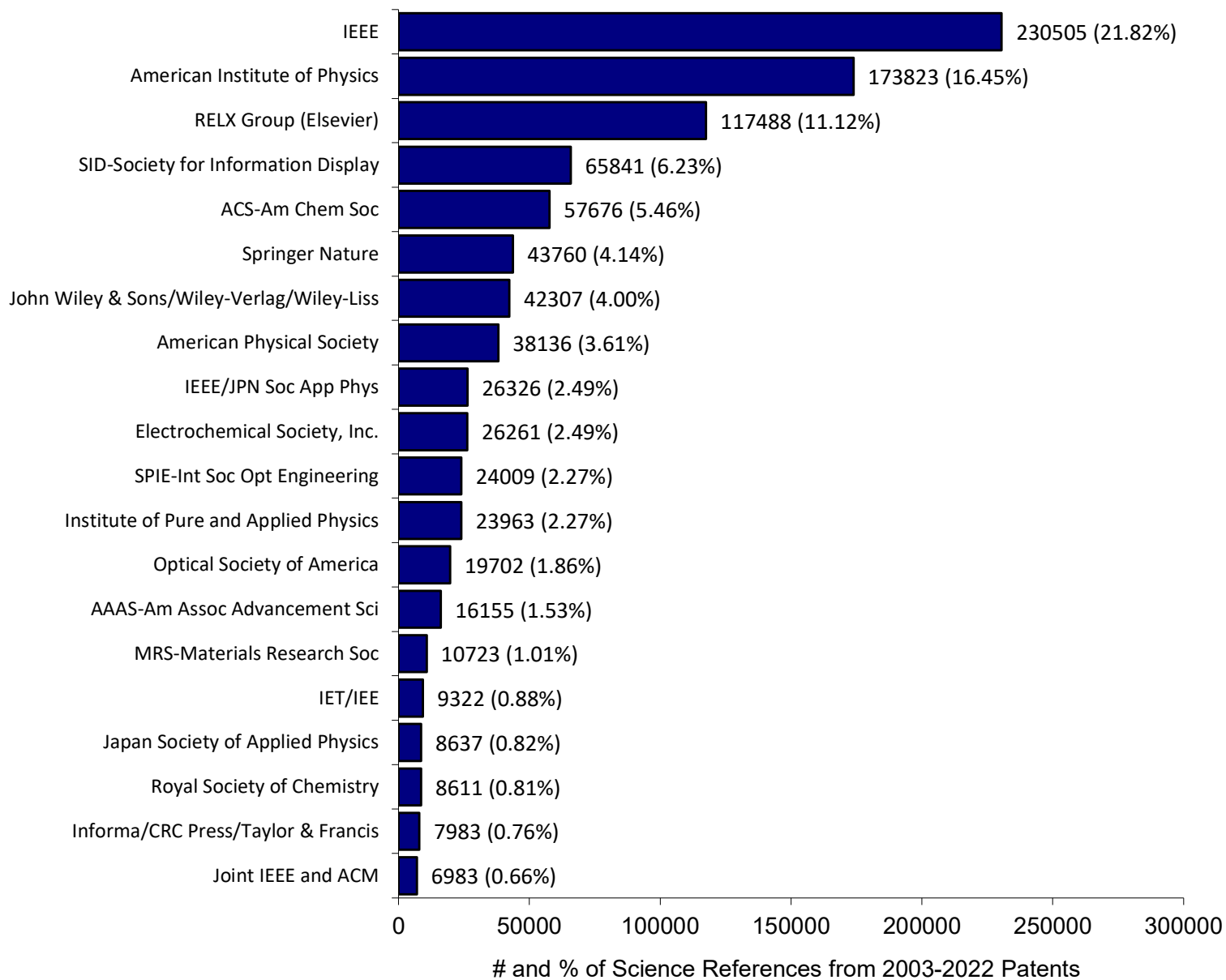
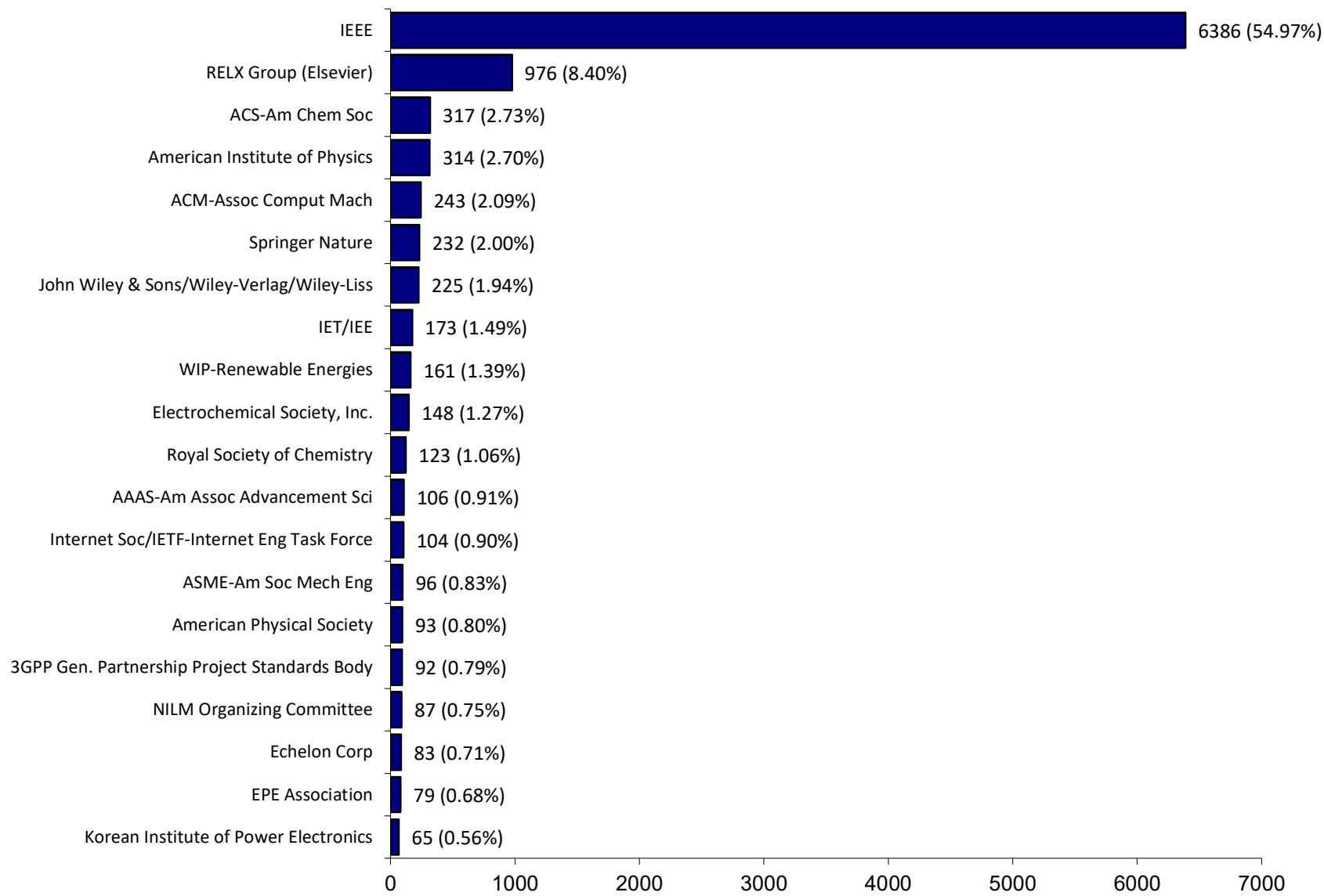
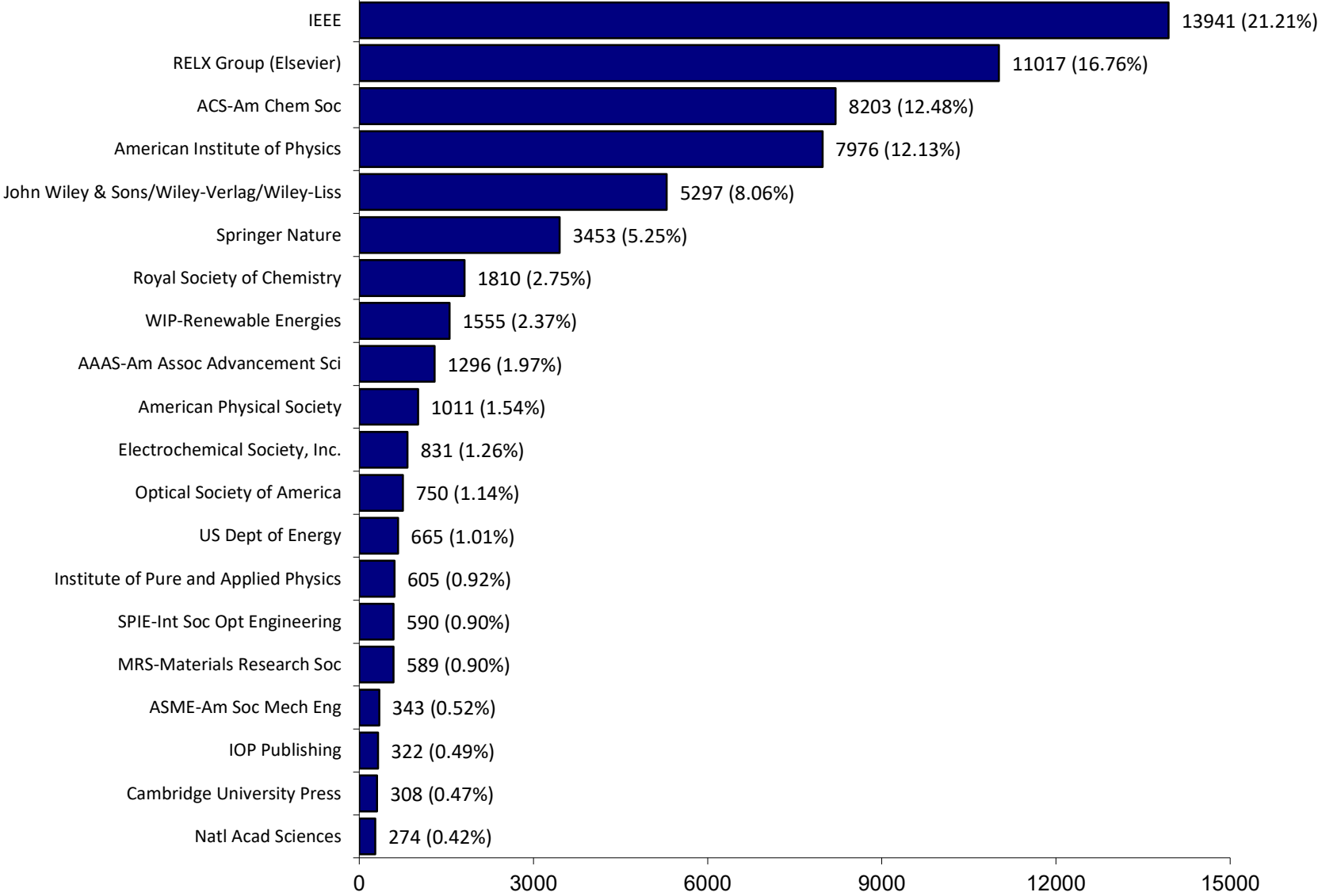


Figure 18 - # and % of Science References from 2003-2022 Smart Meter/Smart Grid US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations



and % of Science References from 2003-2022 Patents

Figure 19 - # and % of Science References from 2003-2022 Solar/Photovoltaic US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations



and % of Science References from 2003-2022 Patents

Figure 20 - # and % of Science References from 2003-2022 Telecommunications US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

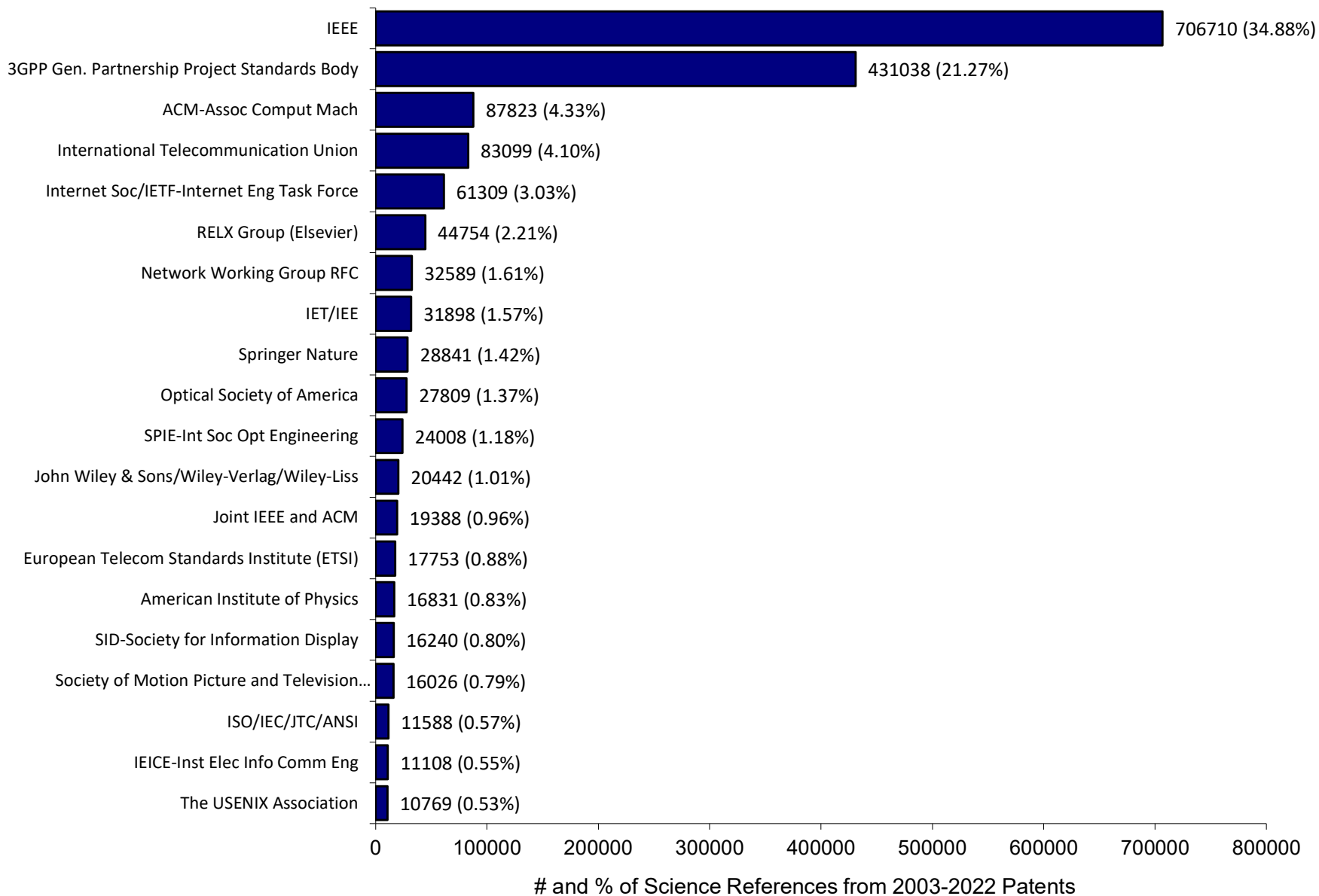


Figure 21 - # and % of Science References from 2003-2022 Virtual/Augmented Reality US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

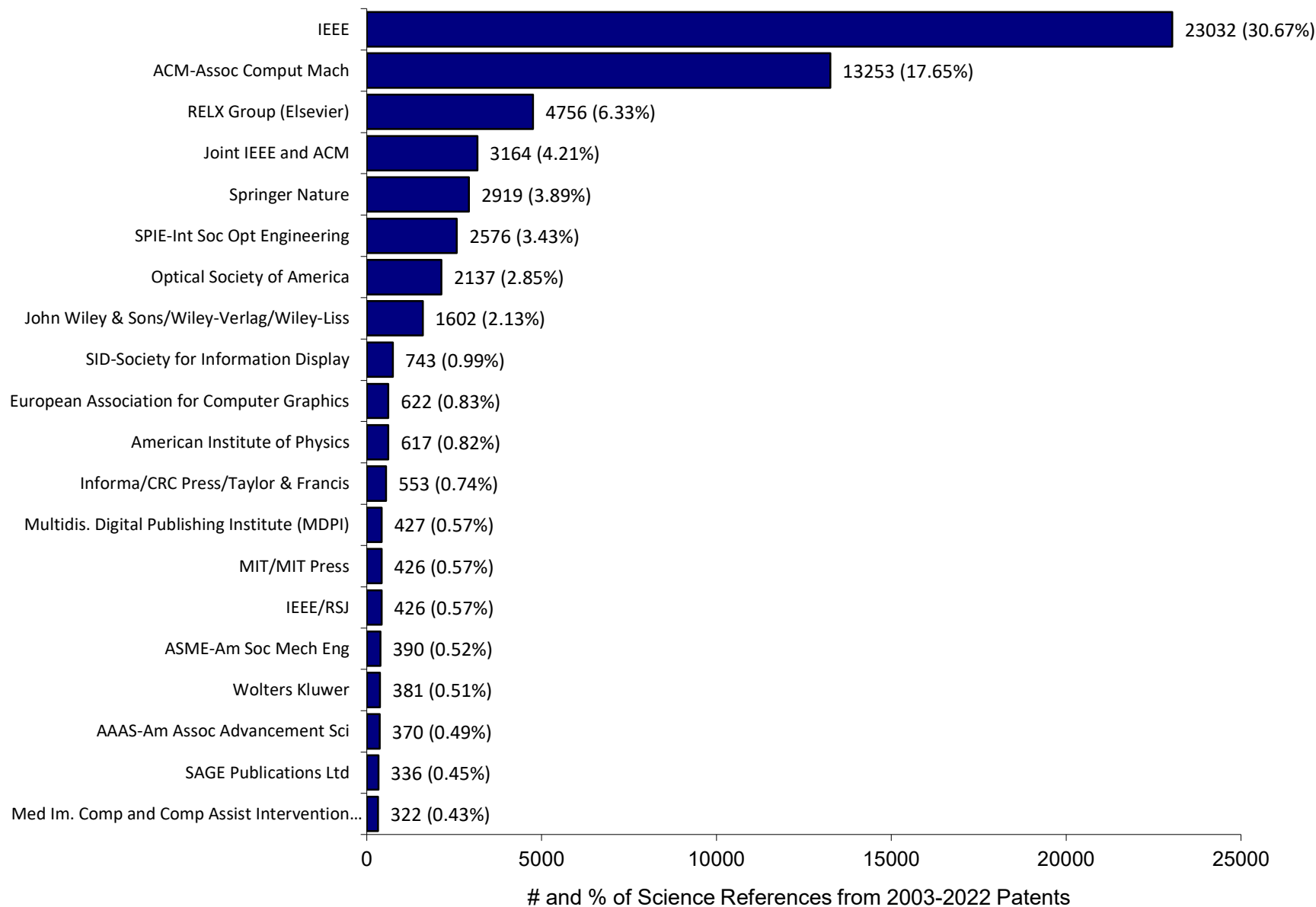
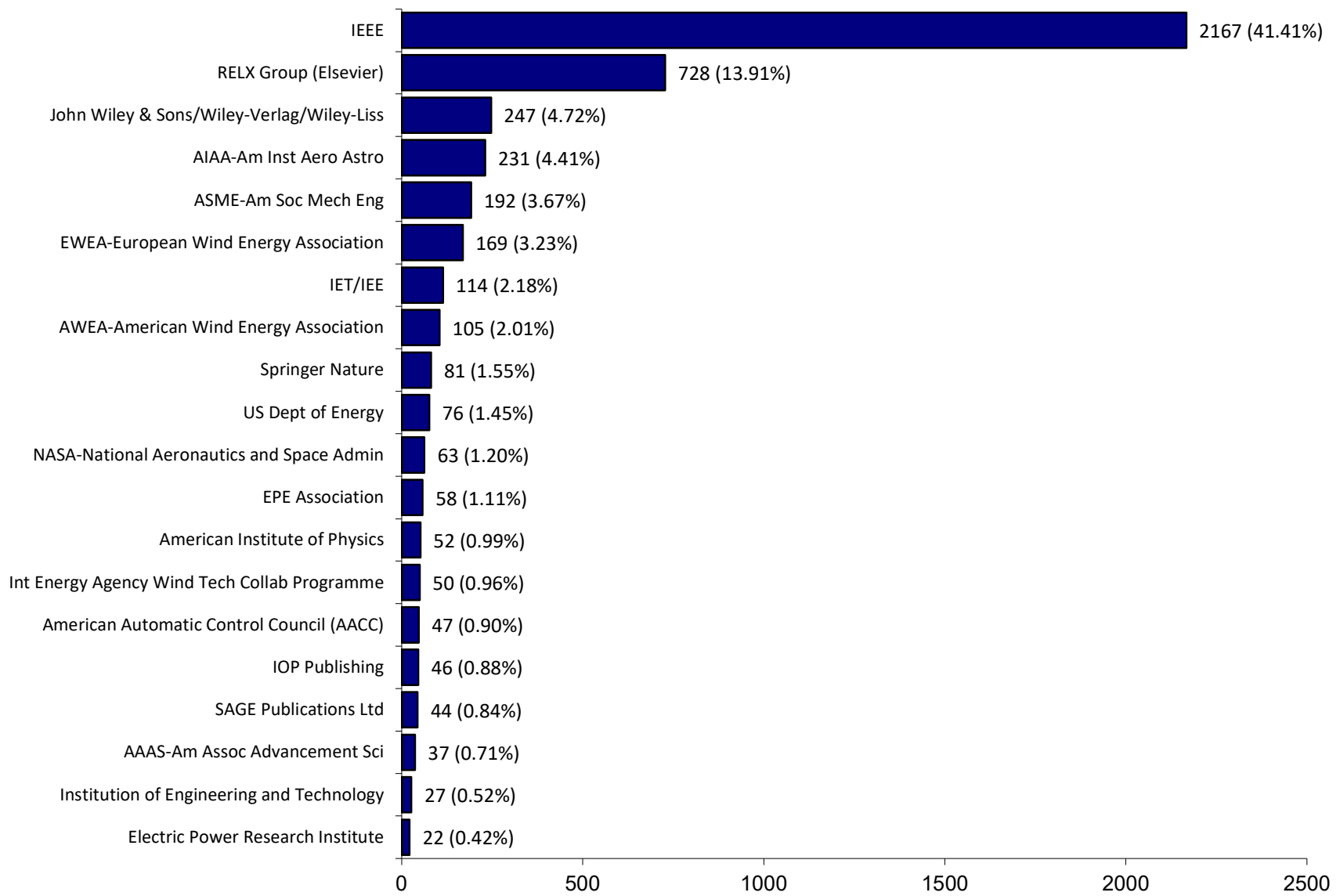
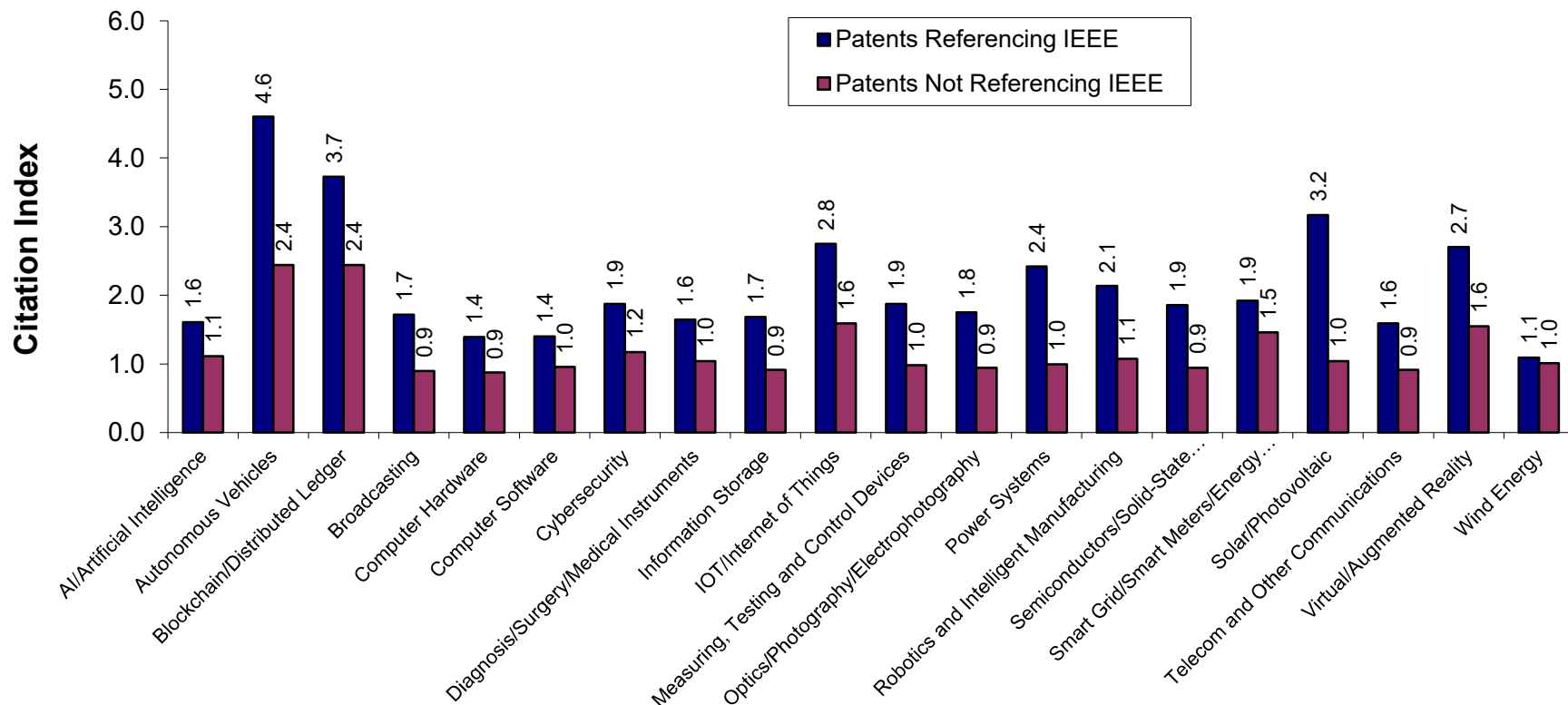


Figure 22 - # and % of Science References from 2003-2022 Wind Energy US Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations



and % of Science References from 2003-2022 Patents

Figure 23 - 2003-2022 Citation Index of US Patents Referencing IEEE Papers and Conferences Versus US Patents not Referencing IEEE for 20 Categories



Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Artificial Intelligence and Machine Learning</i>										
1	Alphabet Inc.	4999	14295	35.0	IEEE	4999	35.0	Neural Information Processing Systems Foundation	1267	8.9
2	International Business Machi	4884	17984	27.2	IEEE	4884	27.2	ACM-Assoc Comput Mach	2068	11.5
3	Microsoft Corporation	4500	13838	32.5	IEEE	4500	32.5	ACM-Assoc Comput Mach	2787	20.1
4	Adobe Inc. (former Adobe Sy	2169	5145	42.2	IEEE	2169	42.2	ACM-Assoc Comput Mach	1003	19.5
5	Apple Inc	1780	5068	35.1	IEEE	1780	35.1	ACM-Assoc Comput Mach	990	19.5
6	STRONG FORCE IOT PORT	1677	2314	72.5	IEEE	1677	72.5	RELX Group (Elsevier)	194	8.4
7	Samsung Electronics Co Ltd	1369	2714	50.4	IEEE	1369	50.4	ACM-Assoc Comput Mach	134	4.9
8	Magic Leap Inc	1068	1757	60.8	IEEE	1068	60.8	arXiv.org	169	9.6
9	Brain Corporation	1065	3178	33.5	IEEE	1065	33.5	MIT Press	427	13.4
10	Amazon.com Inc.	985	2632	37.4	IEEE	985	37.4	ACM-Assoc Comput Mach	377	14.3
11	HRL Laboratories LLC	967	2479	39.0	IEEE	967	39.0	RELX Group (Elsevier)	225	9.1
12	Intel Corporation	853	2010	42.4	IEEE	853	42.4	ACM-Assoc Comput Mach	209	10.4
13	NVIDIA Corp.	737	1570	46.9	IEEE	737	46.9	ACM-Assoc Comput Mach	140	8.9
14	NUMENTA INC	712	2978	23.9	Numenta Inc.	1115	37.4	IEEE	712	23.9
15	Siemens Aktiengesellschaft	669	2144	31.2	IEEE	669	31.2	RELX Group (Elsevier)	278	13.0
16	NEWVALUEXCHANGE LT	647	1772	36.5	IEEE	647	36.5	ACM-Assoc Comput Mach	416	23.5
17	Meta Platforms Inc.(formerly	620	2231	27.8	IEEE	620	27.8	ACM-Assoc Comput Mach	428	19.2
18	The Arizona Board of Regent	618	1276	48.4	IEEE	618	48.4	ACM-Assoc Comput Mach	106	8.3
19	Qualcomm Inc	597	1742	34.3	IEEE	597	34.3	Springer Nature	165	9.5
20	Honda Motor Co. Ltd.(Honda	567	964	58.8	IEEE	567	58.8	RELX Group (Elsevier)	40	4.1
21	SalesforceCom Inc	565	2320	24.4	IEEE	565	24.4	ACL - Association for Computational Linguistics	542	23.4
22	Xperi Holding Corporation (F	558	1038	53.8	IEEE	558	53.8	Joint IEEE and ACM	93	9.0
23	General Electric Company	516	965	53.5	IEEE	516	53.5	RELX Group (Elsevier)	78	8.1
24	Baidu Inc	504	1361	37.0	IEEE	504	37.0	arXiv.org	164	12.0
25	Cortica Ltd	489	738	66.3	IEEE	489	66.3	ACM-Assoc Comput Mach	89	12.1
26	Oracle Corporation	454	2310	19.7	IEEE	454	19.7	ACL - Association for Computational Linguistics	316	13.7
27	Cisco Systems Inc.	448	1179	38.0	IEEE	448	38.0	ACM-Assoc Comput Mach	145	12.3
28	Toyota Motor Corp	447	829	53.9	IEEE	447	53.9	IEEE/CVF	69	8.3
29	NEC Corp	430	1119	38.4	IEEE	430	38.4	ACM-Assoc Comput Mach	134	12.0
30	University of Alabama	429	554	77.4	IEEE	429	77.4	RELX Group (Elsevier)	26	4.7
31	Columbia University	354	1082	32.7	IEEE	354	32.7	ACM-Assoc Comput Mach	146	13.5
32	Xerox Corp	354	1144	30.9	IEEE	354	30.9	ACM-Assoc Comput Mach	130	11.4
33	SAS Institute	347	1370	25.3	IEEE	347	25.3	RELX Group (Elsevier)	182	13.3
34	IP RESERVOIR LLC	324	614	52.8	IEEE	324	52.8	ACM-Assoc Comput Mach	87	14.2
35	Twitter Inc	317	455	69.7	IEEE	317	69.7	RELX Group (Elsevier)	27	5.9
36	CARTICA AI LTD	309	484	63.8	IEEE	309	63.8	ACM-Assoc Comput Mach	56	11.6
37	Fujitsu Limited	307	891	34.5	IEEE	307	34.5	ACM-Assoc Comput Mach	95	10.7
38	Bosch (Robert) GmbH	304	662	45.9	IEEE	304	45.9	Neural Information Processing Systems Foundation	47	7.1
39	Massachusetts Institute of Te	304	1887	16.1	Springer Nature	330	17.5	IEEE	304	16.1

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	University of California	285	2060	13.8	Oxford University Press	286	13.9	IEEE	285	13.8
41	Sony Group Corp	275	617	44.6	IEEE	275	44.6	ACM-Assoc Comput Mach	46	7.5
42	Huawei Technologies Compa	274	693	39.5	IEEE	274	39.5	ACM-Assoc Comput Mach	89	12.8
43	Raytheon Co.	272	641	42.4	IEEE	272	42.4	SPIE-Int Soc Opt Engineering	59	9.2
44	NEURALA INC	250	518	48.3	IEEE	250	48.3	MIT Press	50	9.7
45	Nokia Corporation	248	546	45.4	IEEE	248	45.4	ACM-Assoc Comput Mach	61	11.2
46	eBay Inc	243	438	55.5	IEEE	243	55.5	ACM-Assoc Comput Mach	52	11.9
47	CEREBRAS SYSTEMS INC	241	483	49.9	IEEE	241	49.9	Joint IEEE and ACM	83	17.2
48	Micron Technology Inc.	226	380	59.5	IEEE	226	59.5	ACM-Assoc Comput Mach	34	8.9
49	TuSimple	225	319	70.5	IEEE	225	70.5	Neural Information Processing Systems Foundation	29	9.1
50	SRI International	222	624	35.6	IEEE	222	35.6	Neural Information Processing Systems Foundation	49	7.9
51	Koninklijke Philips N.V.	220	622	35.4	IEEE	220	35.4	RELX Group (Elsevier)	74	11.9
52	Naver Corp.	218	326	66.9	IEEE	218	66.9	IEEE/CVF	31	9.5
53	Battelle Memorial Institute	217	377	57.6	IEEE	217	57.6	RELX Group (Elsevier)	36	9.5
54	DIVEPLANE CORP	214	941	22.7	IEEE	214	22.7	Springer Nature	124	13.2
55	STMicroelectronics	209	345	60.6	IEEE	209	60.6	Joint IEEE and ACM	25	7.2
56	UATC LLC	204	284	71.8	IEEE	204	71.8	IEEE/CVF	20	7.0
57	Canon Inc	203	439	46.2	IEEE	203	46.2	Neural Information Processing Systems Foundation	27	6.2
58	Cornell University	202	1620	12.5	RELX Group (Elsevier)	237	14.6	IEEE	202	12.5
59	University of Tennessee Rese	202	484	41.7	IEEE	202	41.7	RELX Group (Elsevier)	63	13.0
60	Accenture Ltd.	201	757	26.6	IEEE	201	26.6	ACM-Assoc Comput Mach	116	15.3
61	CapitalOne	198	635	31.2	IEEE	198	31.2	RELX Group (Elsevier)	67	10.6
62	AT&T Inc	194	578	33.6	IEEE	194	33.6	ACM-Assoc Comput Mach	141	24.4
63	Cambricon Technologies Co	194	706	27.5	ACM-Assoc Comput Mach	250	35.4	Joint IEEE and ACM	250	35.4
64	Walt Disney Co.	190	650	29.2	IEEE	190	29.2	ACM-Assoc Comput Mach	160	24.6
65	INCEPTION INSTITUTE OF	187	287	65.2	IEEE	187	65.2	IEEE/CVF	34	11.8
66	Trellix (merger of FireEye Inc	185	525	35.2	IEEE	185	35.2	ACM-Assoc Comput Mach	87	16.6
67	COGNIZANT TECHNOLOG	175	805	21.7	IEEE	175	21.7	ACM-Assoc Comput Mach	160	19.9
68	Omni Ai Inc. Inc (formerly B	172	211	81.5	IEEE	172	81.5	International Association for Pattern Recognition (IAPR)	22	10.4
69	Ohio State University	170	216	78.7	IEEE	170	78.7	RELX Group (Elsevier)	12	5.6
70	Boeing Co. (The)	167	509	32.8	IEEE	167	32.8	RELX Group (Elsevier)	74	14.5
71	Sap SE	166	606	27.4	IEEE	166	27.4	ACM-Assoc Comput Mach	95	15.7
72	Snap Inc	164	388	42.3	IEEE	164	42.3	ACM-Assoc Comput Mach	83	21.4
73	NEW VALUEXCHANGE L	163	440	37.0	IEEE	163	37.0	ACM-Assoc Comput Mach	101	23.0
74	United States Navy	162	349	46.4	IEEE	162	46.4	RELX Group (Elsevier)	53	15.2
75	Toshiba Corp	161	311	51.8	IEEE	161	51.8	RELX Group (Elsevier)	19	6.1
76	Spotify AB	155	270	57.4	IEEE	155	57.4	International Society for Music Information Retrieval Conferen	50	18.5
77	BERTEC CORP	147	208	70.7	IEEE	147	70.7	INRIA Grenoble - Rhône-Alpes	23	11.1
78	23ANDME INC	146	2624	5.6	Cell Press	520	19.8	Springer Nature	368	14.0
79	Dell Technologies Inc	141	464	30.4	IEEE	141	30.4	ACM-Assoc Comput Mach	62	13.4
80	Tencent Holding Ltd	140	323	43.3	IEEE	140	43.3	ACM-Assoc Comput Mach	23	7.1

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Hewlett Packard Enterprises	139	362	38.4	IEEE	139	38.4	ACM-Assoc Comput Mach	51	14.1
82	Western Digital Corp.	139	357	38.9	IEEE	139	38.9	Joint IEEE and ACM	61	17.1
83	Aerospace Corp.	133	419	31.7	IEEE	133	31.7	RELX Group (Elsevier)	133	31.7
84	Mitsubishi Electric Corp	133	250	53.2	IEEE	133	53.2	ACM-Assoc Comput Mach	10	4.0
85	University of South Florida	131	262	50.0	IEEE	131	50.0	RELX Group (Elsevier)	27	10.3
86	Motorola Solutions Inc.	129	166	77.7	IEEE	129	77.7	International Association for Pattern Recognition (IAPR)	7	4.2
87	STRONG FORCE TX PORT	129	290	44.5	IEEE	129	44.5	RELX Group (Elsevier)	52	17.9
88	ASAPP INC	128	639	20.0	IEEE	128	20.0	ACL - Association for Computational Linguistics	119	18.6
89	California Institute of Techno	128	578	22.1	IEEE	128	22.1	Neural Information Processing Systems Foundation	64	11.1
90	D-Wave Quantum Inc. (forme	128	626	20.4	IEEE	128	20.4	International Machine Learning Society (IMLS)	85	13.6
91	ICOSYSTEM CORP	127	174	73.0	IEEE	127	73.0	RELX Group (Elsevier)	9	5.2
92	Illumina Inc.	127	608	20.9	IEEE	127	20.9	Springer Nature	92	15.1
93	Purdue University	126	307	41.0	IEEE	126	41.0	ACM-Assoc Comput Mach	60	19.5
94	GYRFALCON TECHNOLO	123	210	58.6	IEEE	123	58.6	RELX Group (Elsevier)	45	21.4
95	VIA ALLIANCE SEMICON	123	515	23.9	IEEE	123	23.9	Joint IEEE and ACM	91	17.7
96	PINDROP SECURITY INC	122	205	59.5	IEEE	122	59.5	International Speech Communication Association (ISCA)	36	17.6
97	University of Illinois	121	440	27.5	IEEE	121	27.5	Springer Nature	46	10.5
98	Marvell Technology Group Lt	119	203	58.6	IEEE	119	58.6	ACM-Assoc Comput Mach	47	23.2
99	PRIMAL FUSION INC	117	258	45.3	IEEE	117	45.3	ACM-Assoc Comput Mach	41	15.9
100	Zebra Technologies Corp.	115	157	73.2	IEEE	115	73.2	RFID Journal/YGS Group	26	16.6

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Autonomous Vehicles</i>										
1	Amazon.com Inc.	2554	4564	56.0	IEEE	2554	56.0	SPIE-Int Soc Opt Engineering	431	9.4
2	TuSimple	779	1114	69.9	IEEE	779	69.9	Neural Information Processing Systems Foundation	103	9.2
3	State Farm Mutual Automobi	495	1653	29.9	IEEE	495	29.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	114	6.9
4	Alphabet Inc.	383	744	51.5	IEEE	383	51.5	IEEE/RSJ	54	7.3
5	CARTICA AI LTD	285	444	64.2	IEEE	285	64.2	ACM-Assoc Comput Mach	51	11.5
6	Nio Co. Ltd	280	504	55.6	IEEE	280	55.6	CBS Interactive	36	7.1
7	UATC LLC	272	417	65.2	IEEE	272	65.2	IEEE/RSJ	29	7.0
8	Walmart Stores Inc	272	779	34.9	IEEE	272	34.9	CBS Interactive	82	10.5
9	Toyota Motor Corp	215	394	54.6	IEEE	215	54.6	IEEE/RSJ	29	7.4
10	NVIDIA Corp.	212	398	53.3	IEEE	212	53.3	SAE-Society of Automobile Engineers	32	8.0
11	Honda Motor Co. Ltd.(Honda	208	384	54.2	IEEE	208	54.2	RELX Group (Elsevier)	24	6.3
12	Aptiv Plc (former Delphi Aut	206	427	48.2	IEEE	206	48.2	RELX Group (Elsevier)	33	7.7
13	Intel Corporation	178	519	34.3	IEEE	178	34.3	Neural Information Processing Systems Foundation	46	8.9
14	MOTIONAL AD LLC	176	356	49.4	IEEE	176	49.4	RELX Group (Elsevier)	22	6.2
15	Siemens Aktiengesellschaft	173	262	66.0	IEEE	173	66.0	Springer Nature	21	8.0
16	FedEx Corp	172	375	45.9	IEEE	172	45.9	RELX Group (Elsevier)	53	14.1
17	NURO INC	167	268	62.3	IEEE	167	62.3	IEEE/RSJ	18	6.7
18	Brain Corporation	140	309	45.3	IEEE	140	45.3	Frontiers Media S.A.	26	8.4
19	International Business Machi	125	581	21.5	IEEE	125	21.5	IP.Com	98	16.9
20	Baidu Inc	123	197	62.4	IEEE	123	62.4	RELX Group (Elsevier)	14	7.1
21	Uber Technologies Inc	121	203	59.6	IEEE	121	59.6	Joint IEEE and ACM	10	4.9
22	Ford Motor Co.	118	243	48.6	IEEE	118	48.6	SAE-Society of Automobile Engineers	22	9.1
23	HRL Laboratories LLC	110	196	56.1	IEEE	110	56.1	IEEE/RSJ	17	8.7
24	Boeing Co. (The)	106	245	43.3	IEEE	106	43.3	IEEE/RSJ	16	6.5
25	Nissan Motor Co. Ltd.	104	155	67.1	IEEE	104	67.1	Mcgraw Hill	9	5.8
26	University of Pennsylvania	93	176	52.8	IEEE	93	52.8	IEEE/RSJ	14	8.0
27	Zebra Technologies Corp.	91	189	48.1	IEEE	91	48.1	ACM-Assoc Comput Mach	17	9.0
28	DIVEPLANE CORP	90	380	23.7	IEEE	90	23.7	Springer Nature	50	13.2
29	IFLIGHT Innovation Technol	90	177	50.8	IEEE	90	50.8	Association for the Advancement of Artificial Intelligence	15	8.5
30	APEX ARTIFICIAL INTELL	88	304	28.9	IEEE	88	28.9	RELX Group (Elsevier)	44	14.5
31	PELTON TECHNOLOGY I	71	145	49.0	IEEE	71	49.0	American Automatic Control Council (AACC)	21	14.5
32	SPHERO INC	71	74	95.9	IEEE	71	95.9	American Automatic Control Council (AACC)	3	4.1
33	TRIFO INC	70	90	77.8	IEEE	70	77.8	SAGE Publications Ltd	20	22.2
34	Allstate Corp	63	140	45.0	IEEE	63	45.0	ACM-Assoc Comput Mach	15	10.7
35	Renault SA	62	88	70.5	IEEE	62	70.5	Mcgraw Hill	4	4.5
36	California Institute of Techno	59	149	39.6	IEEE	59	39.6	IOP Publishing	12	8.1
37	AURORA OPERATIONS IN	58	77	75.3	IEEE	58	75.3	American Society of Mechanical Engineers	5	6.5
38	INTOUCH HEALTH INC	57	170	33.5	IEEE	57	33.5	IEEE/RSJ	16	9.4
39	General Motors Corp	48	81	59.3	IEEE	48	59.3	RELX Group (Elsevier)	7	8.6

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Garrett Motion (formerly Gar	43	151	28.5	SAE-Society of Automobile Engineers	48	31.8	IEEE	43	28.5
41	University of Massachusetts	40	64	62.5	IEEE	40	62.5	Mcgraw Hill	9	14.1
42	Digimarc Corp.	37	91	40.7	IEEE	37	40.7	ACM-Assoc Comput Mach	14	15.4
43	Bosch (Robert) GmbH	36	60	60.0	IEEE	36	60.0	ISIF/IEEE	2	3.3
44	Qualcomm Inc	36	66	54.5	IEEE	36	54.5	SAGE Publications Ltd	6	9.1
45	NEC Corp	35	55	63.6	IEEE	35	63.6	European Conference on Computer Vision-Google/Microsoft	7	12.7
46	Zhejiang Geely Holding Grou	35	48	72.9	IEEE	35	72.9	Springer Nature	3	6.3
47	CYBERNET SYSTEMS CO	34	58	58.6	IEEE	34	58.6	SPIE-Int Soc Opt Engineering	6	10.3
48	Toshiba Corp	32	53	60.4	IEEE	32	60.4	European Conference on Computer Vision-Google/Microsoft	7	13.2
49	University of Michigan	32	51	62.7	IEEE	32	62.7	AAAS-Am Assoc Advancement Sci	3	5.9
50	AUTONOMOUS SOLUTIO	30	89	33.7	IEEE	30	33.7	American Automatic Control Council (AACC)	16	18.0
51	PATRONESS LLC	29	52	55.8	IEEE	29	55.8	European Telecom Standards Institute (ETSI)	8	15.4
52	STRADVISION INC	28	46	60.9	IEEE	28	60.9	IEEE/CVF	5	10.9
53	TELADOC HEALTH INC	28	88	31.8	IEEE	28	31.8	IEEE/RSJ	8	9.1
54	Deere & Co.	27	66	40.9	IEEE	27	40.9	IP.Com	6	9.1
55	Lockheed Martin Corp.	27	548	4.9	American Physical Society	99	18.1	Springer Nature	96	17.5
56	CARTICA AL LTD	25	37	67.6	IEEE	25	67.6	ACM-Assoc Comput Mach	4	10.8
57	ARGO AI LLC	24	45	53.3	IEEE	24	53.3	IEEE/CVF	8	17.8
58	AUTOBRAINS TECHNOLO	24	37	64.9	IEEE	24	64.9	ACM-Assoc Comput Mach	4	10.8
59	Here Global BV	23	39	59.0	IEEE	23	59.0	RELX Group (Elsevier)	6	15.4
60	Oshkosh Corporation	23	30	76.7	IEEE	23	76.7	SAE-Society of Automobile Engineers	2	6.7
61	THE CHAMBERLAIN GRO	23	65	35.4	IEEE	23	35.4	International Association for Cryptologic Research (IACR)	10	15.4
62	EPISYS SCIENCE INC	22	46	47.8	IEEE	22	47.8	Springer Nature	6	13.0
63	Porsche Automobil Holding S	22	32	68.8	IEEE	22	68.8	Springer Nature	2	6.3
64	The Arizona Board of Regent	21	46	45.7	IEEE	21	45.7	Joint IEEE and ACM	6	13.0
65	Aviation Industry Corporatio	20	34	58.8	IEEE	20	58.8	SAE-Society of Automobile Engineers	13	38.2
66	HANGZHOU ZERO ZERO	20	26	76.9	IEEE	20	76.9	SAGE Publications Ltd	4	15.4
67	NONEND INVENTIONS N	20	22	90.9	IEEE	20	90.9	The International Association for Computers and Communicati	1	4.5
68	Apple Inc	19	71	26.8	IEEE	19	26.8	ACM-Assoc Comput Mach	12	16.9
69	Brown University Research F	19	28	67.9	IEEE	19	67.9	RELX Group (Elsevier)	6	21.4
70	Duke University	19	28	67.9	IEEE	19	67.9	RELX Group (Elsevier)	6	21.4
71	Fujitsu Limited	19	29	65.5	IEEE	19	65.5	New York Times	2	6.9
72	Huawei Technologies Compa	19	36	52.8	IEEE	19	52.8	IEEE/RSJ	4	11.1
73	Micron Technology Inc.	19	48	39.6	IEEE	19	39.6	ACM-Assoc Comput Mach	5	10.4
74	Samsung Electronics Co Ltd	19	28	67.9	IEEE	19	67.9	European Conference on Computer Vision-Google/Microsoft	2	7.1
75	BEIJING TUSEN ZHITU TE	18	23	78.3	IEEE	18	78.3	European Conference on Computer Vision-Google/Microsoft	2	8.7
76	GECKO ROBOTICS INC	18	42	42.9	IEEE	18	42.9	RELX Group (Elsevier)	11	26.2
77	MAY MOBILITY INC	18	22	81.8	IEEE	18	81.8	IEEE/RSJ	4	18.2
78	Raytheon Co.	18	45	40.0	IEEE	18	40.0	SPIE-Int Soc Opt Engineering	9	20.0
79	AFFECTIVA INC	17	29	58.6	IEEE	17	58.6	RELX Group (Elsevier)	5	17.2
80	Mitsubishi Electric Corp	17	26	65.4	IEEE	17	65.4	RELX Group (Elsevier)	3	11.5

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Battelle Memorial Institute	16	24	66.7	IEEE	16	66.7	IEEE/RSJ	6	25.0
82	Causam Enterprises (former	16	28	57.1	IEEE	16	57.1	RELX Group (Elsevier)	4	14.3
83	Panasonic Holding Corporati	16	22	72.7	IEEE	16	72.7	IEEE/RSJ	2	9.1
84	STARSHIP TECHNOLOGIE	16	27	59.3	IEEE	16	59.3	RELX Group (Elsevier)	4	14.8
85	Wipro Ltd	16	27	59.3	IEEE	16	59.3	RELX Group (Elsevier)	4	14.8
86	AURORA INNOVATION IN	15	26	57.7	IEEE	15	57.7	Morgan Kaufmann Publishers, Inc.	2	7.7
87	BRIAN CORP	15	35	42.9	IEEE	15	42.9	Frontiers Media S.A.	3	8.6
88	King Fahd University of Petr	15	21	71.4	IEEE	15	71.4	American Automatic Control Council (AACC)	2	9.5
89	LG Electronics Inc.	15	19	78.9	IEEE	15	78.9	American Automatic Control Council (AACC)	1	5.3
90	PERCEPTIVE AUTOMATA	15	24	62.5	IEEE	15	62.5	Neural Information Processing Systems Foundation	6	25.0
91	Denso Corp	14	28	50.0	IEEE	14	50.0	RELX Group (Elsevier)	5	17.9
92	GATIK AI INC	14	20	70.0	IEEE	14	70.0	American Automatic Control Council (AACC)	6	30.0
93	Massachusetts Institute of Te	14	35	40.0	IEEE	14	40.0	IEEE/CVF	4	11.4
94	Walt Disney Co.	14	15	93.3	IEEE	14	93.3	CBS Interactive	1	6.7
95	AT&T Inc	13	30	43.3	IEEE	13	43.3	RELX Group (Elsevier)	8	26.7
96	Hyundai Motor Co.	13	19	68.4	IEEE	13	68.4	IP.Com	1	5.3
97	PERCEPTIN SHENZHEN L	13	17	76.5	IEEE	13	76.5	SAGE Publications Ltd	2	11.8
98	ROBART GMBH	13	22	59.1	IEEE	13	59.1	Joint IEEE and ACM	8	36.4
99	COGNATA LTD	12	15	80.0	IEEE	12	80.0	SAE-Society of Automobile Engineers	2	13.3
100	CRINKLAW FARM SERVI	12	19	63.2	IEEE	12	63.2	Springer Nature	4	21.1

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Blockchain/Distributed Ledger</i>										
1	Advanced New Technologies	420	785	53.5	IEEE	420	53.5	ACM-Assoc Comput Mach	62	7.9
2	International Business Machi	268	801	33.5	IEEE	268	33.5	IP.Com	163	20.3
3	Cisco Systems Inc.	115	183	62.8	IEEE	115	62.8	ACM-Assoc Comput Mach	12	6.6
4	Alibaba Group Holding Ltd	102	205	49.8	IEEE	102	49.8	ACM-Assoc Comput Mach	33	16.1
5	nChain Holdings Ltd	84	290	29.0	IEEE	84	29.0	GitHub.com	60	20.7
6	IP RESERVOIR LLC	82	152	53.9	IEEE	82	53.9	ACM-Assoc Comput Mach	26	17.1
7	STRONG FORCE TX PORT	67	149	45.0	IEEE	67	45.0	RELX Group (Elsevier)	26	17.4
8	Ant Group (ANT Financial S	66	121	54.5	IEEE	66	54.5	ACM-Assoc Comput Mach	14	11.6
9	BT Group PLC	62	164	37.8	IEEE	62	37.8	RELX Group (Elsevier)	25	15.2
10	Hewlett Packard Enterprises	62	138	44.9	IEEE	62	44.9	ACM-Assoc Comput Mach	25	18.1
11	INVENIAM CAPITAL PAR	53	88	60.2	IEEE	53	60.2	Dow Jones & Co.	19	21.6
12	Bank of America Corp.	49	90	54.4	IEEE	49	54.4	New York Times	20	22.2
13	Microsoft Corporation	47	142	33.1	IEEE	47	33.1	ACM-Assoc Comput Mach	37	26.1
14	eBay Inc	40	56	71.4	IEEE	40	71.4	RELX Group (Elsevier)	5	8.9
15	NCHAIN LICENSING AG	37	145	25.5	IEEE	37	25.5	O'Reilly Media	26	17.9
16	Juniper Networks Inc.	35	39	89.7	IEEE	35	89.7	Microsoft	1	2.6
17	Dell Technologies Inc	34	92	37.0	ACM-Assoc Comput Mach	36	39.1	IEEE	34	37.0
18	Accenture Ltd.	33	134	24.6	ACM-Assoc Comput Mach	51	38.1	IEEE	33	24.6
19	AMERICORP INVESTMEN	32	35	91.4	IEEE	32	91.4	World Wide Web Consortium	2	5.7
20	NEC Corp	29	90	32.2	ACM-Assoc Comput Mach	36	40.0	IEEE	29	32.2
21	Marvell Technology Group Lt	28	31	90.3	IEEE	28	90.3	ACM-Assoc Comput Mach	1	3.2
22	SalesforceCom Inc	27	30	90.0	IEEE	27	90.0	Internet Soc/IETF-Internet Eng Task Force	2	6.7
23	ELUVIO INC	26	95	27.4	IEEE	26	27.4	ACM-Assoc Comput Mach	18	18.9
24	BLOCKCHAIN ASICS INC	25	26	96.2	IEEE	25	96.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	3.8
25	State Farm Mutual Automobi	24	37	64.9	IEEE	24	64.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	4	10.8
26	FACTOM INC	23	33	69.7	IEEE	23	69.7	Dow Jones & Co.	10	30.3
27	Intel Corporation	22	51	43.1	IEEE	22	43.1	ACM-Assoc Comput Mach	12	23.5
28	COGNITIVE SCALE INC	20	52	38.5	IEEE	20	38.5	ACM-Assoc Comput Mach	8	15.4
29	SYMBIONT IO INC	20	51	39.2	IEEE	20	39.2	ACM-Assoc Comput Mach	11	21.6
30	University of South Florida	20	22	90.9	IEEE	20	90.9	ACM-Assoc Comput Mach	1	4.5
31	NXGEN PARTNERS IP LLC	18	55	32.7	Optical Society of America	20	36.4	IEEE	18	32.7
32	Amazon.com Inc.	17	45	37.8	IEEE	17	37.8	ISO-International Standards Organization	8	17.8
33	MasterCard Inc	17	44	38.6	IEEE	17	38.6	O'Reilly Media	6	13.6
34	Causam Enterprises (former	16	28	57.1	IEEE	16	57.1	RELX Group (Elsevier)	4	14.3
35	Meta Platforms Inc.(formerly	16	104	15.4	ACM-Assoc Comput Mach	42	40.4	IEEE	16	15.4
36	INDIVIDUAL PATENTER	14	21	66.7	IEEE	14	66.7	International Association for Cryptologic Research (IACR)	2	9.5
37	LO3 ENERGY INC	14	46	30.4	RELX Group (Elsevier)	24	52.2	IEEE	14	30.4
38	Nokia Corporation	14	28	50.0	IEEE	14	50.0	Internet Soc/IETF-Internet Eng Task Force	3	10.7
39	MILESTONE ENTERTAIN	13	41	31.7	IEEE	13	31.7	The USENIX Association	7	17.1

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Micron Technology Inc.	12	18	66.7	IEEE	12	66.7	Joint IEEE and ACM	4	22.2
41	TRANSACTIVE GRID INC	12	45	26.7	RELX Group (Elsevier)	27	60.0	IEEE	12	26.7
42	MOX-SPEEDCHAIN LLC	11	11	100.0	IEEE	11	100.0			
43	AT&T Inc	10	17	58.8	IEEE	10	58.8	FORBES INC	3	17.6
44	Emerson Electric Co.	10	11	90.9	IEEE	10	90.9	Informa/CRC Press/Taylor & Francis	1	9.1
45	JINAN UNIVERSITY	10	22	45.5	IEEE	10	45.5	ACM-Assoc Comput Mach	4	18.2
46	Broadcom Ltd	9	11	81.8	IEEE	9	81.8	The USENIX Association	1	9.1
47	CapitalOne	9	29	31.0	IEEE	9	31.0	ACM-Assoc Comput Mach	5	17.2
48	EYGS LLP	9	43	20.9	IEEE	9	20.9	Organisation for Economic Co-operation and Development	7	16.3
49	Sap SE	9	23	39.1	IEEE	9	39.1	IFIP - International Federation for Information Processing	2	8.7
50	Sony Group Corp	9	9	100.0	IEEE	9	100.0			
51	Via Technologies Inc.	9	16	56.3	IEEE	9	56.3	Joint IEEE and ACM	2	12.5
52	Boeing Co. (The)	8	12	66.7	IEEE	8	66.7	IP.Com	3	25.0
53	LG Electronics Inc.	8	9	88.9	IEEE	8	88.9	World Academy of Science Engineering and Technology	1	11.1
54	American Express Co.	7	12	58.3	IEEE	7	58.3	ACM-Assoc Comput Mach	4	33.3
55	ANCHOR LABS INC	7	25	28.0	IEEE	7	28.0	Condé Nast	7	28.0
56	ANTHURIUM SOLUTIONS	7	42	16.7	ACM-Assoc Comput Mach	15	35.7	IEEE	7	16.7
57	DIGITAL ASSET (SWITZER	7	11	63.6	IEEE	7	63.6	O'Reilly Media	2	18.2
58	FORCEPOINT LLC	7	11	63.6	IEEE	7	63.6	Microsoft	2	18.2
59	MASSACHUSETTS MUTU	7	8	87.5	IEEE	7	87.5	International Association for Cryptologic Research (IACR)	1	12.5
60	THE TORONTO-DOMINIO	7	31	22.6	Imagine Publishing	9	29.0	World Wide Web Consortium	9	29.0
61	THE VANGUARD GROUP I	7	17	41.2	IEEE	7	41.2	ACM-Assoc Comput Mach	4	23.5
62	TURING TECHNOLOGY IN	7	13	53.8	IEEE	7	53.8	RELX Group (Elsevier)	5	38.5
63	United Services Automobile	7	16	43.8	IEEE	7	43.8	ACM-Assoc Comput Mach	5	31.3
64	Wells Fargo & Co	7	67	10.4	ANSI-American National Standards Institute	23	34.3	International Telecommunication Union	18	26.9
65	Workday Inc	7	8	87.5	IEEE	7	87.5	National Institute of Standards and Technology (NIST)	1	12.5
66	Block Inc. (formerSquare Inc)	6	7	85.7	IEEE	6	85.7	The International Association for Computers and Communicati	1	14.3
67	CIPHERTRACE INC	6	16	37.5	IEEE	6	37.5	ACM-Assoc Comput Mach	4	25.0
68	CME Group Inc	6	24	25.0	FORBES INC	13	54.2	IEEE	6	25.0
69	EQUITY SHIFT INC	6	6	100.0	IEEE	6	100.0			
70	FACETEC INC	6	6	100.0	IEEE	6	100.0			
71	McAfee Inc	6	11	54.5	IEEE	6	54.5	ACM-Assoc Comput Mach	2	18.2
72	Northwestern University	6	21	28.6	IEEE	6	28.6	ACM-Assoc Comput Mach	5	23.8
73	NUID INC	6	72	8.3	Internet Soc/IETF-Internet Eng Task Force	25	34.7	International Association for Cryptologic Research (IACR)	17	23.6
74	Oracle Corporation	6	35	17.1	ACM-Assoc Comput Mach	10	28.6	The USENIX Association	8	22.9
75	R3 LTD	6	17	35.3	IEEE	6	35.3	International Association for Cryptologic Research (IACR)	4	23.5
76	SYNIVERSE TECHNOLOGI	6	13	46.2	IEEE	6	46.2	European Telecom Standards Institute (ETSI)	2	15.4
77	THE BANK OF NEW YORK	6	8	75.0	IEEE	6	75.0	MIT Press	1	12.5
78	Toyota Motor Corp	6	7	85.7	IEEE	6	85.7	European Alliance for Innovation	1	14.3
79	Visa Inc	6	30	20.0	ACM-Assoc Comput Mach	7	23.3	IEEE	6	20.0
80	ARROWHEAD CENTER IN	5	12	41.7	IEEE	5	41.7	The USENIX Association	3	25.0

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Baidu Inc	5	8	62.5	IEEE	5	62.5	Nikkei Business Publications, Inc.	1	12.5
82	Cornell University	5	39	12.8	International Association for Cryptologic Rese	13	33.3	International Financial Cryptography Association	6	15.4
83	Endress+Hauser (Internationa	5	5	100.0	IEEE	5	100.0			
84	FARMOBILE LLC	5	5	100.0	IEEE	5	100.0			
85	Huawei Technologies Compa	5	9	55.6	IEEE	5	55.6	ACM-Assoc Comput Mach	1	11.1
86	London Stock Exchange Gro	5	9	55.6	IEEE	5	55.6	Condé Nast	2	22.2
87	Seagate Technology Plc	5	12	41.7	IEEE	5	41.7	The USENIX Association	2	16.7
88	SIDE INC	5	10	50.0	ACM-Assoc Comput Mach	5	50.0	IEEE	5	50.0
89	University of Florida	5	6	83.3	IEEE	5	83.3	Very Large Data Base Endowment Inc. (VLDB Endowment)	1	16.7
90	Virginia Commonwealth Uni	5	6	83.3	IEEE	5	83.3	Very Large Data Base Endowment Inc. (VLDB Endowment)	1	16.7
91	Zhejiang Geely Holding Grou	5	7	71.4	IEEE	5	71.4	ACM-Assoc Comput Mach	2	28.6
92	21 INC	4	7	57.1	IEEE	4	57.1	IP.Com	1	14.3
93	BEYOND AEROSPACE LT	4	8	50.0	Multidisciplinary Digital Publishing Institute (	4	50.0	IEEE	4	50.0
94	BLOCK ONE	4	4	100.0	IEEE	4	100.0			
95	Cloudminds Technology	4	7	57.1	IEEE	4	57.1	IEEE/NASA	1	14.3
96	DIGITAL ASSET HOLDING	4	6	66.7	IEEE	4	66.7	First Monday	2	33.3
97	Ericsson	4	15	26.7	Internet Soc/IETF-Internet Eng Task Force	5	33.3	IEEE	4	26.7
98	ERNST & YOUNG U S LLP	4	17	23.5	IEEE	4	23.5	ISO-International Standards Organization	3	17.6
99	ESHARD	4	25	16.0	International Association for Cryptologic Rese	16	64.0	IET/IEE	4	16.0
100	Gen Digital Inc. (formerly No	4	6	66.7	IEEE	4	66.7	RELX Group (Elsevier)	1	16.7

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Broadcasting</i>										
1	Microsoft Corporation	12183	28789	42.3	IEEE	12183	42.3	International Telecommunication Union	3462	12.0
2	Xperi Holding Corporation (F	11702	30011	39.0	IEEE	11702	39.0	SPIE-Int Soc Opt Engineering	2785	9.3
3	Personalized Media Commun	8943	53708	16.7	Society of Motion Picture and Television Engi	16058	29.9	IEEE	8943	16.7
4	Alphabet Inc.	6347	18619	34.1	IEEE	6347	34.1	International Telecommunication Union	3011	16.2
5	Qualcomm Inc	6208	33951	18.3	International Telecommunication Union	15911	46.9	IEEE	6208	18.3
6	Magna International Inc.	5180	9568	54.1	IEEE	5180	54.1	SAE-Society of Automobile Engineers	784	8.2
7	Sony Group Corp	3898	11224	34.7	IEEE	3898	34.7	International Telecommunication Union	2696	24.0
8	Apple Inc	3595	10400	34.6	IEEE	3595	34.6	ACM-Assoc Comput Mach	1381	13.3
9	Samsung Electronics Co Ltd	3044	10488	29.0	IEEE	3044	29.0	International Telecommunication Union	2398	22.9
10	AT&T Inc	2679	6223	43.0	IEEE	2679	43.0	ACM-Assoc Comput Mach	752	12.1
11	LG Electronics Inc.	2127	9874	21.5	International Telecommunication Union	2301	23.3	IEEE	2127	21.5
12	Vantiva SA (former Technico	2089	4908	42.6	IEEE	2089	42.6	ISO/IEC/JTC/ANSI	351	7.2
13	Dolby Laboratories Inc	2085	8187	25.5	International Telecommunication Union	2216	27.1	IEEE	2085	25.5
14	Cisco Systems Inc.	2073	5332	38.9	IEEE	2073	38.9	ACM-Assoc Comput Mach	454	8.5
15	Sonos Inc	1890	5799	32.6	IEEE	1890	32.6	Open Connectivity Foundation	595	10.3
16	General Electric Company	1876	6207	30.2	International Telecommunication Union	2418	39.0	IEEE	1876	30.2
17	Broadcom Ltd	1873	2971	63.0	IEEE	1873	63.0	ACM-Assoc Comput Mach	176	5.9
18	Panasonic Holding Corporati	1768	6143	28.8	International Telecommunication Union	1798	29.3	IEEE	1768	28.8
19	Intel Corporation	1755	4520	38.8	IEEE	1755	38.8	3GPP General Partnership Project Standards Body	1024	22.7
20	Massachusetts Institute of Te	1742	3247	53.6	IEEE	1742	53.6	ACM-Assoc Comput Mach	286	8.8
21	InterDigital Inc	1680	6323	26.6	IEEE	1680	26.6	International Telecommunication Union	1662	26.3
22	Huawei Technologies Compa	1565	6322	24.8	International Telecommunication Union	2794	44.2	IEEE	1565	24.8
23	Adobe Inc. (former Adobe Sy	1453	3336	43.6	IEEE	1453	43.6	ACM-Assoc Comput Mach	772	23.1
24	Nokia Corporation	1381	4100	33.7	IEEE	1381	33.7	International Telecommunication Union	576	14.0
25	Fraunhofer Gesellschaft	1348	3107	43.4	IEEE	1348	43.4	International Telecommunication Union	324	10.4
26	Canon Inc	1238	3536	35.0	IEEE	1238	35.0	International Telecommunication Union	605	17.1
27	International Business Machi	1212	4081	29.7	IEEE	1212	29.7	Internet Soc/IETF-Internet Eng Task Force	634	15.5
28	Softbank Corp	1207	3232	37.3	IEEE	1207	37.3	ISO/IEC	270	8.4
29	Hon Hai Precision Industry C	1193	4298	27.8	IEEE	1193	27.8	International Telecommunication Union	1108	25.8
30	GoPro Inc	1115	2205	50.6	IEEE	1115	50.6	ACM-Assoc Comput Mach	226	10.2
31	NETWORK-1 TECHNOLOG	1074	3117	34.5	IEEE	1074	34.5	ACM-Assoc Comput Mach	727	23.3
32	HP Inc	899	1912	47.0	IEEE	899	47.0	ACM-Assoc Comput Mach	257	13.4
33	STMicroelectronics	851	1345	63.3	IEEE	851	63.3	RELX Group (Elsevier)	74	5.5
34	Amazon.com Inc.	843	2020	41.7	IEEE	843	41.7	ACM-Assoc Comput Mach	260	12.9
35	Commscope Holding (formerl	833	2654	31.4	IEEE	833	31.4	International Telecommunication Union	510	19.2
36	California Institute of Techno	782	3862	20.2	Optical Society of America	1035	26.8	IEEE	782	20.2
37	Honeywell International Inc.	766	2970	25.8	IEEE	766	25.8	Optical Society of America	659	22.2
38	INTOUCH HEALTH INC	759	2243	33.8	IEEE	759	33.8	IEEE/RSJ	217	9.7
39	Cortica Ltd	746	1101	67.8	IEEE	746	67.8	ACM-Assoc Comput Mach	143	13.0

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Digimarc Corp.	718	1955	36.7	IEEE	718	36.7	SPIE-Int Soc Opt Engineering	343	17.5
41	Ricoh Co. Ltd.	705	1580	44.6	IEEE	705	44.6	ACM-Assoc Comput Mach	203	12.8
42	Tencent Holding Ltd	674	2700	25.0	International Telecommunication Union	1306	48.4	IEEE	674	25.0
43	Ericsson	632	2313	27.3	IEEE	632	27.3	International Telecommunication Union	565	24.4
44	ByteDance Ltd	601	7626	7.9	International Telecommunication Union	5948	78.0	ISO/IEC	626	8.2
45	Wisteria Trading Inc	570	1215	46.9	IEEE	570	46.9	SPIE-Int Soc Opt Engineering	135	11.1
46	Columbia University	556	1283	43.3	IEEE	556	43.3	ACM-Assoc Comput Mach	188	14.7
47	Mitsubishi Electric Corp	544	1317	41.3	IEEE	544	41.3	International Telecommunication Union	228	17.3
48	Nielsen Holdings Plc	534	3486	15.3	IEEE	534	15.3	RELX Group (Elsevier)	506	14.5
49	Koninklijke Philips N.V.	522	1287	40.6	IEEE	522	40.6	ACM-Assoc Comput Mach	114	8.9
50	Walt Disney Co.	520	1496	34.8	IEEE	520	34.8	ACM-Assoc Comput Mach	457	30.5
51	Blackberry Ltd.	518	1240	41.8	IEEE	518	41.8	International Telecommunication Union	195	15.7
52	Motorola Solutions Inc.	512	1018	50.3	IEEE	512	50.3	RELX Group (Elsevier)	67	6.6
53	Xerox Corp	511	1286	39.7	IEEE	511	39.7	SPIE-Int Soc Opt Engineering	149	11.6
54	Electronics and Telecommuni	505	2372	21.3	International Telecommunication Union	1291	54.4	IEEE	505	21.3
55	Toshiba Corp	489	1642	29.8	International Telecommunication Union	605	36.8	IEEE	489	29.8
56	Nippon Telegraph & Telepho	476	1513	31.5	IEEE	476	31.5	International Telecommunication Union	452	29.9
57	PixelWorks Inc	472	744	63.4	IEEE	472	63.4	SPIE-Int Soc Opt Engineering	66	8.9
58	SUN PATENT TRUST	466	6787	6.9	International Telecommunication Union	5264	77.6	IEEE	466	6.9
59	Industrial Technology Researc	460	746	61.7	IEEE	460	61.7	SPIE-Int Soc Opt Engineering	50	6.7
60	Texas Instruments Inc	443	2262	19.6	International Telecommunication Union	1526	67.5	IEEE	443	19.6
61	Verance Corp	443	963	46.0	IEEE	443	46.0	SPIE-Int Soc Opt Engineering	126	13.1
62	Fujifilm Business Innovation	440	1293	34.0	IEEE	440	34.0	ACM-Assoc Comput Mach	316	24.4
63	BLANDING HOVENWEEP	422	1210	34.9	IEEE	422	34.9	SPIE-Int Soc Opt Engineering	179	14.8
64	Mediatek Inc.	413	2135	19.3	International Telecommunication Union	1156	54.1	IEEE	413	19.3
65	NEC Corp	410	1112	36.9	IEEE	410	36.9	International Telecommunication Union	199	17.9
66	ACACIA MEDIA TECHNO	408	746	54.7	IEEE	408	54.7	ACM-Assoc Comput Mach	66	8.8
67	Semiconductor Energy Labor	404	4979	8.1	SID-Society for Information Display	1746	35.1	American Institute of Physics	612	12.3
68	NVIDIA Corp.	391	934	41.9	IEEE	391	41.9	ACM-Assoc Comput Mach	135	14.5
69	Twitter Inc	382	588	65.0	IEEE	382	65.0	ACM-Assoc Comput Mach	42	7.1
70	Comcast Corp	378	1556	24.3	IEEE	378	24.3	ACM-Assoc Comput Mach	277	17.8
71	Meta Platforms Inc.(formerly	372	1425	26.1	IEEE	372	26.1	ACM-Assoc Comput Mach	177	12.4
72	On Semiconductor Corporati	371	534	69.5	IEEE	371	69.5	SPIE-Int Soc Opt Engineering	54	10.1
73	Marvell Technology Group Lt	366	450	81.3	IEEE	366	81.3	ACM-Assoc Comput Mach	9	2.0
74	Witricity Corp	324	609	53.2	IEEE	324	53.2	American Institute of Physics	41	6.7
75	Intellectual Ventures Manage	321	1283	25.0	IEEE	321	25.0	ACM-Assoc Comput Mach	174	13.6
76	ECOLE DE TECHBOLOGIE	318	539	59.0	IEEE	318	59.0	3GPP General Partnership Project Standards Body	52	9.6
77	Omnivision Technologies Inc	318	528	60.2	IEEE	318	60.2	SPIE-Int Soc Opt Engineering	67	12.7
78	Align Technology Inc	312	2678	11.7	JCO - Journal of Clinical Orthodontics	333	12.4	RELX Group (Elsevier)	321	12.0
79	REARDEN LLC	300	459	65.4	IEEE	300	65.4	Optical Society of America	41	8.9
80	The Arizona Board of Regent	296	1704	17.4	Optical Society of America	483	28.3	IEEE	296	17.4

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	BLACK HILLS MEDIA LLC	291	1970	14.8	Open Connectivity Foundation	1169	59.3	IEEE	291	14.8
82	Ostendo Technologies Inc	290	927	31.3	IEEE	290	31.3	SPIE-Int Soc Opt Engineering	161	17.4
83	EUCLID DISCOVERIES LL	289	563	51.3	IEEE	289	51.3	RELX Group (Elsevier)	141	25.0
84	Micron Technology Inc.	285	494	57.7	IEEE	285	57.7	SPIE-Int Soc Opt Engineering	56	11.3
85	University of Washington	281	805	34.9	IEEE	281	34.9	SPIE-Int Soc Opt Engineering	106	13.2
86	Netflix Inc	277	526	52.7	IEEE	277	52.7	International Telecommunication Union	40	7.6
87	University of Minnesota (The	277	409	67.7	IEEE	277	67.7	SAGE Publications Ltd	24	5.9
88	MONOLITHIC 3D INC	272	481	56.5	IEEE	272	56.5	IEEE/JPN Soc App Phys	50	10.4
89	Walmart Stores Inc	269	806	33.4	IEEE	269	33.4	CBS Interactive	82	10.2
90	BT Group PLC	267	531	50.3	IEEE	267	50.3	RELX Group (Elsevier)	42	7.9
91	Advanced Micro Devices Inc	261	443	58.9	IEEE	261	58.9	ACM-Assoc Comput Mach	23	5.2
92	ONPOINT MEDICAL INC	253	1132	22.3	IEEE	253	22.3	RELX Group (Elsevier)	184	16.3
93	University of California	253	758	33.4	IEEE	253	33.4	Optical Society of America	73	9.6
94	Dish Network Corp	250	487	51.3	IEEE	250	51.3	RELX Group (Elsevier)	47	9.7
95	Raytheon Co.	247	681	36.3	IEEE	247	36.3	SPIE-Int Soc Opt Engineering	131	19.2
96	University of North Carolina	247	654	37.8	IEEE	247	37.8	ACM-Assoc Comput Mach	166	25.4
97	Ford Motor Co.	245	522	46.9	IEEE	245	46.9	SAE-Society of Automobile Engineers	45	8.6
98	Orange	243	464	52.4	IEEE	243	52.4	International Telecommunication Union	46	9.9
99	United States Navy	242	564	42.9	IEEE	242	42.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	61	10.8
100	ARC DEVICES LTD	240	1097	21.9	ACM-Assoc Comput Mach	448	40.8	IEEE	240	21.9

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Computer Hardware</i>										
1	International Business Machi	21216	80330	26.4	IEEE	21216	26.4	ACM-Assoc Comput Mach	16829	20.9
2	Microsoft Corporation	17982	72405	24.8	ACM-Assoc Comput Mach	24267	33.5	IEEE	17982	24.8
3	Apple Inc	14495	53556	27.1	ACM-Assoc Comput Mach	15822	29.5	IEEE	14495	27.1
4	Intel Corporation	11400	24772	46.0	IEEE	11400	46.0	ACM-Assoc Comput Mach	3295	13.3
5	Alphabet Inc.	6525	22721	28.7	IEEE	6525	28.7	ACM-Assoc Comput Mach	5285	23.3
6	Samsung Electronics Co Ltd	5111	13158	38.8	IEEE	5111	38.8	ACM-Assoc Comput Mach	1256	9.5
7	Oracle Corporation	4676	17859	26.2	ACM-Assoc Comput Mach	6188	34.6	IEEE	4676	26.2
8	OneTrust	4437	14251	31.1	ACM-Assoc Comput Mach	6991	49.1	IEEE	4437	31.1
9	Broadcom Ltd	4015	7035	57.1	IEEE	4015	57.1	ACM-Assoc Comput Mach	618	8.8
10	Qualcomm Inc	3462	8999	38.5	IEEE	3462	38.5	ACM-Assoc Comput Mach	759	8.4
11	Cadence Design Systems Inc	3379	8519	39.7	IEEE	3379	39.7	Joint IEEE and ACM	3047	35.8
12	Immersion Corp.	3344	9800	34.1	IEEE	3344	34.1	ACM-Assoc Comput Mach	1038	10.6
13	Sony Group Corp	3192	7765	41.1	IEEE	3192	41.1	ACM-Assoc Comput Mach	1105	14.2
14	Advanced Micro Devices Inc	3184	8997	35.4	IEEE	3184	35.4	ACM-Assoc Comput Mach	2788	31.0
15	Canon Inc	2572	6547	39.3	IEEE	2572	39.3	ACM-Assoc Comput Mach	532	8.1
16	Commvault Systems Inc.	2485	4291	57.9	IEEE	2485	57.9	ACM-Assoc Comput Mach	747	17.4
17	Ricoh Co. Ltd.	2416	5209	46.4	IEEE	2416	46.4	ACM-Assoc Comput Mach	901	17.3
18	Amazon.com Inc.	2256	7826	28.8	IEEE	2256	28.8	ACM-Assoc Comput Mach	2042	26.1
19	Nokia Corporation	2125	5669	37.5	IEEE	2125	37.5	ACM-Assoc Comput Mach	807	14.2
20	Micron Technology Inc.	2119	4176	50.7	IEEE	2119	50.7	ACM-Assoc Comput Mach	345	8.3
21	HP Inc	2094	6691	31.3	IEEE	2094	31.3	ACM-Assoc Comput Mach	1429	21.4
22	Fujitsu Limited	2082	5560	37.4	IEEE	2082	37.4	ACM-Assoc Comput Mach	692	12.4
23	Siemens Aktiengesellschaft	1965	4396	44.7	IEEE	1965	44.7	Joint IEEE and ACM	471	10.7
24	Cisco Systems Inc.	1937	6177	31.4	IEEE	1937	31.4	Internet Soc/IETF-Internet Eng Task Force	934	15.1
25	Xperi Holding Corporation (F	1877	4321	43.4	IEEE	1877	43.4	ACM-Assoc Comput Mach	304	7.0
26	MicroUnity Systems Enginee	1855	3067	60.5	IEEE	1855	60.5	Joint IEEE and ACM	266	8.7
27	AT&T Inc	1851	5373	34.5	IEEE	1851	34.5	ACM-Assoc Comput Mach	1121	20.9
28	Sonos Inc	1769	5368	33.0	IEEE	1769	33.0	Open Connectivity Foundation	569	10.6
29	Personalized Media Commun	1746	11059	15.8	Society of Motion Picture and Television Engi	3284	29.7	IEEE	1746	15.8
30	Dell Technologies Inc	1698	4931	34.4	IEEE	1698	34.4	ACM-Assoc Comput Mach	958	19.4
31	IP RESERVOIR LLC	1683	3320	50.7	IEEE	1683	50.7	ACM-Assoc Comput Mach	545	16.4
32	Ignis Innovation Inc	1672	2372	70.5	IEEE	1672	70.5	SID-Society for Information Display	390	16.4
33	Rambus Inc.	1598	2319	68.9	IEEE	1598	68.9	JEDEC Semiconductor Standards Organization	117	5.0
34	Infineon Technologies AG	1593	2727	58.4	IEEE	1593	58.4	Joint IEEE and ACM	317	11.6
35	Honeywell International Inc.	1578	4144	38.1	IEEE	1578	38.1	RELX Group (Elsevier)	331	8.0
36	Panasonic Holding Corporati	1530	3840	39.8	IEEE	1530	39.8	International Telecommunication Union	316	8.2
37	Columbia University	1478	5797	25.5	IEEE	1478	25.5	ACM-Assoc Comput Mach	1196	20.6
38	Huawei Technologies Compa	1431	4681	30.6	IEEE	1431	30.6	3GPP General Partnership Project Standards Body	587	12.5
39	NEC Corp	1411	3739	37.7	IEEE	1411	37.7	ACM-Assoc Comput Mach	546	14.6

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Sap SE	1393	5591	24.9	ACM-Assoc Comput Mach	1761	31.5	IEEE	1393	24.9
41	Fraunhofer Gesellschaft	1349	3506	38.5	IEEE	1349	38.5	Audio Eng Soc	547	15.6
42	Toshiba Corp	1346	3302	40.8	IEEE	1346	40.8	ACM-Assoc Comput Mach	216	6.5
43	Semiconductor Energy Labor	1341	20086	6.7	SID-Society for Information Display	7548	37.6	American Institute of Physics	2486	12.4
44	Synopsys Inc.	1322	3467	38.1	IEEE	1322	38.1	Joint IEEE and ACM	720	20.8
45	Marvell Technology Group Lt	1240	1891	65.6	IEEE	1240	65.6	ACM-Assoc Comput Mach	142	7.5
46	STMicroelectronics	1217	2183	55.7	IEEE	1217	55.7	ACM-Assoc Comput Mach	119	5.5
47	Trellix (merger of FireEye Inc	1211	3518	34.4	IEEE	1211	34.4	ACM-Assoc Comput Mach	598	17.0
48	Adobe Inc. (former Adobe Sy	1205	4314	27.9	ACM-Assoc Comput Mach	1694	39.3	IEEE	1205	27.9
49	PACT XPP TECHNOLOGIE	1199	2072	57.9	IEEE	1199	57.9	ACM-Assoc Comput Mach	194	9.4
50	Softbank Corp	1133	2749	41.2	IEEE	1133	41.2	Joint IEEE and ACM	413	15.0
51	Blackberry Ltd.	1093	2927	37.3	IEEE	1093	37.3	ACM-Assoc Comput Mach	402	13.7
52	P4TENTS1 LLC	1066	2606	40.9	IEEE	1066	40.9	ACM-Assoc Comput Mach	378	14.5
53	NVIDIA Corp.	1065	2691	39.6	IEEE	1065	39.6	ACM-Assoc Comput Mach	603	22.4
54	Texas A&M University	1008	1130	89.2	IEEE	1008	89.2	IET/IEEE	18	1.6
55	Xerox Corp	981	4033	24.3	ACM-Assoc Comput Mach	984	24.4	IEEE	981	24.3
56	Hitachi Ltd	975	3530	27.6	IEEE	975	27.6	ACM-Assoc Comput Mach	568	16.1
57	Western Digital Corp.	975	2726	35.8	IEEE	975	35.8	ACM-Assoc Comput Mach	365	13.4
58	The Arizona Board of Regent	934	2663	35.1	IEEE	934	35.1	ACM-Assoc Comput Mach	297	11.2
59	Seiko Epson Corporation	931	2739	34.0	IEEE	931	34.0	Joint IEEE and ACM	328	12.0
60	Vantiva SA (former Technico	914	1804	50.7	IEEE	914	50.7	ACM-Assoc Comput Mach	167	9.3
61	Intellectual Ventures Manage	895	3908	22.9	IEEE	895	22.9	ACM-Assoc Comput Mach	632	16.2
62	Meta Platforms Inc.(formerly	876	3210	27.3	IEEE	876	27.3	ACM-Assoc Comput Mach	846	26.4
63	Massachusetts Institute of Te	875	2685	32.6	IEEE	875	32.6	ACM-Assoc Comput Mach	389	14.5
64	Tabula Inc	873	2422	36.0	IEEE	873	36.0	ACM-Assoc Comput Mach	864	35.7
65	NXP Semiconductors NV	849	1565	54.2	IEEE	849	54.2	Joint IEEE and ACM	196	12.5
66	Texas Instruments Inc	847	1537	55.1	IEEE	847	55.1	Joint IEEE and ACM	139	9.0
67	Hewlett Packard Enterprises	834	2702	30.9	IEEE	834	30.9	ACM-Assoc Comput Mach	697	25.8
68	LG Electronics Inc.	795	2652	30.0	IEEE	795	30.0	3GPP General Partnership Project Standards Body	370	14.0
69	General Electric Company	768	1879	40.9	IEEE	768	40.9	RELX Group (Elsevier)	205	10.9
70	Brain Corporation	752	2448	30.7	IEEE	752	30.7	MIT Press	363	14.8
71	Hon Hai Precision Industry C	741	3208	23.1	IEEE	741	23.1	SID-Society for Information Display	459	14.3
72	Magic Leap Inc	735	1995	36.8	IEEE	735	36.8	ACM-Assoc Comput Mach	211	10.6
73	Fujifilm Business Innovation	723	2251	32.1	IEEE	723	32.1	ACM-Assoc Comput Mach	538	23.9
74	Cloud Software Group	719	2089	34.4	IEEE	719	34.4	ACM-Assoc Comput Mach	320	15.3
75	University of California	698	3582	19.5	IEEE	698	19.5	RELX Group (Elsevier)	410	11.4
76	Tela Innovations inc	696	1921	36.2	IEEE	696	36.2	SPIE-Int Soc Opt Engineering	585	30.5
77	SRC Computers Inc.	684	770	88.8	IEEE	684	88.8	ACM-Assoc Comput Mach	25	3.2
78	Empire Technology Develop	674	2125	31.7	IEEE	674	31.7	Joint IEEE and ACM	640	30.1
79	Netapp Inc	674	3482	19.4	ACM-Assoc Comput Mach	1392	40.0	IEEE	674	19.4
80	Ericsson	673	2329	28.9	IEEE	673	28.9	3GPP General Partnership Project Standards Body	359	15.4

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	HRL Laboratories LLC	666	1855	35.9	IEEE	666	35.9	ACM-Assoc Comput Mach	199	10.7
82	Koninklijke Philips N.V.	660	1819	36.3	IEEE	660	36.3	RELX Group (Elsevier)	171	9.4
83	Mitsubishi Electric Corp	654	1465	44.6	IEEE	654	44.6	ACM-Assoc Comput Mach	227	15.5
84	NEWVALUEXCHANGE LT	647	1772	36.5	IEEE	647	36.5	ACM-Assoc Comput Mach	416	23.5
85	Nippon Telegraph & Telepho	642	2225	28.9	IEEE	642	28.9	ACM-Assoc Comput Mach	252	11.3
86	Raytheon Co.	636	1863	34.1	IEEE	636	34.1	ACM-Assoc Comput Mach	157	8.4
87	Digimarc Corp.	635	1790	35.5	IEEE	635	35.5	ACM-Assoc Comput Mach	297	16.6
88	Math Works Inc (The)	632	1656	38.2	IEEE	632	38.2	ACM-Assoc Comput Mach	358	21.6
89	Wave Computing Inc.	628	2106	29.8	IEEE	628	29.8	ACM-Assoc Comput Mach	377	17.9
90	VMWare Inc	627	2902	21.6	ACM-Assoc Comput Mach	1177	40.6	IEEE	627	21.6
91	Industrial Technology Researc	613	1260	48.7	IEEE	613	48.7	ACM-Assoc Comput Mach	122	9.7
92	PURE Storage Inc	610	4325	14.1	Internet Soc/IETF-Internet Eng Task Force	2091	48.3	ACM-Assoc Comput Mach	937	21.7
93	Electronics and Telecommuni	608	1381	44.0	IEEE	608	44.0	ACM-Assoc Comput Mach	136	9.8
94	Mosaid Technologies (forme	597	853	70.0	IEEE	597	70.0	Joint IEEE and ACM	53	6.2
95	Murata Manufacturing Co. Lt	592	775	76.4	IEEE	592	76.4	RELX Group (Elsevier)	30	3.9
96	EDGE 3 TECHNOLOGIES I	569	899	63.3	IEEE	569	63.3	RELX Group (Elsevier)	54	6.0
97	SILVERBROOK RESEARC	565	1439	39.3	IEEE	565	39.3	Springer Nature	285	19.8
98	Accenture Ltd.	562	1794	31.3	IEEE	562	31.3	ACM-Assoc Comput Mach	437	24.4
99	Dolby Laboratories Inc	559	1537	36.4	IEEE	559	36.4	Audio Eng Soc	186	12.1
100	Zebra Technologies Corp.	554	1216	45.6	IEEE	554	45.6	ACM-Assoc Comput Mach	79	6.5

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Computer Software</i>										
1	Microsoft Corporation	32250	1E+05	31.8	IEEE	32250	31.8	ACM-Assoc Comput Mach	26631	26.3
2	Apple Inc	23046	66933	34.4	IEEE	23046	34.4	ACM-Assoc Comput Mach	13419	20.0
3	International Business Machi	18072	68636	26.3	IEEE	18072	26.3	ACM-Assoc Comput Mach	13810	20.1
4	Alphabet Inc.	11801	37507	31.5	IEEE	11801	31.5	ACM-Assoc Comput Mach	8306	22.1
5	Xperi Holding Corporation (F	5277	11338	46.5	IEEE	5277	46.5	ACM-Assoc Comput Mach	1071	9.4
6	Adobe Inc. (former Adobe Sy	5262	14134	37.2	IEEE	5262	37.2	ACM-Assoc Comput Mach	4345	30.7
7	Amazon.com Inc.	4626	14972	30.9	IEEE	4626	30.9	ACM-Assoc Comput Mach	3038	20.3
8	Oracle Corporation	4552	19685	23.1	ACM-Assoc Comput Mach	6038	30.7	IEEE	4552	23.1
9	Intel Corporation	3650	8497	43.0	IEEE	3650	43.0	ACM-Assoc Comput Mach	1573	18.5
10	Qualcomm Inc	3591	8631	41.6	IEEE	3591	41.6	3GPP General Partnership Project Standards Body	481	5.6
11	Siemens Aktiengesellschaft	3544	9581	37.0	IEEE	3544	37.0	SPIE-Int Soc Opt Engineering	1029	10.7
12	Cisco Systems Inc.	2929	10036	29.2	IEEE	2929	29.2	ACM-Assoc Comput Mach	1831	18.2
13	Dolby Laboratories Inc	2701	5634	47.9	IEEE	2701	47.9	Audio Eng Soc	950	16.9
14	AT&T Inc	2666	6959	38.3	IEEE	2666	38.3	ACM-Assoc Comput Mach	1020	14.7
15	Xerox Corp	2571	7979	32.2	IEEE	2571	32.2	ACM-Assoc Comput Mach	1543	19.3
16	Sap SE	2470	11908	20.7	ACM-Assoc Comput Mach	4199	35.3	IEEE	2470	20.7
17	Commvault Systems Inc.	2325	4039	57.6	IEEE	2325	57.6	ACM-Assoc Comput Mach	656	16.2
18	Ricoh Co. Ltd.	2228	4946	45.0	IEEE	2228	45.0	ACM-Assoc Comput Mach	804	16.3
19	Koninklijke Philips N.V.	2180	8149	26.8	IEEE	2180	26.8	RELX Group (Elsevier)	1025	12.6
20	HP Inc	2092	5692	36.8	IEEE	2092	36.8	ACM-Assoc Comput Mach	1234	21.7
21	Sony Group Corp	1856	4065	45.7	IEEE	1856	45.7	ACM-Assoc Comput Mach	650	16.0
22	General Electric Company	1849	4215	43.9	IEEE	1849	43.9	RELX Group (Elsevier)	396	9.4
23	Cadence Design Systems Inc	1775	3727	47.6	IEEE	1775	47.6	Joint IEEE and ACM	1049	28.1
24	Magna International Inc.	1774	3209	55.3	IEEE	1774	55.3	SAE-Society of Automobile Engineers	231	7.2
25	Digimarc Corp.	1715	4538	37.8	IEEE	1715	37.8	SPIE-Int Soc Opt Engineering	725	16.0
26	Synopsys Inc.	1668	5619	29.7	IEEE	1668	29.7	SPIE-Int Soc Opt Engineering	1239	22.1
27	NVIDIA Corp.	1666	5451	30.6	ACM-Assoc Comput Mach	1783	32.7	IEEE	1666	30.6
28	Broadcom Ltd	1663	3561	46.7	IEEE	1663	46.7	ACM-Assoc Comput Mach	360	10.1
29	Cortica Ltd	1655	2428	68.2	IEEE	1655	68.2	ACM-Assoc Comput Mach	266	11.0
30	Nokia Corporation	1641	4745	34.6	IEEE	1641	34.6	ACM-Assoc Comput Mach	481	10.1
31	Advanced Micro Devices Inc	1636	6899	23.7	ACM-Assoc Comput Mach	3209	46.5	IEEE	1636	23.7
32	Cognex Corp.	1569	3752	41.8	IEEE	1569	41.8	RELX Group (Elsevier)	702	18.7
33	HRL Laboratories LLC	1534	3626	42.3	IEEE	1534	42.3	RELX Group (Elsevier)	308	8.5
34	Honeywell International Inc.	1451	2778	52.2	IEEE	1451	52.2	RELX Group (Elsevier)	250	9.0
35	Meta Platforms Inc.(formerly	1420	5790	24.5	ACM-Assoc Comput Mach	1601	27.7	IEEE	1420	24.5
36	Accenture Ltd.	1405	4420	31.8	IEEE	1405	31.8	ACM-Assoc Comput Mach	662	15.0
37	Sonos Inc	1387	4138	33.5	IEEE	1387	33.5	Open Connectivity Foundation	340	8.2
38	Applied Materials Inc.	1318	2374	55.5	IEEE	1318	55.5	American Institute of Physics	129	5.4
39	Blackberry Ltd.	1275	3641	35.0	IEEE	1275	35.0	ACM-Assoc Comput Mach	326	9.0

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Samsung Electronics Co Ltd	1250	2946	42.4	IEEE	1250	42.4	ACM-Assoc Comput Mach	275	9.3
41	Walt Disney Co.	1242	5219	23.8	ACM-Assoc Comput Mach	2487	47.7	IEEE	1242	23.8
42	Honda Motor Co. Ltd.(Honda	1237	2508	49.3	IEEE	1237	49.3	RELX Group (Elsevier)	245	9.8
43	NEC Corp	1212	3089	39.2	IEEE	1212	39.2	ACM-Assoc Comput Mach	450	14.6
44	Intuitive Surgical Inc.	1167	2782	41.9	IEEE	1167	41.9	The Medical Image Computing and Computer Assisted Interve	317	11.4
45	eBay Inc	1156	6105	18.9	IEEE	1156	18.9	ACM-Assoc Comput Mach	803	13.2
46	Fraunhofer Gesellschaft	1140	3049	37.4	IEEE	1140	37.4	Audio Eng Soc	420	13.8
47	Raytheon Co.	1120	2659	42.1	IEEE	1120	42.1	SPIE-Int Soc Opt Engineering	218	8.2
48	Intellectual Ventures Manage	1100	5792	19.0	IEEE	1100	19.0	RELX Group (Elsevier)	622	10.7
49	PHOENIX SOLUTIONS INC	1070	3332	32.1	IEEE	1070	32.1	ISCA (International Speech Communication Association)	422	12.7
50	Magic Leap Inc	1021	2086	48.9	IEEE	1021	48.9	ACM-Assoc Comput Mach	201	9.6
51	OneTrust	950	3038	31.3	ACM-Assoc Comput Mach	1442	47.5	IEEE	950	31.3
52	MicroUnity Systems Enginee	939	1529	61.4	IEEE	939	61.4	Joint IEEE and ACM	140	9.2
53	Canon Inc	935	2240	41.7	IEEE	935	41.7	RELX Group (Elsevier)	218	9.7
54	Massachusetts Institute of Te	907	3018	30.1	IEEE	907	30.1	RELX Group (Elsevier)	301	10.0
55	LG Electronics Inc.	906	1968	46.0	IEEE	906	46.0	Audio Eng Soc	139	7.1
56	STMicroelectronics	887	1515	58.5	IEEE	887	58.5	RELX Group (Elsevier)	97	6.4
57	SalesforceCom Inc	877	2751	31.9	IEEE	877	31.9	ACM-Assoc Comput Mach	494	18.0
58	Ericsson	873	3000	29.1	IEEE	873	29.1	3GPP General Partnership Project Standards Body	444	14.8
59	Palantir Technologies Inc	863	4209	20.5	ACM-Assoc Comput Mach	904	21.5	IEEE	863	20.5
60	Boeing Co. (The)	839	2602	32.2	IEEE	839	32.2	RELX Group (Elsevier)	345	13.3
61	Battelle Memorial Institute	820	1312	62.5	IEEE	820	62.5	RELX Group (Elsevier)	115	8.8
62	Dell Technologies Inc	815	2802	29.1	IEEE	815	29.1	ACM-Assoc Comput Mach	557	19.9
63	Huawei Technologies Compa	803	2445	32.8	IEEE	803	32.8	ACM-Assoc Comput Mach	225	9.2
64	ParkerVision Inc	792	1713	46.2	IEEE	792	46.2	IET/IEE	491	28.7
65	Bosch (Robert) GmbH	788	4246	18.6	IEEE	788	18.6	Springer Nature	381	9.0
66	Nippon Telegraph & Telepho	785	2779	28.2	IEEE	785	28.2	ACM-Assoc Comput Mach	343	12.3
67	University of California	772	4982	15.5	IEEE	772	15.5	RELX Group (Elsevier)	668	13.4
68	Mitsubishi Electric Corp	767	1610	47.6	IEEE	767	47.6	ACM-Assoc Comput Mach	323	20.1
69	Motorola Solutions Inc.	754	1239	60.9	IEEE	754	60.9	Springer Nature	74	6.0
70	The Arizona Board of Regent	743	2008	37.0	IEEE	743	37.0	RELX Group (Elsevier)	213	10.6
71	Panasonic Holding Corporati	718	1814	39.6	IEEE	718	39.6	RELX Group (Elsevier)	129	7.1
72	Columbia University	711	2480	28.7	IEEE	711	28.7	ACM-Assoc Comput Mach	399	16.1
73	Fujitsu Limited	710	2048	34.7	IEEE	710	34.7	Joint IEEE and ACM	349	17.0
74	Tela Innovations inc	702	2316	30.3	SPIE-Int Soc Opt Engineering	882	38.1	IEEE	702	30.3
75	Eagleview Technologies Inc	701	2503	28.0	IEEE	701	28.0	ACM-Assoc Comput Mach	482	19.3
76	Toyota Motor Corp	658	1328	49.5	IEEE	658	49.5	RELX Group (Elsevier)	88	6.6
77	Vantiva SA (former Technico	652	1444	45.2	IEEE	652	45.2	ACM-Assoc Comput Mach	124	8.6
78	IP RESERVOIR LLC	646	1277	50.6	IEEE	646	50.6	ACM-Assoc Comput Mach	221	17.3
79	Nant Holdings IP Llc	597	2671	22.4	Joint IEEE and ACM	855	32.0	ACM-Assoc Comput Mach	653	24.4
80	Cloud Software Group	596	1950	30.6	IEEE	596	30.6	ACM-Assoc Comput Mach	358	18.4

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Lumens Technologies Inc. (fo	589	2482	23.7	ACM-Assoc Comput Mach	702	28.3	IEEE	589	23.7
82	INDIVIDUAL PATENTER	588	2957	19.9	IEEE	588	19.9	ACM-Assoc Comput Mach	422	14.3
83	Hon Hai Precision Industry C	587	1337	43.9	IEEE	587	43.9	ACM-Assoc Comput Mach	137	10.2
84	Verizon Communications Inc	554	2130	26.0	IEEE	554	26.0	ACM-Assoc Comput Mach	394	18.5
85	BT Group PLC	544	1229	44.3	IEEE	544	44.3	ACM-Assoc Comput Mach	126	10.3
86	Yahoo Inc	536	3935	13.6	ACM-Assoc Comput Mach	1165	29.6	IEEE	536	13.6
87	Seiko Epson Corporation	534	1055	50.6	IEEE	534	50.6	ACM-Assoc Comput Mach	98	9.3
88	Nielsen Holdings Plc	524	4764	11.0	RELX Group (Elsevier)	1019	21.4	IEEE	524	11.0
89	SRI International	523	1284	40.7	IEEE	523	40.7	RELX Group (Elsevier)	75	5.8
90	Hewlett Packard Enterprises	521	1933	27.0	ACM-Assoc Comput Mach	531	27.5	IEEE	521	27.0
91	Math Works Inc (The)	513	1226	41.8	IEEE	513	41.8	ACM-Assoc Comput Mach	213	17.4
92	United States Navy	506	1104	45.8	IEEE	506	45.8	RELX Group (Elsevier)	90	8.2
93	University of North Carolina	506	1677	30.2	IEEE	506	30.2	ACM-Assoc Comput Mach	230	13.7
94	Eastman Kodak Company	501	1091	45.9	IEEE	501	45.9	RELX Group (Elsevier)	100	9.2
95	Texas Instruments Inc	501	816	61.4	IEEE	501	61.4	International Telecommunication Union	91	11.2
96	United Services Automobile	501	3786	13.2	Source Media	661	17.5	IEEE	501	13.2
97	Lockheed Martin Corp.	500	1160	43.1	IEEE	500	43.1	RELX Group (Elsevier)	109	9.4
98	State University of New York	497	1263	39.4	IEEE	497	39.4	ACM-Assoc Comput Mach	153	12.1
99	Infineon Technologies AG	489	789	62.0	IEEE	489	62.0	Joint IEEE and ACM	93	11.8
100	Marvell Technology Group Lt	484	681	71.1	IEEE	484	71.1	ACM-Assoc Comput Mach	40	5.9

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Cybersecurity</i>										
1	Microsoft Corporation	7185	27420	26.2	IEEE	7185	26.2	ACM-Assoc Comput Mach	6500	23.7
2	OneTrust	6362	20384	31.2	ACM-Assoc Comput Mach	9937	48.7	IEEE	6362	31.2
3	International Business Machi	6324	27468	23.0	IEEE	6324	23.0	ACM-Assoc Comput Mach	5105	18.6
4	Cisco Systems Inc.	4248	14761	28.8	IEEE	4248	28.8	ACM-Assoc Comput Mach	2216	15.0
5	Trellix (merger of FireEye Inc	2706	7755	34.9	IEEE	2706	34.9	ACM-Assoc Comput Mach	1340	17.3
6	Intel Corporation	2245	5954	37.7	IEEE	2245	37.7	ACM-Assoc Comput Mach	681	11.4
7	Alphabet Inc.	2182	7458	29.3	IEEE	2182	29.3	ACM-Assoc Comput Mach	1425	19.1
8	Blackberry Ltd.	2083	7967	26.1	IEEE	2083	26.1	3GPP General Partnership Project Standards Body	883	11.1
9	Oracle Corporation	1868	8336	22.4	IEEE	1868	22.4	ACM-Assoc Comput Mach	1703	20.4
10	AT&T Inc	1605	4713	34.1	IEEE	1605	34.1	ACM-Assoc Comput Mach	529	11.2
11	Columbia University	1521	6527	23.3	IEEE	1521	23.3	ACM-Assoc Comput Mach	1248	19.1
12	Apple Inc	1452	4788	30.3	IEEE	1452	30.3	ACM-Assoc Comput Mach	1003	20.9
13	Intertrust Technologies Corp	1384	8939	15.5	ACM-Assoc Comput Mach	1564	17.5	IEEE	1384	15.5
14	Amazon.com Inc.	1370	5795	23.6	IEEE	1370	23.6	ACM-Assoc Comput Mach	891	15.4
15	Massachusetts Institute of Te	1331	2346	56.7	IEEE	1331	56.7	ACM-Assoc Comput Mach	262	11.2
16	Wisteria Trading Inc	1325	2809	47.2	IEEE	1325	47.2	SPIE-Int Soc Opt Engineering	326	11.6
17	Nokia Corporation	1152	5310	21.7	3GPP General Partnership Project Standards B	1417	26.7	IEEE	1152	21.7
18	X ONE INC	1036	2922	35.5	IEEE	1036	35.5	ACM-Assoc Comput Mach	522	17.9
19	Cloud Software Group	1031	3101	33.2	IEEE	1031	33.2	ACM-Assoc Comput Mach	376	12.1
20	Qualcomm Inc	976	3906	25.0	3GPP General Partnership Project Standards B	1106	28.3	IEEE	976	25.0
21	InterDigital Inc	924	4248	21.8	3GPP General Partnership Project Standards B	2820	66.4	IEEE	924	21.8
22	McAfee Inc	917	4039	22.7	IEEE	917	22.7	ACM-Assoc Comput Mach	774	19.2
23	Gen Digital Inc. (formerly No	900	3411	26.4	IEEE	900	26.4	ACM-Assoc Comput Mach	724	21.2
24	IP RESERVOIR LLC	883	1686	52.4	IEEE	883	52.4	ACM-Assoc Comput Mach	245	14.5
25	Nippon Telegraph & Telepho	882	4420	20.0	IEEE	882	20.0	ACM-Assoc Comput Mach	568	12.9
26	Huawei Technologies Compa	864	5195	16.6	3GPP General Partnership Project Standards B	2346	45.2	IEEE	864	16.6
27	Headwater Partners 1 LLC	843	2039	41.3	IEEE	843	41.3	3GPP General Partnership Project Standards Body	382	18.7
28	Juniper Networks Inc.	824	1901	43.3	IEEE	824	43.3	Internet Soc/IETF-Internet Eng Task Force	372	19.6
29	Digimarc Corp.	815	2334	34.9	IEEE	815	34.9	ACM-Assoc Comput Mach	261	11.2
30	NXGEN PARTNERS IP LLC	803	1557	51.6	IEEE	803	51.6	Optical Society of America	383	24.6
31	Ericsson	775	5642	13.7	3GPP General Partnership Project Standards B	2413	42.8	IEEE	775	13.7
32	Broadcom Ltd	764	2270	33.7	IEEE	764	33.7	Network Working Group RFC	289	12.7
33	CENTRIPETAL NETWORK	698	2115	33.0	IEEE	698	33.0	ACM-Assoc Comput Mach	389	18.4
34	Dell Technologies Inc	687	2437	28.2	IEEE	687	28.2	ACM-Assoc Comput Mach	485	19.9
35	Verizon Communications Inc	673	2383	28.2	IEEE	673	28.2	Internet Soc/IETF-Internet Eng Task Force	558	23.4
36	Xerox Corp	668	2185	30.6	IEEE	668	30.6	ACM-Assoc Comput Mach	638	29.2
37	Marvell Technology Group Lt	656	1030	63.7	IEEE	656	63.7	ACM-Assoc Comput Mach	73	7.1
38	Sony Group Corp	645	1826	35.3	IEEE	645	35.3	ACM-Assoc Comput Mach	191	10.5
39	Samsung Electronics Co Ltd	630	2098	30.0	3GPP General Partnership Project Standards B	736	35.1	IEEE	630	30.0

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Softbank Corp	626	2088	30.0	IEEE	626	30.0	Virus Bulletin Ltd	261	12.5
41	VirnetX Holding Corp	587	11857	5.0	Network Working Group RFC	6287	53.0	Internet Soc/IETF-Internet Eng Task Force	1816	15.3
42	Verance Corp	583	1183	49.3	IEEE	583	49.3	SPIE-Int Soc Opt Engineering	155	13.1
43	Raytheon Co.	580	2058	28.2	IEEE	580	28.2	ACM-Assoc Comput Mach	239	11.6
44	Comcast Corp	557	1352	41.2	IEEE	557	41.2	3GPP General Partnership Project Standards Body	522	38.6
45	Commvault Systems Inc.	554	956	57.9	IEEE	554	57.9	ACM-Assoc Comput Mach	145	15.2
46	Advanced New Technologies	553	1045	52.9	IEEE	553	52.9	ACM-Assoc Comput Mach	73	7.0
47	Extreme Networks Inc	533	1214	43.9	IEEE	533	43.9	ACM-Assoc Comput Mach	146	12.0
48	The Arizona Board of Regent	510	1460	34.9	IEEE	510	34.9	ACM-Assoc Comput Mach	377	25.8
49	NXP Semiconductors NV	501	980	51.1	IEEE	501	51.1	International Association for Cryptologic Research (IACR)	87	8.9
50	Fortinet Inc	484	1017	47.6	IEEE	484	47.6	ACM-Assoc Comput Mach	183	18.0
51	L3 Harris Technologies (form	481	849	56.7	IEEE	481	56.7	ACM-Assoc Comput Mach	71	8.4
52	HP Inc	474	1834	25.8	IEEE	474	25.8	ACM-Assoc Comput Mach	290	15.8
53	Palo Alto Networks	466	1210	38.5	IEEE	466	38.5	ACM-Assoc Comput Mach	209	17.3
54	VMWare Inc	457	2376	19.2	ACM-Assoc Comput Mach	853	35.9	IEEE	457	19.2
55	NEC Corp	432	2357	18.3	3GPP General Partnership Project Standards B	708	30.0	IEEE	432	18.3
56	LG Electronics Inc.	428	1575	27.2	3GPP General Partnership Project Standards B	643	40.8	IEEE	428	27.2
57	Sonos Inc	412	1236	33.3	IEEE	412	33.3	Open Connectivity Foundation	109	8.8
58	Assa Abloy AB	409	2072	19.7	IEEE	409	19.7	International Association for Cryptologic Research (IACR)	371	17.9
59	Sap SE	401	1670	24.0	ACM-Assoc Comput Mach	539	32.3	IEEE	401	24.0
60	Hewlett Packard Enterprises	400	1390	28.8	IEEE	400	28.8	ACM-Assoc Comput Mach	248	17.8
61	BT Group PLC	396	1104	35.9	IEEE	396	35.9	RELX Group (Elsevier)	82	7.4
62	Ricoh Co. Ltd.	395	1038	38.1	IEEE	395	38.1	ACM-Assoc Comput Mach	234	22.5
63	Meta Platforms Inc.(formerly	394	1983	19.9	ACM-Assoc Comput Mach	439	22.1	IEEE	394	19.9
64	Security First Corp	372	1392	26.7	ACM-Assoc Comput Mach	401	28.8	IEEE	372	26.7
65	DAMBALLA INC	370	1990	18.6	The USENIX Association	550	27.6	ACM-Assoc Comput Mach	397	19.9
66	Advanced Micro Devices Inc	364	1987	18.3	ACM-Assoc Comput Mach	992	49.9	Joint IEEE and ACM	380	19.1
67	Accenture Ltd.	360	1095	32.9	IEEE	360	32.9	ACM-Assoc Comput Mach	239	21.8
68	Fujitsu Limited	350	1208	29.0	IEEE	350	29.0	ACM-Assoc Comput Mach	181	15.0
69	THE CHAMBERLAIN GRO	348	1023	34.0	IEEE	348	34.0	International Association for Cryptologic Research (IACR)	157	15.3
70	BLUERISC INC	335	945	35.4	IEEE	335	35.4	ACM-Assoc Comput Mach	218	23.1
71	Witricity Corp	324	609	53.2	IEEE	324	53.2	American Institute of Physics	41	6.7
72	Palantir Technologies Inc	316	1588	19.9	IEEE	316	19.9	ACM-Assoc Comput Mach	263	16.6
73	Analog Devices Inc.	314	721	43.6	IEEE	314	43.6	ACM-Assoc Comput Mach	153	21.2
74	Toshiba Corp	313	1457	21.5	IEEE	313	21.5	AACS-Advanced Access Content System	299	20.5
75	Motorola Solutions Inc.	311	677	45.9	IEEE	311	45.9	Network Working Group RFC	68	10.0
76	Rambus Inc.	291	1121	26.0	International Association for Cryptologic Rese	340	30.3	IEEE	291	26.0
77	Empire Technology Develop	285	1014	28.1	IEEE	285	28.1	ACM-Assoc Comput Mach	199	19.6
78	SILVERBROOK RESEARC	281	547	51.4	IEEE	281	51.4	RELX Group (Elsevier)	146	26.7
79	Bank of America Corp.	279	625	44.6	IEEE	279	44.6	ACM-Assoc Comput Mach	113	18.1
80	Johnson & Johnson	269	1113	24.2	IEEE	269	24.2	RELX Group (Elsevier)	267	24.0

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	T-Mobile USA INC	266	981	27.1	IEEE	266	27.1	3GPP General Partnership Project Standards Body	89	9.1
82	Panasonic Holding Corporati	265	1070	24.8	IEEE	265	24.8	3GPP General Partnership Project Standards Body	188	17.6
83	BLACK HILLS MEDIA LLC	264	1786	14.8	Open Connectivity Foundation	1068	59.8	IEEE	264	14.8
84	Open Text Corp	260	608	42.8	IEEE	260	42.8	ACM-Assoc Comput Mach	153	25.2
85	CapitalOne	256	1164	22.0	IEEE	256	22.0	CBS Interactive	151	13.0
86	DropBox Inc	256	646	39.6	IEEE	256	39.6	ACM-Assoc Comput Mach	136	21.1
87	WEST VIEW RESEARCH L	254	625	40.6	IEEE	254	40.6	SAE-Society of Automobile Engineers	86	13.8
88	VerintSys	245	1318	18.6	ACM-Assoc Comput Mach	276	20.9	IEEE	245	18.6
89	SalesforceCom Inc	244	686	35.6	IEEE	244	35.6	ACM-Assoc Comput Mach	118	17.2
90	Walmart Stores Inc	242	702	34.5	IEEE	242	34.5	CBS Interactive	69	9.8
91	Wells Fargo & Co	242	744	32.5	IEEE	242	32.5	ANSI-American National Standards Institute	78	10.5
92	CONVERGENT MEDIA SO	240	1055	22.7	ACM-Assoc Comput Mach	257	24.4	IEEE	240	22.7
93	Commscope Holding (formerl	238	484	49.2	IEEE	238	49.2	3GPP General Partnership Project Standards Body	57	11.8
94	Intellectual Ventures Manage	233	1073	21.7	IEEE	233	21.7	ACM-Assoc Comput Mach	129	12.0
95	ViaPath Technologies (Forme	233	460	50.7	IEEE	233	50.7	RELX Group (Elsevier)	30	6.5
96	INDIVIDUAL PATENTER	231	829	27.9	IEEE	231	27.9	ACM-Assoc Comput Mach	123	14.8
97	Micro Focus International PL	230	759	30.3	IEEE	230	30.3	ACM-Assoc Comput Mach	101	13.3
98	Alibaba Group Holding Ltd	224	554	40.4	IEEE	224	40.4	ACM-Assoc Comput Mach	71	12.8
99	F5 Networks Inc	223	1504	14.8	Network Working Group RFC	263	17.5	IEEE	223	14.8
100	Siemens Aktiengesellschaft	222	699	31.8	IEEE	222	31.8	Internet Soc/IETF-Internet Eng Task Force	94	13.4

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Diagnosis/Surgery/Medical Instruments</i>										
1	Medtronic Inc	11669	2E+05	6.5	RELX Group (Elsevier)	30586	17.0	Wolters Kluwer	24530	13.6
2	Johnson & Johnson	7236	87841	8.2	RELX Group (Elsevier)	19439	22.1	Springer Nature	9176	10.4
3	Boston Scientific Corp.	6165	90645	6.8	RELX Group (Elsevier)	23376	25.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	11543	12.7
4	Dexcom Inc	5890	1E+05	5.8	RELX Group (Elsevier)	25976	25.5	American Diabetes Association	10505	10.3
5	Intuitive Surgical Inc.	5285	14572	36.3	IEEE	5285	36.3	The Medical Image Computing and Computer Assisted Interve	1421	9.8
6	Abbott Laboratories	4607	1E+05	4.3	RELX Group (Elsevier)	24925	23.5	ACS-Am Chem Soc	10231	9.7
7	Mass General Brigham (form	2715	44671	6.1	Optical Society of America	14064	31.5	RELX Group (Elsevier)	6809	15.2
8	Masimo Corp	2678	5708	46.9	IEEE	2678	46.9	Springer Nature	500	8.8
9	Koninklijke Philips N.V.	2406	17772	13.5	RELX Group (Elsevier)	2674	15.0	IEEE	2406	13.5
10	Massachusetts Institute of Te	2038	9904	20.6	IEEE	2038	20.6	RELX Group (Elsevier)	2003	20.2
11	Intellectual Ventures Manage	1983	14278	13.9	IEEE	1983	13.9	RELX Group (Elsevier)	1638	11.5
12	Stryker Corp.	1666	15191	11.0	RELX Group (Elsevier)	2721	17.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1777	11.7
13	GUIDED THERAPY SYSTE	1612	6885	23.4	IEEE	1612	23.4	RELX Group (Elsevier)	1144	16.6
14	Siemens Aktiengesellschaft	1461	8828	16.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1795	20.3	RELX Group (Elsevier)	1722	19.5
15	University of California	1380	12727	10.8	RELX Group (Elsevier)	2406	18.9	IEEE	1380	10.8
16	Valencell Inc	1257	3399	37.0	IEEE	1257	37.0	RELX Group (Elsevier)	329	9.7
17	LivaNova Plc	1175	22004	5.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	4883	22.2	RELX Group (Elsevier)	4356	19.8
18	Vanderbilt University	1089	3439	31.7	IEEE	1089	31.7	RELX Group (Elsevier)	495	14.4
19	Smith & Nephew Plc.	1057	16990	6.2	RELX Group (Elsevier)	3335	19.6	Wolters Kluwer	1705	10.0
20	General Electric Company	950	4433	21.4	IEEE	950	21.4	RELX Group (Elsevier)	629	14.2
21	Mevion Medical Systems Inc	916	2945	31.1	IEEE	916	31.1	RELX Group (Elsevier)	572	19.4
22	Otto Bock Holding GmbH &	897	2825	31.8	IEEE	897	31.8	RELX Group (Elsevier)	597	21.1
23	Ossur hf	854	2769	30.8	IEEE	854	30.8	RELX Group (Elsevier)	604	21.8
24	Columbia University	848	5335	15.9	RELX Group (Elsevier)	1388	26.0	IEEE	848	15.9
25	VIVAQUANT LLC	846	1730	48.9	IEEE	846	48.9	RELX Group (Elsevier)	222	12.8
26	Stanford University	831	24126	3.4	RELX Group (Elsevier)	4178	17.3	Springer Nature	3745	15.5
27	Sotera Wireless	813	1759	46.2	IEEE	813	46.2	Springer Nature	342	19.4
28	Alphabet Inc.	787	2427	32.4	IEEE	787	32.4	RELX Group (Elsevier)	265	10.9
29	Baxter International Inc.	787	9036	8.7	RELX Group (Elsevier)	2040	22.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	951	10.5
30	University of Minnesota (The	770	3486	22.1	IEEE	770	22.1	RELX Group (Elsevier)	716	20.5
31	University of Illinois	730	10494	7.0	RELX Group (Elsevier)	1480	14.1	ACS-Am Chem Soc	1432	13.6
32	BUTTERFLY NETWORKS I	688	780	88.2	IEEE	688	88.2	Acoustical Society of America	28	3.6
33	University of Nebraska	672	3447	19.5	IEEE	672	19.5	Springer Nature	589	17.1
34	Virginia Tech University	640	4748	13.5	RELX Group (Elsevier)	1049	22.1	IEEE	640	13.5
35	Saluda Medical Pty Ltd	589	3405	17.3	IEEE	589	17.3	RELX Group (Elsevier)	559	16.4
36	Maui Diagnostic Imaging	582	941	61.8	IEEE	582	61.8	RELX Group (Elsevier)	121	12.9
37	Cleveland Clinic (and Founda	581	3803	15.3	RELX Group (Elsevier)	776	20.4	IEEE	581	15.3
38	Johns Hopkins University	563	3772	14.9	RELX Group (Elsevier)	605	16.0	IEEE	563	14.9
39	The Arizona Board of Regent	538	2044	26.3	IEEE	538	26.3	RELX Group (Elsevier)	332	16.2

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	University of Michigan	535	6396	8.4	RELX Group (Elsevier)	1803	28.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	591	9.2
41	MIRAMAR LABS INC	476	1356	35.1	IEEE	476	35.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	169	12.5
42	University of Washington	449	4913	9.1	RELX Group (Elsevier)	974	19.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	540	11.0
43	Becton Dickinson and Co.	447	30199	1.5	Wolters Kluwer	8233	27.3	RELX Group (Elsevier)	5305	17.6
44	California Institute of Techno	434	3579	12.1	RELX Group (Elsevier)	493	13.8	IEEE	434	12.1
45	University of Texas	433	5542	7.8	RELX Group (Elsevier)	1141	20.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	607	11.0
46	FACENSE LTD	431	768	56.1	IEEE	431	56.1	RELX Group (Elsevier)	67	8.7
47	Otsuka Holdings Co Ltd	427	3009	14.2	RELX Group (Elsevier)	594	19.7	IEEE	427	14.2
48	BIO CONTROL MEDICAL (	383	1410	27.2	IEEE	383	27.2	Wolters Kluwer	222	15.7
49	Nevro Corp	373	5611	6.6	Wolters Kluwer	1035	18.4	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1007	17.9
50	IWALK INC	372	1160	32.1	IEEE	372	32.1	RELX Group (Elsevier)	251	21.6
51	Blue Sail Medical Co. Ltd.	371	1257	29.5	IEEE	371	29.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	180	14.3
52	INDIVIDUAL PATENTER	368	8383	4.4	RELX Group (Elsevier)	1862	22.2	Wolters Kluwer	1031	12.3
53	University of Pennsylvania	356	6582	5.4	RELX Group (Elsevier)	1058	16.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	827	12.6
54	University Health Network	354	1298	27.3	IEEE	354	27.3	RELX Group (Elsevier)	235	18.1
55	MIRADRY INC	351	953	36.8	IEEE	351	36.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	115	12.1
56	Samsung Electronics Co Ltd	349	898	38.9	IEEE	349	38.9	RELX Group (Elsevier)	94	10.5
57	University of Florida	346	1795	19.3	IEEE	346	19.3	RELX Group (Elsevier)	341	19.0
58	Bonutti Technologies LLC	338	2078	16.3	Springer Nature	486	23.4	IEEE	338	16.3
59	HIGHLAND INSTRUMENT	338	722	46.8	IEEE	338	46.8	RELX Group (Elsevier)	84	11.6
60	Case Western Reserve Univer	337	1465	23.0	IEEE	337	23.0	RELX Group (Elsevier)	194	13.2
61	AngioDynamics Inc.	334	3789	8.8	RELX Group (Elsevier)	855	22.6	Springer Nature	408	10.8
62	Nyxoah SA	329	884	37.2	IEEE	329	37.2	RELX Group (Elsevier)	106	12.0
63	Asahi Kasei Corp.	314	4482	7.0	Wolters Kluwer	1145	25.5	RELX Group (Elsevier)	798	17.8
64	Conformis Inc	305	10203	3.0	Springer Nature	1692	16.6	RELX Group (Elsevier)	1279	12.5
65	Cirrus Logic Inc.	299	498	60.0	IEEE	299	60.0	Acoustical Society of America	74	14.9
66	Alcon Inc	298	6592	4.5	RELX Group (Elsevier)	1778	27.0	American Medical Association	540	8.2
67	University of Pittsburgh	297	4132	7.2	RELX Group (Elsevier)	1152	27.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	518	12.5
68	INNEROPTIC TECHNOLO	291	1667	17.5	IEEE	291	17.5	SPIE-Int Soc Opt Engineering	227	13.6
69	BLUEWIND MEDICAL LT	286	654	43.7	IEEE	286	43.7	American Physiological Society	83	12.7
70	KONA MEDICAL INC	286	1950	14.7	RELX Group (Elsevier)	523	26.8	IEEE	286	14.7
71	Canon Inc	282	1688	16.7	IEEE	282	16.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	200	11.8
72	Medispectra Inc	278	717	38.8	IEEE	278	38.8	RELX Group (Elsevier)	80	11.2
73	United States Department of	263	1433	18.4	RELX Group (Elsevier)	337	23.5	IEEE	263	18.4
74	University of South Florida	260	1318	19.7	IEEE	260	19.7	RELX Group (Elsevier)	257	19.5
75	BRAINGATE CO LLC	254	675	37.6	IEEE	254	37.6	RELX Group (Elsevier)	101	15.0
76	International Business Machi	253	1017	24.9	IEEE	253	24.9	RELX Group (Elsevier)	111	10.9
77	Mayo Foundation for Medica	252	3864	6.5	RELX Group (Elsevier)	882	22.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	519	13.4
78	Zimmer Biomet Holdings	250	10840	2.3	RELX Group (Elsevier)	2305	21.3	Springer Nature	1552	14.3
79	Merz GmbH & Co KGaA	245	1601	15.3	RELX Group (Elsevier)	406	25.4	IEEE	245	15.3
80	Nuvasive Inc	244	9988	2.4	Wolters Kluwer	4728	47.3	Springer Nature	1329	13.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Duke University	242	2146	11.3	RELX Group (Elsevier)	305	14.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	277	12.9
82	Washington University in St.	240	4463	5.4	RELX Group (Elsevier)	657	14.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	643	14.4
83	Hologic Inc	232	3798	6.1	RELX Group (Elsevier)	847	22.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	644	17.0
84	University of North Carolina	231	1837	12.6	RELX Group (Elsevier)	354	19.3	IEEE	231	12.6
85	Victhom Human Bionics Inc	228	642	35.5	IEEE	228	35.5	RELX Group (Elsevier)	197	30.7
86	HEMOSONICS LLC	221	523	42.3	IEEE	221	42.3	RELX Group (Elsevier)	64	12.2
87	Align Technology Inc	220	2077	10.6	JCO - Journal of Clinical Orthodontics	291	14.0	RELX Group (Elsevier)	264	12.7
88	Medrobotics Corp	216	631	34.2	IEEE	216	34.2	Springer Nature	154	24.4
89	PHYSIOWAVE INC	212	548	38.7	IEEE	212	38.7	Wolters Kluwer	128	23.4
90	Ecole Polytechnique Federale	206	1239	16.6	RELX Group (Elsevier)	213	17.2	IEEE	206	16.6
91	ICU Medical Inc	205	1495	13.7	IEEE	205	13.7	Springer Nature	192	12.8
92	DISTALMOTION SA	203	345	58.8	IEEE	203	58.8	IEEE/RSJ	60	17.4
93	University of Virginia (and P	202	1350	15.0	RELX Group (Elsevier)	241	17.9	IEEE	202	15.0
94	Electrocor Llc	197	1167	16.9	IEEE	197	16.9	Natl Acad Sciences	186	15.9
95	University of Southern Califo	191	1241	15.4	RELX Group (Elsevier)	216	17.4	IEEE	191	15.4
96	Bayer AG	190	2059	9.2	RELX Group (Elsevier)	325	15.8	Wolters Kluwer	294	14.3
97	GEARBOX LLC	190	1389	13.7	IEEE	190	13.7	RELX Group (Elsevier)	155	11.2
98	Kardium Inc	188	1387	13.6	IEEE	188	13.6	Springer Nature	173	12.5
99	Deka Products LP	187	414	45.2	IEEE	187	45.2	RELX Group (Elsevier)	65	15.7
100	Northwestern University	187	3202	5.8	RELX Group (Elsevier)	610	19.1	ACS-Am Chem Soc	396	12.4

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<i>Information Storage</i>										
1	Micron Technology Inc.	15732	32583	48.3	IEEE	15732	48.3	RELX Group (Elsevier)	4973	15.3
2	Western Digital Corp.	6304	12354	51.0	IEEE	6304	51.0	American Institute of Physics	1301	10.5
3	ZENO SEMICONDUCTOR I	6237	8352	74.7	IEEE	6237	74.7	IEEE/JPN Soc App Phys	1380	16.5
4	International Business Machi	5038	16874	29.9	IEEE	5038	29.9	ACM-Assoc Comput Mach	2599	15.4
5	Broadcom Ltd	2662	3532	75.4	IEEE	2662	75.4	ACM-Assoc Comput Mach	134	3.8
6	Macronix International Co. Lt	2545	4474	56.9	IEEE	2545	56.9	IEEE/JPN Soc App Phys	877	19.6
7	Semiconductor Energy Labor	2303	26037	8.8	SID-Society for Information Display	9027	34.7	American Institute of Physics	3237	12.4
8	ATTOPSEMI TECHNOLOG	2281	2839	80.3	IEEE	2281	80.3	IEEE/JPN Soc App Phys	347	12.2
9	Mosaid Technologies (forme	2203	2684	82.1	IEEE	2203	82.1	IEEE/JPN Soc App Phys	204	7.6
10	Rambus Inc.	2080	3612	57.6	IEEE	2080	57.6	JEDEC Semiconductor Standards Organization	315	8.7
11	INNOVATIVE SILICON SA	1580	1959	80.7	IEEE	1580	80.7	RELX Group (Elsevier)	84	4.3
12	Intel Corporation	1558	3973	39.2	IEEE	1558	39.2	Joint IEEE and ACM	727	18.3
13	Seagate Technology Plc	1505	4671	32.2	IEEE	1505	32.2	American Institute of Physics	991	21.2
14	Apple Inc	1461	3065	47.7	IEEE	1461	47.7	American Institute of Physics	253	8.3
15	Toshiba Corp	1373	3085	44.5	IEEE	1373	44.5	American Institute of Physics	403	13.1
16	Infineon Technologies AG	1275	1729	73.7	IEEE	1275	73.7	American Institute of Physics	106	6.1
17	Renesas Electronic Corporati	1144	1558	73.4	IEEE	1144	73.4	IEEE/JPN Soc App Phys	117	7.5
18	MONOLITHIC 3D INC	1036	1851	56.0	IEEE	1036	56.0	IEEE/JPN Soc App Phys	189	10.2
19	Samsung Electronics Co Ltd	788	2256	34.9	IEEE	788	34.9	Joint IEEE and ACM	223	9.9
20	Microsoft Corporation	782	3987	19.6	ACM-Assoc Comput Mach	1450	36.4	IEEE	782	19.6
21	Oracle Corporation	735	2646	27.8	ACM-Assoc Comput Mach	1106	41.8	IEEE	735	27.8
22	TDK Corporation	727	2526	28.8	IEEE	727	28.8	American Institute of Physics	521	20.6
23	Commvault Systems Inc.	695	1175	59.1	IEEE	695	59.1	ACM-Assoc Comput Mach	206	17.5
24	Hitachi Ltd	686	1869	36.7	IEEE	686	36.7	ACM-Assoc Comput Mach	183	9.8
25	Netapp Inc	661	2981	22.2	ACM-Assoc Comput Mach	1222	41.0	IEEE	661	22.2
26	NXP Semiconductors NV	595	876	67.9	IEEE	595	67.9	Joint IEEE and ACM	84	9.6
27	Qualcomm Inc	580	982	59.1	IEEE	580	59.1	Joint IEEE and ACM	96	9.8
28	Marvell Technology Group Lt	541	751	72.0	IEEE	541	72.0	ECMA International	34	4.5
29	Synopsys Inc.	527	1003	52.5	IEEE	527	52.5	American Institute of Physics	134	13.4
30	Texas Instruments Inc	516	795	64.9	IEEE	516	64.9	United Business Media/UBM Tech	62	7.8
31	Dell Technologies Inc	505	1410	35.8	IEEE	505	35.8	ACM-Assoc Comput Mach	344	24.4
32	Softbank Corp	492	1070	46.0	IEEE	492	46.0	Joint IEEE and ACM	206	19.3
33	Advanced Micro Devices Inc	469	1156	40.6	IEEE	469	40.6	Joint IEEE and ACM	277	24.0
34	Intellectual Ventures Manage	393	744	52.8	IEEE	393	52.8	ACM-Assoc Comput Mach	53	7.1
35	HP Inc	389	1218	31.9	IEEE	389	31.9	ACM-Assoc Comput Mach	202	16.6
36	Taiwan Semiconductor Manu	377	544	69.3	IEEE	377	69.3	IEEE/JPN Soc App Phys	61	11.2
37	Fujitsu Limited	360	672	53.6	IEEE	360	53.6	American Institute of Physics	65	9.7
38	Microchip Technology Inc.	359	482	74.5	IEEE	359	74.5	IEEE/JPN Soc App Phys	20	4.1
39	Avid Technology Inc.	354	682	51.9	IEEE	354	51.9	ACM-Assoc Comput Mach	219	32.1

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Massachusetts Institute of Te	318	753	42.2	IEEE	318	42.2	American Institute of Physics	70	9.3
41	Sony Group Corp	315	882	35.7	IEEE	315	35.7	RELX Group (Elsevier)	68	7.7
42	Intertrust Technologies Corp	312	1976	15.8	ACM-Assoc Comput Mach	381	19.3	IEEE	312	15.8
43	Hewlett Packard Enterprises	308	905	34.0	IEEE	308	34.0	ACM-Assoc Comput Mach	250	27.6
44	SK Hynix Inc	305	512	59.6	IEEE	305	59.6	Joint IEEE and ACM	45	8.8
45	STMicroelectronics	301	492	61.2	IEEE	301	61.2	RELX Group (Elsevier)	33	6.7
46	Alphabet Inc.	296	732	40.4	IEEE	296	40.4	ACM-Assoc Comput Mach	215	29.4
47	QST Holdings Llc	290	487	59.5	IEEE	290	59.5	Joint IEEE and ACM	56	11.5
48	Crossbar Inc	289	1120	25.8	IEEE	289	25.8	American Institute of Physics	152	13.6
49	NVIDIA Corp.	287	645	44.5	IEEE	287	44.5	Joint IEEE and ACM	150	23.3
50	Netlist Inc	270	1091	24.7	JEDEC Semiconductor Standards Organizatio	295	27.0	IP.Com	291	26.7
51	Nantero Inc	262	2515	10.4	ACS-Am Chem Soc	671	26.7	American Institute of Physics	533	21.2
52	Global Foundries Inc	249	467	53.3	IEEE	249	53.3	Joint IEEE and ACM	28	6.0
53	The Arizona Board of Regent	248	515	48.2	IEEE	248	48.2	RELX Group (Elsevier)	36	7.0
54	Empire Technology Develop	241	508	47.4	IEEE	241	47.4	Joint IEEE and ACM	108	21.3
55	Panasonic Holding Corporati	230	664	34.6	IEEE	230	34.6	Institute of Pure and Applied Physics	80	12.0
56	Trellix (merger of FireEye Inc	229	675	33.9	IEEE	229	33.9	ACM-Assoc Comput Mach	117	17.3
57	California Institute of Techno	228	345	66.1	IEEE	228	66.1	AAAS-Am Assoc Advancement Sci	18	5.2
58	Boston Scientific Corp.	221	299	73.9	IEEE	221	73.9	IEEE/JPN Soc App Phys	34	11.4
59	RADIAN MEMORY SYSTE	205	517	39.7	IEEE	205	39.7	The USENIX Association	138	26.7
60	Yonsei University	193	383	50.4	IEEE	193	50.4	Joint IEEE and ACM	68	17.8
61	Commissariat A L'Energie At	185	420	44.0	IEEE	185	44.0	American Institute of Physics	62	14.8
62	PACT XPP TECHNOLOGIE	158	279	56.6	IEEE	158	56.6	ACM-Assoc Comput Mach	24	8.6
63	Kandou Bus SA	156	172	90.7	IEEE	156	90.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	8	4.7
64	NEC Corp	148	407	36.4	IEEE	148	36.4	American Institute of Physics	75	18.4
65	Avalanche Technology Inc	144	653	22.1	American Institute of Physics	202	30.9	IEEE	144	22.1
66	Hon Hai Precision Industry C	144	344	41.9	IEEE	144	41.9	American Institute of Physics	55	16.0
67	PURE Storage Inc	143	916	15.6	Internet Soc/IETF-Internet Eng Task Force	387	42.2	ACM-Assoc Comput Mach	203	22.2
68	Sap SE	141	519	27.2	IEEE	141	27.2	ACM-Assoc Comput Mach	102	19.7
69	Kioxia Corp (formerly Toshiba	135	316	42.7	IEEE	135	42.7	The USENIX Association	47	14.9
70	OPTICAL DEVICES LLC	135	277	48.7	IEEE	135	48.7	RELX Group (Elsevier)	45	16.2
71	INDIVIDUAL PATENTER	134	269	49.8	IEEE	134	49.8	RELX Group (Elsevier)	26	9.7
72	Industrial Techology Researc	130	230	56.5	IEEE	130	56.5	IEEE/JPN Soc App Phys	20	8.7
73	University of California	129	582	22.2	IEEE	129	22.2	ACS-Am Chem Soc	122	21.0
74	Spin Memory	127	479	26.5	IEEE	127	26.5	American Institute of Physics	101	21.1
75	Purdue University	125	289	43.3	IEEE	125	43.3	Joint IEEE and ACM	29	10.0
76	Columbia University	123	340	36.2	IEEE	123	36.2	ACM-Assoc Comput Mach	64	18.8
77	Huawei Technologies Compa	123	354	34.7	IEEE	123	34.7	Joint IEEE and ACM	83	23.4
78	Amazon.com Inc.	122	418	29.2	IEEE	122	29.2	ACM-Assoc Comput Mach	96	23.0
79	Cisco Systems Inc.	120	261	46.0	IEEE	120	46.0	ACM-Assoc Comput Mach	72	27.6
80	Tela Innovations inc	112	355	31.5	SPIE-Int Soc Opt Engineering	134	37.7	IEEE	112	31.5

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Soitec SA	111	140	79.3	IEEE	111	79.3	IET/IEE	7	5.0
82	Mitsubishi Electric Corp	110	249	44.2	IEEE	110	44.2	ECMA International	70	28.1
83	Round Rock Research LLC	109	480	22.7	RELX Group (Elsevier)	138	28.8	IEEE	109	22.7
84	United Microelectronics Corp	106	208	51.0	IEEE	106	51.0	American Institute of Physics	30	14.4
85	MEMRAY CORP	99	239	41.4	IEEE	99	41.4	Joint IEEE and ACM	61	25.5
86	Texas A&M University	97	152	63.8	IEEE	97	63.8	ACM-Assoc Comput Mach	21	13.8
87	R & D 3 LLC	96	96	100.0	IEEE	96	100.0			
88	University of Minnesota (The	90	502	17.9	Springer Nature	113	22.5	American Physical Society	104	20.7
89	Ecole Polytechnique Federale	89	136	65.4	IEEE	89	65.4	Joint IEEE and ACM	13	9.6
90	Nokia Corporation	89	234	38.0	IEEE	89	38.0	ACM-Assoc Comput Mach	28	12.0
91	Waratek	83	220	37.7	IEEE	83	37.7	ACM-Assoc Comput Mach	55	25.0
92	Glassbridge Enterprises Inc	82	153	53.6	IEEE	82	53.6	RELX Group (Elsevier)	11	7.2
93	VMWare Inc	81	427	19.0	ACM-Assoc Comput Mach	182	42.6	The USENIX Association	89	20.8
94	Alibaba Group Holding Ltd	78	169	46.2	IEEE	78	46.2	Joint IEEE and ACM	31	18.3
95	Interuniversity MicroElectron	76	158	48.1	IEEE	76	48.1	Joint IEEE and ACM	21	13.3
96	SEEQC INC	75	129	58.1	IEEE	75	58.1	American Institute of Physics	20	15.5
97	INSTON INC	72	239	30.1	IEEE	72	30.1	Springer Nature	51	21.3
98	Honeywell International Inc.	71	123	57.7	IEEE	71	57.7	Springer Nature	9	7.3
99	University of Michigan	70	168	41.7	IEEE	70	41.7	Joint IEEE and ACM	42	25.0
100	BLUERISC INC	67	199	33.7	IEEE	67	33.7	Joint IEEE and ACM	52	26.1

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>IOT/Internet of Things</i>										
1	Apple Inc	4870	14393	33.8	IEEE	4870	33.8	ACM-Assoc Comput Mach	2979	20.7
2	SolarEdge Technologies Inc	1636	2049	79.8	IEEE	1636	79.8	WIP-Renewable Energies	129	6.3
3	STRONG FORCE IOT PORT	1048	1448	72.4	IEEE	1048	72.4	RELX Group (Elsevier)	117	8.1
4	Velatia Group	839	1120	74.9	IEEE	839	74.9	Echelon Corp	81	7.2
5	SIPCO LLC	630	1102	57.2	IEEE	630	57.2	Internet Soc/IETF-Internet Eng Task Force	98	8.9
6	Comcast Corp	502	841	59.7	IEEE	502	59.7	3GPP General Partnership Project Standards Body	270	32.1
7	Cisco Systems Inc.	456	1112	41.0	IEEE	456	41.0	ACM-Assoc Comput Mach	131	11.8
8	International Business Machi	398	1043	38.2	IEEE	398	38.2	IP.Com	97	9.3
9	AT&T Inc	372	845	44.0	IEEE	372	44.0	RELX Group (Elsevier)	57	6.7
10	Honeywell International Inc.	326	495	65.9	IEEE	326	65.9	SAE-Society of Automobile Engineers	24	4.8
11	Rockwell Automation Inc	313	580	54.0	IEEE	313	54.0	ACM-Assoc Comput Mach	68	11.7
12	Samsung Electronics Co Ltd	312	4201	7.4	3GPP General Partnership Project Standards B	3668	87.3	IEEE	312	7.4
13	Alphabet Inc.	299	666	44.9	IEEE	299	44.9	ACM-Assoc Comput Mach	110	16.5
14	LG Electronics Inc.	297	642	46.3	IEEE	297	46.3	3GPP General Partnership Project Standards Body	252	39.3
15	Microsoft Corporation	262	704	37.2	IEEE	262	37.2	ACM-Assoc Comput Mach	111	15.8
16	ORIGIN WIRELESS INC	247	363	68.0	IEEE	247	68.0	American Physical Society	21	5.8
17	TRILLIANT NETWORKS IN	243	363	66.9	IEEE	243	66.9	Internet Soc/IETF-Internet Eng Task Force	24	6.6
18	General Electric Company	239	352	67.9	IEEE	239	67.9	RELX Group (Elsevier)	22	6.3
19	Sonos Inc	202	576	35.1	IEEE	202	35.1	Open Connectivity Foundation	73	12.7
20	Intel Corporation	180	426	42.3	IEEE	180	42.3	3GPP General Partnership Project Standards Body	113	26.5
21	EAGLE HARBOR HOLDIN	175	490	35.7	IEEE	175	35.7	SAE-Society of Automobile Engineers	135	27.6
22	Schneider Electric S.A.	160	1369	11.7	ISA - Instrumentation, Systems & Automation	252	18.4	IEEE	160	11.7
23	ABB Ltd	145	175	82.9	IEEE	145	82.9	IET/IEE	5	2.9
24	California Institute of Techno	136	244	55.7	IEEE	136	55.7	RELX Group (Elsevier)	19	7.8
25	MAY PATENTS LTD	134	268	50.0	IEEE	134	50.0	SAE-Society of Automobile Engineers	54	20.1
26	Amazon.com Inc.	130	345	37.7	IEEE	130	37.7	ACM-Assoc Comput Mach	43	12.5
27	Walmart Stores Inc	130	363	35.8	IEEE	130	35.8	CBS Interactive	37	10.2
28	Qualcomm Inc	123	395	31.1	3GPP General Partnership Project Standards B	171	43.3	IEEE	123	31.1
29	AMPT LLC	121	151	80.1	IEEE	121	80.1	RELX Group (Elsevier)	8	5.3
30	Battelle Memorial Institute	116	160	72.5	IEEE	116	72.5	RELX Group (Elsevier)	8	5.0
31	Emerson Electric Co.	114	276	41.3	IEEE	114	41.3	RELX Group (Elsevier)	79	28.6
32	Johnson Controls Internationa	113	257	44.0	IEEE	113	44.0	RELX Group (Elsevier)	40	15.6
33	DOMINION ENERGY TEC	102	128	79.7	IEEE	102	79.7	International Telecommunication Union	12	9.4
34	EchoStar Corp	100	173	57.8	IEEE	100	57.8	CBS Interactive	24	13.9
35	ASTROLINK INTERNATIO	97	122	79.5	IEEE	97	79.5	International Telecommunication Union	12	9.8
36	Toyota Motor Corp	95	295	32.2	IEEE	95	32.2	ACM-Assoc Comput Mach	52	17.6
37	Nokia Corporation	94	296	31.8	IEEE	94	31.8	3GPP General Partnership Project Standards Body	76	25.7
38	Siemens Aktiengesellschaft	93	175	53.1	IEEE	93	53.1	Internet Soc/IETF-Internet Eng Task Force	21	12.0
39	KIP PROD P1 LP	86	170	50.6	IEEE	86	50.6	American Society of Plant Biologists	18	10.6

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	State Farm Mutual Automobi	82	368	22.3	IEEE	82	22.3	IP.Com	36	9.8
41	NETWORK-1 TECHNOLOG	79	286	27.6	IEEE	79	27.6	Internet Soc/IETF-Internet Eng Task Force	71	24.8
42	III HOLDINGS 12 LLC	78	159	49.1	IEEE	78	49.1	ACM-Assoc Comput Mach	21	13.2
43	Georgia Institute of Technolo	77	246	31.3	ACM-Assoc Comput Mach	120	48.8	IEEE	77	31.3
44	STATSIGNAL SYSTEMS IN	75	132	56.8	IEEE	75	56.8	Internet Soc/IETF-Internet Eng Task Force	14	10.6
45	Extreme Networks Inc	74	159	46.5	IEEE	74	46.5	ACM-Assoc Comput Mach	20	12.6
46	Alstom	73	90	81.1	IEEE	73	81.1	IET/IEE	11	12.2
47	Sap SE	73	222	32.9	IEEE	73	32.9	ACM-Assoc Comput Mach	44	19.8
48	Dexcom Inc	72	451	16.0	RELX Group (Elsevier)	92	20.4	IEEE	72	16.0
49	Adaptive Computing Enterpri	71	146	48.6	IEEE	71	48.6	ACM-Assoc Comput Mach	27	18.5
50	BORGIA/CUMMINS LLC	69	102	67.6	IEEE	69	67.6	SPIE-Int Soc Opt Engineering	17	16.7
51	Itron Inc.	69	122	56.6	IEEE	69	56.6	ACM-Assoc Comput Mach	18	14.8
52	Johnson & Johnson	66	132	50.0	IEEE	66	50.0	RELX Group (Elsevier)	20	15.2
53	Zebra Technologies Corp.	66	107	61.7	IEEE	66	61.7	RFID Journal/YGS Group	11	10.3
54	University System of Maryla	62	66	93.9	IEEE	62	93.9	EPE Association	2	3.0
55	Huawei Technologies Compa	58	410	14.1	3GPP General Partnership Project Standards B	193	47.1	Open Mobile Alliance (Standards Org)	60	14.6
56	CARTICA AI LTD	56	81	69.1	IEEE	56	69.1	ACM-Assoc Comput Mach	8	9.9
57	MIDDLE CHART LLC	56	79	70.9	IEEE	56	70.9	Multidisciplinary Digital Publishing Institute (MDPI)	20	25.3
58	Western Digital Corp.	56	68	82.4	IEEE	56	82.4	RELX Group (Elsevier)	12	17.6
59	UNIVERSITY OF SAO PAU	54	119	45.4	IEEE	54	45.4	National Institute of Standards and Technology (NIST)	18	15.1
60	AFERO INC	52	71	73.2	IEEE	52	73.2	United Business Media/UBM Tech	11	15.5
61	Blackberry Ltd.	52	92	56.5	IEEE	52	56.5	ACM-Assoc Comput Mach	13	14.1
62	DELTA ENERGY & COMM	52	131	39.7	IEEE	52	39.7	RELX Group (Elsevier)	35	26.7
63	PTC Inc	52	133	39.1	IEEE	52	39.1	ACM-Assoc Comput Mach	21	15.8
64	SECURENET SOLUTIONS	52	132	39.4	IEEE	52	39.4	ACM-Assoc Comput Mach	22	16.7
65	Hello Inc	51	81	63.0	IEEE	51	63.0	ACM-Assoc Comput Mach	16	19.8
66	Palo Alto Networks	51	99	51.5	IEEE	51	51.5	3GPP General Partnership Project Standards Body	30	30.3
67	SMART WIRES INC	51	73	69.9	IEEE	51	69.9	ACM-Assoc Comput Mach	5	6.8
68	InterDigital Inc	50	383	13.1	3GPP General Partnership Project Standards B	172	44.9	European Telecom Standards Institute (ETSI)	75	19.6
69	Dell Technologies Inc	48	120	40.0	IEEE	48	40.0	ACM-Assoc Comput Mach	18	15.0
70	Ericsson	48	527	9.1	3GPP General Partnership Project Standards B	236	44.8	Internet Soc/IETF-Internet Eng Task Force	115	21.8
71	Deere & Co.	47	83	56.6	IEEE	47	56.6	IEEE/RSJ	5	6.0
72	Aeris Communications Inc	46	64	71.9	IEEE	46	71.9	RELX Group (Elsevier)	11	17.2
73	Hewlett Packard Enterprises	46	116	39.7	IEEE	46	39.7	International Conference on Representation Learning	12	10.3
74	3M Co	45	68	66.2	IEEE	45	66.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	8	11.8
75	Panasonic Holding Corporati	45	73	61.6	IEEE	45	61.6	Network Working Group RFC	11	15.1
76	University of Minnesota (The	45	53	84.9	IEEE	45	84.9	RELX Group (Elsevier)	3	5.7
77	TRIAx TECHNOLOGIES IN	44	76	57.9	IEEE	44	57.9	Hindawi Publishing Corporation	9	11.8
78	University of Texas	44	120	36.7	IEEE	44	36.7	RELX Group (Elsevier)	23	19.2
79	Abbott Laboratories	43	477	9.0	RELX Group (Elsevier)	59	12.4	Mary Ann Liebert Inc.	53	11.1
80	University of California	43	1160	3.7	ACS-Am Chem Soc	335	28.9	Royal Society of Chemistry	190	16.4

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Continental AG (Germany Fe	42	56	75.0	IEEE	42	75.0	Academy Publisher	3	5.4
82	Convida Wireless LLC	41	670	6.1	3GPP General Partnership Project Standards B	275	41.0	Internet Soc/IETF-Internet Eng Task Force	145	21.6
83	FedEx Corp	40	223	17.9	RELX Group (Elsevier)	41	18.4	IEEE	40	17.9
84	SmartDrive Systems Inc	40	56	71.4	IEEE	40	71.4	SAMS Publishing	4	7.1
85	Boeing Co. (The)	39	71	54.9	IEEE	39	54.9	Springer Nature	4	5.6
86	Schweitzer Engineering Labo	39	45	86.7	IEEE	39	86.7	ACM-Assoc Comput Mach	3	6.7
87	Koninklijke Philips N.V.	38	183	20.8	IEEE	38	20.8	Springer Nature	25	13.7
88	NURO INC	38	63	60.3	IEEE	38	60.3	IEEE/RSJ	4	6.3
89	Enphase Energy Inc	37	37	100.0	IEEE	37	100.0			
90	THE FLORIDA INTERNATI	36	89	40.4	IEEE	36	40.4	ACM-Assoc Comput Mach	22	24.7
91	Totalenergies SE (formerly T	36	45	80.0	IEEE	36	80.0	EPE Association	4	8.9
92	Hubbell Inc.	35	44	79.5	IEEE	35	79.5	Multidisciplinary Digital Publishing Institute (MDPI)	3	6.8
93	PROXY INC	35	36	97.2	IEEE	35	97.2	IP.Com	1	2.8
94	Witricity Corp	35	68	51.5	IEEE	35	51.5	American Institute of Physics	5	7.4
95	Oracle Corporation	34	301	11.3	3GPP General Partnership Project Standards B	205	68.1	IEEE	34	11.3
96	Westinghouse Air Brake Tec	34	44	77.3	IEEE	34	77.3	ACM-Assoc Comput Mach	4	9.1
97	Accenture Ltd.	33	53	62.3	IEEE	33	62.3	A B B Corporate Management Services AG	4	7.5
98	Knowles Corp	32	50	64.0	IEEE	32	64.0	RELX Group (Elsevier)	4	8.0
99	LS Electric co. Ltd. (formerly	32	41	78.0	IEEE	32	78.0	IET/IEE	4	9.8
100	NEC Corp	32	379	8.4	3GPP General Partnership Project Standards B	310	81.8	IEEE	32	8.4

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Measuring, Testing and Control Devices</i>										
1	Thermo Fisher Scientific Inc	3675	21045	17.5	RELX Group (Elsevier)	7172	34.1	IEEE	3675	17.5
2	Siemens Aktiengesellschaft	3527	8833	39.9	IEEE	3527	39.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2077	23.5
3	Sanken Electric Co. Ltd.	3138	4081	76.9	IEEE	3138	76.9	RELX Group (Elsevier)	667	16.3
4	Mass General Brigham (form	3051	48898	6.2	Optical Society of America	17969	36.7	RELX Group (Elsevier)	6695	13.7
5	Amazon.com Inc.	2807	5552	50.6	IEEE	2807	50.6	SPIE-Int Soc Opt Engineering	633	11.4
6	International Business Machi	2592	7792	33.3	IEEE	2592	33.3	RELX Group (Elsevier)	467	6.0
7	Honeywell International Inc.	2153	7251	29.7	IEEE	2153	29.7	RELX Group (Elsevier)	955	13.2
8	Microsoft Corporation	1912	5357	35.7	IEEE	1912	35.7	ACM-Assoc Comput Mach	1302	24.3
9	Texas Instruments Inc	1851	2268	81.6	IEEE	1851	81.6	Joint IEEE and ACM	75	3.3
10	FormFactor Inc	1760	3483	50.5	IEEE	1760	50.5	Springer Nature	642	18.4
11	STRONG FORCE IOT PORT	1545	2121	72.8	IEEE	1545	72.8	RELX Group (Elsevier)	177	8.3
12	General Electric Company	1459	6569	22.2	IEEE	1459	22.2	RELX Group (Elsevier)	1062	16.2
13	illumina Inc.	1097	5322	20.6	IEEE	1097	20.6	Royal Society of Chemistry	742	13.9
14	SolarEdge Technologies Inc	1039	1289	80.6	IEEE	1039	80.6	WIP-Renewable Energies	95	7.4
15	Alphabet Inc.	1034	2896	35.7	IEEE	1034	35.7	ACM-Assoc Comput Mach	379	13.1
16	Apple Inc	1003	2429	41.3	IEEE	1003	41.3	ACM-Assoc Comput Mach	312	12.8
17	California Institute of Techno	976	8088	12.1	RELX Group (Elsevier)	979	12.1	IEEE	976	12.1
18	University of Minnesota (The	950	2959	32.1	IEEE	950	32.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	340	11.5
19	Emerson Electric Co.	912	3749	24.3	IEEE	912	24.3	RELX Group (Elsevier)	565	15.1
20	Infineon Technologies AG	894	1457	61.4	IEEE	894	61.4	RELX Group (Elsevier)	127	8.7
21	Massachusetts Institute of Te	820	5572	14.7	IEEE	820	14.7	RELX Group (Elsevier)	693	12.4
22	Intel Corporation	786	2043	38.5	IEEE	786	38.5	RELX Group (Elsevier)	138	6.8
23	AT&T Inc	754	1751	43.1	IEEE	754	43.1	ACM-Assoc Comput Mach	101	5.8
24	NXP Semiconductors NV	737	1115	66.1	IEEE	737	66.1	RELX Group (Elsevier)	66	5.9
25	Qualcomm Inc	702	1549	45.3	IEEE	702	45.3	3GPP General Partnership Project Standards Body	261	16.8
26	ABB Ltd	693	1203	57.6	IEEE	693	57.6	RELX Group (Elsevier)	110	9.1
27	Applied Materials Inc.	681	1487	45.8	IEEE	681	45.8	American Institute of Physics	138	9.3
28	Schlumberger Ltd.	667	10794	6.2	Society of Exploration Geophysicists	2134	19.8	Society of Petroleum Engineers	1757	16.3
29	Boeing Co. (The)	664	2357	28.2	IEEE	664	28.2	RELX Group (Elsevier)	302	12.8
30	Commissariat A L'Energie At	656	2374	27.6	IEEE	656	27.6	RELX Group (Elsevier)	543	22.9
31	Lockheed Martin Corp.	656	9655	6.8	American Institute of Physics	1538	15.9	American Physical Society	1501	15.5
32	Broadcom Ltd	648	1047	61.9	IEEE	648	61.9	RELX Group (Elsevier)	46	4.4
33	Midtronics Inc.	589	1394	42.3	IEEE	589	42.3	RELX Group (Elsevier)	254	18.2
34	Intuitive Surgical Inc.	587	1600	36.7	IEEE	587	36.7	SAGES-Society of American Gastrointestinal and Endoscopic	165	10.3
35	University of Illinois	585	6137	9.5	American Institute of Physics	926	15.1	RELX Group (Elsevier)	908	14.8
36	Nokia Corporation	573	1608	35.6	IEEE	573	35.6	3GPP General Partnership Project Standards Body	115	7.2
37	STMicroelectronics	572	959	59.6	IEEE	572	59.6	RELX Group (Elsevier)	126	13.1
38	CPG TECHNOLOGIES LLC	546	1048	52.1	IEEE	546	52.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	134	12.8
39	Analog Devices Inc.	545	854	63.8	IEEE	545	63.8	RELX Group (Elsevier)	53	6.2

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Honda Motor Co. Ltd.(Honda	532	1268	42.0	IEEE	532	42.0	RELX Group (Elsevier)	139	11.0
41	Raytheon Co.	530	1881	28.2	IEEE	530	28.2	RELX Group (Elsevier)	171	9.1
42	Duke University	521	2842	18.3	IEEE	521	18.3	RELX Group (Elsevier)	361	12.7
43	Synopsys Inc.	518	657	78.8	IEEE	518	78.8	Joint IEEE and ACM	45	6.8
44	Samsung Electronics Co Ltd	507	1413	35.9	IEEE	507	35.9	RELX Group (Elsevier)	134	9.5
45	Battelle Memorial Institute	498	2019	24.7	IEEE	498	24.7	RELX Group (Elsevier)	473	23.4
46	INTOUCH HEALTH INC	482	1401	34.4	IEEE	482	34.4	IEEE/RSJ	135	9.6
47	Toyota Motor Corp	482	1230	39.2	IEEE	482	39.2	RELX Group (Elsevier)	98	8.0
48	INDIVIDUAL PATENTER	480	2816	17.0	Optical Society of America	760	27.0	IEEE	480	17.0
49	University of California	473	8398	5.6	RELX Group (Elsevier)	1234	14.7	ACS-Am Chem Soc	1223	14.6
50	Abbott Laboratories	469	15446	3.0	ACS-Am Chem Soc	3850	24.9	RELX Group (Elsevier)	3710	24.0
51	Schneider Electric S.A.	465	2733	17.0	IEEE	465	17.0	RELX Group (Elsevier)	316	11.6
52	Koninklijke Philips N.V.	463	3397	13.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1039	30.6	Society of Magnetic Resonance in Medicine (SMRM)	559	16.5
53	Industrial Technology Researc	458	1082	42.3	IEEE	458	42.3	RELX Group (Elsevier)	220	20.3
54	University of Texas	449	2961	15.2	IEEE	449	15.2	RELX Group (Elsevier)	440	14.9
55	Rockwell Automation Inc	440	776	56.7	IEEE	440	56.7	RELX Group (Elsevier)	77	9.9
56	Marvell Technology Group Lt	425	492	86.4	IEEE	425	86.4	Joint IEEE and ACM	13	2.6
57	OMNI MEDSCI INC	423	5501	7.7	Optical Society of America	1860	33.8	RELX Group (Elsevier)	888	16.1
58	HEMOSONICS LLC	418	1203	34.7	IEEE	418	34.7	RELX Group (Elsevier)	203	16.9
59	Schweitzer Engineering Labo	418	511	81.8	IEEE	418	81.8	RELX Group (Elsevier)	29	5.7
60	HRL Laboratories LLC	414	1018	40.7	IEEE	414	40.7	RELX Group (Elsevier)	109	10.7
61	Advantest Corp.	410	584	70.2	IEEE	410	70.2	American Institute of Physics	26	4.5
62	FARO Technologies Inc.	385	1357	28.4	IEEE	385	28.4	SPIE-Int Soc Opt Engineering	254	18.7
63	Johnson Controls Internationa	385	1192	32.3	IEEE	385	32.3	RELX Group (Elsevier)	284	23.8
64	Advanced Micro Devices Inc	383	667	57.4	IEEE	383	57.4	SPIE-Int Soc Opt Engineering	61	9.1
65	TuSimple	383	538	71.2	IEEE	383	71.2	Neural Information Processing Systems Foundation	51	9.5
66	Stanford University	376	4376	8.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	537	12.3	Optical Society of America	456	10.4
67	Taiwan Semiconductor Manu	372	661	56.3	IEEE	372	56.3	American Institute of Physics	40	6.1
68	United States Navy	371	2172	17.1	IEEE	371	17.1	RELX Group (Elsevier)	276	12.7
69	Ericsson	347	916	37.9	IEEE	347	37.9	3GPP General Partnership Project Standards Body	218	23.8
70	Teradyne Inc.	333	738	45.1	IEEE	333	45.1	ASME-Am Soc Mech Eng	107	14.5
71	ParkerVision Inc	332	531	62.5	IEEE	332	62.5	IET/IEE	50	9.4
72	Bosch (Robert) GmbH	331	1224	27.0	IEEE	331	27.0	RELX Group (Elsevier)	233	19.0
73	Cisco Systems Inc.	330	1379	23.9	Internet Soc/IETF-Internet Eng Task Force	410	29.7	IEEE	330	23.9
74	Intellectual Ventures Manage	308	1792	17.2	IEEE	308	17.2	RELX Group (Elsevier)	181	10.1
75	Toshiba Corp	307	1100	27.9	IEEE	307	27.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	202	18.4
76	Brain Corporation	301	703	42.8	IEEE	301	42.8	MIT Press	70	10.0
77	Zebra Technologies Corp.	297	686	43.3	IEEE	297	43.3	ACM-Assoc Comput Mach	49	7.1
78	Agilent Technologies Inc	295	1568	18.8	RELX Group (Elsevier)	298	19.0	IEEE	295	18.8
79	General Motors Corp	292	590	49.5	IEEE	292	49.5	RELX Group (Elsevier)	63	10.7
80	Hitachi Ltd	291	1450	20.1	IEEE	291	20.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	200	13.8

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	University of Southern Califo	286	871	32.8	IEEE	286	32.8	Optical Society of America	70	8.0
82	Xerox Corp	283	1273	22.2	IEEE	283	22.2	RELX Group (Elsevier)	135	10.6
83	Georgia Institute of Technolo	281	1003	28.0	IEEE	281	28.0	RELX Group (Elsevier)	126	12.6
84	TDK Corporation	281	607	46.3	IEEE	281	46.3	RELX Group (Elsevier)	124	20.4
85	MACAU UNIVERSITY OF	270	315	85.7	IEEE	270	85.7	RELX Group (Elsevier)	18	5.7
86	University of Michigan	270	1738	15.5	IEEE	270	15.5	RELX Group (Elsevier)	241	13.9
87	NEC Corp	267	736	36.3	IEEE	267	36.3	RELX Group (Elsevier)	41	5.6
88	HP Inc	263	1194	22.0	IEEE	263	22.0	ACS-Am Chem Soc	139	11.6
89	Panasonic Holding Corporati	263	986	26.7	IEEE	263	26.7	RELX Group (Elsevier)	221	22.4
90	University of Alabama	263	1122	23.4	RELX Group (Elsevier)	301	26.8	IEEE	263	23.4
91	Fujitsu Limited	260	603	43.1	IEEE	260	43.1	RELX Group (Elsevier)	53	8.8
92	University of Nebraska	260	812	32.0	IEEE	260	32.0	RELX Group (Elsevier)	85	10.5
93	Halliburton Co. (Holding)	255	5288	4.8	Society of Petroleum Engineers	1662	31.4	SPWLA-Society of Petrophysicists and Well Log Analysts	648	12.3
94	Adaptix	252	374	67.4	IEEE	252	67.4	European Telecom Standards Institute (ETSI)	47	12.6
95	University of Pennsylvania	246	1370	18.0	IEEE	246	18.0	RELX Group (Elsevier)	178	13.0
96	Purdue University	244	2089	11.7	RELX Group (Elsevier)	359	17.2	ACS-Am Chem Soc	358	17.1
97	Ford Motor Co.	243	715	34.0	IEEE	243	34.0	SAE-Society of Automobile Engineers	89	12.4
98	State Farm Mutual Automobi	238	847	28.1	IEEE	238	28.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	65	7.7
99	Canon Inc	237	2074	11.4	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	441	21.3	IEEE	237	11.4
100	TRX SYSTEMS INC	237	394	60.2	IEEE	237	60.2	ION-The Inst of Navigation	34	8.6

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Optics/Photography/Electrophotography</i>										
1	Qualcomm Inc	1861	5276	35.3	IEEE	1861	35.3	SID-Society for Information Display	986	18.7
2	Infinera Corporation	1184	2206	53.7	IEEE	1184	53.7	IET/IEE	361	16.4
3	Mass General Brigham (form	985	15275	6.4	Optical Society of America	5810	38.0	RELX Group (Elsevier)	2136	14.0
4	II-VI Inc	650	2228	29.2	IEEE	650	29.2	Optical Society of America	501	22.5
5	IDC LLC	642	1779	36.1	IEEE	642	36.1	SID-Society for Information Display	236	13.3
6	Nikon Corp.	632	4266	14.8	SPIE-Int Soc Opt Engineering	1929	45.2	SEMATECH Consortium	849	19.9
7	Xperi Holding Corporation (F	625	1432	43.6	IEEE	625	43.6	SPIE-Int Soc Opt Engineering	201	14.0
8	Massachusetts Institute of Te	595	3902	15.2	Optical Society of America	631	16.2	IEEE	595	15.2
9	Corning Inc.	572	4613	12.4	Optical Society of America	969	21.0	RELX Group (Elsevier)	617	13.4
10	Microsoft Corporation	558	2008	27.8	IEEE	558	27.8	ACM-Assoc Comput Mach	333	16.6
11	Alphabet Inc.	557	2159	25.8	IEEE	557	25.8	SID-Society for Information Display	335	15.5
12	The Arizona Board of Regent	491	3768	13.0	Optical Society of America	1220	32.4	SPIE-Int Soc Opt Engineering	511	13.6
13	Synopsys Inc.	445	3041	14.6	SPIE-Int Soc Opt Engineering	1385	45.5	IEEE	445	14.6
14	Magic Leap Inc	430	2302	18.7	IEEE	430	18.7	ACM-Assoc Comput Mach	299	13.0
15	Intellectual Ventures Manage	428	2039	21.0	IEEE	428	21.0	American Physical Society	277	13.6
16	NVIDIA Corp.	426	1209	35.2	IEEE	426	35.2	IET/IEE	218	18.0
17	Hoya Corp	421	1260	33.4	IEEE	421	33.4	American Institute of Physics	257	20.4
18	YFY Inc	416	4891	8.5	SID-Society for Information Display	2021	41.3	IEEE	416	8.5
19	California Institute of Techno	382	4723	8.1	Optical Society of America	1611	34.1	Springer Nature	449	9.5
20	ASML Holding NV	378	10655	3.5	SPIE-Int Soc Opt Engineering	3903	36.6	American Institute of Physics	1788	16.8
21	Nokia Corporation	364	1634	22.3	IEEE	364	22.3	Optical Society of America	345	21.1
22	Screen Holdings Co Ltd (For	355	1322	26.9	IEEE	355	26.9	RELX Group (Elsevier)	204	15.4
23	International Business Machi	326	2032	16.0	SPIE-Int Soc Opt Engineering	433	21.3	IEEE	326	16.0
24	Intel Corporation	313	1029	30.4	IEEE	313	30.4	SPIE-Int Soc Opt Engineering	147	14.3
25	CHEETAH OMNI LLC	276	1101	25.1	IEEE	276	25.1	Optical Society of America	266	24.2
26	MONOLITHIC 3D INC	275	482	57.1	IEEE	275	57.1	IEEE/JPN Soc App Phys	48	10.0
27	Ericsson	269	1170	23.0	Optical Society of America	447	38.2	IEEE	269	23.0
28	Cisco Systems Inc.	263	643	40.9	IEEE	263	40.9	Optical Society of America	177	27.5
29	Stanford University	256	2286	11.2	Optical Society of America	340	14.9	IEEE	256	11.2
30	ALENTIC MICROSCIENCE	237	880	26.9	IEEE	237	26.9	Royal Society of Chemistry	113	12.8
31	Samsung Electronics Co Ltd	228	1767	12.9	Optical Society of America	277	15.7	IEEE	228	12.9
32	Texas Instruments Inc	224	822	27.3	IEEE	224	27.3	American Institute of Physics	137	16.7
33	University of California	224	2132	10.5	Optical Society of America	321	15.1	Springer Nature	283	13.3
34	Adobe Inc. (former Adobe Sy	219	512	42.8	IEEE	219	42.8	ACM-Assoc Comput Mach	127	24.8
35	Lockheed Martin Corp.	199	1189	16.7	Optical Society of America	294	24.7	IEEE	199	16.7
36	3M Co	193	3611	5.3	Optical Society of America	518	14.3	RELX Group (Elsevier)	397	11.0
37	Micron Technology Inc.	185	1868	9.9	American Institute of Physics	340	18.2	SPIE-Int Soc Opt Engineering	236	12.6
38	Lumentum Holdings Inc	181	648	27.9	IEEE	181	27.9	Optical Society of America	139	21.5
39	HP Inc	177	883	20.0	IEEE	177	20.0	Optical Society of America	94	10.6

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Princeton University	175	404	43.3	IEEE	175	43.3	American Physical Society	34	8.4
41	Canon Inc	171	2042	8.4	SPIE-Int Soc Opt Engineering	249	12.2	American Institute of Physics	231	11.3
42	Honeywell International Inc.	168	829	20.3	IEEE	168	20.3	Optical Society of America	147	17.7
43	Global Foundries Inc	166	766	21.7	Optical Society of America	307	40.1	IEEE	166	21.7
44	Prysmian SPA	161	968	16.6	Optical Society of America	211	21.8	IEEE	161	16.6
45	STEYPHI SERVICES DE LL	161	458	35.2	IEEE	161	35.2	Optical Society of America	104	22.7
46	Electronics and Telecommuni	151	443	34.1	IEEE	151	34.1	Optical Society of America	82	18.5
47	Fujitsu Limited	150	685	21.9	IEEE	150	21.9	Optical Society of America	103	15.0
48	DIGILENS INC	147	5319	2.8	Optical Society of America	1092	20.5	SPIE-Int Soc Opt Engineering	839	15.8
49	Viavi Solutions Inc	145	715	20.3	IEEE	145	20.3	Optical Society of America	125	17.5
50	Huawei Technologies Compa	143	378	37.8	IEEE	143	37.8	Optical Society of America	113	29.9
51	University of Colorado (The	143	2059	6.9	Optical Society of America	830	40.3	RELX Group (Elsevier)	246	11.9
52	AUGMENTED VISION INC	137	1092	12.5	Optical Society of America	372	34.1	SPIE-Int Soc Opt Engineering	157	14.4
53	University of Texas	136	1253	10.9	American Institute of Physics	198	15.8	Optical Society of America	187	14.9
54	CIRREX SYSTEMS LLC	134	563	23.8	IEEE	134	23.8	Optical Society of America	81	14.4
55	OmniGuide Inc	134	1030	13.0	Optical Society of America	242	23.5	IEEE	134	13.0
56	Emcore Corp.	133	168	79.2	IEEE	133	79.2	IEEE/OSA	11	6.5
57	VASCULAR IMAGING CO	133	281	47.3	IEEE	133	47.3	IET/IEE	80	28.5
58	Georgia Institute of Technolo	128	390	32.8	IEEE	128	32.8	Optical Society of America	52	13.3
59	Raytheon Co.	127	2020	6.3	Optical Society of America	534	26.4	SPIE-Int Soc Opt Engineering	389	19.3
60	Cubic Wafer Inc	126	224	56.3	IEEE	126	56.3	SPIE-Int Soc Opt Engineering	42	18.8
61	Ostendo Technologies Inc	120	467	25.7	IEEE	120	25.7	ACM-Assoc Comput Mach	77	16.5
62	STMicroelectronics	113	285	39.6	IEEE	113	39.6	SPIE-Int Soc Opt Engineering	42	14.7
63	Skorpios Technologies Inc	111	245	45.3	IEEE	111	45.3	Optical Society of America	85	34.7
64	Xerox Corp	110	1099	10.0	ACS-Am Chem Soc	239	21.7	RELX Group (Elsevier)	132	12.0
65	Carl-Zeiss Stiftung	106	3208	3.3	SPIE-Int Soc Opt Engineering	1153	35.9	Optical Society of America	607	18.9
66	Applied Materials Inc.	103	576	17.9	SPIE-Int Soc Opt Engineering	155	26.9	IEEE	103	17.9
67	Nippon Telegraph & Telepho	103	592	17.4	Optical Society of America	108	18.2	IEEE	103	17.4
68	PTS Corporation	102	232	44.0	IEEE	102	44.0	Optical Society of America	34	14.7
69	Sumitomo Electric Industries	102	963	10.6	Optical Society of America	248	25.8	European Conference on Optical Communication (ECOC) Soc	129	13.4
70	Furukawa Electric Co. Ltd.	99	785	12.6	Optical Society of America	258	32.9	IEICE-Inst Elec Info Comm Eng	102	13.0
71	MENTOR ACQUISITION O	99	255	38.8	IEEE	99	38.8	ACM-Assoc Comput Mach	77	30.2
72	Calient Technologies Inc.	97	188	51.6	IEEE	97	51.6	Optical Society of America	28	14.9
73	University of Illinois	97	663	14.6	American Institute of Physics	126	19.0	Optical Society of America	121	18.3
74	Industrial Technology Researc	93	409	22.7	IEEE	93	22.7	SPIE-Int Soc Opt Engineering	67	16.4
75	Apple Inc	90	716	12.6	Optical Society of America	194	27.1	SPIE-Int Soc Opt Engineering	109	15.2
76	Commscope Holding (formerl	90	1020	8.8	Optical Society of America	200	19.6	IEEE/OSA	175	17.2
77	NXP Semiconductors NV	87	275	31.6	IEEE	87	31.6	American Institute of Physics	45	16.4
78	Columbia University	86	942	9.1	Springer Nature	166	17.6	Optical Society of America	145	15.4
79	Panasonic Holding Corporati	86	578	14.9	SPIE-Int Soc Opt Engineering	97	16.8	IEEE	86	14.9
80	Mitsubishi Electric Corp	85	218	39.0	IEEE	85	39.0	ACM-Assoc Comput Mach	38	17.4

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Juniper Networks Inc.	83	173	48.0	IEEE	83	48.0	Optical Society of America	50	28.9
82	Hewlett Packard Enterprises	82	228	36.0	IEEE	82	36.0	Optical Society of America	64	28.1
83	Oracle Corporation	81	170	47.6	IEEE	81	47.6	Optical Society of America	40	23.5
84	BEIJING INSTITUTE OF TE	79	537	14.7	Optical Society of America	173	32.2	IEEE	79	14.7
85	RPX Corp	79	192	41.1	IEEE	79	41.1	IEEE/OSA	25	13.0
86	Oewaves Inc	76	253	30.0	Optical Society of America	100	39.5	IEEE	76	30.0
87	Eastman Kodak Company	73	930	7.8	RELX Group (Elsevier)	145	15.6	ACS-Am Chem Soc	121	13.0
88	University of Washington	73	663	11.0	SPIE-Int Soc Opt Engineering	98	14.8	Optical Society of America	89	13.4
89	Extreme Networks Inc	72	163	44.2	IEEE	72	44.2	ACM-Assoc Comput Mach	22	13.5
90	Seiko Epson Corporation	70	283	24.7	IEEE	70	24.7	SID-Society for Information Display	54	19.1
91	HRL Laboratories LLC	69	315	21.9	IEEE	69	21.9	American Institute of Physics	52	16.5
92	Koninklijke Philips N.V.	69	764	9.0	SPIE-Int Soc Opt Engineering	162	21.2	Optical Society of America	98	12.8
93	Fujikura Ltd.	68	676	10.1	Optical Society of America	195	28.8	IEICE-Inst Elec Info Comm Eng	126	18.6
94	University of Connecticut	68	364	18.7	Optical Society of America	149	40.9	IEEE	68	18.7
95	Hong Kong University of Sci	66	144	45.8	IEEE	66	45.8	RELX Group (Elsevier)	11	7.6
96	Johnson & Johnson	66	2112	3.1	Optical Society of America	377	17.9	RELX Group (Elsevier)	352	16.7
97	NEC Corp	66	382	17.3	IEEE	66	17.3	Optical Society of America	40	10.5
98	Broadcom Ltd	65	194	33.5	IEEE	65	33.5	SPIE-Int Soc Opt Engineering	41	21.1
99	Cornell University	65	572	11.4	Optical Society of America	84	14.7	RELX Group (Elsevier)	69	12.1
100	University of North Carolina	64	532	12.0	SPIE-Int Soc Opt Engineering	82	15.4	ACM-Assoc Comput Mach	74	13.9

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Power Systems</i>										
1	SolarEdge Technologies Inc	6717	8367	80.3	IEEE	6717	80.3	WIP-Renewable Energies	604	7.2
2	Witricity Corp	4431	8543	51.9	IEEE	4431	51.9	American Institute of Physics	699	8.2
3	CPG TECHNOLOGIES LLC	2666	5154	51.7	IEEE	2666	51.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	633	12.3
4	Energous Corporation	1741	2255	77.2	IEEE	1741	77.2	The European Association on Antennas and Propagation (Eur	179	7.9
5	Flex Ltd (Formerly Flextronic	1663	1806	92.1	IEEE	1663	92.1	United Business Media/UBM Tech	79	4.4
6	Cirrus Logic Inc.	1653	1812	91.2	IEEE	1653	91.2	ISO-International Standards Organization	50	2.8
7	ABB Ltd	1650	2373	69.5	IEEE	1650	69.5	IVI Foundation/SCPI Consortium	94	4.0
8	Massachusetts Institute of Te	1513	4310	35.1	IEEE	1513	35.1	RELX Group (Elsevier)	606	14.1
9	Totalenergies SE (formerly T	1485	1713	86.7	IEEE	1485	86.7	IET/IEE	54	3.2
10	Rockwell Automation Inc	1362	1523	89.4	IEEE	1362	89.4	EPE Association	41	2.7
11	General Electric Company	1339	2772	48.3	IEEE	1339	48.3	US Dept of Energy	343	12.4
12	AMPT LLC	1046	1343	77.9	IEEE	1046	77.9	RELX Group (Elsevier)	84	6.3
13	MOJO MOBILITY INC	1019	1336	76.3	IEEE	1019	76.3	RELX Group (Elsevier)	111	8.3
14	Renesas Electronic Corporati	925	1088	85.0	IEEE	925	85.0	IEEE/JPN Soc App Phys	26	2.4
15	Texas Instruments Inc	922	1094	84.3	IEEE	922	84.3	RELX Group (Elsevier)	39	3.6
16	Analog Devices Inc.	904	1356	66.7	IEEE	904	66.7	RELX Group (Elsevier)	235	17.3
17	SYNQOR INC	886	1013	87.5	IEEE	886	87.5	Penton/IPC, Inc.	45	4.4
18	Murata Manufacturing Co. Lt	811	1030	78.7	IEEE	811	78.7	RELX Group (Elsevier)	61	5.9
19	Infineon Technologies AG	776	896	86.6	IEEE	776	86.6	EPE Association	18	2.0
20	Vicor Corp	708	906	78.1	IEEE	708	78.1	Center for Power Electronics Systems (Virginia Tech)	44	4.9
21	Intel Corporation	564	686	82.2	IEEE	564	82.2	Joint IEEE and ACM	16	2.3
22	NUCURRENT INC	545	683	79.8	IEEE	545	79.8	Wireless Power Consortium	38	5.6
23	Qualcomm Inc	522	659	79.2	IEEE	522	79.2	RELX Group (Elsevier)	38	5.8
24	NXP Semiconductors NV	500	609	82.1	IEEE	500	82.1	IET/IEE	17	2.8
25	Battelle Memorial Institute	489	2492	19.6	RELX Group (Elsevier)	537	21.5	IEEE	489	19.6
26	STMicroelectronics	473	606	78.1	IEEE	473	78.1	RELX Group (Elsevier)	29	4.8
27	University of California	472	2687	17.6	ACS-Am Chem Soc	501	18.6	IEEE	472	17.6
28	Qorvo	438	493	88.8	IEEE	438	88.8	European Microwave Association	16	3.2
29	International Business Machi	434	1014	42.8	IEEE	434	42.8	RELX Group (Elsevier)	120	11.8
30	Enphase Energy Inc	421	459	91.7	IEEE	421	91.7	IET/IEE	8	1.7
31	Industrial Technology Researc	405	872	46.4	IEEE	405	46.4	RELX Group (Elsevier)	219	25.1
32	Raytheon Co.	375	1246	30.1	IEEE	375	30.1	NASA-National Aeronautics and Space Admin	132	10.6
33	Amazon.com Inc.	325	629	51.7	IEEE	325	51.7	SPIE-Int Soc Opt Engineering	93	14.8
34	Alstom	321	427	75.2	IEEE	321	75.2	IET/IEE	32	7.5
35	Tigo Energy Inc	319	498	64.1	IEEE	319	64.1	WIP-Renewable Energies	134	26.9
36	Siemens Aktiengesellschaft	297	450	66.0	IEEE	297	66.0	RELX Group (Elsevier)	38	8.4
37	California Institute of Techno	291	3443	8.5	RELX Group (Elsevier)	1002	29.1	ACS-Am Chem Soc	519	15.1
38	Apple Inc	285	1200	23.8	IEEE	285	23.8	RELX Group (Elsevier)	220	18.3
39	THE FLORIDA INTERNATI	283	401	70.6	IEEE	283	70.6	RELX Group (Elsevier)	28	7.0

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Power Integrations Inc.	280	420	66.7	IEEE	280	66.7	Penton/IPC, Inc.	56	13.3
41	University of Illinois	254	1111	22.9	RELX Group (Elsevier)	383	34.5	IEEE	254	22.9
42	Delta Electronics Inc	252	281	89.7	IEEE	252	89.7	Korean Institute of Power Electronics	13	4.6
43	The Arizona Board of Regent	251	1300	19.3	ACS-Am Chem Soc	276	21.2	RELX Group (Elsevier)	258	19.8
44	Eaton Corp.	245	348	70.4	IEEE	245	70.4	RELX Group (Elsevier)	36	10.3
45	Schneider Electric S.A.	232	304	76.3	IEEE	232	76.3	IET/IEE	9	3.0
46	Advanced Energy Industries I	231	250	92.4	IEEE	231	92.4	IET/IEE	4	1.6
47	Koch Industries Inc	230	289	79.6	IEEE	230	79.6	RELX Group (Elsevier)	13	4.5
48	Samsung Electronics Co Ltd	227	1893	12.0	RELX Group (Elsevier)	527	27.8	ACS-Am Chem Soc	312	16.5
49	Broadcom Ltd	220	276	79.7	IEEE	220	79.7	RELX Group (Elsevier)	10	3.6
50	Honeywell International Inc.	214	683	31.3	IEEE	214	31.3	RELX Group (Elsevier)	186	27.2
51	Powwermat Technologies Ltd	209	219	95.4	IEEE	209	95.4	American Institute of Physics	7	3.2
52	Causam Enterprises (former	206	398	51.8	IEEE	206	51.8	Springer Nature	72	18.1
53	Microchip Technology Inc.	206	250	82.4	IEEE	206	82.4	IEICE-Inst Elec Info Comm Eng	9	3.6
54	On Semiconductor Corporati	205	243	84.4	IEEE	205	84.4	Penton/IPC, Inc.	6	2.5
55	Huawei Technologies Compa	202	240	84.2	IEEE	202	84.2	RELX Group (Elsevier)	4	1.7
56	University of Alabama	196	230	85.2	IEEE	196	85.2	IET/IEE	11	4.8
57	Hong Kong University of Sci	186	308	60.4	IEEE	186	60.4	RELX Group (Elsevier)	37	12.0
58	Semiconductor Energy Labor	184	4143	4.4	SID-Society for Information Display	933	22.5	RELX Group (Elsevier)	535	12.9
59	Utah State University	179	282	63.5	IEEE	179	63.5	ACS-Am Chem Soc	23	8.2
60	Boeing Co. (The)	175	514	34.0	IEEE	175	34.0	RELX Group (Elsevier)	82	16.0
61	Microsoft Corporation	174	467	37.3	IEEE	174	37.3	ACM-Assoc Comput Mach	93	19.9
62	University of Wisconsin	172	237	72.6	IEEE	172	72.6	RELX Group (Elsevier)	11	4.6
63	Tesla Motors Inc	170	223	76.2	IEEE	170	76.2	WIP-Renewable Energies	11	4.9
64	Hitachi Ltd	165	335	49.3	IEEE	165	49.3	IET/IEE	53	15.8
65	R2 SEMICONDUCTOR INC	163	166	98.2	IEEE	163	98.2	European Microwave Association	2	1.2
66	AT&T Inc	162	336	48.2	IEEE	162	48.2	American Institute of Physics	18	5.4
67	Toshiba Corp	160	837	19.1	RELX Group (Elsevier)	329	39.3	IEEE	160	19.1
68	General Motors Corp	154	1188	13.0	RELX Group (Elsevier)	373	31.4	ACS-Am Chem Soc	163	13.7
69	Koninklijke Philips N.V.	150	279	53.8	IEEE	150	53.8	Wireless Power Consortium	23	8.2
70	Schweitzer Engineering Labo	148	153	96.7	IEEE	148	96.7	IET/IEE	3	2.0
71	University of Florida	148	377	39.3	IEEE	148	39.3	RELX Group (Elsevier)	57	15.1
72	University of Minnesota (The	148	247	59.9	IEEE	148	59.9	American Institute of Physics	21	8.5
73	Alphabet Inc.	147	241	61.0	IEEE	147	61.0	ACM-Assoc Comput Mach	15	6.2
74	O2Micro International Ltd.	147	224	65.6	IEEE	147	65.6	Texas Instruments	30	13.4
75	Silicon Laboratories Inc	146	165	88.5	IEEE	146	88.5	SAE-Society of Automobile Engineers	12	7.3
76	University of Michigan	146	631	23.1	IEEE	146	23.1	RELX Group (Elsevier)	114	18.1
77	Mitsubishi Electric Corp	145	202	71.8	IEEE	145	71.8	IET/IEE	25	12.4
78	Midtronics Inc.	142	352	40.3	IEEE	142	40.3	RELX Group (Elsevier)	61	17.3
79	Commissariat A L'Energie At	137	742	18.5	RELX Group (Elsevier)	290	39.1	IEEE	137	18.5
80	Marvell Technology Group Lt	137	174	78.7	IEEE	137	78.7	Texas Instruments	16	9.2

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Mosaid Technologies (forme	135	162	83.3	IEEE	135	83.3	Joint IEEE and ACM	13	8.0
82	University of Washington	134	827	16.2	RELX Group (Elsevier)	252	30.5	IEEE	134	16.2
83	INFINITE POWER SOLUTI	130	1398	9.3	RELX Group (Elsevier)	317	22.7	American Institute of Physics	309	22.1
84	Panasonic Holding Corporati	130	1308	9.9	RELX Group (Elsevier)	397	30.4	Electrochemical Society, Inc.	302	23.1
85	Vestas Wind Systems A/S	130	277	46.9	IEEE	130	46.9	RELX Group (Elsevier)	34	12.3
86	Western Digital Corp.	129	160	80.6	IEEE	129	80.6	McGraw Hill	16	10.0
87	University of Hong Kong	126	147	85.7	IEEE	126	85.7	IET/IEE	9	6.1
88	SRI International	124	701	17.7	SPIE-Int Soc Opt Engineering	152	21.7	IEEE	124	17.7
89	University of Colorado (The	124	325	38.2	IEEE	124	38.2	RELX Group (Elsevier)	37	11.4
90	University of Texas	123	1037	11.9	RELX Group (Elsevier)	245	23.6	Electrochemical Society, Inc.	126	12.2
91	TDK Corporation	119	315	37.8	IEEE	119	37.8	RELX Group (Elsevier)	68	21.6
92	Bosch (Robert) GmbH	118	1236	9.5	RELX Group (Elsevier)	303	24.5	Electrochemical Society, Inc.	254	20.6
93	FYRE STORM INC	118	124	95.2	IEEE	118	95.2	Scripta Pub Co.	3	2.4
94	Micron Technology Inc.	114	170	67.1	IEEE	114	67.1	RELX Group (Elsevier)	14	8.2
95	SMART WIRES INC	114	156	73.1	IEEE	114	73.1	Research & Reviews	9	5.8
96	MOTOR EXCELLENCE LL	111	125	88.8	IEEE	111	88.8	IEEE/ASME	14	11.2
97	Intellectual Ventures Manage	110	254	43.3	IEEE	110	43.3	RELX Group (Elsevier)	39	15.4
98	Virginia Tech University	108	118	91.5	IEEE	108	91.5	Korean Institute of Power Electronics	2	1.7
99	NEC Corp	107	285	37.5	IEEE	107	37.5	RELX Group (Elsevier)	63	22.1
100	Lenovo Group Ltd	103	136	75.7	IEEE	103	75.7	RELX Group (Elsevier)	12	8.8

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Robotics and Intelligent Manufacturing</i>										
1	Intuitive Surgical Inc.	6475	16331	39.6	IEEE	6475	39.6	The Medical Image Computing and Computer Assisted Interv	1862	11.4
2	Amazon.com Inc.	6390	12414	51.5	IEEE	6390	51.5	SPIE-Int Soc Opt Engineering	1579	12.7
3	Applied Materials Inc.	1597	2729	58.5	IEEE	1597	58.5	American Institute of Physics	151	5.5
4	INTOUCH HEALTH INC	1435	4161	34.5	IEEE	1435	34.5	IEEE/RSJ	403	9.7
5	Alphabet Inc.	1065	2238	47.6	IEEE	1065	47.6	IEEE/RSJ	189	8.4
6	Brain Corporation	836	2138	39.1	IEEE	836	39.1	MIT Press	237	11.1
7	Stryker Corp.	780	2436	32.0	IEEE	780	32.0	Springer Nature	376	15.4
8	Massachusetts Institute of Te	759	2243	33.8	IEEE	759	33.8	RELX Group (Elsevier)	376	16.8
9	Vanderbilt University	750	1272	59.0	IEEE	750	59.0	RELX Group (Elsevier)	95	7.5
10	Johnson & Johnson	722	4630	15.6	RELX Group (Elsevier)	1064	23.0	IEEE	722	15.6
11	Microsoft Corporation	695	1962	35.4	IEEE	695	35.4	ACM-Assoc Comput Mach	377	19.2
12	Honda Motor Co. Ltd.(Honda	678	1686	40.2	IEEE	678	40.2	RELX Group (Elsevier)	214	12.7
13	University of Nebraska	673	3148	21.4	IEEE	673	21.4	Springer Nature	552	17.5
14	International Business Machi	584	1801	32.4	IEEE	584	32.4	ACM-Assoc Comput Mach	206	11.4
15	Siemens Aktiengesellschaft	452	1014	44.6	IEEE	452	44.6	RELX Group (Elsevier)	99	9.8
16	PDF Solutions	393	596	65.9	IEEE	393	65.9	SPIE-Int Soc Opt Engineering	134	22.5
17	TELADOC HEALTH INC	370	1108	33.4	IEEE	370	33.4	IEEE/RSJ	101	9.1
18	Sony Group Corp	323	533	60.6	IEEE	323	60.6	IEEE/RSJ	97	18.2
19	Samsung Electronics Co Ltd	306	494	61.9	IEEE	306	61.9	IEEE/RSJ	40	8.1
20	HRL Laboratories LLC	289	596	48.5	IEEE	289	48.5	RELX Group (Elsevier)	57	9.6
21	MACAU UNIVERSITY OF	267	292	91.4	IEEE	267	91.4	Springer Nature	5	1.7
22	Johns Hopkins University	264	580	45.5	IEEE	264	45.5	RELX Group (Elsevier)	41	7.1
23	Boeing Co. (The)	261	683	38.2	IEEE	261	38.2	RELX Group (Elsevier)	105	15.4
24	Walmart Stores Inc	260	754	34.5	IEEE	260	34.5	CBS Interactive	80	10.6
25	Otto Bock Holding GmbH &	249	788	31.6	IEEE	249	31.6	RELX Group (Elsevier)	166	21.1
26	Medrobotics Corp	243	704	34.5	IEEE	243	34.5	Springer Nature	173	24.6
27	SIPCO LLC	238	414	57.5	IEEE	238	57.5	Internet Soc/IETF-Internet Eng Task Force	35	8.5
28	Emerson Electric Co.	228	862	26.5	IEEE	228	26.5	RELX Group (Elsevier)	156	18.1
29	General Electric Company	216	451	47.9	IEEE	216	47.9	RELX Group (Elsevier)	48	10.6
30	Immersion Corp.	199	530	37.5	IEEE	199	37.5	ASME-Am Soc Mech Eng	42	7.9
31	The Arizona Board of Regent	195	583	33.4	IEEE	195	33.4	RELX Group (Elsevier)	88	15.1
32	Cadence Design Systems Inc	194	468	41.5	IEEE	194	41.5	Joint IEEE and ACM	158	33.8
33	Koch Industries Inc	189	237	79.7	IEEE	189	79.7	RELX Group (Elsevier)	13	5.5
34	Advanced Micro Devices Inc	188	399	47.1	IEEE	188	47.1	RELX Group (Elsevier)	48	12.0
35	ABB Ltd	182	301	60.5	IEEE	182	60.5	RELX Group (Elsevier)	32	10.6
36	Cimpres NV	179	435	41.1	IEEE	179	41.1	RELX Group (Elsevier)	121	27.8
37	Honeywell International Inc.	171	426	40.1	IEEE	171	40.1	RELX Group (Elsevier)	78	18.3
38	SRI International	158	377	41.9	IEEE	158	41.9	SPIE-Int Soc Opt Engineering	56	14.9
39	Harvard University	155	631	24.6	IEEE	155	24.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	79	12.5

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Bonutti Technologies LLC	154	726	21.2	Springer Nature	199	27.4	IEEE	154	21.2
41	L3 Harris Technologies (form	151	237	63.7	IEEE	151	63.7	Society of Petroleum Engineers	16	6.8
42	ICOSYSTEM CORP	150	198	75.8	IEEE	150	75.8	IET/IEEE	10	5.1
43	Toyota Motor Corp	150	354	42.4	IEEE	150	42.4	IEEE/RSJ	36	10.2
44	University of Southern Califo	150	248	60.5	IEEE	150	60.5	Springer Nature	18	7.3
45	University of Pennsylvania	145	265	54.7	IEEE	145	54.7	IEEE/RSJ	19	7.2
46	NEURALA INC	143	294	48.6	IEEE	143	48.6	MIT Press	30	10.2
47	INDIVIDUAL PATENTER	141	318	44.3	IEEE	141	44.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	13	4.1
48	Rockwell Automation Inc	141	271	52.0	IEEE	141	52.0	RELX Group (Elsevier)	30	11.1
49	Align Technology Inc	134	1187	11.3	JCO - Journal of Clinical Orthodontics	205	17.3	SAGE Publications Ltd	147	12.4
50	Battelle Memorial Institute	133	263	50.6	IEEE	133	50.6	IEEE/RSJ	35	13.3
51	OneTrust	133	424	31.4	ACM-Assoc Comput Mach	211	49.8	IEEE	133	31.4
52	FedEx Corp	132	139	95.0	IEEE	132	95.0	IEEE/RSJ	4	2.9
53	University of Washington	129	329	39.2	IEEE	129	39.2	RELX Group (Elsevier)	24	7.3
54	IWALK INC	127	395	32.2	IEEE	127	32.2	RELX Group (Elsevier)	82	20.8
55	Walt Disney Co.	126	348	36.2	IEEE	126	36.2	ACM-Assoc Comput Mach	106	30.5
56	Johnson Controls Internationa	125	352	35.5	IEEE	125	35.5	RELX Group (Elsevier)	77	21.9
57	MONOLITHIC 3D INC	124	223	55.6	IEEE	124	55.6	IEEE/JPN Soc App Phys	24	10.8
58	ROY-G-BIV CORP	120	385	31.2	IEEE	120	31.2	ISO-International Standards Organization	67	17.4
59	Canon Inc	119	270	44.1	IEEE	119	44.1	RELX Group (Elsevier)	23	8.5
60	University of South Florida	119	255	46.7	IEEE	119	46.7	IEEE/RSJ	25	9.8
61	Broadcom Ltd	117	204	57.4	IEEE	117	57.4	RELX Group (Elsevier)	38	18.6
62	SPHERO INC	117	121	96.7	IEEE	117	96.7	American Automatic Control Council (AACC)	2	1.7
63	University of Minnesota (The	117	222	52.7	IEEE	117	52.7	IEEE/RSJ	18	8.1
64	Taiwan Semiconductor Manu	115	217	53.0	IEEE	115	53.0	SPIE-Int Soc Opt Engineering	18	8.3
65	Teradyne Inc.	114	297	38.4	IEEE	114	38.4	ASME-Am Soc Mech Eng	40	13.5
66	Xerox Corp	114	306	37.3	IEEE	114	37.3	ACM-Assoc Comput Mach	41	13.4
67	Fanuc Ltd.	112	233	48.1	IEEE	112	48.1	RELX Group (Elsevier)	37	15.9
68	Zebra Technologies Corp.	110	226	48.7	IEEE	110	48.7	ACM-Assoc Comput Mach	17	7.5
69	NVIDIA Corp.	109	176	61.9	IEEE	109	61.9	ACM-Assoc Comput Mach	14	8.0
70	Toshiba Corp	108	179	60.3	IEEE	108	60.3	RSJ-Robotics Society of Japan	6	3.4
71	University of California	108	271	39.9	IEEE	108	39.9	RELX Group (Elsevier)	28	10.3
72	Intel Corporation	107	211	50.7	IEEE	107	50.7	ACM-Assoc Comput Mach	21	10.0
73	Tela Innovations inc	105	273	38.5	IEEE	105	38.5	SPIE-Int Soc Opt Engineering	96	35.2
74	VIRTUAL INCISION CORP	104	489	21.3	IEEE	104	21.3	Springer Nature	83	17.0
75	Ecole Polytechnique Federale	103	375	27.5	IEEE	103	27.5	Springer Nature	51	13.6
76	BOSTON POLARIMETRICS	100	207	48.3	IEEE	100	48.3	SPIE-Int Soc Opt Engineering	25	12.1
77	GECKO ROBOTICS INC	100	177	56.5	IEEE	100	56.5	IEEE/RSJ	35	19.8
78	Intellectual Ventures Manage	100	516	19.4	IEEE	100	19.4	RELX Group (Elsevier)	59	11.4
79	American Express Co.	96	343	28.0	IEEE	96	28.0	The USENIX Association	39	11.4
80	Tokyo Electron Limited	95	239	39.7	IEEE	95	39.7	RELX Group (Elsevier)	26	10.9

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81	Panasonic Holding Corporati	90	249	36.1	IEEE	90	36.1	RELX Group (Elsevier)	38	15.3
82	Sap SE	89	332	26.8	IEEE	89	26.8	RELX Group (Elsevier)	58	17.5
83	Lockheed Martin Corp.	87	235	37.0	IEEE	87	37.0	RELX Group (Elsevier)	20	8.5
84	Raytheon Co.	87	272	32.0	IEEE	87	32.0	RELX Group (Elsevier)	37	13.6
85	TRX SYSTEMS INC	85	145	58.6	IEEE	85	58.6	ION-The Inst of Navigation	10	6.9
86	Caterpillar Inc.	84	227	37.0	IEEE	84	37.0	SAE-Society of Automobile Engineers	35	15.4
87	LG Electronics Inc.	84	116	72.4	IEEE	84	72.4	IEEE/RSJ	7	6.0
88	BERKSHIRE GREY INC	83	135	61.5	IEEE	83	61.5	ASME-Am Soc Mech Eng	30	22.2
89	3D Systems Corp.	82	177	46.3	IEEE	82	46.3	ACM-Assoc Comput Mach	41	23.2
90	ALOFT MEDIA LLC	82	103	79.6	IEEE	82	79.6	ASCE-AMER SOC CIVIL ENGINEERS	6	5.8
91	ARCHI CON DES INVENTI	82	408	20.1	ACM-Assoc Comput Mach	115	28.2	IEEE	82	20.1
92	Hyundai Motor Co.	81	199	40.7	IEEE	81	40.7	IEEE/RSJ	44	22.1
93	Rag Foundation	81	131	61.8	IEEE	81	61.8	RELX Group (Elsevier)	18	13.7
94	Midea Group Co Ltd	80	118	67.8	IEEE	80	67.8	IEEE/RSJ	13	11.0
95	HP Inc	76	193	39.4	IEEE	76	39.4	ACM-Assoc Comput Mach	27	14.0
96	Lincoln Electric Holdings Inc	75	229	32.8	IEEE	75	32.8	Amer Welding Soc	25	10.9
97	Procter & Gamble Co.	75	129	58.1	IEEE	75	58.1	RELX Group (Elsevier)	14	10.9
98	General Motors Corp	74	183	40.4	IEEE	74	40.4	RELX Group (Elsevier)	20	10.9
99	Industrial Technology Researc	74	149	49.7	IEEE	74	49.7	RELX Group (Elsevier)	21	14.1
100	University of Michigan	74	190	38.9	IEEE	74	38.9	RELX Group (Elsevier)	28	14.7

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Semiconductors/Solid-State Devices/Electronics</i>										
1	Micron Technology Inc.	21792	82930	26.3	IEEE	21792	26.3	RELX Group (Elsevier)	15690	18.9
2	MONOLITHIC 3D INC	20420	36267	56.3	IEEE	20420	56.3	IEEE/JPN Soc App Phys	3692	10.2
3	Semiconductor Energy Labor	12777	2E+05	6.8	SID-Society for Information Display	62606	33.1	American Institute of Physics	27178	14.4
4	International Business Machi	10291	25240	40.8	IEEE	10291	40.8	American Institute of Physics	3676	14.6
5	Taiwan Semiconductor Manu	8547	27141	31.5	IEEE	8547	31.5	American Institute of Physics	7816	28.8
6	Qorvo	6857	8954	76.6	IEEE	6857	76.6	RELX Group (Elsevier)	466	5.2
7	Tela Innovations inc	5182	17054	30.4	SPIE-Int Soc Opt Engineering	6246	36.6	IEEE	5182	30.4
8	Macronix International Co. Lt	4835	9245	52.3	IEEE	4835	52.3	IEEE/JPN Soc App Phys	1807	19.5
9	Intel Corporation	4613	9649	47.8	IEEE	4613	47.8	American Institute of Physics	1274	13.2
10	Western Digital Corp.	4436	9281	47.8	IEEE	4436	47.8	American Institute of Physics	1193	12.9
11	Wolfsped Inc. (formerly Cre	4349	12074	36.0	IEEE	4349	36.0	American Institute of Physics	2598	21.5
12	Murata Manufacturing Co. Lt	3892	5173	75.2	IEEE	3892	75.2	RELX Group (Elsevier)	193	3.7
13	Infineon Technologies AG	3759	7169	52.4	IEEE	3759	52.4	American Institute of Physics	877	12.2
14	ASM International N.V.	3183	34306	9.3	RELX Group (Elsevier)	6076	17.7	American Institute of Physics	5947	17.3
15	Chipbond Technology Corp	2904	3635	79.9	IEEE	2904	79.9	RELX Group (Elsevier)	268	7.4
16	On Semiconductor Corporati	2786	4128	67.5	IEEE	2786	67.5	RELX Group (Elsevier)	327	7.9
17	NXP Semiconductors NV	2660	5289	50.3	IEEE	2660	50.3	American Institute of Physics	816	15.4
18	University of Illinois	2613	26761	9.8	American Institute of Physics	5371	20.1	ACS-Am Chem Soc	4303	16.1
19	Applied Materials Inc.	2541	13536	18.8	American Institute of Physics	2721	20.1	IEEE	2541	18.8
20	Amberwave Inc	2337	6843	34.2	IEEE	2337	34.2	American Institute of Physics	2045	29.9
21	PDF Solutions	2336	3669	63.7	IEEE	2336	63.7	SPIE-Int Soc Opt Engineering	843	23.0
22	Xperi Holding Corporation (F	2020	6185	32.7	IEEE	2020	32.7	American Institute of Physics	1075	17.4
23	Global Foundries Inc	2011	3981	50.5	IEEE	2011	50.5	American Institute of Physics	498	12.5
24	Toshiba Corp	2008	5139	39.1	IEEE	2008	39.1	American Institute of Physics	830	16.2
25	Broadcom Ltd	1959	5914	33.1	IEEE	1959	33.1	SMTA-Surface Mount Technology Association	1017	17.2
26	Texas Instruments Inc	1947	3377	57.7	IEEE	1947	57.7	American Institute of Physics	316	9.4
27	ZENO SEMICONDUCTOR I	1718	2262	76.0	IEEE	1718	76.0	IEEE/JPN Soc App Phys	328	14.5
28	Samsung Electronics Co Ltd	1572	11644	13.5	American Institute of Physics	2209	19.0	ACS-Am Chem Soc	1888	16.2
29	Renesas Electronic Corporati	1514	2656	57.0	IEEE	1514	57.0	IEEE/JPN Soc App Phys	306	11.5
30	II-VI Inc	1405	5146	27.3	IEEE	1405	27.3	American Institute of Physics	866	16.8
31	University of California	1392	17421	8.0	American Institute of Physics	3838	22.0	RELX Group (Elsevier)	2272	13.0
32	California Institute of Techno	1365	9316	14.7	American Institute of Physics	1423	15.3	RELX Group (Elsevier)	1386	14.9
33	Qualcomm Inc	1343	2731	49.2	IEEE	1343	49.2	American Institute of Physics	229	8.4
34	STMicroelectronics	1339	3262	41.0	IEEE	1339	41.0	RELX Group (Elsevier)	494	15.1
35	Transphorm Inc	1203	2561	47.0	IEEE	1203	47.0	American Institute of Physics	453	17.7
36	Advanced Micro Devices Inc	1202	2101	57.2	IEEE	1202	57.2	American Institute of Physics	197	9.4
37	Analog Devices Inc.	1178	1682	70.0	IEEE	1178	70.0	RELX Group (Elsevier)	96	5.7
38	HRL Laboratories LLC	1144	2477	46.2	IEEE	1144	46.2	American Institute of Physics	443	17.9
39	Massachusetts Institute of Te	1116	8106	13.8	American Institute of Physics	1676	20.7	IEEE	1116	13.8

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Commissariat A L'Energie At	1097	5622	19.5	American Institute of Physics	1231	21.9	IEEE	1097	19.5
41	United Microelectronics Corp	999	2111	47.3	IEEE	999	47.3	American Institute of Physics	298	14.1
42	Mevion Medical Systems Inc	866	2731	31.7	IEEE	866	31.7	RELX Group (Elsevier)	531	19.4
43	Fujitsu Limited	837	2296	36.5	IEEE	837	36.5	American Institute of Physics	295	12.8
44	Synopsys Inc.	835	1850	45.1	IEEE	835	45.1	American Institute of Physics	344	18.6
45	Panasonic Holding Corporati	806	4125	19.5	IEEE	806	19.5	American Institute of Physics	703	17.0
46	Crossbar Inc	738	2855	25.8	IEEE	738	25.8	RELX Group (Elsevier)	389	13.6
47	Lam Research Corp.	738	5332	13.8	American Institute of Physics	1283	24.1	IEEE	738	13.8
48	Apple Inc	731	1945	37.6	IEEE	731	37.6	American Institute of Physics	261	13.4
49	Motorola Solutions Inc.	683	2324	29.4	IEEE	683	29.4	American Institute of Physics	637	27.4
50	Unisantis Electronics Ltd	637	785	81.1	IEEE	637	81.1	Institute of Pure and Applied Physics	52	6.6
51	EcoSense Lighting Inc	568	7410	7.7	American Institute of Physics	2153	29.1	Institute of Pure and Applied Physics	1509	20.4
52	Michigan State University	552	7083	7.8	Optical Society of America	1527	21.6	American Institute of Physics	1089	15.4
53	Hon Hai Precision Industry C	551	3234	17.0	American Institute of Physics	720	22.3	IEEE	551	17.0
54	Hong Kong University of Sci	551	1130	48.8	IEEE	551	48.8	American Institute of Physics	219	19.4
55	Interuniversity MicroElectron	540	1816	29.7	IEEE	540	29.7	American Institute of Physics	309	17.0
56	AMS Osram (former AMS A	537	3816	14.1	American Institute of Physics	941	24.7	IEEE	537	14.1
57	Thermo Fisher Scientific Inc	537	2838	18.9	RELX Group (Elsevier)	885	31.2	IEEE	537	18.9
58	Industrial Technology Researc	526	1717	30.6	IEEE	526	30.6	RELX Group (Elsevier)	298	17.4
59	Cubic Corporation	500	696	71.8	IEEE	500	71.8	The International Society of Infrared, Millimeter, and Terahert	44	6.3
60	Mass General Brigham (form	489	7612	6.4	Optical Society of America	2845	37.4	RELX Group (Elsevier)	1055	13.9
61	Nantero Inc	483	7563	6.4	ACS-Am Chem Soc	2278	30.1	American Institute of Physics	1589	21.0
62	Aisin Corporation (Aisin Seki	475	3377	14.1	Optical Society of America	1218	36.1	IEEE	475	14.1
63	INNOVATIVE SILICON SA	453	556	81.5	IEEE	453	81.5	RELX Group (Elsevier)	24	4.3
64	Sulvolta Inc	448	930	48.2	IEEE	448	48.2	American Institute of Physics	139	14.9
65	General Electric Company	447	1522	29.4	IEEE	447	29.4	American Institute of Physics	244	16.0
66	Mitsubishi Electric Corp	446	1001	44.6	IEEE	446	44.6	American Institute of Physics	106	10.6
67	Power Integrations Inc.	444	689	64.4	IEEE	444	64.4	American Institute of Physics	62	9.0
68	Hitachi Ltd	441	1418	31.1	IEEE	441	31.1	American Institute of Physics	283	20.0
69	SolAero Technologies Corp	436	873	49.9	IEEE	436	49.9	RELX Group (Elsevier)	137	15.7
70	ACORN SEMI LLC	423	2626	16.1	American Institute of Physics	956	36.4	RELX Group (Elsevier)	466	17.7
71	Jiangsu ChangJiang Electroni	417	553	75.4	IEEE	417	75.4	International Microelectronics And Packaging Society	61	11.0
72	United States Navy	415	2409	17.2	American Institute of Physics	591	24.5	IEEE	415	17.2
73	The Arizona Board of Regent	414	4666	8.9	American Institute of Physics	835	17.9	RELX Group (Elsevier)	749	16.1
74	ARTILUX INC	396	782	50.6	IEEE	396	50.6	Optical Society of America	131	16.8
75	Electronics and Telecommuni	394	1155	34.1	IEEE	394	34.1	American Institute of Physics	229	19.8
76	Sanken Electric Co. Ltd.	391	588	66.5	IEEE	391	66.5	RELX Group (Elsevier)	81	13.8
77	Soitec SA	383	1994	19.2	American Institute of Physics	531	26.6	IEEE	383	19.2
78	ACORN TECHNOLOGIES I	377	1784	21.1	American Institute of Physics	528	29.6	IEEE	377	21.1
79	University of Wisconsin	377	1875	20.1	American Institute of Physics	502	26.8	IEEE	377	20.1
80	Totalenergies SE (formerly T	376	737	51.0	IEEE	376	51.0	RELX Group (Elsevier)	92	12.5

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Silicon Genesis Corporation	367	1526	24.0	IEEE	367	24.0	American Institute of Physics	291	19.1
82	Georgia Institute of Technolo	365	1110	32.9	IEEE	365	32.9	RELX Group (Elsevier)	153	13.8
83	SiOnyx Inc	364	2321	15.7	American Institute of Physics	659	28.4	RELX Group (Elsevier)	369	15.9
84	Sony Group Corp	363	1823	19.9	IEEE	363	19.9	American Institute of Physics	361	19.8
85	Raytheon Co.	360	1593	22.6	IEEE	360	22.6	American Institute of Physics	237	14.9
86	TDK Corporation	353	1843	19.2	American Institute of Physics	478	25.9	IEEE	353	19.2
87	Honeywell International Inc.	351	2901	12.1	ACS-Am Chem Soc	481	16.6	IEEE	351	12.1
88	Vishay Intertechnology Inc.	347	533	65.1	IEEE	347	65.1	RELX Group (Elsevier)	35	6.6
89	Seoul Semiconductor Co Ltd	341	3224	10.6	American Institute of Physics	1194	37.0	RELX Group (Elsevier)	435	13.5
90	Xerox Corp	338	1981	17.1	American Institute of Physics	533	26.9	IEEE	338	17.1
91	SK Hynix Inc	335	731	45.8	IEEE	335	45.8	American Institute of Physics	103	14.1
92	Lockheed Martin Corp.	332	1970	16.9	Optical Society of America	346	17.6	American Institute of Physics	337	17.1
93	Bosch (Robert) GmbH	328	599	54.8	IEEE	328	54.8	RELX Group (Elsevier)	101	16.9
94	Microchip Technology Inc.	324	534	60.7	IEEE	324	60.7	American Institute of Physics	43	8.1
95	Sanan Optoelectronics Techn	323	1466	22.0	American Institute of Physics	566	38.6	US Dept of Energy	392	26.7
96	Columbia University	322	4228	7.6	American Institute of Physics	1508	35.7	MRS-Materials Research Soc	447	10.6
97	SolarEdge Technologies Inc	322	400	80.5	IEEE	322	80.5	WIP-Renewable Energies	40	10.0
98	University of Michigan	322	2148	15.0	American Institute of Physics	479	22.3	IEEE	322	15.0
99	Sin-American Silicon	315	757	41.6	IEEE	315	41.6	American Institute of Physics	149	19.7
100	Xtera Communications Inc.	305	948	32.2	IEEE	305	32.2	Optical Society of America	238	25.1

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Smart Grid/Smart Meters/Energy Infrastructure</i>										
1	SolarEdge Technologies Inc	1876	2349	79.9	IEEE	1876	79.9	WIP-Renewable Energies	144	6.1
2	Velatia Group	839	1120	74.9	IEEE	839	74.9	Echelon Corp	81	7.2
3	Honeywell International Inc.	234	299	78.3	IEEE	234	78.3	Pearson Education	15	5.0
4	TRILLIANT NETWORKS IN	231	344	67.2	IEEE	231	67.2	Internet Soc/IETF-Internet Eng Task Force	23	6.7
5	SIPCO LLC	157	271	57.9	IEEE	157	57.9	Internet Soc/IETF-Internet Eng Task Force	27	10.0
6	General Electric Company	150	229	65.5	IEEE	150	65.5	RELX Group (Elsevier)	21	9.2
7	California Institute of Techno	136	244	55.7	IEEE	136	55.7	RELX Group (Elsevier)	19	7.8
8	ABB Ltd	128	153	83.7	IEEE	128	83.7	IET/IEE	5	3.3
9	AMPT LLC	121	151	80.1	IEEE	121	80.1	RELX Group (Elsevier)	8	5.3
10	Battelle Memorial Institute	116	159	73.0	IEEE	116	73.0	RELX Group (Elsevier)	8	5.0
11	DOMINION ENERGY TEC	109	136	80.1	IEEE	109	80.1	International Telecommunication Union	12	8.8
12	International Business Machi	105	196	53.6	IEEE	105	53.6	IP.Com	17	8.7
13	ASTROLINK INTERNATIO	97	122	79.5	IEEE	97	79.5	International Telecommunication Union	12	9.8
14	Alstom	73	90	81.1	IEEE	73	81.1	IET/IEE	11	12.2
15	Witricity Corp	71	137	51.8	IEEE	71	51.8	American Institute of Physics	10	7.3
16	University System of Maryla	62	66	93.9	IEEE	62	93.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2	3.0
17	Itron Inc.	60	106	56.6	IEEE	60	56.6	ACM-Assoc Comput Mach	18	17.0
18	Enphase Energy Inc	52	54	96.3	IEEE	52	96.3	EPE Association	2	3.7
19	SMART WIRES INC	51	73	69.9	IEEE	51	69.9	Research & Reviews	5	6.8
20	University of Minnesota (The	45	53	84.9	IEEE	45	84.9	RELX Group (Elsevier)	3	5.7
21	Qualcomm Inc	44	75	58.7	IEEE	44	58.7	3GPP General Partnership Project Standards Body	10	13.3
22	University of Texas	44	120	36.7	IEEE	44	36.7	RELX Group (Elsevier)	23	19.2
23	3M Co	43	54	79.6	IEEE	43	79.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	5	9.3
24	DELTA ENERGY & COMM	40	100	40.0	IEEE	40	40.0	RELX Group (Elsevier)	27	27.0
25	Totalenergies SE (formerly T	36	45	80.0	IEEE	36	80.0	EPE Association	4	8.9
26	Hubbell Inc.	35	43	81.4	IEEE	35	81.4	Multidisciplinary Digital Publishing Institute (MDPI)	3	7.0
27	Schweitzer Engineering Labo	34	38	89.5	IEEE	34	89.5	IEC-International Electrotechnical Commission	1	2.6
28	Siemens Aktiengesellschaft	34	50	68.0	IEEE	34	68.0	IET/IEE	2	4.0
29	Rockwell Automation Inc	33	44	75.0	IEEE	33	75.0	AIAA-Am Inst Aero Astro	4	9.1
30	Georgia Institute of Technolo	29	85	34.1	ACM-Assoc Comput Mach	47	55.3	IEEE	29	34.1
31	Microsoft Corporation	29	63	46.0	IEEE	29	46.0	ACM-Assoc Comput Mach	11	17.5
32	Causam Enterprises (former	28	50	56.0	IEEE	28	56.0	Springer Nature	10	20.0
33	LS Electric co. Ltd. (formerly	27	36	75.0	IEEE	27	75.0	IET/IEE	4	11.1
34	ENERGY TECHNOLOGY G	26	30	86.7	IEEE	26	86.7	RELX Group (Elsevier)	2	6.7
35	Electro Industries Gauge Tec	25	53	47.2	IEEE	25	47.2	ACM-Assoc Comput Mach	10	18.9
36	Tigo Energy Inc	25	37	67.6	IEEE	25	67.6	WIP-Renewable Energies	9	24.3
37	STEM INC	24	25	96.0	IEEE	24	96.0	RELX Group (Elsevier)	1	4.0
38	SPARQ SYSTEMS INC	23	29	79.3	IEEE	23	79.3	RELX Group (Elsevier)	3	10.3
39	University of California	23	577	4.0	ACS-Am Chem Soc	169	29.3	Royal Society of Chemistry	94	16.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Ecole Polytechnique Federale	22	27	81.5	IEEE	22	81.5	RELX Group (Elsevier)	3	11.1
41	Schneider Electric S.A.	21	105	20.0	ANSI-American National Standards Institute	27	25.7	IEEE	21	20.0
42	TAE TECHNOLOGIES INC	21	440	4.8	American Institute of Physics	211	48.0	American Physical Society	68	15.5
43	Taiwan Semiconductor Manu	21	39	53.8	IEEE	21	53.8	Electrostatic Discharge Association	15	38.5
44	Empire Technology Develop	20	24	83.3	IEEE	20	83.3	Internet Soc/IETF-Internet Eng Task Force	2	8.3
45	Mitsubishi Electric Corp	20	21	95.2	IEEE	20	95.2	Hindawi Publishing Corporation	1	4.8
46	SENSE LABS INC	20	129	15.5	NILM Organizing Committee	87	67.4	IEEE	20	15.5
47	TEMPORAL POWER LTD	20	26	76.9	IEEE	20	76.9	NASA-National Aeronautics and Space Admin	2	7.7
48	Accenture Ltd.	19	25	76.0	IEEE	19	76.0	A B B Corporate Management Services AG	4	16.0
49	Commscope Holding (formerl	19	19	100.0	IEEE	19	100.0			
50	Panasonic Holding Corporati	19	27	70.4	IEEE	19	70.4	IEICE-Inst Elec Info Comm Eng	2	7.4
51	Signify NV	19	23	82.6	IEEE	19	82.6	IEEE/OSA	1	4.3
52	Intellectual Ventures Manage	18	34	52.9	IEEE	18	52.9	RELX Group (Elsevier)	6	17.6
53	New Jersey Institute of Techn	17	17	100.0	IEEE	17	100.0			
54	Alphabet Inc.	16	42	38.1	IEEE	16	38.1	ACM-Assoc Comput Mach	10	23.8
55	Massachusetts Institute of Te	16	22	72.7	IEEE	16	72.7	AMER SOC NAVAL ENG INC	4	18.2
56	CLEAN POWER RESEARC	15	42	35.7	RELX Group (Elsevier)	22	52.4	IEEE	15	35.7
57	Toshiba Corp	14	22	63.6	IEEE	14	63.6	Internet Soc/IETF-Internet Eng Task Force	3	13.6
58	ENEDYM INC	13	18	72.2	IEEE	13	72.2	Electrochemical Society, Inc.	1	5.6
59	Industrial Technology Researc	13	16	81.3	IEEE	13	81.3	RELX Group (Elsevier)	2	12.5
60	Sony Group Corp	13	45	28.9	SID-Society for Information Display	24	53.3	IEEE	13	28.9
61	THE FLORIDA INTERNATI	13	28	46.4	IEEE	13	46.4	The USENIX Association	4	14.3
62	Landis & Gyr AG	12	13	92.3	IEEE	12	92.3	ANSI-American National Standards Institute	1	7.7
63	United States of America Dep	12	38	31.6	IEEE	12	31.6	Optical Society of America	7	18.4
64	THE DETROIT EDISON CO	11	11	100.0	IEEE	11	100.0			
65	Alliance for Sustainable Ener	10	12	83.3	IEEE	10	83.3	Electric Power Research Institute	1	8.3
66	BRITISH COLUMBIA HYD	10	10	100.0	IEEE	10	100.0			
67	Nokia Corporation	10	20	50.0	IEEE	10	50.0	ACM-Assoc Comput Mach	3	15.0
68	Nth Degree Technologies Wo	10	102	9.8	Springer Nature	18	17.6	Optical Society of America	12	11.8
69	Roche Holding Ltd.	10	10	100.0	IEEE	10	100.0			
70	Cisco Systems Inc.	9	19	47.4	IEEE	9	47.4	Internet Soc/IETF-Internet Eng Task Force	7	36.8
71	DEPSYS SA	9	9	100.0	IEEE	9	100.0			
72	Digimarc Corp.	9	9	100.0	IEEE	9	100.0			
73	Eaton Corp.	9	13	69.2	IEEE	9	69.2	Mcgraw Hill	2	15.4
74	Energous Corporation	9	12	75.0	IEEE	9	75.0	The European Association on Antennas and Propagation (Eur	1	8.3
75	Fortive Corporation	9	15	60.0	IEEE	9	60.0	RELX Group (Elsevier)	5	33.3
76	Hon Hai Precision Industry C	9	34	26.5	ACM-Assoc Comput Mach	16	47.1	IEEE	9	26.5
77	INTERNATIONAL BROAD	9	17	52.9	IEEE	9	52.9	ISO-International Standards Organization	6	35.3
78	Johnson Controls Internationa	9	41	22.0	RELX Group (Elsevier)	12	29.3	IEEE	9	22.0
79	Northeastern University (Bost	9	13	69.2	IEEE	9	69.2	International Network for Scientific Information Publication (I	2	15.4
80	University of Missouri	9	10	90.0	IEEE	9	90.0	Summit Technical Media	1	10.0

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Electricite de France	8	10	80.0	IEEE	8	80.0	US Dept of Energy	1	10.0
82	Raytheon Co.	8	18	44.4	IEEE	8	44.4	RELX Group (Elsevier)	4	22.2
83	Boeing Co. (The)	7	15	46.7	IEEE	7	46.7	AMER SOC TESTING MATERIALS	1	6.7
84	Clemson University	7	9	77.8	IEEE	7	77.8	American Institute of Physics	1	11.1
85	CURRENT GRID LLC	7	11	63.6	IEEE	7	63.6	Echelon Corp	2	18.2
86	CURRENT TECHNOLOGIE	7	12	58.3	IEEE	7	58.3	Hewlett-Packard Company	2	16.7
87	King Fahd University of Petr	7	10	70.0	IEEE	7	70.0	United Business Media/UBM Tech	3	30.0
88	OPEN ACCESS TECHNOL	7	7	100.0	IEEE	7	100.0			
89	POWER TAGGING TECHN	7	8	87.5	IEEE	7	87.5	IET/IEE	1	12.5
90	Semikron Danfoss A/S	7	7	100.0	IEEE	7	100.0			
91	TACTILIS SDN BHD	7	7	100.0	IEEE	7	100.0			
92	Tata Sons Ltd	7	9	77.8	IEEE	7	77.8	Very Large Data Base Endowment Inc. (VLDB Endowment)	1	11.1
93	UNIVERSITI BRUNEI DAR	7	8	87.5	IEEE	7	87.5	RELX Group (Elsevier)	1	12.5
94	AMRITA VISHWA VIDYAP	6	7	85.7	IEEE	6	85.7	IET/IEE	1	14.3
95	Bosch (Robert) GmbH	6	7	85.7	IEEE	6	85.7	American Institute of Physics	1	14.3
96	EMPOWER MICRO SYSTE	6	6	100.0	IEEE	6	100.0			
97	Hello Inc	6	10	60.0	IEEE	6	60.0	ACM-Assoc Comput Mach	2	20.0
98	KING ABDULAZIZ UNIVE	6	9	66.7	IEEE	6	66.7	RELX Group (Elsevier)	2	22.2
99	Korea Electrotechnology Res	6	6	100.0	IEEE	6	100.0			
100	NANOTECH ENERGY INC	6	194	3.1	ACS-Am Chem Soc	58	29.9	Royal Society of Chemistry	32	16.5

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Solar/Photovoltaic</i>										
1	SolarEdge Technologies Inc	4168	5191	80.3	IEEE	4168	80.3	WIP-Renewable Energies	377	7.3
2	AMPT LLC	872	1092	79.9	IEEE	872	79.9	RELX Group (Elsevier)	62	5.7
3	Totalenergies SE (formerly T	641	1049	61.1	IEEE	641	61.1	RELX Group (Elsevier)	120	11.4
4	University of Illinois	465	5091	9.1	American Institute of Physics	966	19.0	ACS-Am Chem Soc	916	18.0
5	SolAero Technologies Corp	452	907	49.8	IEEE	452	49.8	RELX Group (Elsevier)	140	15.4
6	Tigo Energy Inc	440	688	64.0	IEEE	440	64.0	WIP-Renewable Energies	186	27.0
7	Taiwan Semiconductor Manu	330	1611	20.5	American Institute of Physics	578	35.9	IEEE	330	20.5
8	California Institute of Techno	317	1874	16.9	IEEE	317	16.9	American Institute of Physics	286	15.3
9	International Business Machi	310	1563	19.8	RELX Group (Elsevier)	331	21.2	IEEE	310	19.8
10	Sanan Optoelectronics Techn	265	816	32.5	US Dept of Energy	399	48.9	IEEE	265	32.5
11	Emcore Corp.	245	487	50.3	IEEE	245	50.3	US Dept of Energy	76	15.6
12	Tesla Motors Inc	234	589	39.7	IEEE	234	39.7	WIP-Renewable Energies	97	16.5
13	Xtrion NV	216	2327	9.3	American Institute of Physics	431	18.5	ACS-Am Chem Soc	415	17.8
14	Hanergy Holding Group Ltd	172	458	37.6	IEEE	172	37.6	American Institute of Physics	72	15.7
15	Xerox Corp	153	499	30.7	IEEE	153	30.7	RELX Group (Elsevier)	96	19.2
16	SEMPRIUS INC	150	1692	8.9	American Institute of Physics	319	18.9	ACS-Am Chem Soc	307	18.1
17	Alliance for Sustainable Ener	141	1173	12.0	American Institute of Physics	219	18.7	RELX Group (Elsevier)	204	17.4
18	Beamreach Solar Inc	135	626	21.6	RELX Group (Elsevier)	207	33.1	IEEE	135	21.6
19	Solar Junction Corp	126	668	18.9	American Institute of Physics	207	31.0	RELX Group (Elsevier)	170	25.4
20	CLEAN POWER RESEARC	119	308	38.6	RELX Group (Elsevier)	158	51.3	IEEE	119	38.6
21	Boeing Co. (The)	118	272	43.4	IEEE	118	43.4	RELX Group (Elsevier)	51	18.8
22	The Arizona Board of Regent	105	484	21.7	RELX Group (Elsevier)	128	26.4	IEEE	105	21.7
23	Massachusetts Institute of Te	97	798	12.2	RELX Group (Elsevier)	137	17.2	American Institute of Physics	110	13.8
24	LG Electronics Inc.	92	265	34.7	IEEE	92	34.7	American Institute of Physics	48	18.1
25	Advanced Energy Industries I	84	91	92.3	IEEE	84	92.3	IET/IEE	4	4.4
26	Applied Materials Inc.	79	241	32.8	IEEE	79	32.8	WIP-Renewable Energies	51	21.2
27	Stion Corp	77	671	11.5	RELX Group (Elsevier)	225	33.5	American Institute of Physics	146	21.8
28	First Solar Inc	74	401	18.5	RELX Group (Elsevier)	173	43.1	IEEE	74	18.5
29	Azur Space Solar Power Gmb	72	190	37.9	IEEE	72	37.9	RELX Group (Elsevier)	40	21.1
30	Witricity Corp	72	136	52.9	IEEE	72	52.9	American Institute of Physics	11	8.1
31	University of California	70	1324	5.3	ACS-Am Chem Soc	289	21.8	RELX Group (Elsevier)	190	14.4
32	Solyndra Inc	68	361	18.8	RELX Group (Elsevier)	117	32.4	IEEE	68	18.8
33	Nanosolar Inc	61	873	7.0	RELX Group (Elsevier)	248	28.4	Electrochemical Society, Inc.	107	12.3
34	Texas Instruments Inc	60	73	82.2	IEEE	60	82.2	SAE-Society of Automobile Engineers	4	5.5
35	Lockheed Martin Corp.	58	235	24.7	IEEE	58	24.7	American Institute of Physics	37	15.7
36	DuPont de Nemours Inc.	57	303	18.8	RELX Group (Elsevier)	94	31.0	IEEE	57	18.8
37	ZENA TECHNOLOGIES IN	55	240	22.9	IEEE	55	22.9	ACS-Am Chem Soc	49	20.4
38	United States Navy	53	200	26.5	IEEE	53	26.5	RELX Group (Elsevier)	32	16.0
39	Dartmouth College	48	93	51.6	IEEE	48	51.6	RELX Group (Elsevier)	18	19.4

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Ignis Innovation Inc	45	67	67.2	IEEE	45	67.2	SID-Society for Information Display	16	23.9
41	SUNIVA INC	45	88	51.1	IEEE	45	51.1	WIP-Renewable Energies	12	13.6
42	University of Minnesota (The	45	109	41.3	IEEE	45	41.3	American Institute of Physics	25	22.9
43	University of Toledo	45	195	23.1	RELX Group (Elsevier)	91	46.7	IEEE	45	23.1
44	Compagnie de Saint-Gobain	44	202	21.8	IEEE	44	21.8	SPIE-Int Soc Opt Engineering	42	20.8
45	ARRAY PHOTONICS INC	42	219	19.2	American Institute of Physics	68	31.1	RELX Group (Elsevier)	44	20.1
46	Commissariat A L'Energie At	38	280	13.6	RELX Group (Elsevier)	104	37.1	ACS-Am Chem Soc	41	14.6
47	Honeywell International Inc.	36	1078	3.3	ACS-Am Chem Soc	406	37.7	RELX Group (Elsevier)	205	19.0
48	Ostendo Technologies Inc	35	97	36.1	IEEE	35	36.1	RELX Group (Elsevier)	29	29.9
49	4POWER LLC	34	66	51.5	IEEE	34	51.5	American Institute of Physics	18	27.3
50	University of Michigan	34	408	8.3	American Institute of Physics	95	23.3	ACS-Am Chem Soc	73	17.9
51	University of Alabama	33	145	22.8	IEEE	33	22.8	Springer Nature	30	20.7
52	Solarworld Industries GmbH	32	99	32.3	IEEE	32	32.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	19	19.2
53	General Electric Company	31	287	10.8	ACS-Am Chem Soc	83	28.9	American Institute of Physics	41	14.3
54	Hon Hai Precision Industry C	31	211	14.7	RELX Group (Elsevier)	40	19.0	IEEE	31	14.7
55	Industrial Techology Researc	31	215	14.4	RELX Group (Elsevier)	55	25.6	IEEE	31	14.4
56	Semiconductor Energy Labor	31	547	5.7	SID-Society for Information Display	200	36.6	American Institute of Physics	80	14.6
57	Teijin Ltd.	30	86	34.9	IEEE	30	34.9	WIP-Renewable Energies	24	27.9
58	AMI RESAERCH & DEVEL	28	74	37.8	IEEE	28	37.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	9	12.2
59	Interuniversity MicroElectron	28	130	21.5	RELX Group (Elsevier)	33	25.4	IEEE	28	21.5
60	Koch Industries Inc	28	329	8.5	RELX Group (Elsevier)	131	39.8	American Institute of Physics	84	25.5
61	On Semiconductor Corporati	28	127	22.0	IEEE	28	22.0	American Institute of Physics	25	19.7
62	The National Aeronautical an	28	206	13.6	Springer Nature	29	14.1	IEEE	28	13.6
63	Panasonic Holding Corporati	27	200	13.5	American Institute of Physics	45	22.5	RELX Group (Elsevier)	37	18.5
64	Canon Inc	26	97	26.8	IEEE	26	26.8	American Institute of Physics	17	17.5
65	ACORN SEMI LLC	25	162	15.4	American Institute of Physics	63	38.9	RELX Group (Elsevier)	37	22.8
66	Hanwha Solutions (Hhanwha	25	83	30.1	IEEE	25	30.1	American Institute of Physics	19	22.9
67	Imperial College	25	69	36.2	IEEE	25	36.2	American Institute of Physics	16	23.2
68	Nth Degree Technologies Wo	25	256	9.8	Springer Nature	47	18.4	Optical Society of America	32	12.5
69	Enphase Energy Inc	24	28	85.7	IEEE	24	85.7	EPE Association	2	7.1
70	INDIVIDUAL PATENTER	24	159	15.1	IEEE	24	15.1	American Institute of Physics	24	15.1
71	Precursor Energetics Inc	23	1095	2.1	ACS-Am Chem Soc	481	43.9	RELX Group (Elsevier)	237	21.6
72	Qualcomm Inc	23	66	34.8	IEEE	23	34.8	SID-Society for Information Display	11	16.7
73	Solopower Inc	23	213	10.8	RELX Group (Elsevier)	101	47.4	American Institute of Physics	43	20.2
74	FLISOM AG	22	132	16.7	RELX Group (Elsevier)	54	40.9	Springer Nature	23	17.4
75	Fraunhofer Gesellschaft	22	89	24.7	IEEE	22	24.7	RELX Group (Elsevier)	21	23.6
76	King Abdullah University of	22	325	6.8	ACS-Am Chem Soc	96	29.5	Royal Society of Chemistry	49	15.1
77	Shin-Etsu Chemical Co. Ltd.	22	74	29.7	IEEE	22	29.7	RELX Group (Elsevier)	13	17.6
78	Toshiba Corp	22	127	17.3	ACS-Am Chem Soc	25	19.7	IEEE	22	17.3
79	City University of Hong Kon	21	38	55.3	IEEE	21	55.3	IET/IEEE	12	31.6
80	Catholic University Leuven	20	57	35.1	IEEE	20	35.1	RELX Group (Elsevier)	13	22.8

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Toyota Motor Corp	20	113	17.7	Optical Society of America	22	19.5	RELX Group (Elsevier)	21	18.6
82	ENEOS Group (formerly JXT	19	74	25.7	IEEE	19	25.7	RELX Group (Elsevier)	16	21.6
83	Stanford University	19	211	9.0	ACS-Am Chem Soc	35	16.6	American Institute of Physics	34	16.1
84	University of New Mexico	19	58	32.8	IEEE	19	32.8	RELX Group (Elsevier)	12	20.7
85	ATHENAEUM LLC	18	104	17.3	RELX Group (Elsevier)	30	28.8	IEEE	18	17.3
86	BEIJING APOLLO DING R	18	86	20.9	RELX Group (Elsevier)	27	31.4	IEEE	18	20.9
87	New Jersey Institute of Techn	18	34	52.9	IEEE	18	52.9	RELX Group (Elsevier)	10	29.4
88	SMA Solar Technology AG	18	20	90.0	IEEE	18	90.0	RELX Group (Elsevier)	1	5.0
89	1366 TECHNOLOGIES INC	17	93	18.3	RELX Group (Elsevier)	49	52.7	IEEE	17	18.3
90	ASCENT SOLAR TECHNO	17	52	32.7	IEEE	17	32.7	RELX Group (Elsevier)	13	25.0
91	Raytheon Co.	17	69	24.6	IEEE	17	24.6	American Institute of Physics	9	13.0
92	VERLIY LIFE SCIENCES L	17	38	44.7	IEEE	17	44.7	RELX Group (Elsevier)	4	10.5
93	Columbia University	16	241	6.6	ACS-Am Chem Soc	98	40.7	Springer Nature	22	9.1
94	Ecole Polytechnique Federale	16	158	10.1	ACS-Am Chem Soc	46	29.1	RELX Group (Elsevier)	23	14.6
95	PLANT PV INC	16	62	25.8	RELX Group (Elsevier)	21	33.9	IEEE	16	25.8
96	Reliance Industries Ltd	16	41	39.0	IEEE	16	39.0	WIP-Renewable Energies	11	26.8
97	Rensselaer Polytechnic Instit	16	69	23.2	IEEE	16	23.2	American Institute of Physics	16	23.2
98	Soitec SA	16	64	25.0	American Institute of Physics	22	34.4	IEEE	16	25.0
99	Intevac Inc	15	72	20.8	American Institute of Physics	24	33.3	IEEE	15	20.8
100	Kyocera Corp.	15	63	23.8	IEEE	15	23.8	American Institute of Physics	11	17.5

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Telecom and Other Communications</i>										
1	AT&T Inc	32489	71993	45.1	IEEE	32489	45.1	RELX Group (Elsevier)	3485	4.8
2	Qualcomm Inc	30810	99496	31.0	3GPP General Partnership Project Standards B	31348	31.5	IEEE	30810	31.0
3	Marvell Technology Group Lt	23139	29318	78.9	IEEE	23139	78.9	3GPP General Partnership Project Standards Body	3178	10.8
4	Broadcom Ltd	18376	28570	64.3	IEEE	18376	64.3	International Telecommunication Union	1185	4.1
5	Microsoft Corporation	18138	45784	39.6	IEEE	18138	39.6	ACM-Assoc Comput Mach	7055	15.4
6	InterDigital Inc	13828	69718	19.8	3GPP General Partnership Project Standards B	47234	67.8	IEEE	13828	19.8
7	Huawei Technologies Compa	13158	62384	21.1	3GPP General Partnership Project Standards B	34675	55.6	IEEE	13158	21.1
8	Intel Corporation	12985	30667	42.3	IEEE	12985	42.3	3GPP General Partnership Project Standards Body	9735	31.7
9	Nokia Corporation	12664	39376	32.2	3GPP General Partnership Project Standards B	13777	35.0	IEEE	12664	32.2
10	Ericsson	12651	58906	21.5	3GPP General Partnership Project Standards B	31329	53.2	IEEE	12651	21.5
11	Cisco Systems Inc.	12512	46186	27.1	IEEE	12512	27.1	Internet Soc/IETF-Internet Eng Task Force	7738	16.8
12	REARDEN LLC	11453	14352	79.8	IEEE	11453	79.8	3GPP General Partnership Project Standards Body	876	6.1
13	Samsung Electronics Co Ltd	9955	46077	21.6	3GPP General Partnership Project Standards B	26785	58.1	IEEE	9955	21.6
14	International Business Machi	9545	28135	33.9	IEEE	9545	33.9	ACM-Assoc Comput Mach	3874	13.8
15	ParkerVision Inc	9473	18686	50.7	IEEE	9473	50.7	IET/IEE	4244	22.7
16	Apple Inc	8916	25174	35.4	IEEE	8916	35.4	3GPP General Partnership Project Standards Body	4681	18.6
17	LG Electronics Inc.	8483	56224	15.1	3GPP General Partnership Project Standards B	37888	67.4	IEEE	8483	15.1
18	Xperi Holding Corporation (F	7963	21317	37.4	IEEE	7963	37.4	SPIE-Int Soc Opt Engineering	1964	9.2
19	Personalized Media Commun	7797	45672	17.1	Society of Motion Picture and Television Engi	13661	29.9	IEEE	7797	17.1
20	Sony Group Corp	7062	21258	33.2	IEEE	7062	33.2	3GPP General Partnership Project Standards Body	5425	25.5
21	Alphabet Inc.	7006	21838	32.1	IEEE	7006	32.1	International Telecommunication Union	2976	13.6
22	Panasonic Holding Corporati	6808	20955	32.5	3GPP General Partnership Project Standards B	7154	34.1	IEEE	6808	32.5
23	Massachusetts Institute of Te	6494	12397	52.4	IEEE	6494	52.4	Optical Society of America	789	6.4
24	Fractus SA	5888	10538	55.9	IEEE	5888	55.9	IET/IEE	1393	13.2
25	Commscope Holding (formerl	5852	10433	56.1	IEEE	5852	56.1	International Telecommunication Union	601	5.8
26	Murata Manufacturing Co. Lt	5768	7530	76.6	IEEE	5768	76.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	218	2.9
27	Blackberry Ltd.	5332	23868	22.3	3GPP General Partnership Project Standards B	12516	52.4	IEEE	5332	22.3
28	NXP Semiconductors NV	5160	6655	77.5	IEEE	5160	77.5	3GPP General Partnership Project Standards Body	129	1.9
29	Adaptix	4375	6474	67.6	IEEE	4375	67.6	European Telecom Standards Institute (ETSI)	730	11.3
30	Nippon Telegraph & Telepho	4367	16469	26.5	3GPP General Partnership Project Standards B	7056	42.8	IEEE	4367	26.5
31	Rambus Inc.	4249	6145	69.1	IEEE	4249	69.1	IEEE/JPN Soc App Phys	308	5.0
32	Fujitsu Limited	4189	13271	31.6	3GPP General Partnership Project Standards B	4248	32.0	IEEE	4189	31.6
33	University of Minnesota (The	3897	4646	83.9	IEEE	3897	83.9	ACM-Assoc Comput Mach	79	1.7
34	Comcast Corp	3849	43722	8.8	3GPP General Partnership Project Standards B	37579	85.9	IEEE	3849	8.8
35	Electronics and Telecommuni	3832	8612	44.5	IEEE	3832	44.5	3GPP General Partnership Project Standards Body	1845	21.4
36	Raytheon Co.	3740	7119	52.5	IEEE	3740	52.5	Optical Society of America	325	4.6
37	Columbia University	3508	6198	56.6	IEEE	3508	56.6	ACM-Assoc Comput Mach	622	10.0
38	NEC Corp	3472	16852	20.6	3GPP General Partnership Project Standards B	9485	56.3	IEEE	3472	20.6
39	Texas Instruments Inc	3468	6569	52.8	IEEE	3468	52.8	International Telecommunication Union	1492	22.7

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	L3 Harris Technologies (form	3341	5460	61.2	IEEE	3341	61.2	Internet Soc/IETF-Internet Eng Task Force	249	4.6
41	Analog Devices Inc.	3280	4342	75.5	IEEE	3280	75.5	ACM-Assoc Comput Mach	127	2.9
42	Toshiba Corp	3127	5831	53.6	IEEE	3127	53.6	International Telecommunication Union	564	9.7
43	RPX Corp	3109	7415	41.9	IEEE	3109	41.9	IEEE/OSA	740	10.0
44	Mosaid Technologies (forme	3058	5934	51.5	IEEE	3058	51.5	3GPP General Partnership Project Standards Body	252	4.2
45	CPG TECHNOLOGIES LLC	3031	5828	52.0	IEEE	3031	52.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	737	12.6
46	STMicroelectronics	2900	4190	69.2	IEEE	2900	69.2	European Telecom Standards Institute (ETSI)	124	3.0
47	Industrial Techology Researc	2838	4479	63.4	IEEE	2838	63.4	3GPP General Partnership Project Standards Body	525	11.7
48	Advanced Micro Devices Inc	2723	7073	38.5	IEEE	2723	38.5	ACM-Assoc Comput Mach	2519	35.6
49	Mitsubishi Electric Corp	2478	6983	35.5	IEEE	2478	35.5	3GPP General Partnership Project Standards Body	2213	31.7
50	Motorola Solutions Inc.	2466	4466	55.2	IEEE	2466	55.2	3GPP General Partnership Project Standards Body	388	8.7
51	Vantiva SA (former Technico	2462	5291	46.5	IEEE	2462	46.5	ISO/IEC/JTC/ANSI	329	6.2
52	Amazon.com Inc.	2454	8595	28.6	IEEE	2454	28.6	ACM-Assoc Comput Mach	1266	14.7
53	University of California	2386	4350	54.9	IEEE	2386	54.9	Optical Society of America	219	5.0
54	Infineon Technologies AG	2384	3557	67.0	IEEE	2384	67.0	IET/IEE	105	3.0
55	Honeywell International Inc.	2381	4954	48.1	IEEE	2381	48.1	Optical Society of America	269	5.4
56	Corning Inc.	2373	4238	56.0	IEEE	2373	56.0	IET/IEE	335	7.9
57	SUN PATENT TRUST	2360	14082	16.8	3GPP General Partnership Project Standards B	5049	35.9	International Telecommunication Union	4764	33.8
58	General Electric Company	2247	7042	31.9	International Telecommunication Union	2402	34.1	IEEE	2247	31.9
59	Fraunhofer Gesellschaft	2237	4719	47.4	IEEE	2237	47.4	International Telecommunication Union	358	7.6
60	Renesas Electronic Corporati	2198	3580	61.4	IEEE	2198	61.4	IEEE/OSA	217	6.1
61	Semiconductor Energy Labor	2184	27967	7.8	SID-Society for Information Display	10328	36.9	American Institute of Physics	3403	12.2
62	Viasat	2173	3386	64.2	IEEE	2173	64.2	AIAA-Am Inst Aero Astro	234	6.9
63	SIPCO LLC	2158	3867	55.8	IEEE	2158	55.8	Internet Soc/IETF-Internet Eng Task Force	325	8.4
64	Mediatek Inc.	2080	5792	35.9	IEEE	2080	35.9	3GPP General Partnership Project Standards Body	1848	31.9
65	Verizon Communications Inc	2057	6116	33.6	IEEE	2057	33.6	Internet Soc/IETF-Internet Eng Task Force	1226	20.0
66	Silicon Laboratories Inc	2052	2645	77.6	IEEE	2052	77.6	RELX Group (Elsevier)	120	4.5
67	Intellectual Ventures Manage	2027	5587	36.3	IEEE	2027	36.3	3GPP General Partnership Project Standards Body	452	8.1
68	HRL Laboratories LLC	1938	3495	55.5	IEEE	1938	55.5	IET/IEE	235	6.7
69	California Institute of Techno	1937	4261	45.5	IEEE	1937	45.5	Optical Society of America	386	9.1
70	Digimarc Corp.	1928	4808	40.1	IEEE	1928	40.1	SPIE-Int Soc Opt Engineering	571	11.9
71	Oracle Corporation	1913	8900	21.5	3GPP General Partnership Project Standards B	2174	24.4	IEEE	1913	21.5
72	Dolby Laboratories Inc	1883	7352	25.6	International Telecommunication Union	2156	29.3	IEEE	1883	25.6
73	Quarterhill Inc	1878	3663	51.3	IEEE	1878	51.3	3GPP General Partnership Project Standards Body	605	16.5
74	Juniper Networks Inc.	1877	7140	26.3	Network Working Group RFC	2174	30.4	IEEE	1877	26.3
75	GENGHISCOMM HOLDIN	1873	2338	80.1	IEEE	1873	80.1	3GPP General Partnership Project Standards Body	91	3.9
76	Kandou Bus SA	1793	1991	90.1	IEEE	1793	90.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	67	3.4
77	Boeing Co. (The)	1759	3501	50.2	IEEE	1759	50.2	RELX Group (Elsevier)	132	3.8
78	Qorvo	1757	2391	73.5	IEEE	1757	73.5	European Microwave Association	85	3.6
79	Hon Hai Precision Industry C	1729	14810	11.7	3GPP General Partnership Project Standards B	9348	63.1	IEEE	1729	11.7
80	Micron Technology Inc.	1729	2784	62.1	IEEE	1729	62.1	RELX Group (Elsevier)	153	5.5

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Koninklijke Philips N.V.	1643	3719	44.2	IEEE	1643	44.2	3GPP General Partnership Project Standards Body	367	9.9
82	HP Inc	1637	3961	41.3	IEEE	1637	41.3	ACM-Assoc Comput Mach	421	10.6
83	NXGEN PARTNERS IP LLC	1604	3351	47.9	IEEE	1604	47.9	Optical Society of America	839	25.0
84	Hewlett Packard Enterprises	1559	4096	38.1	IEEE	1559	38.1	ACM-Assoc Comput Mach	526	12.8
85	University of Washington	1543	2856	54.0	IEEE	1543	54.0	ACM-Assoc Comput Mach	385	13.5
86	Cubic Corporation	1535	2122	72.3	IEEE	1535	72.3	The International Society of Infrared, Millimeter, and Terahert	109	5.1
87	OneTrust	1502	4780	31.4	ACM-Assoc Comput Mach	2284	47.8	IEEE	1502	31.4
88	Canon Inc	1481	3734	39.7	IEEE	1481	39.7	International Telecommunication Union	594	15.9
89	Softbank Corp	1479	3610	41.0	IEEE	1479	41.0	ISO/IEC	230	6.4
90	CONSTELLATION DESIGN	1401	1674	83.7	IEEE	1401	83.7	IET/IEE	50	3.0
91	NVIDIA Corp.	1386	2974	46.6	IEEE	1386	46.6	ACM-Assoc Comput Mach	262	8.8
92	The Arizona Board of Regent	1345	2832	47.5	IEEE	1345	47.5	ACM-Assoc Comput Mach	319	11.3
93	ORIGIN WIRELESS INC	1329	2021	65.8	IEEE	1329	65.8	American Physical Society	129	6.4
94	LibertyMedia	1327	2435	54.5	IEEE	1327	54.5	ACM-Assoc Comput Mach	193	7.9
95	Tabula Inc	1316	3694	35.6	ACM-Assoc Comput Mach	1337	36.2	IEEE	1316	35.6
96	Microchip Technology Inc.	1279	1944	65.8	IEEE	1279	65.8	International Telecommunication Union	106	5.5
97	Xerox Corp	1270	3695	34.4	IEEE	1270	34.4	ACM-Assoc Comput Mach	861	23.3
98	T-Mobile USA INC	1229	4949	24.8	IEEE	1229	24.8	3GPP General Partnership Project Standards Body	900	18.2
99	BT Group PLC	1218	2966	41.1	IEEE	1218	41.1	3GPP General Partnership Project Standards Body	349	11.8
100	Siemens Aktiengesellschaft	1211	2703	44.8	IEEE	1211	44.8	3GPP General Partnership Project Standards Body	243	9.0

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Virtual/Augmented Reality</i>										
1	Microsoft Corporation	3686	10096	36.5	IEEE	3686	36.5	ACM-Assoc Comput Mach	2437	24.1
2	Magic Leap Inc	1507	5239	28.8	IEEE	1507	28.8	ACM-Assoc Comput Mach	595	11.4
3	Apple Inc	1244	3414	36.4	IEEE	1244	36.4	ACM-Assoc Comput Mach	720	21.1
4	Immersion Corp.	1099	3176	34.6	IEEE	1099	34.6	ACM-Assoc Comput Mach	353	11.1
5	Alphabet Inc.	1076	3389	31.7	IEEE	1076	31.7	ACM-Assoc Comput Mach	807	23.8
6	Meta Platforms Inc.(formerly	757	3272	23.1	IEEE	757	23.1	ACM-Assoc Comput Mach	647	19.8
7	Sony Group Corp	560	1318	42.5	IEEE	560	42.5	ACM-Assoc Comput Mach	230	17.5
8	Qualcomm Inc	388	1115	34.8	IEEE	388	34.8	ACM-Assoc Comput Mach	186	16.7
9	The Arizona Board of Regent	333	2222	15.0	Optical Society of America	657	29.6	IEEE	333	15.0
10	International Business Machi	311	1313	23.7	IEEE	311	23.7	ACM-Assoc Comput Mach	251	19.1
11	Lincoln Electric Holdings Inc	310	1909	16.2	ACM-Assoc Comput Mach	464	24.3	IEEE	310	16.2
12	Intellectual Ventures Manage	266	811	32.8	IEEE	266	32.8	ACM-Assoc Comput Mach	172	21.2
13	Ultrahaptics Ltd.	254	758	33.5	IEEE	254	33.5	ACM-Assoc Comput Mach	183	24.1
14	ONPOINT MEDICAL INC	253	1132	22.3	IEEE	253	22.3	RELX Group (Elsevier)	184	16.3
15	Xperi Holding Corporation (F	233	517	45.1	IEEE	233	45.1	SPIE-Int Soc Opt Engineering	58	11.2
16	P4TENTS1 LLC	229	559	41.0	IEEE	229	41.0	ACM-Assoc Comput Mach	79	14.1
17	AT&T Inc	227	574	39.5	IEEE	227	39.5	ACM-Assoc Comput Mach	163	28.4
18	Samsung Electronics Co Ltd	208	552	37.7	IEEE	208	37.7	ACM-Assoc Comput Mach	107	19.4
19	Adobe Inc. (former Adobe Sy	204	807	25.3	ACM-Assoc Comput Mach	366	45.4	IEEE	204	25.3
20	Intel Corporation	200	525	38.1	IEEE	200	38.1	ACM-Assoc Comput Mach	119	22.7
21	University of North Carolina	165	575	28.7	IEEE	165	28.7	ACM-Assoc Comput Mach	152	26.4
22	InterDigital Inc	163	466	35.0	IEEE	163	35.0	ACM-Assoc Comput Mach	124	26.6
23	Massachusetts Institute of Te	155	582	26.6	IEEE	155	26.6	Springer Nature	60	10.3
24	3D Systems Corp.	151	323	46.7	IEEE	151	46.7	ACM-Assoc Comput Mach	81	25.1
25	Snap Inc	145	386	37.6	IEEE	145	37.6	RELX Group (Elsevier)	62	16.1
26	Nokia Corporation	138	379	36.4	IEEE	138	36.4	ACM-Assoc Comput Mach	59	15.6
27	AUGMENTED VISION INC	137	1092	12.5	Optical Society of America	372	34.1	SPIE-Int Soc Opt Engineering	157	14.4
28	Walt Disney Co.	129	368	35.1	IEEE	129	35.1	ACM-Assoc Comput Mach	104	28.3
29	Ostendo Technologies Inc	127	482	26.3	IEEE	127	26.3	ACM-Assoc Comput Mach	87	18.0
30	Nant Holdings IP Llc	124	284	43.7	IEEE	124	43.7	ACM-Assoc Comput Mach	32	11.3
31	BRAINGATE CO LLC	120	308	39.0	IEEE	120	39.0	RELX Group (Elsevier)	45	14.6
32	MENTOR ACQUISITION O	112	310	36.1	IEEE	112	36.1	ACM-Assoc Comput Mach	100	32.3
33	Digimarc Corp.	110	252	43.7	IEEE	110	43.7	ACM-Assoc Comput Mach	40	15.9
34	Medtronic Inc	109	226	48.2	IEEE	109	48.2	Springer Nature	22	9.7
35	MIDDLE CHART LLC	106	148	71.6	IEEE	106	71.6	Multidisciplinary Digital Publishing Institute (MDPI)	37	25.0
36	META PLATFORMS TECH	104	349	29.8	IEEE	104	29.8	ACM-Assoc Comput Mach	47	13.5
37	Intuitive Surgical Inc.	103	262	39.3	IEEE	103	39.3	The Medical Image Computing and Computer Assisted Interve	34	13.0
38	INDIVIDUAL PATENTER	96	475	20.2	RELX Group (Elsevier)	112	23.6	IEEE	96	20.2
39	NVIDIA Corp.	95	351	27.1	ACM-Assoc Comput Mach	103	29.3	IEEE	95	27.1

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Amazon.com Inc.	93	301	30.9	ACM-Assoc Comput Mach	109	36.2	IEEE	93	30.9
41	D3D TECHNOLOGIES INC	93	218	42.7	IEEE	93	42.7	RELX Group (Elsevier)	20	9.2
42	University of Connecticut	93	628	14.8	Optical Society of America	227	36.1	IEEE	93	14.8
43	Honda Motor Co. Ltd.(Honda	90	186	48.4	IEEE	90	48.4	RELX Group (Elsevier)	18	9.7
44	Tobii Ab	90	199	45.2	IEEE	90	45.2	ACM-Assoc Comput Mach	55	27.6
45	Cortica Ltd	85	127	66.9	IEEE	85	66.9	ACM-Assoc Comput Mach	19	15.0
46	Empire Technology Develop	84	248	33.9	IEEE	84	33.9	ACM-Assoc Comput Mach	27	10.9
47	TANGIS CORP	81	537	15.1	Joint IEEE and ACM	277	51.6	ACM-Assoc Comput Mach	92	17.1
48	ULTRAHAPTICS IP TWO L	79	183	43.2	IEEE	79	43.2	ACM-Assoc Comput Mach	35	19.1
49	HRL Laboratories LLC	76	209	36.4	IEEE	76	36.4	ACM-Assoc Comput Mach	20	9.6
50	Bosch (Robert) GmbH	74	133	55.6	IEEE	74	55.6	ACM-Assoc Comput Mach	7	5.3
51	Canon Inc	74	235	31.5	IEEE	74	31.5	Joint IEEE and ACM	44	18.7
52	Toyota Motor Corp	74	210	35.2	IEEE	74	35.2	ACM-Assoc Comput Mach	35	16.7
53	Stanford University	68	208	32.7	IEEE	68	32.7	ACM-Assoc Comput Mach	20	9.6
54	GoPro Inc	66	133	49.6	IEEE	66	49.6	ACM-Assoc Comput Mach	16	12.0
55	ULTIMATEPOINTER LLC	65	178	36.5	ACM-Assoc Comput Mach	78	43.8	IEEE	65	36.5
56	BUTTERFLY NETWORKS I	62	70	88.6	IEEE	62	88.6	Acoustical Society of America	4	5.7
57	Purdue University	62	288	21.5	ACM-Assoc Comput Mach	170	59.0	IEEE	62	21.5
58	Autodesk Inc.	59	462	12.8	ACM-Assoc Comput Mach	308	66.7	IEEE	59	12.8
59	ELECTRONIC SCRIPTING	58	146	39.7	IEEE	58	39.7	Joint IEEE and ACM	26	17.8
60	Nio Co. Ltd	58	121	47.9	IEEE	58	47.9	CBS Interactive	21	17.4
61	APPLIED RESEARCH ASS	56	117	47.9	IEEE	56	47.9	SPIE-Int Soc Opt Engineering	16	13.7
62	Lockheed Martin Corp.	54	287	18.8	IEEE	54	18.8	SPIE-Int Soc Opt Engineering	44	15.3
63	ORCAM TECHNOLOGIES	54	63	85.7	IEEE	54	85.7	Springer Nature	4	6.3
64	Siemens Aktiengesellschaft	54	157	34.4	IEEE	54	34.4	Joint IEEE and ACM	33	21.0
65	Johns Hopkins University	53	102	52.0	IEEE	53	52.0	Joint IEEE and ACM	16	15.7
66	Vantiva SA (former Technico	48	85	56.5	IEEE	48	56.5	Springer Nature	6	7.1
67	Johnson & Johnson	47	161	29.2	IEEE	47	29.2	RELX Group (Elsevier)	46	28.6
68	Honeywell International Inc.	46	127	36.2	IEEE	46	36.2	RELX Group (Elsevier)	14	11.0
69	Huawei Technologies Compa	44	160	27.5	IEEE	44	27.5	ACM-Assoc Comput Mach	20	12.5
70	Surefire LLC	44	55	80.0	IEEE	44	80.0	IEEE/OSA	11	20.0
71	Ohio State University	43	83	51.8	IEEE	43	51.8	ACM-Assoc Comput Mach	10	12.0
72	BERTEC CORP	41	70	58.6	IEEE	41	58.6	American Association of Physics Teachers	9	12.9
73	Harvard University	41	186	22.0	IEEE	41	22.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	30	16.1
74	Cox Enterprises Inc	40	74	54.1	IEEE	40	54.1	ACM-Assoc Comput Mach	10	13.5
75	TIPPING POINT MEDICAL	40	102	39.2	IEEE	40	39.2	RELX Group (Elsevier)	8	7.8
76	Cisco Systems Inc.	39	90	43.3	IEEE	39	43.3	Internet Soc/IETF-Internet Eng Task Force	10	11.1
77	RealD	39	72	54.2	IEEE	39	54.2	Optical Society of America	6	8.3
78	Boeing Co. (The)	38	116	32.8	IEEE	38	32.8	ACM-Assoc Comput Mach	16	13.8
79	Fujitsu Limited	38	90	42.2	IEEE	38	42.2	ACM-Assoc Comput Mach	15	16.7
80	HP Inc	38	119	31.9	ACM-Assoc Comput Mach	45	37.8	IEEE	38	31.9

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	EMERGE NOW INC	37	126	29.4	ACM-Assoc Comput Mach	39	31.0	IEEE	37	29.4
82	Comcast Corp	35	97	36.1	IEEE	35	36.1	SPIE-Int Soc Opt Engineering	26	26.8
83	Nintendo Co. Ltd.	35	169	20.7	Nintendo of America	54	32.0	IEEE	35	20.7
84	Acuity Brands Inc.	34	65	52.3	IEEE	34	52.3	Springer Nature	15	23.1
85	Panasonic Holding Corporati	34	77	44.2	IEEE	34	44.2	RELX Group (Elsevier)	7	9.1
86	University of Washington	34	187	18.2	ACM-Assoc Comput Mach	34	18.2	IEEE	34	18.2
87	L3 Harris Technologies (form	33	74	44.6	IEEE	33	44.6	RELX Group (Elsevier)	7	9.5
88	GlowPoint Inc.	32	48	66.7	IEEE	32	66.7	ACM-Assoc Comput Mach	16	33.3
89	Rag Foundation	32	47	68.1	IEEE	32	68.1	RELX Group (Elsevier)	8	17.0
90	Seiko Epson Corporation	32	138	23.2	Joint IEEE and ACM	50	36.2	IEEE	32	23.2
91	Adidas AG	31	123	25.2	IEEE	31	25.2	RELX Group (Elsevier)	12	9.8
92	California Institute of Techno	31	135	23.0	IEEE	31	23.0	American Physiological Society	18	13.3
93	Drexel University	31	159	19.5	RELX Group (Elsevier)	43	27.0	IEEE	31	19.5
94	Koninklijke Philips N.V.	31	98	31.6	IEEE	31	31.6	ACM-Assoc Comput Mach	16	16.3
95	LEGEND3D INC	31	53	58.5	IEEE	31	58.5	ACM-Assoc Comput Mach	9	17.0
96	Uber Technologies Inc	31	71	43.7	IEEE	31	43.7	Joint IET and IEEE	11	15.5
97	ARTILUX INC	30	58	51.7	IEEE	30	51.7	Optical Society of America	10	17.2
98	National Cheng Kung Univer	30	37	81.1	IEEE	30	81.1	IEEE/ASME	2	5.4
99	North Carolina State Universi	30	49	61.2	IEEE	30	61.2	RELX Group (Elsevier)	3	6.1
100	University of California	30	70	42.9	IEEE	30	42.9	RELX Group (Elsevier)	9	12.9

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Wind Energy</i>										
1	Vestas Wind Systems A/S	483	1044	46.3	IEEE	483	46.3	AWEA-American Wind Energy Association	98	9.4
2	General Electric Company	288	668	43.1	IEEE	288	43.1	RELX Group (Elsevier)	94	14.1
3	University of Nebraska	165	220	75.0	IEEE	165	75.0	RELX Group (Elsevier)	28	12.7
4	ABB Ltd	147	268	54.9	IEEE	147	54.9	EWEA-European Wind Energy Association	29	10.8
5	The Arizona Board of Regent	92	138	66.7	IEEE	92	66.7	RELX Group (Elsevier)	10	7.2
6	Enercon GmbH	70	109	64.2	IEEE	70	64.2	RELX Group (Elsevier)	16	14.7
7	Siemens Aktiengesellschaft	65	117	55.6	IEEE	65	55.6	RELX Group (Elsevier)	13	11.1
8	SolarEdge Technologies Inc	62	77	80.5	IEEE	62	80.5	WIP-Renewable Energies	7	9.1
9	Siemens Energy Ag (formerly	51	115	44.3	IEEE	51	44.3	AIAA-Am Inst Aero Astro	12	10.4
10	Ingeteam Corporation SA	46	77	59.7	IEEE	46	59.7	EWEA-European Wind Energy Association	6	7.8
11	University of Alabama	34	42	81.0	IEEE	34	81.0	IET/IEE	6	14.3
12	Rensselaer Polytechnic Instit	25	30	83.3	IEEE	25	83.3	AIAA-Am Inst Aero Astro	2	6.7
13	University of New Brunswick	25	27	92.6	IEEE	25	92.6	AIAA-Am Inst Aero Astro	1	3.7
14	Tigo Energy Inc	23	35	65.7	IEEE	23	65.7	WIP-Renewable Energies	9	25.7
15	INDIVIDUAL PATENTER	18	39	46.2	IEEE	18	46.2	ASME-Am Soc Mech Eng	7	17.9
16	National Cheng Kung Univer	18	19	94.7	IEEE	18	94.7	IET/IEE	1	5.3
17	UWM Research Foundation	17	19	89.5	IEEE	17	89.5	IET/IEE	1	5.3
18	BEIJING GOLDWIND SCIE	16	29	55.2	IEEE	16	55.2	RELX Group (Elsevier)	7	24.1
19	Nordex SE	15	23	65.2	IEEE	15	65.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	4	17.4
20	NORTH CHINA ELECTRIC	14	15	93.3	IEEE	14	93.3	Hindawi Publishing Corporation	1	6.7
21	NRG SYSTEMS INC	14	24	58.3	IEEE	14	58.3	RELX Group (Elsevier)	4	16.7
22	University of South Florida	14	14	100.0	IEEE	14	100.0			
23	UPTAKE TECHNOLOGIES	14	19	73.7	IEEE	14	73.7	National Institute of Standards and Technology (NIST)	3	15.8
24	INVENTUS HOLDINGS LL	13	19	68.4	IEEE	13	68.4	RELX Group (Elsevier)	2	10.5
25	TechnipFMC	13	17	76.5	IEEE	13	76.5	IET/IEE	1	5.9
26	University of Calgary	13	16	81.3	IEEE	13	81.3	China Electrochemical Society	1	6.3
27	Fujitsu Limited	12	13	92.3	IEEE	12	92.3	RELX Group (Elsevier)	1	7.7
28	UNIVERSITY OF ZAGREB	12	14	85.7	IEEE	12	85.7	China Electrochemical Society	1	7.1
29	SPARQ SYSTEMS INC	11	14	78.6	IEEE	11	78.6	IET/IEE	2	14.3
30	MOIXA ENERGY HOLDIN	10	10	100.0	IEEE	10	100.0			
31	Woodward Inc	10	10	100.0	IEEE	10	100.0			
32	Kite Gen Research Srl	9	21	42.9	IEEE	9	42.9	RELX Group (Elsevier)	7	33.3
33	PRENAV INC	9	11	81.8	IEEE	9	81.8	RELX Group (Elsevier)	2	18.2
34	State Grid Corp of China	9	13	69.2	IEEE	9	69.2	China Academic Journal Electronic Publishing House	2	15.4
35	Hitachi Ltd	8	13	61.5	IEEE	8	61.5	Hitachi Ltd.	3	23.1
36	Raytheon Co.	8	25	32.0	IEEE	8	32.0	RELX Group (Elsevier)	4	16.0
37	US WIND TECHNOLOGY L	8	14	57.1	IEEE	8	57.1	RELX Group (Elsevier)	3	21.4
38	GENEDICS CLEAN ENERG	7	63	11.1	RELX Group (Elsevier)	49	77.8	AAAS-Am Assoc Advancement Sci	7	11.1
39	Alphabet Inc.	6	20	30.0	IEEE	6	30.0	AIAA-Am Inst Aero Astro	3	15.0

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	GENEDICS LLC	6	47	12.8	RELX Group (Elsevier)	35	74.5	AAAS-Am Assoc Advancement Sci	6	12.8
41	Honeywell International Inc.	6	12	50.0	IEEE	6	50.0	AIAA-Am Inst Aero Astro	2	16.7
42	Imperial College	6	13	46.2	IEEE	6	46.2	RELX Group (Elsevier)	2	15.4
43	LS Electric co. Ltd. (formerly	6	10	60.0	IEEE	6	60.0	RELX Group (Elsevier)	2	20.0
44	Medtronic Inc	6	7	85.7	IEEE	6	85.7	Springer Nature	1	14.3
45	Mitsubishi Heavy Industries	6	59	10.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	29	49.2	ASME-Am Soc Mech Eng	13	22.0
46	OKINAWA INSTITUTE OF	6	28	21.4	RELX Group (Elsevier)	7	25.0	IEEE	6	21.4
47	GREEN ENERGY CORP	5	5	100.0	IEEE	5	100.0			
48	NEC Corp	5	6	83.3	IEEE	5	83.3	Institute of Electrical Engineers of Japan	1	16.7
49	RHEINISCH-WESTFALISC	5	5	100.0	IEEE	5	100.0			
50	ROPE ROBOTICS APS	5	5	100.0	IEEE	5	100.0			
51	University of Western Ontari	5	5	100.0	IEEE	5	100.0			
52	Alstom	4	6	66.7	IEEE	4	66.7	A B B Corporate Management Services AG	2	33.3
53	COMBINED ENERGIES LL	4	5	80.0	IEEE	4	80.0	RELX Group (Elsevier)	1	20.0
54	HYPER TECH RESEARCH	4	4	100.0	IEEE	4	100.0			
55	IDENTIFLIGHT INTERNAT	4	6	66.7	IEEE	4	66.7	Massachusetts Institute of Technology	2	33.3
56	KK WIND SOLUTIONS A/S	4	4	100.0	IEEE	4	100.0			
57	NORTHERN POWER SYST	4	5	80.0	IEEE	4	80.0	PennWell Publishing Co.	1	20.0
58	POWER ENABLE SOLUTIO	4	6	66.7	IEEE	4	66.7	IET/IEE	1	16.7
59	REARDEN POWER LLC	4	4	100.0	IEEE	4	100.0			
60	UNIVERSIDAD PUBLICA	4	5	80.0	IEEE	4	80.0	Instrument Society of America	1	20.0
61	AB SKF	3	3	100.0	IEEE	3	100.0			
62	Alliance for Sustainable Ener	3	34	8.8	SAGE Publications Ltd	7	20.6	ASME-Am Soc Mech Eng	7	20.6
63	Baker Hughes Inc.	3	3	100.0	IEEE	3	100.0			
64	Corteva Agriscience(former	3	24	12.5	RELX Group (Elsevier)	7	29.2	IEEE	3	12.5
65	Daewoo Shipbuilding & Mari	3	6	50.0	IEEE	3	50.0	ISA - Instrumentation, Systems & Automation Society	1	16.7
66	Doosan Enerbility (former Do	3	4	75.0	IEEE	3	75.0	IET/IEE	1	25.0
67	EMPIRE MAGNETICS INC	3	3	100.0	IEEE	3	100.0			
68	GLOBAL ENERGYCONCE	3	5	60.0	IEEE	3	60.0	AWEA-American Wind Energy Association	1	20.0
69	HARMONY TURBINES IN	3	5	60.0	IEEE	3	60.0	IOP Publishing	1	20.0
70	International Business Machi	3	15	20.0	RELX Group (Elsevier)	8	53.3	IP.Com	3	20.0
71	Intertrust Technologies Corp	3	3	100.0	IEEE	3	100.0			
72	Korea Electric Power Corp	3	8	37.5	RELX Group (Elsevier)	4	50.0	IEEE	3	37.5
73	Microsoft Corporation	3	5	60.0	IEEE	3	60.0	IEICE-Inst Elec Info Comm Eng	1	20.0
74	Nanyang Technological Univ	3	3	100.0	IEEE	3	100.0			
75	SAMAYS INNOVACIONES	3	5	60.0	IEEE	3	60.0	RELX Group (Elsevier)	1	20.0
76	Schweitzer Engineering Labo	3	3	100.0	IEEE	3	100.0			
77	University of Florida	3	52	5.8	American Institute of Physics	12	23.1	ACS-Am Chem Soc	9	17.3
78	University of Wisconsin	3	3	100.0	IEEE	3	100.0			
79	ADVANCED MAGNET LA	2	2	100.0	IEEE	2	100.0			
80	AGILE WIND POWER AG	2	7	28.6	Hindawi Publishing Corporation	3	42.9	IEEE	2	28.6

Appendix B: Top 100 Organizations That Cite IEEE; (2003-2022 Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Apple Inc	2	2	100.0	IEEE	2	100.0			
82	Bosch (Robert) GmbH	2	2	100.0	IEEE	2	100.0			
83	CHARGEPOINT INC	2	2	100.0	IEEE	2	100.0			
84	Consiglio Nazionale Delle Ri	2	2	100.0	IEEE	2	100.0			
85	CREATING MOORE LLC	2	4	50.0	IEEE	2	50.0	IOP Publishing	1	25.0
86	Dana Holding Corp.	2	3	66.7	IEEE	2	66.7	EVS.org	1	33.3
87	HAWAIIAN ELECTRIC CO	2	4	50.0	IEEE	2	50.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2	50.0
88	Kansas State University	2	3	66.7	IEEE	2	66.7	International Research Publication House	1	33.3
89	L3 Harris Technologies (form	2	6	33.3	IEEE	2	33.3	RELX Group (Elsevier)	2	33.3
90	Nidec Corp.	2	5	40.0	ISA - Instrumentation, Systems & Automation	2	40.0	IEEE	2	40.0
91	ONSEMBLE LLC	2	4	50.0	IEEE	2	50.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2	50.0
92	Rockwell Automation Inc	2	2	100.0	IEEE	2	100.0			
93	Rolls Royce Holdings Plc	2	7	28.6	ASME-Am Soc Mech Eng	4	57.1	IEEE	2	28.6
94	Trevii - Finanziaria Industrial	2	2	100.0	IEEE	2	100.0			
95	Tsinghua University	2	4	50.0	American Institute of Physics	2	50.0	IEEE	2	50.0
96	Airbus SE	1	6	16.7	RELX Group (Elsevier)	3	50.0	American Institute of Physics	1	16.7
97	American Superconductor Co	1	3	33.3	IOP Publishing	2	66.7	IEEE	1	33.3
98	BASELOAD ENERGY INC	1	2	50.0	IEEE	1	50.0	Konggansa	1	50.0
99	BLUE WATER SHIPPING A	1	1	100.0	IEEE	1	100.0			
100	Boeing Co. (The)	1	17	5.9	NASA-National Aeronautics and Space Admi	5	29.4	AIAA-Am Inst Aero Astro	4	23.5

Appendix C: Top Organizations from All Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
1	Microsoft Corporation	72761	234549	31.0	IEEE	72761	31.0	ACM-Assoc Comput Mach	61476	26.2
2	International Business Machi	68203	233357	29.2	IEEE	68203	29.2	ACM-Assoc Comput Mach	37708	16.2
3	Apple Inc	50373	156359	32.2	IEEE	50373	32.2	ACM-Assoc Comput Mach	32467	20.8
4	Qualcomm Inc	42995	128791	33.4	IEEE	42995	33.4	3GPP General Partnership Project Standards Body	32520	25.3
5	Micron Technology Inc.	42187	125714	33.6	IEEE	42187	33.6	RELX Group (Elsevier)	21364	17.0
6	AT&T Inc	38206	87127	43.9	IEEE	38206	43.9	ACM-Assoc Comput Mach	5424	6.2
7	Intel Corporation	36090	81837	44.1	IEEE	36090	44.1	3GPP General Partnership Project Standards Body	10115	12.4
8	Broadcom Ltd	29555	50025	59.1	IEEE	29555	59.1	ACM-Assoc Comput Mach	1689	3.4
9	Alphabet Inc.	28957	92950	31.2	IEEE	28957	31.2	ACM-Assoc Comput Mach	16742	18.0
10	Marvell Technology Group Lt	26147	33567	77.9	IEEE	26147	77.9	3GPP General Partnership Project Standards Body	3231	9.6
11	MONOLITHIC 3D INC	23090	41059	56.2	IEEE	23090	56.2	IEEE/JPN Soc App Phys	4187	10.2
12	Samsung Electronics Co Ltd	20156	82679	24.4	3GPP General Partnership Project Standards B	27172	32.9	IEEE	20156	24.4
13	Semiconductor Energy Labor	18987	269797	7.0	SID-Society for Information Display	91276	33.8	American Institute of Physics	36984	13.7
14	Xperi Holding Corporation (F	18524	46084	40.2	IEEE	18524	40.2	ACM-Assoc Comput Mach	3487	7.6
15	Cisco Systems Inc.	18287	65121	28.1	IEEE	18287	28.1	Internet Soc/IETF-Internet Eng Task Force	10445	16.0
16	Nokia Corporation	17897	55688	32.1	IEEE	17897	32.1	3GPP General Partnership Project Standards Body	14708	26.4
17	Huawei Technologies Compa	16201	71392	22.7	3GPP General Partnership Project Standards B	35632	49.9	IEEE	16201	22.7
18	Massachusetts Institute of Te	15045	52662	28.6	IEEE	15045	28.6	RELX Group (Elsevier)	5631	10.7
19	InterDigital Inc	14872	73864	20.1	3GPP General Partnership Project Standards B	48594	65.8	IEEE	14872	20.1
20	Ericsson	14825	66507	22.3	3GPP General Partnership Project Standards B	32384	48.7	IEEE	14825	22.3
21	Amazon.com Inc.	14781	42529	34.8	IEEE	14781	34.8	ACM-Assoc Comput Mach	6743	15.9
22	Sony Group Corp	13420	37719	35.6	IEEE	13420	35.6	3GPP General Partnership Project Standards Body	5477	14.5
23	Western Digital Corp.	12777	26460	48.3	IEEE	12777	48.3	American Institute of Physics	2563	9.7
24	Medtronic Inc	12542	188720	6.6	RELX Group (Elsevier)	32504	17.2	Wolters Kluwer	25008	13.3
25	Siemens Aktiengesellschaft	12376	36251	34.1	IEEE	12376	34.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	4668	12.9
26	Oracle Corporation	12345	50848	24.3	ACM-Assoc Comput Mach	14243	28.0	IEEE	12345	24.3
27	REARDEN LLC	11755	14829	79.3	IEEE	11755	79.3	3GPP General Partnership Project Standards Body	892	6.0
28	Murata Manufacturing Co. Lt	11305	14918	75.8	IEEE	11305	75.8	RELX Group (Elsevier)	537	3.6
29	Infineon Technologies AG	11249	18656	60.3	IEEE	11249	60.3	American Institute of Physics	1099	5.9
30	ParkerVision Inc	10924	21627	50.5	IEEE	10924	50.5	IET/IEE	4979	23.0
31	NXP Semiconductors NV	10842	16855	64.3	IEEE	10842	64.3	American Institute of Physics	968	5.7
32	Panasonic Holding Corporati	10726	34729	30.9	IEEE	10726	30.9	3GPP General Partnership Project Standards Body	7266	20.9
33	LG Electronics Inc.	10604	62481	17.0	3GPP General Partnership Project Standards B	38745	62.0	IEEE	10604	17.0
34	Taiwan Semiconductor Manu	10497	30805	34.1	IEEE	10497	34.1	American Institute of Physics	7973	25.9
35	Texas Instruments Inc	10340	17380	59.5	IEEE	10340	59.5	International Telecommunication Union	1589	9.1
36	Personalized Media Commun	10229	61319	16.7	Society of Motion Picture and Television Engi	18278	29.8	IEEE	10229	16.7
37	Advanced Micro Devices Inc	9642	27102	35.6	IEEE	9642	35.6	ACM-Assoc Comput Mach	8693	32.1
38	SolarEdge Technologies Inc	9436	11762	80.2	IEEE	9436	80.2	WIP-Renewable Energies	886	7.5
39	General Electric Company	9415	30619	30.7	IEEE	9415	30.7	RELX Group (Elsevier)	3433	11.2
40	Qorvo	9246	12228	75.6	IEEE	9246	75.6	American Institute of Physics	541	4.4

Appendix C: Top Organizations from All Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
41	Toshiba Corp	8916	21349	41.8	IEEE	8916	41.8	American Institute of Physics	1466	6.9
42	Fujitsu Limited	8742	25555	34.2	IEEE	8742	34.2	3GPP General Partnership Project Standards Body	4331	16.9
43	Honeywell International Inc.	8481	24658	34.4	IEEE	8481	34.4	RELX Group (Elsevier)	2445	9.9
44	Rambus Inc.	8413	13275	63.4	IEEE	8413	63.4	IEEE/JPN Soc App Phys	674	5.1
45	Johnson & Johnson	8122	94849	8.6	RELX Group (Elsevier)	20882	22.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	9718	10.2
46	ZENO SEMICONDUCTOR I	8040	10736	74.9	IEEE	8040	74.9	IEEE/JPN Soc App Phys	1733	16.1
47	University of California	8016	57845	13.9	IEEE	8016	13.9	RELX Group (Elsevier)	7845	13.6
48	STMicroelectronics	8000	13931	57.4	IEEE	8000	57.4	RELX Group (Elsevier)	1028	7.4
49	Intuitive Surgical Inc.	7920	21311	37.2	IEEE	7920	37.2	The Medical Image Computing and Computer Assisted Interve	2086	9.8
50	Adobe Inc. (former Adobe Sy	7911	22034	35.9	IEEE	7911	35.9	ACM-Assoc Comput Mach	6827	31.0
51	Blackberry Ltd.	7877	30997	25.4	3GPP General Partnership Project Standards B	12938	41.7	IEEE	7877	25.4
52	Koninklijke Philips N.V.	7828	37062	21.1	IEEE	7828	21.1	RELX Group (Elsevier)	4657	12.6
53	Mass General Brigham (form	7647	121529	6.3	Optical Society of America	42201	34.7	RELX Group (Elsevier)	17388	14.3
54	Macronix International Co. Lt	7628	14173	53.8	IEEE	7628	53.8	IEEE/JPN Soc App Phys	2756	19.4
55	Intellectual Ventures Manage	7350	35449	20.7	IEEE	7350	20.7	RELX Group (Elsevier)	2964	8.4
56	Columbia University	7296	27345	26.7	IEEE	7296	26.7	RELX Group (Elsevier)	2445	8.9
57	Raytheon Co.	7060	30833	22.9	IEEE	7060	22.9	NASA-National Aeronautics and Space Admin	3492	11.3
58	NEC Corp	6964	26490	26.3	3GPP General Partnership Project Standards B	9615	36.3	IEEE	6964	26.3
59	OneTrust	6911	22162	31.2	ACM-Assoc Comput Mach	10764	48.6	IEEE	6911	31.2
60	HP Inc	6905	21426	32.2	IEEE	6905	32.2	ACM-Assoc Comput Mach	3406	15.9
61	Tela Innovations inc	6768	21881	30.9	SPIE-Int Soc Opt Engineering	7940	36.3	IEEE	6768	30.9
62	Boston Scientific Corp.	6751	92751	7.3	RELX Group (Elsevier)	23637	25.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	11685	12.6
63	University of Minnesota (The	6613	14828	44.6	IEEE	6613	44.6	RELX Group (Elsevier)	1424	9.6
64	California Institute of Techno	6548	38408	17.0	IEEE	6548	17.0	RELX Group (Elsevier)	4853	12.6
65	Analog Devices Inc.	6520	9371	69.6	IEEE	6520	69.6	RELX Group (Elsevier)	514	5.5
66	Renesas Electronic Corporati	6518	10333	63.1	IEEE	6518	63.1	IEEE/JPN Soc App Phys	554	5.4
67	Commscope Holding (formerl	6502	12696	51.2	IEEE	6502	51.2	International Telecommunication Union	642	5.1
68	CPG TECHNOLOGIES LLC	6397	12326	51.9	IEEE	6397	51.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1542	12.5
69	Mosaid Technologies (forme	6212	10117	61.4	IEEE	6212	61.4	3GPP General Partnership Project Standards Body	299	3.0
70	Dexcom Inc	6198	105732	5.9	RELX Group (Elsevier)	26840	25.4	American Diabetes Association	10882	10.3
71	Nippon Telegraph & Telepho	6196	23116	26.8	3GPP General Partnership Project Standards B	7256	31.4	IEEE	6196	26.8
72	Canon Inc	6090	21910	27.8	IEEE	6090	27.8	RELX Group (Elsevier)	1882	8.6
73	HRL Laboratories LLC	5990	14124	42.4	IEEE	5990	42.4	RELX Group (Elsevier)	1091	7.7
74	Fractus SA	5937	10601	56.0	IEEE	5937	56.0	IET/IEE	1394	13.1
75	Abbott Laboratories	5846	129975	4.5	RELX Group (Elsevier)	30220	23.3	ACS-Am Chem Soc	15401	11.8
76	Xerox Corp	5829	21214	27.5	IEEE	5829	27.5	ACM-Assoc Comput Mach	3516	16.6
77	Commvault Systems Inc.	5778	9958	58.0	IEEE	5778	58.0	ACM-Assoc Comput Mach	1687	16.9
78	Industrial Technology Researc	5627	11349	49.6	IEEE	5627	49.6	RELX Group (Elsevier)	1114	9.8
79	Cadence Design Systems Inc	5566	12974	42.9	IEEE	5566	42.9	Joint IEEE and ACM	4171	32.1
80	Synopsys Inc.	5457	15862	34.4	IEEE	5457	34.4	SPIE-Int Soc Opt Engineering	3045	19.2

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Electronics and Telecommuni	5400	12632	42.7	IEEE	5400	42.7	3GPP General Partnership Project Standards Body	1899	15.0
82	University of Illinois	5373	49572	10.8	American Institute of Physics	8111	16.4	ACS-Am Chem Soc	6976	14.1
83	The Arizona Board of Regent	5365	22268	24.1	IEEE	5365	24.1	RELX Group (Elsevier)	2485	11.2
84	Dolby Laboratories Inc	5335	15009	35.5	IEEE	5335	35.5	International Telecommunication Union	2279	15.2
85	Magna International Inc.	5327	10303	51.7	IEEE	5327	51.7	SAE-Society of Automobile Engineers	868	8.4
86	Ricoh Co. Ltd.	5263	12609	41.7	IEEE	5263	41.7	ACM-Assoc Comput Mach	1885	14.9
87	Fraunhofer Gesellschaft	5203	13058	39.8	IEEE	5203	39.8	Audio Eng Soc	998	7.6
88	NVIDIA Corp.	5147	13525	38.1	IEEE	5147	38.1	ACM-Assoc Comput Mach	2798	20.7
89	Mitsubishi Electric Corp	4946	12325	40.1	IEEE	4946	40.1	3GPP General Partnership Project Standards Body	2238	18.2
90	Witricity Corp	4856	9351	51.9	IEEE	4856	51.9	American Institute of Physics	762	8.1
91	Applied Materials Inc.	4703	18271	25.7	IEEE	4703	25.7	American Institute of Physics	3083	16.9
92	Thermo Fisher Scientific Inc	4687	27847	16.8	RELX Group (Elsevier)	8979	32.2	IEEE	4687	16.8
93	Adaptix	4627	6848	67.6	IEEE	4627	67.6	European Telecom Standards Institute (ETSI)	777	11.3
94	Wolfspeed Inc. (formerly Cre	4562	12473	36.6	IEEE	4562	36.6	American Institute of Physics	2630	21.1
95	Comcast Corp	4526	46105	9.8	3GPP General Partnership Project Standards B	37922	82.3	IEEE	4526	9.8
96	Motorola Solutions Inc.	4478	9400	47.6	IEEE	4478	47.6	American Institute of Physics	754	8.0
97	Digimarc Corp.	4468	11653	38.3	IEEE	4468	38.3	SPIE-Int Soc Opt Engineering	1532	13.1
98	Boeing Co. (The)	4403	13661	32.2	IEEE	4403	32.2	RELX Group (Elsevier)	1408	10.3
99	L3 Harris Technologies (form	4400	7757	56.7	IEEE	4400	56.7	RELX Group (Elsevier)	370	4.8
100	Sap SE	4375	19727	22.2	ACM-Assoc Comput Mach	6584	33.4	IEEE	4375	22.2
101	Hitachi Ltd	4225	14662	28.8	IEEE	4225	28.8	ACM-Assoc Comput Mach	1212	8.3
102	Vantiva SA (former Technico	4132	8833	46.8	IEEE	4132	46.8	SPIE-Int Soc Opt Engineering	465	5.3
103	Hon Hai Precision Industry C	4118	25094	16.4	3GPP General Partnership Project Standards B	9426	37.6	IEEE	4118	16.4
104	RPX Corp	4072	10234	39.8	IEEE	4072	39.8	Internet Soc/IETF-Internet Eng Task Force	902	8.8
105	On Semiconductor Corporati	3990	5830	68.4	IEEE	3990	68.4	RELX Group (Elsevier)	371	6.4
106	Immersion Corp.	3902	11376	34.3	IEEE	3902	34.3	ACM-Assoc Comput Mach	1190	10.5
107	Dell Technologies Inc	3886	11787	33.0	IEEE	3886	33.0	ACM-Assoc Comput Mach	2287	19.4
108	Sonos Inc	3694	11228	32.9	IEEE	3694	32.9	SPIE-Int Soc Opt Engineering	1012	9.0
109	Sanken Electric Co. Ltd.	3647	4850	75.2	IEEE	3647	75.2	RELX Group (Elsevier)	765	15.8
110	Softbank Corp	3624	9381	38.6	IEEE	3624	38.6	ACM-Assoc Comput Mach	791	8.4
111	Commissariat A L'Energie At	3492	12231	28.6	IEEE	3492	28.6	RELX Group (Elsevier)	2120	17.3
112	Hewlett Packard Enterprises	3478	10346	33.6	IEEE	3478	33.6	ACM-Assoc Comput Mach	2029	19.6
113	INDIVIDUAL PATENTER	3401	21534	15.8	IEEE	3401	15.8	RELX Group (Elsevier)	3154	14.6
114	Lockheed Martin Corp.	3398	22033	15.4	IEEE	3398	15.4	RELX Group (Elsevier)	2390	10.8
115	ABB Ltd	3395	5307	64.0	IEEE	3395	64.0	RELX Group (Elsevier)	261	4.9
116	Meta Platforms Inc.(formerly	3368	14075	23.9	IEEE	3368	23.9	ACM-Assoc Comput Mach	3130	22.2
117	Corning Inc.	3328	12296	27.1	IEEE	3328	27.1	RELX Group (Elsevier)	1528	12.4
118	ASM International N.V.	3241	34919	9.3	RELX Group (Elsevier)	6170	17.7	American Institute of Physics	6057	17.3
119	Global Foundries Inc	3176	7027	45.2	IEEE	3176	45.2	American Institute of Physics	603	8.6
120	Cirrus Logic Inc.	3157	4074	77.5	IEEE	3157	77.5	RELX Group (Elsevier)	127	3.1

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121	Stanford University	3105	38986	8.0	RELX Group (Elsevier)	5381	13.8	Springer Nature	5029	12.9
122	United States Navy	2997	10190	29.4	IEEE	2997	29.4	American Institute of Physics	1081	10.6
123	University of Washington	2956	14601	20.2	IEEE	2956	20.2	RELX Group (Elsevier)	2039	14.0
124	Verizon Communications Inc	2951	9531	31.0	IEEE	2951	31.0	Internet Soc/IETF-Internet Eng Task Force	1661	17.4
125	Chipbond Technology Corp	2947	3688	79.9	IEEE	2947	79.9	RELX Group (Elsevier)	272	7.4
126	Tabula Inc	2903	8112	35.8	IEEE	2903	35.8	ACM-Assoc Comput Mach	2878	35.5
127	Bosch (Robert) GmbH	2884	11553	25.0	IEEE	2884	25.0	RELX Group (Elsevier)	1095	9.5
128	II-VI Inc	2840	9689	29.3	IEEE	2840	29.3	Optical Society of America	1615	16.7
129	MicroUnity Systems Enginee	2808	4616	60.8	IEEE	2808	60.8	Joint IEEE and ACM	407	8.8
130	Trellix (merger of FireEye Inc	2779	7983	34.8	IEEE	2779	34.8	ACM-Assoc Comput Mach	1381	17.3
131	Masimo Corp	2727	5917	46.1	IEEE	2727	46.1	Springer Nature	517	8.7
132	Juniper Networks Inc.	2651	9542	27.8	IEEE	2651	27.8	Network Working Group RFC	2595	27.2
133	Honda Motor Co. Ltd.(Honda	2628	6359	41.3	IEEE	2628	41.3	RELX Group (Elsevier)	735	11.6
134	IP RESERVOIR LLC	2620	5140	51.0	IEEE	2620	51.0	ACM-Assoc Comput Mach	852	16.6
135	Microchip Technology Inc.	2619	4162	62.9	IEEE	2619	62.9	ACM-Assoc Comput Mach	189	4.5
136	PDF Solutions	2585	4069	63.5	IEEE	2585	63.5	SPIE-Int Soc Opt Engineering	910	22.4
137	University of Michigan	2534	14395	17.6	RELX Group (Elsevier)	2629	18.3	IEEE	2534	17.6
138	Silicon Laboratories Inc	2532	3284	77.1	IEEE	2532	77.1	RELX Group (Elsevier)	142	4.3
139	Rockwell Automation Inc	2531	3672	68.9	IEEE	2531	68.9	RELX Group (Elsevier)	194	5.3
140	Seagate Technology Plc	2476	7090	34.9	IEEE	2476	34.9	American Institute of Physics	1305	18.4
141	SUN PATENT TRUST	2474	14802	16.7	International Telecommunication Union	5264	35.6	3GPP General Partnership Project Standards Body	5055	34.2
142	Mediatek Inc.	2467	6462	38.2	IEEE	2467	38.2	3GPP General Partnership Project Standards Body	1874	29.0
143	Toyota Motor Corp	2447	7662	31.9	IEEE	2447	31.9	RELX Group (Elsevier)	1206	15.7
144	University of Texas	2446	15044	16.3	IEEE	2446	16.3	RELX Group (Elsevier)	2410	16.0
145	Cortica Ltd	2443	3592	68.0	IEEE	2443	68.0	ACM-Assoc Comput Mach	412	11.5
146	SIPCO LLC	2372	4227	56.1	IEEE	2372	56.1	Internet Soc/IETF-Internet Eng Task Force	349	8.3
147	Magic Leap Inc	2357	7666	30.7	IEEE	2357	30.7	ACM-Assoc Comput Mach	816	10.6
148	Amberwave Inc	2337	6843	34.2	IEEE	2337	34.2	American Institute of Physics	2045	29.9
149	Accenture Ltd.	2336	7198	32.5	IEEE	2336	32.5	ACM-Assoc Comput Mach	1233	17.1
150	ATTOPSEMI TECHNOLOG	2281	2839	80.3	IEEE	2281	80.3	IEEE/JPN Soc App Phys	347	12.2
151	VMWare Inc	2262	13333	17.0	ACM-Assoc Comput Mach	5750	43.1	IEEE	2262	17.0
152	Battelle Memorial Institute	2257	7944	28.4	IEEE	2257	28.4	RELX Group (Elsevier)	1393	17.5
153	Cubic Corporation	2247	3220	69.8	IEEE	2247	69.8	The International Society of Infrared, Millimeter, and Terahert	164	5.1
154	Empire Technology Develop	2237	6748	33.2	IEEE	2237	33.2	Joint IEEE and ACM	1020	15.1
155	Seiko Epson Corporation	2232	6472	34.5	IEEE	2232	34.5	RELX Group (Elsevier)	473	7.3
156	Viasat	2217	3550	62.5	IEEE	2217	62.5	AIAA-Am Inst Aero Astro	234	6.6
157	PACT XPP TECHNOLOGIE	2214	3849	57.5	IEEE	2214	57.5	ACM-Assoc Comput Mach	361	9.4
158	Texas A&M University	2184	4035	54.1	IEEE	2184	54.1	RELX Group (Elsevier)	332	8.2
159	Georgia Institute of Technolo	2174	6368	34.1	IEEE	2174	34.1	RELX Group (Elsevier)	669	10.5
160	Lenovo Group Ltd	2141	7872	27.2	3GPP General Partnership Project Standards B	4078	51.8	IEEE	2141	27.2

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161	Totalenergies SE (formerly T	2135	3129	68.2	IEEE	2135	68.2	RELX Group (Elsevier)	230	7.4
162	BT Group PLC	2119	5226	40.5	IEEE	2119	40.5	ACM-Assoc Comput Mach	400	7.7
163	TDK Corporation	2108	6435	32.8	IEEE	2108	32.8	American Institute of Physics	1140	17.7
164	Kandou Bus SA	2093	2323	90.1	IEEE	2093	90.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	82	3.5
165	Walt Disney Co.	2060	8013	25.7	ACM-Assoc Comput Mach	3411	42.6	IEEE	2060	25.7
166	Interuniversity MicroElectron	2040	4726	43.2	IEEE	2040	43.2	American Institute of Physics	409	8.7
167	INNOVATIVE SILICON SA	2033	2515	80.8	IEEE	2033	80.8	RELX Group (Elsevier)	108	4.3
168	Energous Corporation	2018	2616	77.1	IEEE	2018	77.1	The European Association on Antennas and Propagation (Eur	207	7.9
169	Infinera Corporation	2014	4585	43.9	IEEE	2014	43.9	Optical Society of America	777	16.9
170	Quarterhill Inc	2012	3931	51.2	IEEE	2012	51.2	3GPP General Partnership Project Standards Body	618	15.7
171	Fujifilm Business Innovation	1995	8569	23.3	IEEE	1995	23.3	ACM-Assoc Comput Mach	1333	15.6
172	Stryker Corp.	1991	17346	11.5	RELX Group (Elsevier)	3153	18.2	Springer Nature	2066	11.9
173	Cognex Corp.	1962	4710	41.7	IEEE	1962	41.7	RELX Group (Elsevier)	801	17.0
174	INTOUCH HEALTH INC	1921	5588	34.4	IEEE	1921	34.4	IEEE/RSJ	539	9.6
175	Emerson Electric Co.	1920	7547	25.4	IEEE	1920	25.4	RELX Group (Elsevier)	1065	14.1
176	University of South Florida	1908	6508	29.3	IEEE	1908	29.3	RELX Group (Elsevier)	966	14.8
177	Flex Ltd (Formerly Flextronic	1894	2704	70.0	IEEE	1894	70.0	CBS Interactive	335	12.4
178	Netapp Inc	1889	10493	18.0	ACM-Assoc Comput Mach	4269	40.7	IEEE	1889	18.0
179	Ignis Innovation Inc	1886	2691	70.1	IEEE	1886	70.1	SID-Society for Information Display	454	16.9
180	GENGHISCOMM HOLDIN	1878	2347	80.0	IEEE	1878	80.0	3GPP General Partnership Project Standards Body	91	3.9
181	Lumens Technologies Inc. (fo	1822	6010	30.3	IEEE	1822	30.3	ACM-Assoc Comput Mach	1113	18.5
182	Cloud Software Group	1812	5558	32.6	IEEE	1812	32.6	ACM-Assoc Comput Mach	968	17.4
183	NXGEN PARTNERS IP LLC	1797	3985	45.1	IEEE	1797	45.1	Optical Society of America	1053	26.4
184	FormFactor Inc	1788	3558	50.3	IEEE	1788	50.3	Springer Nature	648	18.2
185	Mevion Medical Systems Inc	1782	5679	31.4	IEEE	1782	31.4	RELX Group (Elsevier)	1104	19.4
186	STRONG FORCE IOT PORT	1741	2381	73.1	IEEE	1741	73.1	RELX Group (Elsevier)	195	8.2
187	Vanderbilt University	1730	6881	25.1	IEEE	1730	25.1	RELX Group (Elsevier)	951	13.8
188	T-Mobile USA INC	1701	6565	25.9	IEEE	1701	25.9	3GPP General Partnership Project Standards Body	943	14.4
189	BAE Systems Plc.	1697	3031	56.0	IEEE	1697	56.0	SPIE-Int Soc Opt Engineering	178	5.9
190	University of Southern Califo	1692	9340	18.1	IEEE	1692	18.1	ACS-Am Chem Soc	1223	13.1
191	Wisteria Trading Inc	1686	3519	47.9	IEEE	1686	47.9	SPIE-Int Soc Opt Engineering	405	11.5
192	Purdue University	1669	8991	18.6	IEEE	1669	18.6	RELX Group (Elsevier)	1337	14.9
193	SRI International	1644	5088	32.3	IEEE	1644	32.3	RELX Group (Elsevier)	437	8.6
194	Nielsen Holdings Plc	1629	12676	12.9	RELX Group (Elsevier)	2303	18.2	IEEE	1629	12.9
195	Northrop Grumman Corp	1629	3781	43.1	IEEE	1629	43.1	American Institute of Physics	266	7.0
196	GUIDED THERAPY SYSTE	1612	6885	23.4	IEEE	1612	23.4	RELX Group (Elsevier)	1144	16.6
197	illumina Inc.	1593	8336	19.1	IEEE	1593	19.1	RELX Group (Elsevier)	908	10.9
198	University of North Carolina	1585	7487	21.2	IEEE	1585	21.2	RELX Group (Elsevier)	940	12.6
199	Zebra Technologies Corp.	1577	3262	48.3	IEEE	1577	48.3	ACM-Assoc Comput Mach	204	6.3
200	SalesforceCom Inc	1560	5429	28.7	IEEE	1560	28.7	ACM-Assoc Comput Mach	787	14.5

Appendix C: Top Organizations from All Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
201	eBay Inc	1542	7813	19.7	IEEE	1542	19.7	ACM-Assoc Comput Mach	1105	14.1
202	SK Hynix Inc	1518	2640	57.5	IEEE	1518	57.5	Joint IEEE and ACM	143	5.4
203	Brain Corporation	1517	4382	34.6	IEEE	1517	34.6	MIT Press	574	13.1
204	University of Wisconsin	1514	8848	17.1	IEEE	1514	17.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1144	12.9
205	Palantir Technologies Inc	1487	7475	19.9	ACM-Assoc Comput Mach	1513	20.2	IEEE	1487	19.9
206	Hong Kong University of Sci	1485	3631	40.9	IEEE	1485	40.9	American Institute of Physics	328	9.0
207	Headwater Partners 1 LLC	1467	3549	41.3	IEEE	1467	41.3	3GPP General Partnership Project Standards Body	668	18.8
208	Gen Digital Inc. (formerly No	1462	5474	26.7	IEEE	1462	26.7	ACM-Assoc Comput Mach	1213	22.2
209	Intertrust Technologies Corp	1457	9484	15.4	ACM-Assoc Comput Mach	1654	17.4	IEEE	1457	15.4
210	Orange	1449	3052	47.5	IEEE	1449	47.5	3GPP General Partnership Project Standards Body	279	9.1
211	Transphorm Inc	1434	2994	47.9	IEEE	1434	47.9	American Institute of Physics	511	17.1
212	University of Florida	1407	5369	26.2	IEEE	1407	26.2	RELX Group (Elsevier)	843	15.7
213	Ford Motor Co.	1405	4055	34.6	IEEE	1405	34.6	RELX Group (Elsevier)	438	10.8
214	CONSTELLATION DESIGN	1401	1674	83.7	IEEE	1401	83.7	IET/IEEE	50	3.0
215	Thales	1387	3300	42.0	IEEE	1387	42.0	ACM-Assoc Comput Mach	217	6.6
216	GoPro Inc	1381	2831	48.8	IEEE	1381	48.8	ACM-Assoc Comput Mach	252	8.9
217	ORIGIN WIRELESS INC	1376	2069	66.5	IEEE	1376	66.5	American Physical Society	129	6.2
218	BUTTERFLY NETWORKS I	1370	1504	91.1	IEEE	1370	91.1	RELX Group (Elsevier)	36	2.4
219	Valencell Inc	1361	3688	36.9	IEEE	1361	36.9	RELX Group (Elsevier)	350	9.5
220	LibertyMedia	1360	2562	53.1	IEEE	1360	53.1	ACM-Assoc Comput Mach	210	8.2
221	United Microelectronics Corp	1326	2739	48.4	IEEE	1326	48.4	American Institute of Physics	384	14.0
222	Schneider Electric S.A.	1324	6539	20.2	IEEE	1324	20.2	RELX Group (Elsevier)	673	10.3
223	QST Holdings Llc	1318	2272	58.0	IEEE	1318	58.0	Joint IEEE and ACM	249	11.0
224	United States Army	1275	5582	22.8	IEEE	1275	22.8	American Institute of Physics	555	9.9
225	Johns Hopkins University	1269	7571	16.8	IEEE	1269	16.8	RELX Group (Elsevier)	1097	14.5
226	University of Nebraska	1262	5666	22.3	IEEE	1262	22.3	Springer Nature	848	15.0
227	Cornell University	1260	8141	15.5	IEEE	1260	15.5	RELX Group (Elsevier)	1151	14.1
228	Align Technology Inc	1246	11012	11.3	JCO - Journal of Clinical Orthodontics	1585	14.4	RELX Group (Elsevier)	1332	12.1
229	P4TENTS1 LLC	1229	2944	41.7	IEEE	1229	41.7	ACM-Assoc Comput Mach	396	13.5
230	Extreme Networks Inc	1226	2798	43.8	IEEE	1226	43.8	Network Working Group RFC	319	11.4
231	NETWORK-1 TECHNOLOG	1224	3649	33.5	IEEE	1224	33.5	ACM-Assoc Comput Mach	739	20.3
232	PHOENIX SOLUTIONS INC	1206	3795	31.8	IEEE	1206	31.8	ISCA (International Speech Communication Association)	478	12.6
233	LivaNova Plc	1197	22150	5.4	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	4905	22.1	RELX Group (Elsevier)	4393	19.8
234	Avaya Inc	1195	4495	26.6	IEEE	1195	26.6	Internet Soc/IETF-Internet Eng Task Force	803	17.9
235	General Motors Corp	1191	3361	35.4	IEEE	1191	35.4	RELX Group (Elsevier)	546	16.2
236	Math Works Inc (The)	1183	2955	40.0	IEEE	1183	40.0	ACM-Assoc Comput Mach	575	19.5
237	Velatia Group	1182	1564	75.6	IEEE	1182	75.6	Echelon Corp	113	7.2
238	III HOLDINGS 1 LLC	1178	2125	55.4	IEEE	1178	55.4	ACM-Assoc Comput Mach	252	11.9
239	Synaptics Inc.	1170	2324	50.3	IEEE	1170	50.3	ACM-Assoc Comput Mach	143	6.2
240	Kyocera Corp.	1167	4796	24.3	3GPP General Partnership Project Standards B	2329	48.6	IEEE	1167	24.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
241	Smith & Nephew Plc.	1156	17434	6.6	RELX Group (Elsevier)	3419	19.6	Wolters Kluwer	1716	9.8
242	United States of America Dep	1153	5210	22.1	IEEE	1153	22.1	RELX Group (Elsevier)	784	15.0
243	Tencent Holding Ltd	1144	3844	29.8	International Telecommunication Union	1306	34.0	IEEE	1144	29.8
244	Agency for Science Technolo	1143	3409	33.5	IEEE	1143	33.5	RELX Group (Elsevier)	429	12.6
245	X ONE INC	1130	3202	35.3	IEEE	1130	35.3	ACM-Assoc Comput Mach	571	17.8
246	AMPT LLC	1129	1446	78.1	IEEE	1129	78.1	RELX Group (Elsevier)	90	6.2
247	National Instruments Corp.	1124	2195	51.2	IEEE	1124	51.2	3GPP General Partnership Project Standards Body	198	9.0
248	Johnson Controls Internationa	1110	3359	33.0	IEEE	1110	33.0	RELX Group (Elsevier)	616	18.3
249	Skyworks Solutions Inc	1102	1509	73.0	IEEE	1102	73.0	Summit Technical Media	53	3.5
250	Crossbar Inc	1101	4245	25.9	IEEE	1101	25.9	American Institute of Physics	574	13.5
251	Washington University in St.	1095	7916	13.8	IEEE	1095	13.8	RELX Group (Elsevier)	1058	13.4
252	State Farm Mutual Automobi	1084	3621	29.9	IEEE	1084	29.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	230	6.4
253	Carnegie Mellon University	1073	4467	24.0	IEEE	1073	24.0	RELX Group (Elsevier)	504	11.3
254	REALTIME DATA LLC	1068	4210	25.4	IEEE	1068	25.4	Network Working Group RFC	546	13.0
255	Verance Corp	1065	2173	49.0	IEEE	1065	49.0	SPIE-Int Soc Opt Engineering	286	13.2
256	Teledyne Technologies Incor	1061	2683	39.5	IEEE	1061	39.5	SPIE-Int Soc Opt Engineering	326	12.2
257	MOJO MOBILITY INC	1047	1372	76.3	IEEE	1047	76.3	RELX Group (Elsevier)	114	8.3
258	TuSimple	1046	1474	71.0	IEEE	1046	71.0	Neural Information Processing Systems Foundation	133	9.0
259	University of Pennsylvania	1042	10195	10.2	RELX Group (Elsevier)	1489	14.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1109	10.9
260	Fortinet Inc	1032	1980	52.1	IEEE	1032	52.1	ACM-Assoc Comput Mach	257	13.0
261	Ecole Polytechnique Federale	1031	3825	27.0	IEEE	1031	27.0	RELX Group (Elsevier)	412	10.8
262	Virginia Tech University	1031	5589	18.4	RELX Group (Elsevier)	1080	19.3	IEEE	1031	18.4
263	Duke University	1029	6579	15.6	IEEE	1029	15.6	RELX Group (Elsevier)	750	11.4
264	Schlumberger Ltd.	1028	15673	6.6	Society of Petroleum Engineers	3599	23.0	Society of Exploration Geophysicists	2480	15.8
265	IDC LLC	1026	2862	35.8	IEEE	1026	35.8	SID-Society for Information Display	386	13.5
266	New Jersey Institute of Techn	1020	2523	40.4	IEEE	1020	40.4	RELX Group (Elsevier)	420	16.6
267	Agilent Technologies Inc	992	3455	28.7	IEEE	992	28.7	RELX Group (Elsevier)	442	12.8
268	McAfee Inc	991	4476	22.1	IEEE	991	22.1	ACM-Assoc Comput Mach	841	18.8
269	Michigan State University	991	9561	10.4	Optical Society of America	1823	19.1	American Institute of Physics	1303	13.6
270	Eastman Kodak Company	987	4278	23.1	IEEE	987	23.1	RELX Group (Elsevier)	418	9.8
271	Technion - Israel Institute of	980	3088	31.7	IEEE	980	31.7	RELX Group (Elsevier)	397	12.9
272	PURE Storage Inc	968	7207	13.4	Internet Soc/IETF-Internet Eng Task Force	3445	47.8	ACM-Assoc Comput Mach	1585	22.0
273	State University of New York	954	4233	22.5	IEEE	954	22.5	RELX Group (Elsevier)	571	13.5
274	Baxter International Inc.	950	9990	9.5	RELX Group (Elsevier)	2158	21.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	995	10.0
275	ViaPath Technologies (Forme	950	1944	48.9	IEEE	950	48.9	RELX Group (Elsevier)	131	6.7
276	Charles Stark Draper Laborat	949	2888	32.9	IEEE	949	32.9	RELX Group (Elsevier)	291	10.1
277	Cleveland Clinic (and Founda	948	5688	16.7	RELX Group (Elsevier)	1117	19.6	IEEE	948	16.7
278	TRILLIANT NETWORKS IN	948	1417	66.9	IEEE	948	66.9	Internet Soc/IETF-Internet Eng Task Force	98	6.9
279	Harvard University	938	13874	6.8	Springer Nature	1865	13.4	RELX Group (Elsevier)	1660	12.0
280	Maxlinear Inc	936	1204	77.7	IEEE	936	77.7	ACM-Assoc Comput Mach	47	3.9

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281	3M Co	934	25734	3.6	RELX Group (Elsevier)	3476	13.5	Wolters Kluwer	3144	12.2
282	Northwestern University	932	9612	9.7	ACS-Am Chem Soc	1478	15.4	RELX Group (Elsevier)	1283	13.3
283	Baidu Inc	920	2388	38.5	IEEE	920	38.5	arXiv.org	262	11.0
284	VerintSys	920	6149	15.0	International Data Group	1426	23.2	ACM-Assoc Comput Mach	1112	18.1
285	AMS Osram (former AMS A	916	4614	19.9	American Institute of Physics	994	21.5	IEEE	916	19.9
286	University of Alabama	916	3803	24.1	IEEE	916	24.1	RELX Group (Elsevier)	704	18.5
287	PME IP PTY LTD	911	2376	38.3	IEEE	911	38.3	ACM-Assoc Comput Mach	580	24.4
288	HTC Corporation	910	4450	20.4	3GPP General Partnership Project Standards B	2694	60.5	IEEE	910	20.4
289	Otto Bock Holding GmbH &	905	2837	31.9	IEEE	905	31.9	RELX Group (Elsevier)	598	21.1
290	Nikon Corp.	903	5193	17.4	SPIE-Int Soc Opt Engineering	2139	41.2	IEEE	903	17.4
291	YFY Inc	900	10969	8.2	SID-Society for Information Display	4259	38.8	Korean Information Display Society (KIDS)	957	8.7
292	SYNQOR INC	886	1013	87.5	IEEE	886	87.5	Penton/IPC, Inc.	45	4.4
293	Schweitzer Engineering Labo	883	1172	75.3	IEEE	883	75.3	ACM-Assoc Comput Mach	56	4.8
294	SRC Computers Inc.	883	1006	87.8	IEEE	883	87.8	ACM-Assoc Comput Mach	36	3.6
295	Synergy Microwave Corp	880	1076	81.8	IEEE	880	81.8	Horizon House Publications	66	6.1
296	Imagination Technologies Gr	877	2150	40.8	IEEE	877	40.8	ACM-Assoc Comput Mach	535	24.9
297	Princeton University	867	6841	12.7	American Institute of Physics	1227	17.9	IEEE	867	12.7
298	Ossur hf	854	2772	30.8	IEEE	854	30.8	RELX Group (Elsevier)	604	21.8
299	KLA-Tencor Corp.	853	6138	13.9	SPIE-Int Soc Opt Engineering	1930	31.4	IEEE	853	13.9
300	Eagleview Technologies Inc	851	3590	23.7	IEEE	851	23.7	ACM-Assoc Comput Mach	581	16.2
301	VIVAQUANT LLC	846	1730	48.9	IEEE	846	48.9	RELX Group (Elsevier)	222	12.8
302	Lam Research Corp.	845	5746	14.7	American Institute of Physics	1420	24.7	IEEE	845	14.7
303	Ciena Corp	839	2667	31.5	IEEE	839	31.5	Optical Society of America	421	15.8
304	ZTE Microelectronics Techno	836	5711	14.6	3GPP General Partnership Project Standards B	3575	62.6	IEEE	836	14.6
305	University System of Maryla	835	6017	13.9	RELX Group (Elsevier)	1020	17.0	IEEE	835	13.9
306	Sotera Wireless	827	1824	45.3	IEEE	827	45.3	Springer Nature	349	19.1
307	Midtronics Inc.	826	1975	41.8	IEEE	826	41.8	RELX Group (Elsevier)	356	18.0
308	Voxer Llc	825	1445	57.1	IEEE	825	57.1	Internet Soc/IETF-Internet Eng Task Force	132	9.1
309	Airbus SE	824	2105	39.1	IEEE	824	39.1	RELX Group (Elsevier)	261	12.4
310	New York University	813	5500	14.8	IEEE	813	14.8	RELX Group (Elsevier)	675	12.3
311	Tel Aviv University	813	3774	21.5	IEEE	813	21.5	RELX Group (Elsevier)	644	17.1
312	Korea Advanced Institute for	811	2340	34.7	IEEE	811	34.7	RELX Group (Elsevier)	171	7.3
313	JPMorgan	809	6807	11.9	Source Media	1205	17.7	IEEE	809	11.9
314	Nantero Inc	807	10717	7.5	ACS-Am Chem Soc	3136	29.3	American Institute of Physics	2264	21.1
315	Yahoo Inc	805	5774	13.9	ACM-Assoc Comput Mach	1777	30.8	IEEE	805	13.9
316	Ohio State University	804	3314	24.3	IEEE	804	24.3	RELX Group (Elsevier)	510	15.4
317	Centre National De La Reche	801	6508	12.3	RELX Group (Elsevier)	1567	24.1	IEEE	801	12.3
318	Vicor Corp	796	1021	78.0	IEEE	796	78.0	Center for Power Electronics Systems (Virginia Tech)	47	4.6
319	Here Global BV	789	1801	43.8	IEEE	789	43.8	ACM-Assoc Comput Mach	209	11.6
320	Round Rock Research LLC	787	2437	32.3	IEEE	787	32.3	RELX Group (Elsevier)	356	14.6

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321	Nant Holdings IP Llc	778	3278	23.7	Joint IEEE and ACM	899	27.4	IEEE	778	23.7
322	NUCURRENT INC	776	968	80.2	IEEE	776	80.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	53	5.5
323	NUMENTA INC	775	3224	24.0	Numenta Inc.	1182	36.7	IEEE	775	24.0
324	Knowles Corp	774	1648	47.0	IEEE	774	47.0	RELX Group (Elsevier)	188	11.4
325	Power Integrations Inc.	769	1182	65.1	IEEE	769	65.1	American Institute of Physics	63	5.3
326	Wave Computing Inc.	766	2573	29.8	IEEE	766	29.8	ACM-Assoc Comput Mach	487	18.9
327	Aisin Corporation (Aisin Seki	756	5226	14.5	Optical Society of America	1996	38.2	IEEE	756	14.5
328	SAS Institute	753	3045	24.7	IEEE	753	24.7	RELX Group (Elsevier)	435	14.3
329	M/A-COM Technology Solut	752	1564	48.1	IEEE	752	48.1	American Institute of Physics	195	12.5
330	PixelWorks Inc	750	1185	63.3	IEEE	750	63.3	SPIE-Int Soc Opt Engineering	113	9.5
331	Yageo Corporation	743	1103	67.4	IEEE	743	67.4	IET/IEE	201	18.2
332	United Services Automobile	735	5032	14.6	Source Media	781	15.5	IEEE	735	14.6
333	BANDSPEED INC	732	1291	56.7	IEEE	732	56.7	Bluetooth Special Interest Group	447	34.6
334	City University of Hong Kon	731	2226	32.8	IEEE	731	32.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	234	10.5
335	Realtek Semiconductor Corp.	729	899	81.1	IEEE	729	81.1	IET/IEE	20	2.2
336	Advantest Corp.	728	1018	71.5	IEEE	728	71.5	American Institute of Physics	37	3.6
337	University of Pittsburgh	727	6050	12.0	RELX Group (Elsevier)	1393	23.0	IEEE	727	12.0
338	Otsuka Holdings Co Ltd	724	4791	15.1	RELX Group (Elsevier)	976	20.4	IEEE	724	15.1
339	Mau Di Diagnostic Imaging	722	1171	61.7	IEEE	722	61.7	RELX Group (Elsevier)	150	12.8
340	MegaChips Corp	720	1044	69.0	IEEE	720	69.0	American Physical Society	69	6.6
341	AOL Inc	719	3753	19.2	ACM-Assoc Comput Mach	821	21.9	IEEE	719	19.2
342	EXEGY INC	719	1390	51.7	IEEE	719	51.7	ACM-Assoc Comput Mach	236	17.0
343	ASML Holding NV	718	14766	4.9	SPIE-Int Soc Opt Engineering	5625	38.1	American Institute of Physics	2517	17.0
344	National Chiao Tung Univers	718	1445	49.7	IEEE	718	49.7	American Institute of Physics	124	8.6
345	Advanced New Technologies	714	1427	50.0	IEEE	714	50.0	ACM-Assoc Comput Mach	131	9.2
346	University of Virginia (and P	714	3298	21.6	IEEE	714	21.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	496	15.0
347	EcoSense Lighting Inc	704	8673	8.1	American Institute of Physics	2522	29.1	Institute of Pure and Applied Physics	1768	20.4
348	CENTRIPETAL NETWORK	700	2122	33.0	IEEE	700	33.0	ACM-Assoc Comput Mach	389	18.3
349	FACENSE LTD	686	1224	56.0	IEEE	686	56.0	RELX Group (Elsevier)	105	8.6
350	Denso Corp	681	1438	47.4	IEEE	681	47.4	RELX Group (Elsevier)	108	7.5
351	Dassault Systemes SA	680	3869	17.6	RELX Group (Elsevier)	804	20.8	IEEE	680	17.6
352	Viavi Solutions Inc	680	2298	29.6	IEEE	680	29.6	Optical Society of America	241	10.5
353	North Carolina State Universi	677	3665	18.5	IEEE	677	18.5	RELX Group (Elsevier)	569	15.5
354	Alibaba Group Holding Ltd	673	1725	39.0	IEEE	673	39.0	ACM-Assoc Comput Mach	201	11.7
355	Snap Inc	671	1922	34.9	IEEE	671	34.9	ACM-Assoc Comput Mach	390	20.3
356	EDGE 3 TECHNOLOGIES I	664	1049	63.3	IEEE	664	63.3	RELX Group (Elsevier)	62	5.9
357	SILVERBROOK RESEARC	664	1918	34.6	IEEE	664	34.6	Springer Nature	444	23.1
358	Blue Sail Medical Co. Ltd.	661	2211	29.9	IEEE	661	29.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	318	14.4
359	Open Text Corp	661	2079	31.8	IEEE	661	31.8	ACM-Assoc Comput Mach	420	20.2
360	CapitalOne	659	2741	24.0	IEEE	659	24.0	CBS Interactive	238	8.7

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361	IDEMIA	655	1630	40.2	IEEE	655	40.2	RELX Group (Elsevier)	154	9.4
362	Micro Focus International PL	651	2001	32.5	IEEE	651	32.5	ACM-Assoc Comput Mach	434	21.7
363	SK Telecom Co. Ltd.	651	953	68.3	IEEE	651	68.3	3GPP General Partnership Project Standards Body	142	14.9
364	NEWVALUEXCHANGE LT	647	1772	36.5	IEEE	647	36.5	ACM-Assoc Comput Mach	416	23.5
365	Halliburton Co. (Holding)	645	10242	6.3	Society of Petroleum Engineers	3924	38.3	SPWLA-Society of Petrophysicists and Well Log Analysts	717	7.0
366	F5 Networks Inc	643	4044	15.9	IEEE	643	15.9	ACM-Assoc Comput Mach	618	15.3
367	THE FLORIDA INTERNATI	642	1798	35.7	IEEE	642	35.7	RELX Group (Elsevier)	233	13.0
368	Unisantis Electronics Ltd	641	794	80.7	IEEE	641	80.7	Institute of Pure and Applied Physics	52	6.5
369	Aerospace Corp.	639	1741	36.7	IEEE	639	36.7	RELX Group (Elsevier)	257	14.8
370	HEMOSONICS LLC	639	1726	37.0	IEEE	639	37.0	RELX Group (Elsevier)	267	15.5
371	Seoul National University	635	1747	36.3	IEEE	635	36.3	ACM-Assoc Comput Mach	135	7.7
372	ARTILUX INC	631	1228	51.4	IEEE	631	51.4	Optical Society of America	209	17.0
373	PLUSN LLC	628	866	72.5	IEEE	628	72.5	IET/IEE	78	9.0
374	Fastback Networks Inc	623	908	68.6	IEEE	623	68.6	IET/IEE	65	7.2
375	University of Connecticut	621	2873	21.6	IEEE	621	21.6	Optical Society of America	533	18.6
376	Sulvolta Inc	620	1301	47.7	IEEE	620	47.7	American Institute of Physics	200	15.4
377	ACORN TECHNOLOGIES I	618	2109	29.3	IEEE	618	29.3	American Institute of Physics	528	25.0
378	General Dynamics Corp	616	1457	42.3	IEEE	616	42.3	American Physical Society	212	14.6
379	III HOLDINGS 12 LLC	616	1214	50.7	IEEE	616	50.7	ACM-Assoc Comput Mach	159	13.1
380	Becton Dickinson and Co.	613	33542	1.8	Wolters Kluwer	8295	24.7	RELX Group (Elsevier)	5709	17.0
381	FARO Technologies Inc.	613	2020	30.3	IEEE	613	30.3	SPIE-Int Soc Opt Engineering	376	18.6
382	University of Notre Dame Du	611	1511	40.4	IEEE	611	40.4	RELX Group (Elsevier)	142	9.4
383	ByteDance Ltd	609	7644	8.0	International Telecommunication Union	5948	77.8	ISO/IEC	626	8.2
384	National Taiwan University	609	1299	46.9	IEEE	609	46.9	American Institute of Physics	109	8.4
385	Continental AG (Germany Fe	608	1127	53.9	IEEE	608	53.9	RELX Group (Elsevier)	74	6.6
386	Case Western Reserve Univer	603	2429	24.8	IEEE	603	24.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	317	13.1
387	UATC LLC	597	950	62.8	IEEE	597	62.8	IEEE/CVF	68	7.2
388	EchoStar Corp	594	1276	46.6	IEEE	594	46.6	ACM-Assoc Comput Mach	76	6.0
389	Soitec SA	594	2283	26.0	IEEE	594	26.0	American Institute of Physics	537	23.5
390	Autodesk Inc.	590	4950	11.9	ACM-Assoc Comput Mach	2955	59.7	IEEE	590	11.9
391	Saluda Medical Pty Ltd	589	3407	17.3	IEEE	589	17.3	RELX Group (Elsevier)	559	16.4
392	MULTI-TECH SYSTEMS IN	588	912	64.5	IEEE	588	64.5	ACM-Assoc Comput Mach	44	4.8
393	VirnetX Holding Corp	587	11857	5.0	Network Working Group RFC	6287	53.0	Internet Soc/IETF-Internet Eng Task Force	1816	15.3
394	Keysight Technologies	586	1436	40.8	IEEE	586	40.8	3GPP General Partnership Project Standards Body	254	17.7
395	MACAU UNIVERSITY OF	585	845	69.2	IEEE	585	69.2	RELX Group (Elsevier)	74	8.8
396	Tigo Energy Inc	582	909	64.0	IEEE	582	64.0	WIP-Renewable Energies	245	27.0
397	Vestas Wind Systems A/S	582	1237	47.0	IEEE	582	47.0	AWEA-American Wind Energy Association	98	7.9
398	Lumentum Holdings Inc	580	1915	30.3	IEEE	580	30.3	Optical Society of America	415	21.7
399	Eaton Corp.	579	859	67.4	IEEE	579	67.4	RELX Group (Elsevier)	60	7.0
400	University of Utah	577	3953	14.6	RELX Group (Elsevier)	621	15.7	IEEE	577	14.6

Appendix C: Top Organizations from All Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
401	The National Aeronautical an	576	2928	19.7	IEEE	576	19.7	AIAA-Am Inst Aero Astro	345	11.8
402	Pennsylvania State University	573	3754	15.3	RELX Group (Elsevier)	640	17.0	IEEE	573	15.3
403	United States Air Force	571	1976	28.9	IEEE	571	28.9	Optical Society of America	185	9.4
404	OMNI MEDSCI INC	563	7868	7.2	Optical Society of America	2702	34.3	RELX Group (Elsevier)	1252	15.9
405	Assa Abloy AB	561	3310	16.9	IEEE	561	16.9	International Association for Cryptologic Research (IACR)	402	12.1
406	Nintendo Co. Ltd.	561	3261	17.2	ACM-Assoc Comput Mach	734	22.5	IEEE	561	17.2
407	Comtech Telecommunication	553	1223	45.2	IEEE	553	45.2	3GPP General Partnership Project Standards Body	301	24.6
408	Teradyne Inc.	553	1101	50.2	IEEE	553	50.2	ASME-Am Soc Mech Eng	126	11.4
409	ECOLE DE TECHNOLOGIE	552	861	64.1	IEEE	552	64.1	3GPP General Partnership Project Standards Body	66	7.7
410	National University of Ireland	550	1138	48.3	IEEE	550	48.3	RELX Group (Elsevier)	92	8.1
411	University of Central Florida	550	2786	19.7	IEEE	550	19.7	Optical Society of America	308	11.1
412	AB Initio Technology LLC	549	1899	28.9	ACM-Assoc Comput Mach	584	30.8	IEEE	549	28.9
413	Sumitomo Electric Industries	548	3480	15.7	IEEE	548	15.7	American Institute of Physics	434	12.5
414	Avid Technology Inc.	544	1297	41.9	IEEE	544	41.9	ACM-Assoc Comput Mach	482	37.2
415	Screen Holdings Co Ltd (For	543	2051	26.5	IEEE	543	26.5	RELX Group (Elsevier)	304	14.8
416	Yonsei University	542	1286	42.1	IEEE	542	42.1	ACM-Assoc Comput Mach	91	7.1
417	Asahi Kasei Corp.	541	7902	6.8	RELX Group (Elsevier)	1838	23.3	Wolters Kluwer	1158	14.7
418	THE CHAMBERLAIN GRO	541	1554	34.8	IEEE	541	34.8	International Association for Cryptologic Research (IACR)	197	12.7
419	Experian Plc	537	4977	10.8	IEEE	537	10.8	Source Media	500	10.0
420	Omnivision Technologies Inc	536	1349	39.7	IEEE	536	39.7	Optical Society of America	315	23.4
421	Bank of America Corp.	535	1570	34.1	IEEE	535	34.1	ACM-Assoc Comput Mach	236	15.0
422	Twitter Inc	533	1077	49.5	IEEE	533	49.5	ACM-Assoc Comput Mach	155	14.4
423	NEWRACOM Inc	531	539	98.5	IEEE	531	98.5	International Telecommunication Union	4	0.7
424	Swiss Federal Institute of Tec	526	1913	27.5	ACM-Assoc Comput Mach	592	30.9	IEEE	526	27.5
425	3D Systems Corp.	522	1151	45.4	IEEE	522	45.4	ACM-Assoc Comput Mach	284	24.7
426	HeartFlow Inc	521	5404	9.6	Springer Nature	1178	21.8	RELX Group (Elsevier)	1123	20.8
427	MC10 Inc	520	6363	8.2	American Institute of Physics	1081	17.0	ACS-Am Chem Soc	996	15.7
428	Visa Inc	519	2204	23.5	IEEE	519	23.5	ACM-Assoc Comput Mach	210	9.5
429	Splunk Inc	517	2161	23.9	ACM-Assoc Comput Mach	545	25.2	IEEE	517	23.9
430	Via Technologies Inc.	517	1174	44.0	IEEE	517	44.0	Joint IEEE and ACM	161	13.7
431	Pulse Link Inc	516	631	81.8	IEEE	516	81.8	Scientific American Inc.	24	3.8
432	Drexel University	511	4202	12.2	RELX Group (Elsevier)	958	22.8	American Institute of Physics	667	15.9
433	Ultrahaptics Ltd.	509	1555	32.7	IEEE	509	32.7	ACM-Assoc Comput Mach	345	22.2
434	Carl-Zeiss Stiftung	508	9127	5.6	Optical Society of America	1962	21.5	SPIE-Int Soc Opt Engineering	1816	19.9
435	Northeastern University (Bost	508	1460	34.8	IEEE	508	34.8	RELX Group (Elsevier)	160	11.0
436	University of Rochester	508	3081	16.5	IEEE	508	16.5	Optical Society of America	391	12.7
437	Hoya Corp	507	1637	31.0	IEEE	507	31.0	American Institute of Physics	321	19.6
438	CREATIVE KINGDOMS LL	505	1700	29.7	IEEE	505	29.7	ACM-Assoc Comput Mach	457	26.9
439	Causam Enterprises (former	502	829	60.6	IEEE	502	60.6	Springer Nature	131	15.8
440	Emcore Corp.	502	1113	45.1	IEEE	502	45.1	American Institute of Physics	131	11.8

Appendix C: Top Organizations from All Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
441	A10 Networks Inc	500	960	52.1	IEEE	500	52.1	Joint IEEE and ACM	112	11.7
442	INNOPHASE INC	500	559	89.4	IEEE	500	89.4	European Microwave Association	24	4.3
443	ST-Ericsson SA (Patents split	498	722	69.0	IEEE	498	69.0	3GPP General Partnership Project Standards Body	90	12.5
444	University of Colorado (The	498	4886	10.2	Optical Society of America	1195	24.5	RELX Group (Elsevier)	668	13.7
445	MAY PATENTS LTD	497	998	49.8	IEEE	497	49.8	ACM-Assoc Comput Mach	84	8.4
446	University of New Mexico	496	2837	17.5	IEEE	496	17.5	American Institute of Physics	315	11.1
447	Khalifa University of Science	495	815	60.7	IEEE	495	60.7	RELX Group (Elsevier)	46	5.6
448	Palo Alto Networks	495	1308	37.8	IEEE	495	37.8	ACM-Assoc Comput Mach	224	17.1
449	Uber Technologies Inc	495	1126	44.0	IEEE	495	44.0	ACM-Assoc Comput Mach	105	9.3
450	University of Massachusetts	495	3202	15.5	IEEE	495	15.5	RELX Group (Elsevier)	388	12.1
451	Walmart Stores Inc	494	1748	28.3	IEEE	494	28.3	RELX Group (Elsevier)	165	9.4
452	Olympus Corp.	493	1999	24.7	IEEE	493	24.7	RELX Group (Elsevier)	237	11.9
453	Nanyang Technological Univ	490	3107	15.8	RELX Group (Elsevier)	536	17.3	IEEE	490	15.8
454	EAGLE HARBOR HOLDIN	489	978	50.0	IEEE	489	50.0	SAE-Society of Automobile Engineers	162	16.6
455	Enphase Energy Inc	485	531	91.3	IEEE	485	91.3	IET/IEE	8	1.5
456	BLUERISC INC	483	1377	35.1	IEEE	483	35.1	ACM-Assoc Comput Mach	308	22.4
457	Commonwealth Scientific an	483	1160	41.6	IEEE	483	41.6	RELX Group (Elsevier)	133	11.5
458	Fortive Corporation	482	1199	40.2	IEEE	482	40.2	RELX Group (Elsevier)	140	11.7
459	Ostendo Technologies Inc	482	1997	24.1	IEEE	482	24.1	SPIE-Int Soc Opt Engineering	238	11.9
460	TELADOC HEALTH INC	481	1453	33.1	IEEE	481	33.1	IEEE/RSJ	133	9.2
461	MicroStrategy Inc.	478	2020	23.7	IEEE	478	23.7	United Business Media/UBM Tech	374	18.5
462	ZENA TECHNOLOGIES IN	478	2156	22.2	IEEE	478	22.2	ACS-Am Chem Soc	442	20.5
463	MIRAMAR LABS INC	476	1356	35.1	IEEE	476	35.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	169	12.5
464	Tokyo Electron Limited	472	3665	12.9	American Institute of Physics	506	13.8	RELX Group (Elsevier)	501	13.7
465	Ceva Inc.	466	1067	43.7	IEEE	466	43.7	ACM-Assoc Comput Mach	117	11.0
466	Telecom Italia SPA	466	1181	39.5	IEEE	466	39.5	3GPP General Partnership Project Standards Body	167	14.1
467	Alstom	465	769	60.5	IEEE	465	60.5	ASME-Am Soc Mech Eng	55	7.2
468	ISCO International Llc	465	565	82.3	IEEE	465	82.3	3GPP General Partnership Project Standards Body	95	16.8
469	UT-Battelle LLC	465	3791	12.3	RELX Group (Elsevier)	681	18.0	IEEE	465	12.3
470	SiOnyx Inc	464	2935	15.8	American Institute of Physics	830	28.3	RELX Group (Elsevier)	470	16.0
471	Tellabs Inc.	464	1038	44.7	IEEE	464	44.7	Internet Soc/IETF-Internet Eng Task Force	172	16.6
472	Wells Fargo & Co	461	1414	32.6	IEEE	461	32.6	ACM-Assoc Comput Mach	144	10.2
473	WILUS INSTITUTE OF STA	461	718	64.2	IEEE	461	64.2	3GPP General Partnership Project Standards Body	192	26.7
474	CHEETAH OMNI LLC	460	1824	25.2	IEEE	460	25.2	Optical Society of America	437	24.0
475	Mayo Foundation for Medica	460	5516	8.3	RELX Group (Elsevier)	1065	19.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	742	13.5
476	King Abdullah University of	459	2509	18.3	IEEE	459	18.3	ACS-Am Chem Soc	340	13.6
477	Saudi Arabian Oil Company (	458	7598	6.0	RELX Group (Elsevier)	1530	20.1	Society of Petroleum Engineers	1226	16.1
478	Roche Holding Ltd.	456	9517	4.8	RELX Group (Elsevier)	2071	21.8	ACS-Am Chem Soc	1211	12.7
479	Ligado Networks (formerly Li	455	845	53.8	IEEE	455	53.8	Baltzer Science Publishers B.V.	134	15.9
480	Conduent Inc	453	1374	33.0	IEEE	453	33.0	RELX Group (Elsevier)	147	10.7

Appendix C: Top Organizations from All Categories Combined

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
481	SolAero Technologies Corp	453	908	49.9	IEEE	453	49.9	RELX Group (Elsevier)	140	15.4
482	ALOFT MEDIA LLC	448	692	64.7	IEEE	448	64.7	3GPP General Partnership Project Standards Body	105	15.2
483	CARTICA AI LTD	447	703	63.6	IEEE	447	63.6	ACM-Assoc Comput Mach	82	11.7
484	King Fahd University of Petr	447	1417	31.5	IEEE	447	31.5	RELX Group (Elsevier)	346	24.4
485	Oewaves Inc	447	1434	31.2	Optical Society of America	551	38.4	IEEE	447	31.2
486	Qinetiq Group Ltd	445	1373	32.4	IEEE	445	32.4	American Institute of Physics	145	10.6
487	Catholic University Leuven	443	1207	36.7	IEEE	443	36.7	RELX Group (Elsevier)	131	10.9
488	TRACBEAM LLC	443	978	45.3	IEEE	443	45.3	ACM-Assoc Comput Mach	122	12.5
489	Hologic Inc	442	4991	8.9	RELX Group (Elsevier)	998	20.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	781	15.6
490	University of Tennessee Rese	441	1882	23.4	IEEE	441	23.4	RELX Group (Elsevier)	308	16.4
491	TRAXCELL TECHNOLOGI	437	735	59.5	IEEE	437	59.5	3GPP General Partnership Project Standards Body	99	13.5
492	Lattice Semiconductor Corp.	434	658	66.0	IEEE	434	66.0	ACM-Assoc Comput Mach	43	6.5
493	D-Wave Quantum Inc. (forme	433	4395	9.9	American Physical Society	1512	34.4	Springer Nature	495	11.3
494	Kofax Inc	433	1241	34.9	IEEE	433	34.9	ACM-Assoc Comput Mach	200	16.1
495	Xtera Communications Inc.	433	1332	32.5	IEEE	433	32.5	Optical Society of America	324	24.3
496	ICOSYSTEM CORP	429	580	74.0	IEEE	429	74.0	RELX Group (Elsevier)	27	4.7
497	Mitre Corp	429	953	45.0	IEEE	429	45.0	ACM-Assoc Comput Mach	53	5.6
498	Virgin Islands Microsystems	428	1772	24.2	IEEE	428	24.2	American Institute of Physics	365	20.6
499	Hexagon AB	427	1178	36.2	IEEE	427	36.2	ACM-Assoc Comput Mach	117	9.9
500	Aptiv Plc (former Delphi Aut	424	817	51.9	IEEE	424	51.9	ACM-Assoc Comput Mach	72	8.8

Appendix A - Publishers Receiving Most References from Top 50 Companies (Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Alphabet Inc.</i>		
IEEE	29589	31.0
ACM-Assoc Comput Mach	17063	17.9
RELX Group (Elsevier)	5051	5.3
Springer Nature	3236	3.4
International Telecommunication Union	3186	3.3
SPIE-Int Soc Opt Engineering	2478	2.6
3GPP General Partnership Project Standards Body	2146	2.2
Neural Information Processing Systems Foundation	1800	1.9
Joint IEEE and ACM	1690	1.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1550	1.6
ACL - Association for Computational Linguistics	1356	1.4
World Wide Web Consortium	1184	1.2
International Machine Learning Society (IMLS)	1104	1.2
CBS Interactive	1089	1.1
545 others with less than 1% each	22973	21.1
<i>Amazon.com Inc.</i>		
IEEE	16497	35.9
ACM-Assoc Comput Mach	6924	15.1
SPIE-Int Soc Opt Engineering	2555	5.6
RELX Group (Elsevier)	2072	4.5
IEEE/RSJ	1625	3.5
Internet Soc/IETF-Internet Eng Task Force	1235	2.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1200	2.6
Springer Nature	1171	2.5
Joint IEEE and ACM	910	2.0
Information Processing Society of Japan	567	1.2
The USENIX Association	522	1.1
316 others with less than 1% each	10698	21.7
<i>Apple Inc</i>		
IEEE	51203	32.2
ACM-Assoc Comput Mach	32382	20.3
RELX Group (Elsevier)	8223	5.2
3GPP General Partnership Project Standards Body	4871	3.1
ACL - Association for Computational Linguistics	4231	2.7
ISCA (International Speech Communication Association)	3477	2.2
Springer Nature	3002	1.9
Joint IEEE and ACM	2796	1.8
Association for the Advancement of Artificial Intelligence	2246	1.4
448 others with less than 1% each	46750	26.7

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
AT&T Inc		
IEEE	38706	43.8
ACM-Assoc Comput Mach	5547	6.3
RELX Group (Elsevier)	4267	4.8
Optical Society of America	2825	3.2
IET/IEE	2205	2.5
Springer Nature	2044	2.3
3GPP General Partnership Project Standards Body	1912	2.2
American Institute of Physics	1555	1.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1402	1.6
Internet Soc/IETF-Internet Eng Task Force	1200	1.4
NASA-National Aeronautics and Space Admin	1275	1.4
IEEE/OSA	1124	1.3
American Physical Society	1088	1.2
Joint IEEE and ACM	907	1.0
400 others with less than 1% each	22409	22.8
BBK Electronics		
3GPP General Partnership Project Standards Body	6550	90.7
IEEE	294	4.1
International Telecommunication Union	84	1.2
58 others with less than 1% each	291	3.4
BOE Technology Group Ltd		
IEEE	242	21.3
RELX Group (Elsevier)	122	10.7
ACS-Am Chem Soc	100	8.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	96	8.5
American Institute of Physics	81	7.1
Springer Nature	68	6.0
SID-Society for Information Display	44	3.9
China Academic Journal Electronic Publishing House	32	2.8
Royal Society of Chemistry	30	2.6
Optical Society of America	25	2.2
ACM-Assoc Comput Mach	21	1.8
SPIE-Int Soc Opt Engineering	20	1.8
Institute of Pure and Applied Physics	19	1.7
American Physical Society	15	1.3
Informa/CRC Press/Taylor & Francis	12	1.1
AAAS-Am Assoc Advancement Sci	13	1.1
arXiv.org	11	1.0
87 others with less than 1% each	185	17.5

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Boeing Co. (The)		
IEEE	4877	25.8
RELX Group (Elsevier)	2871	15.2
AIAA-Am Inst Aero Astro	1381	7.3
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	674	3.6
Springer Nature	689	3.6
American Institute of Physics	673	3.6
SPIE-Int Soc Opt Engineering	602	3.2
ACS-Am Chem Soc	481	2.5
ACM-Assoc Comput Mach	431	2.3
NASA-National Aeronautics and Space Admin	402	2.1
SAE-Society of Automobile Engineers	343	1.8
SAGE Publications Ltd	245	1.3
American Physical Society	221	1.2
Optical Society of America	211	1.1
ASME-Am Soc Mech Eng	208	1.1
IET/IEE	213	1.1
419 others with less than 1% each	4390	19.6

Bosch (Robert) GmbH

IEEE	3354	25.6
RELX Group (Elsevier)	1291	9.8
Springer Nature	924	7.0
American Diabetes Association	365	2.8
Amer Thoracic Soc	351	2.7
ACS-Am Chem Soc	342	2.6
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	296	2.3
Electrochemical Society, Inc.	294	2.2
ACM-Assoc Comput Mach	257	2.0
SAGE Publications Ltd	223	1.7
SAE-Society of Automobile Engineers	196	1.5
American Medical Informatics Association	194	1.5
Georg Thieme Verlag	188	1.4
Wichtig Publishing	177	1.3
SPIE-Int Soc Opt Engineering	164	1.2
Ziff-Davis	159	1.2
Royal Society of Chemistry	140	1.1
Multidisciplinary Digital Publishing Institute (MDPI)	126	1.0
Wolters Kluwer	125	1.0
316 others with less than 1% each	3955	27.5

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Canon Inc		
IEEE	6880	22.2
RELX Group (Elsevier)	3551	11.4
American Institute of Physics	3202	10.3
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1930	6.2
SPIE-Int Soc Opt Engineering	1679	5.4
ACS-Am Chem Soc	1518	4.9
Springer Nature	1367	4.4
ACM-Assoc Comput Mach	986	3.2
Optical Society of America	907	2.9
International Telecommunication Union	641	2.1
Institute of Pure and Applied Physics	454	1.5
AAAS-Am Assoc Advancement Sci	426	1.4
American Physical Society	306	1.0
473 others with less than 1% each	7200	20.4
Cisco Systems Inc.		
IEEE	18510	28.2
Internet Soc/IETF-Internet Eng Task Force	10471	16.0
Network Working Group RFC	7190	11.0
ACM-Assoc Comput Mach	6986	10.7
3GPP General Partnership Project Standards Body	5020	7.7
RELX Group (Elsevier)	1773	2.7
Joint IEEE and ACM	1320	2.0
The USENIX Association	1124	1.7
European Telecom Standards Institute (ETSI)	1085	1.7
Springer Nature	785	1.2
International Telecommunication Union	804	1.2
331 others with less than 1% each	10495	14.2
Dell Technologies Inc		
IEEE	3996	32.9
ACM-Assoc Comput Mach	2356	19.4
The USENIX Association	1101	9.1
Joint IEEE and ACM	437	3.6
RELX Group (Elsevier)	391	3.2
Internet Soc/IETF-Internet Eng Task Force	361	3.0
Springer Nature	188	1.5
Network Working Group RFC	174	1.4
Microsoft	154	1.3
Very Large Data Base Endowment Inc. (VLDB Endowment)	151	1.2
International Association for Cryptologic Research (IACR)	147	1.2
National Institute of Standards and Technology (NIST)	134	1.1
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	127	1.0
261 others with less than 1% each	2440	16.9

Appendix A - Publishers Receiving Most References from Top 50 Companies (Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Denso Corp		
IEEE	789	42.7
RELX Group (Elsevier)	171	9.3
ACM-Assoc Comput Mach	67	3.6
American Institute of Physics	65	3.5
Springer Nature	55	3.0
IET/IEE	50	2.7
SAE-Society of Automobile Engineers	47	2.5
IEICE-Inst Elec Info Comm Eng	38	2.1
ACS-Am Chem Soc	38	2.1
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	27	1.5
Trans Tech Publications Ltd.	20	1.1
Institute of Pure and Applied Physics	18	1.0
151 others with less than 1% each	461	28.6
Ericsson		
3GPP General Partnership Project Standards Body	32435	48.2
IEEE	15452	22.9
Network Working Group RFC	4898	7.3
Internet Soc/IETF-Internet Eng Task Force	4401	6.5
International Telecommunication Union	1226	1.8
ACM-Assoc Comput Mach	1129	1.7
European Telecom Standards Institute (ETSI)	1002	1.5
Optical Society of America	921	1.4
301 others with less than 1% each	5892	6.7
Ford Motor Co.		
SAE-Society of Automobile Engineers	2229	24.6
IEEE	2178	24.0
RELX Group (Elsevier)	1125	12.4
IP.Com	387	4.3
Springer Nature	220	2.4
ACM-Assoc Comput Mach	201	2.2
American Automatic Control Council (AACC)	189	2.1
ACS-Am Chem Soc	169	1.9
IEEE/RSJ	162	1.8
IET/IEE	119	1.3
ASME-Am Soc Mech Eng	99	1.1
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	95	1.0
248 others with less than 1% each	1899	17.8

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Fujifilm Business Innovation Co. (formerly Fuji Film Holdings Corp)</i>		
RELX Group (Elsevier)	2209	13.4
IEEE	2192	13.3
ACM-Assoc Comput Mach	1459	8.9
ACS-Am Chem Soc	1305	7.9
Springer Nature	1111	6.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	992	6.0
SPIE-Int Soc Opt Engineering	730	4.4
American Institute of Physics	643	3.9
Cell Press	251	1.5
AAAS-Am Assoc Advancement Sci	253	1.5
Optical Society of America	225	1.4
Natl Acad Sciences	234	1.4
Oxford University Press	192	1.2
Royal Society of Chemistry	179	1.1
American Society of Hematology	157	1.0
461 others with less than 1% each	4345	22.0

General Electric Company

IEEE	11142	23.0
RELX Group (Elsevier)	7278	15.0
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3592	7.4
International Telecommunication Union	2466	5.1
US Dept of Energy	2382	4.9
ACS-Am Chem Soc	2002	4.1
Springer Nature	1776	3.7
American Institute of Physics	1355	2.8
ASME-Am Soc Mech Eng	828	1.7
SPIE-Int Soc Opt Engineering	789	1.6
General Electric Co.	741	1.5
Wolters Kluwer	600	1.2
AIAA-Am Inst Aero Astro	569	1.2
732 others with less than 1% each	12949	22.1

Appendix A - Publishers Receiving Most References from Top 50 Companies (Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Halliburton Co. (Holding)</i>		
Society of Petroleum Engineers	10788	45.3
RELX Group (Elsevier)	2014	8.5
ACS-Am Chem Soc	1837	7.7
IEEE	895	3.8
SPWLA-Society of Petrophysicists and Well Log Analysts	830	3.5
Society of Exploration Geophysicists	814	3.4
Springer Nature	725	3.0
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	584	2.5
SPIE-Int Soc Opt Engineering	330	1.4
American Institute of Mining and Metallurgical Engineers	325	1.4
PennWell Publishing Co.	301	1.3
Optical Society of America	270	1.1
American Institute of Physics	254	1.1
265 others with less than 1% each	3828	13.7

Hitachi Ltd

IEEE	4678	25.7
ACM-Assoc Comput Mach	1303	7.2
RELX Group (Elsevier)	1237	6.8
American Institute of Physics	962	5.3
IEICE-Inst Elec Info Comm Eng	588	3.2
Internet Soc/IETF-Internet Eng Task Force	548	3.0
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	551	3.0
Springer Nature	469	2.6
The USENIX Association	413	2.3
ACS-Am Chem Soc	399	2.2
Network Working Group RFC	338	1.9
SPIE-Int Soc Opt Engineering	326	1.8
International Telecommunication Union	328	1.8
Institute of Pure and Applied Physics	299	1.6
Optical Society of America	254	1.4
3GPP General Partnership Project Standards Body	252	1.4
SID-Society for Information Display	244	1.3
Joint IEEE and ACM	235	1.3
IBM Corp.	229	1.3
IET/IEE	218	1.2
Nikkei Business Publications, Inc.	195	1.1
American Physical Society	188	1.0
442 others with less than 1% each	3949	18.0

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Hon Hai Precision Industry Co. Ltd.(also known as Foxconn)</i>		
3GPP General Partnership Project Standards Body	9432	33.9
IEEE	4342	15.6
SID-Society for Information Display	1427	5.1
American Institute of Physics	1303	4.7
RELX Group (Elsevier)	1215	4.4
International Telecommunication Union	1136	4.1
ACM-Assoc Comput Mach	1084	3.9
ACS-Am Chem Soc	940	3.4
Springer Nature	575	2.1
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	520	1.9
ISO/IEC/JTC	531	1.9
AAAS-Am Assoc Advancement Sci	492	1.8
SPIE-Int Soc Opt Engineering	488	1.8
American Physical Society	336	1.2
Internet Soc/IETF-Internet Eng Task Force	318	1.1
Institute of Pure and Applied Physics	275	1.0
280 others with less than 1% each	3382	9.4

Honda Motor Co. Ltd.(Honda Giken Kogyo KK)

IEEE	3173	34.1
RELX Group (Elsevier)	1357	14.6
Springer Nature	531	5.7
ACS-Am Chem Soc	448	4.8
3GPP General Partnership Project Standards Body	311	3.3
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	289	3.1
IEEE/RSJ	282	3.0
ACM-Assoc Comput Mach	251	2.7
ASME-Am Soc Mech Eng	143	1.5
SAGE Publications Ltd	116	1.2
AAAS-Am Assoc Advancement Sci	97	1.0
Neural Information Processing Systems Foundation	91	1.0
SAE-Society of Automobile Engineers	91	1.0
274 others with less than 1% each	2119	20.3

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
HP Inc		
IEEE	7357	31.0
ACM-Assoc Comput Mach	3575	15.1
RELX Group (Elsevier)	1243	5.2
Springer Nature	901	3.8
American Institute of Physics	912	3.8
Joint IEEE and ACM	866	3.6
ACS-Am Chem Soc	594	2.5
SPIE-Int Soc Opt Engineering	582	2.5
The USENIX Association	523	2.2
Internet Soc/IETF-Internet Eng Task Force	476	2.0
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	426	1.8
American Physical Society	314	1.3
Optical Society of America	301	1.3
AAAS-Am Assoc Advancement Sci	289	1.2
Hewlett-Packard Company	268	1.1
430 others with less than 1% each	5109	19.1

Huawei Technologies Company Ltd. (owned by HUAWEI Investment/Holding

3GPP General Partnership Project Standards Body	35326	49.3
IEEE	16490	23.0
International Telecommunication Union	5276	7.4
Internet Soc/IETF-Internet Eng Task Force	3179	4.4
Network Working Group RFC	1943	2.7
ACM-Assoc Comput Mach	1371	1.9
European Telecom Standards Institute (ETSI)	789	1.1
326 others with less than 1% each	7237	8.1

Hyundai Motor Co.

IEEE	347	28.4
RELX Group (Elsevier)	287	23.5
ACS-Am Chem Soc	84	6.9
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	49	4.0
IEEE/RSJ	48	3.9
ACM-Assoc Comput Mach	42	3.4
3GPP General Partnership Project Standards Body	40	3.3
Springer Nature	39	3.2
SAE-Society of Automobile Engineers	35	2.9
Electrochemical Society, Inc.	28	2.3
SAGE Publications Ltd	23	1.9
American Institute of Physics	21	1.7
Royal Society of Chemistry	20	1.6
American Automatic Control Council (AACC)	12	1.0
73 others with less than 1% each	145	12.9

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Intel Corporation</i>		
IEEE	37766	43.5
3GPP General Partnership Project Standards Body	10125	11.7
ACM-Assoc Comput Mach	6820	7.9
Joint IEEE and ACM	5636	6.5
RELX Group (Elsevier)	2498	2.9
American Institute of Physics	1876	2.2
Springer Nature	1804	2.1
IET/IEE	1082	1.2
Internet Soc/IETF-Internet Eng Task Force	911	1.1
516 others with less than 1% each	18232	18.4
<i>International Business Machines Corp</i>		
IEEE	70855	28.1
ACM-Assoc Comput Mach	38708	15.4
IP.Com	15682	6.2
RELX Group (Elsevier)	12315	4.9
Joint IEEE and ACM	12197	4.8
Internet Soc/IETF-Internet Eng Task Force	11706	4.6
Springer Nature	7444	3.0
National Institute of Standards and Technology (NIST)	6404	2.5
American Institute of Physics	5926	2.4
ACS-Am Chem Soc	4939	2.0
IBM Corp.	4667	1.9
The USENIX Association	4534	1.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3675	1.5
Very Large Data Base Endowment Inc. (VLDB Endowment)	2602	1.0
SPIE-Int Soc Opt Engineering	2550	1.0
1012 others with less than 1% each	47869	14.1
<i>Johnson & Johnson</i>		
RELX Group (Elsevier)	69024	23.6
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	30517	10.4
Springer Nature	29408	10.0
ACS-Am Chem Soc	14116	4.8
Wolters Kluwer	11352	3.9
IEEE	8427	2.9
Natl Acad Sciences	6819	2.3
Oxford University Press	4434	1.5
American SociETY for Microbiology	4348	1.5
AAAS-Am Assoc Advancement Sci	4008	1.4
Cell Press	4046	1.4
American Society for Pharmacology and Experimental Therapeutics	4050	1.4
Mary Ann Liebert Inc.	3250	1.1
SAGE Publications Ltd	2796	1.0
839 others with less than 1% each	96070	27.9

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Kia Motors Corp.</i>		
IEEE	163	28.8
RELX Group (Elsevier)	133	23.5
ACS-Am Chem Soc	46	8.1
3GPP General Partnership Project Standards Body	39	6.9
SAE-Society of Automobile Engineers	27	4.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	26	4.6
Electrochemical Society, Inc.	16	2.8
American Institute of Physics	13	2.3
Springer Nature	12	2.1
Royal Society of Chemistry	9	1.6
IET/IEE	7	1.2
ACM-Assoc Comput Mach	6	1.1
44 others with less than 1% each	69	13.3
<i>Koninklijke Philips N.V.</i>		
IEEE	8718	21.7
RELX Group (Elsevier)	5010	12.5
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3710	9.3
Springer Nature	2622	6.5
Wolters Kluwer	1988	5.0
SPIE-Int Soc Opt Engineering	1827	4.6
Optical Society of America	1484	3.7
American Institute of Physics	1163	2.9
ACM-Assoc Comput Mach	694	1.7
Society of Magnetic Resonance in Medicine (SMRM)	694	1.7
Oxford University Press	589	1.5
IOP Publishing	451	1.1
3GPP General Partnership Project Standards Body	387	1.0
599 others with less than 1% each	10765	23.1
<i>LG Chem Ltd.</i>		
RELX Group (Elsevier)	2185	28.1
ACS-Am Chem Soc	1690	21.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1056	13.6
Royal Society of Chemistry	573	7.4
Springer Nature	376	4.8
American Institute of Physics	290	3.7
Electrochemical Society, Inc.	225	2.9
American SociETy for Microbiology	96	1.2
AAAS-Am Assoc Advancement Sci	76	1.0
223 others with less than 1% each	1211	13.7

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>LG Electronics Inc.</i>		
3GPP General Partnership Project Standards Body	38121	61.3
IEEE	10553	17.0
International Telecommunication Union	2540	4.1
ISO/IEC/JTC/ANSI	1660	2.7
European Telecom Standards Institute (ETSI)	1415	2.3
ATSC Std	1323	2.1
Audio Eng Soc	835	1.3
204 others with less than 1% each	5732	8.3
<i>Medtronic Inc</i>		
RELX Group (Elsevier)	35353	17.4
Wolters Kluwer	25857	12.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	18518	9.1
Springer Nature	15857	7.8
IEEE	13134	6.5
American Physiological Society	5726	2.8
Oxford University Press	5766	2.8
American Association of Neurological Surgeons	4125	2.0
ACS-Am Chem Soc	3684	1.8
Radiological Society of North America	3509	1.7
International Federation of Gynecology and Obstetrics (FIGO)	2917	1.4
Mosby Inc.	2346	1.2
American Heart Association	1952	1.0
SPIE-Int Soc Opt Engineering	2092	1.0
S. Karger AG	2090	1.0
616 others with less than 1% each	59944	26.9
<i>Micron Technology Inc.</i>		
IEEE	43151	31.8
RELX Group (Elsevier)	22864	16.8
American Institute of Physics	15418	11.4
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	5804	4.3
IEEE/JPN Soc App Phys	4995	3.7
ACS-Am Chem Soc	4511	3.3
Springer Nature	3201	2.4
Electrochemical Society, Inc.	3324	2.4
American Physical Society	3107	2.3
Institute of Pure and Applied Physics	3004	2.2
SPIE-Int Soc Opt Engineering	1908	1.4
MRS-Materials Research Soc	1952	1.4
Informa/CRC Press/Taylor & Francis	1484	1.1
IOP Publishing	1326	1.0
286 others with less than 1% each	19675	13.6

Appendix A - Publishers Receiving Most References from Top 50 Companies (Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Microsoft Corporation		
IEEE	76439	31.1
ACM-Assoc Comput Mach	64128	26.1
RELX Group (Elsevier)	7964	3.2
Joint IEEE and ACM	7809	3.2
The USENIX Association	5893	2.4
Springer Nature	5885	2.4
Microsoft	4369	1.8
International Telecommunication Union	4539	1.8
Internet Soc/IETF-Internet Eng Task Force	3758	1.5
SPIE-Int Soc Opt Engineering	3087	1.3
ACL - Association for Computational Linguistics	2886	1.2
Very Large Data Base Endowment Inc. (VLDB Endowment)	2793	1.1
706 others with less than 1% each	56196	18.7
Mitsubishi Electric Corp		
IEEE	5372	40.3
3GPP General Partnership Project Standards Body	2241	16.8
ACM-Assoc Comput Mach	843	6.3
IEICE-Inst Elec Info Comm Eng	448	3.4
RELX Group (Elsevier)	430	3.2
International Telecommunication Union	351	2.6
IET/IEE	318	2.4
International Association for Cryptologic Research (IACR)	285	2.1
Springer Nature	251	1.9
American Institute of Physics	216	1.6
SPIE-Int Soc Opt Engineering	168	1.3
Optical Society of America	155	1.2
264 others with less than 1% each	2241	14.4
Murata Manufacturing Co. Ltd.		
IEEE	12336	74.5
RELX Group (Elsevier)	751	4.5
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	467	2.8
Springer Nature	340	2.1
Joint IEEE and ACM	314	1.9
IEICE-Inst Elec Info Comm Eng	312	1.9
IEEE/JPN Soc App Phys	233	1.4
Institute of Pure and Applied Physics	230	1.4
Horizon House Publications	208	1.3
American Institute of Physics	223	1.3
IET/IEE	199	1.2
European Microwave Association	189	1.1
96 others with less than 1% each	752	3.9

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
NEC Corp		
3GPP General Partnership Project Standards Body	9603	34.1
IEEE	7307	26.0
ACM-Assoc Comput Mach	1490	5.3
IEICE-Inst Elec Info Comm Eng	871	3.1
RELX Group (Elsevier)	756	2.7
Springer Nature	572	2.0
Optical Society of America	492	1.7
Joint IEEE and ACM	484	1.7
American Institute of Physics	433	1.5
Internet Soc/IETF-Internet Eng Task Force	361	1.3
International Telecommunication Union	269	1.0
387 others with less than 1% each	5509	16.2

Nippon Telegraph & Telephone Corp.

3GPP General Partnership Project Standards Body	7297	30.8
IEEE	6391	27.0
IEICE-Inst Elec Info Comm Eng	1278	5.4
ACM-Assoc Comput Mach	949	4.0
International Telecommunication Union	713	3.0
Network Working Group RFC	549	2.3
Internet Soc/IETF-Internet Eng Task Force	547	2.3
International Association for Cryptologic Research (IACR)	466	2.0
RELX Group (Elsevier)	465	2.0
Optical Society of America	424	1.8
IET/IEE	407	1.7
Springer Nature	338	1.4
The USENIX Association	266	1.1
IEEE/OSA	247	1.0
230 others with less than 1% each	3334	13.0

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Panasonic Holding Corporation		
IEEE	10866	29.7
3GPP General Partnership Project Standards Body	7282	19.9
International Telecommunication Union	2076	5.7
RELX Group (Elsevier)	2043	5.6
IEICE-Inst Elec Info Comm Eng	1695	4.6
American Institute of Physics	1086	3.0
Institute of Pure and Applied Physics	826	2.3
Internet Soc/IETF-Internet Eng Task Force	679	1.9
ACM-Assoc Comput Mach	520	1.4
ACS-Am Chem Soc	510	1.4
Springer Nature	490	1.3
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	422	1.2
Electrochemical Society, Inc.	444	1.2
European Telecom Standards Institute (ETSI)	428	1.2
SPIE-Int Soc Opt Engineering	427	1.2
ISO/IEC/JTC/ANSI	444	1.2
ISO/IEC	360	1.0
439 others with less than 1% each	6044	13.0

Qualcomm Inc

IEEE	44545	33.9
3GPP General Partnership Project Standards Body	32567	24.8
International Telecommunication Union	16580	12.6
ISO/IEC/JTC/ANSI	3677	2.8
Internet Soc/IETF-Internet Eng Task Force	2585	2.0
ACM-Assoc Comput Mach	2349	1.8
RELX Group (Elsevier)	2188	1.7
ISO/IEC/JTC	2178	1.7
SID-Society for Information Display	1958	1.5
SPIE-Int Soc Opt Engineering	1596	1.2
Springer Nature	1416	1.1
European Telecom Standards Institute (ETSI)	1259	1.0
ISO/IEC	1274	1.0
427 others with less than 1% each	17377	10.4

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<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Raytheon Co.</i>		
IEEE	7752	17.7
NASA-National Aeronautics and Space Admin	6261	14.3
RELX Group (Elsevier)	2831	6.5
IHS Markit	2803	6.4
ASME-Am Soc Mech Eng	2421	5.5
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1642	3.7
AIAA-Am Inst Aero Astro	1510	3.4
SPIE-Int Soc Opt Engineering	1375	3.1
SAE-Society of Automobile Engineers	1325	3.0
Optical Society of America	1303	3.0
Springer Nature	1046	2.4
ACS-Am Chem Soc	959	2.2
American Institute of Physics	784	1.8
Federal Aviation Administration	629	1.4
Cambridge University Press	624	1.4
McGraw Hill	550	1.3
ACM-Assoc Comput Mach	535	1.2
Informa/CRC Press/Taylor & Francis	508	1.2
American Society of Mechanical Engineers	479	1.1
American Physical Society	425	1.0
434 others with less than 1% each	8034	15.2

Samsung Electronics Co Ltd

3GPP General Partnership Project Standards Body	26892	29.1
IEEE	21112	22.8
RELX Group (Elsevier)	4711	5.1
ACS-Am Chem Soc	4535	4.9
American Institute of Physics	3482	3.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2926	3.2
International Telecommunication Union	2586	2.8
Springer Nature	2508	2.7
ACM-Assoc Comput Mach	2514	2.7
SID-Society for Information Display	1592	1.7
SPIE-Int Soc Opt Engineering	1239	1.3
Optical Society of America	901	1.0
Royal Society of Chemistry	942	1.0
649 others with less than 1% each	16483	14.2

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<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Saudi Arabian Oil Company (Saudi Aramco)</i>		
RELX Group (Elsevier)	8883	30.6
Society of Petroleum Engineers	3981	13.7
ACS-Am Chem Soc	3943	13.6
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2181	7.5
Society of Exploration Geophysicists	1173	4.0
Springer Nature	1035	3.6
Royal Society of Chemistry	857	2.9
IEEE	597	2.1
AMER SOC TESTING MATERIALS	357	1.2
374 others with less than 1% each	6045	18.1
<i>Seiko Epson Corporation</i>		
IEEE	2582	32.8
RELX Group (Elsevier)	641	8.1
American Institute of Physics	587	7.5
ACM-Assoc Comput Mach	497	6.3
Joint IEEE and ACM	482	6.1
SID-Society for Information Display	320	4.1
ACS-Am Chem Soc	274	3.5
Springer Nature	227	2.9
IEEE/JPN Soc App Phys	173	2.2
Institute of Pure and Applied Physics	165	2.1
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	169	2.1
SPIE-Int Soc Opt Engineering	113	1.4
IBM Corp.	105	1.3
American Physical Society	98	1.2
IP.Com	84	1.1
IEICE-Inst Elec Info Comm Eng	78	1.0
203 others with less than 1% each	1283	14.8
<i>Siemens Aktiengesellschaft</i>		
IEEE	13787	31.3
RELX Group (Elsevier)	5438	12.3
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	5316	12.1
SPIE-Int Soc Opt Engineering	1975	4.5
Springer Nature	1571	3.6
Joint IEEE and ACM	1167	2.6
American Institute of Physics	1078	2.4
ACM-Assoc Comput Mach	905	2.1
Society of Magnetic Resonance in Medicine (SMRM)	714	1.6
Radiological Society of North America	642	1.5
Wolters Kluwer	600	1.4
IOP Publishing	478	1.1
The Medical Image Computing and Computer Assisted Intervention Society (MICCAI)	427	1.0
665 others with less than 1% each	9954	18.1

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
SK Hynix Inc		
IEEE	1549	55.8
Joint IEEE and ACM	145	5.2
American Institute of Physics	128	4.6
ACM-Assoc Comput Mach	126	4.5
RELX Group (Elsevier)	107	3.9
IEEE/JPN Soc App Phys	104	3.7
Technical Association of Photopolymers	83	3.0
SPIE-Int Soc Opt Engineering	53	1.9
The USENIX Association	46	1.7
Springer Nature	41	1.5
JEDEC Semiconductor Standards Organization	42	1.5
ACS-Am Chem Soc	38	1.4
83 others with less than 1% each	316	9.7

Sony Group Corp

IEEE	14179	34.4
3GPP General Partnership Project Standards Body	5470	13.3
ACM-Assoc Comput Mach	2805	6.8
International Telecommunication Union	2793	6.8
RELX Group (Elsevier)	1783	4.3
SPIE-Int Soc Opt Engineering	819	2.0
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	781	1.9
European Telecom Standards Institute (ETSI)	661	1.6
ACS-Am Chem Soc	659	1.6
Springer Nature	674	1.6
American Institute of Physics	611	1.5
Internet Soc/IETF-Internet Eng Task Force	587	1.4
Joint IEEE and ACM	474	1.1
IEICE-Inst Elec Info Comm Eng	461	1.1
ISO/IEC/JTC/ANSI	404	1.0
475 others with less than 1% each	8074	15.9

Taiwan Semiconductor Manufacturing Co.

IEEE	10823	34.4
American Institute of Physics	8025	25.5
RELX Group (Elsevier)	3257	10.4
Electrochemical Society, Inc.	1218	3.9
Institute of Pure and Applied Physics	1012	3.2
IEEE/JPN Soc App Phys	907	2.9
Springer Nature	846	2.7
SPIE-Int Soc Opt Engineering	830	2.6
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	688	2.2
ACS-Am Chem Soc	419	1.3
IET/IEE	308	1.0
MRS-Materials Research Soc	305	1.0
187 others with less than 1% each	2796	7.8

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Texas Instruments Inc</i>		
IEEE	11023	59.7
International Telecommunication Union	1586	8.6
3GPP General Partnership Project Standards Body	690	3.7
RELX Group (Elsevier)	684	3.7
American Institute of Physics	573	3.1
Joint IEEE and ACM	332	1.8
SPIE-Int Soc Opt Engineering	316	1.7
IET/IEE	273	1.5
IEEE/JPN Soc App Phys	263	1.4
Springer Nature	201	1.1
ACM-Assoc Comput Mach	211	1.1
234 others with less than 1% each	2314	10.6

Toshiba Corp

IEEE	9422	40.0
American Institute of Physics	1705	7.2
RELX Group (Elsevier)	1526	6.5
IEEE/JPN Soc App Phys	780	3.3
International Telecommunication Union	704	3.0
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	689	2.9
Springer Nature	612	2.6
American Physical Society	560	2.4
IEICE-Inst Elec Info Comm Eng	530	2.3
SPIE-Int Soc Opt Engineering	483	2.1
ACM-Assoc Comput Mach	488	2.1
ACS-Am Chem Soc	393	1.7
Institute of Pure and Applied Physics	390	1.7
Internet Soc/IETF-Internet Eng Task Force	380	1.6
AACS-Advanced Access Content System	299	1.3
Joint IEEE and ACM	225	1.0
397 others with less than 1% each	4363	15.9

***Appendix A - Publishers Receiving Most References from Top 50 Companies
(Top 50 Companies in terms of 2023 Patent Activity; References from 2003-2022 Patents)***

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Toyota Motor Corp		
IEEE	2883	21.3
RELX Group (Elsevier)	2478	18.3
Springer Nature	831	6.1
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	826	6.1
ACS-Am Chem Soc	745	5.5
American Society of Plant Biologists	385	2.8
American Institute of Physics	362	2.7
ACM-Assoc Comput Mach	301	2.2
AAAS-Am Assoc Advancement Sci	285	2.1
SAE-Society of Automobile Engineers	248	1.8
Optical Society of America	225	1.7
Electrochemical Society, Inc.	228	1.7
Royal Society of Chemistry	212	1.6
Natl Acad Sciences	209	1.5
Informa/CRC Press/Taylor & Francis	132	1.0
323 others with less than 1% each	3181	20.4