



Analysis of WIPO Patent Referencing to IEEE Papers, Conferences, and Standards 2002-2017

Report prepared for:

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Executive Summary

IEEE engaged 1790 Analytics in this project to assess the impact of IEEE publications on developments in various technologies. This impact is measured by examining the extent to which patented inventions build upon papers from IEEE journals, IEEE-sponsored conferences, and IEEE standards. This impact has been measured with annual reports using US patent activity. This is the first report that uses WIPO (World Intellectual Property Organization) patent documents to assess the impact of IEEE publications on technology developments.

The main findings of this report are:

- This is the first WIPO report. We've been doing US patent reports since 2003. We've found that US patents are referencing scientific papers at a much higher rate than WIPO documents. On average US patents had 11.21 Non-Patent references per patent in 2017. By contrast, 2017 WIPO documents averaged just 0.84 Non-Patent References per patent document. Although the US numbers are somewhat skewed by a large number of Pharmaceutical and Biotechnology patents, the difference is still startling. Even so, the categories tracked in this report often had tens of thousands of Non-Patent references and a large portion of this science base comes from papers presented at IEEE sponsored conferences and published in IEEE journals.
- The top 30 patenting firms in 2017 have referenced over 155,000 articles in the last 26 years. About 26% (40,522) of those articles appeared in IEEE journals, IEEE sponsored conferences or IEEE Standards Documents.
- In this study, we also went beyond the top 30 patenting companies and analyzed all patents from the last 16 years in several technology categories of interest to IEEE members and customers. For example, 39.5% of all scientific references from Computer Hardware patents go to IEEE publications. The second most referenced publisher is ACM (Association for Computer Machinery) with 15.57% of the referenced publications. This compares favorably with the just completed US patent report where we saw that IEEE had 33.5% of the references and ACM had about half as many.
- In other Information Technology areas, such as Information Storage, Semiconductor Manufacturing, Computer Software, and Telecommunications, the results are similar.
- This year for the first time we examined three new technology categories for the US report, and repeated them here in the WIPO report: Artificial Intelligence (AI), Autonomous Vehicles, and Internet-of-Things related patents. In AI, IEEE enjoys a nearly 3-fold lead over second place RELX/Elsevier. In Autonomous Vehicles, IEEE has a dominant lead (8-fold lead) over the second place publisher IEEE and

Robotics Society of Japan. In the Internet-of-Things category IEEE has narrow lead over the standards organization 3GPP.

- IEEE is referenced a surprising amount in areas which are not central to its mission.
 - For example, just over 14% of the science references from patents in medical devices go to IEEE publications. This ranks IEEE second behind RELX with 22% of the references. The latter has hundreds of journals in the medical area, whereas IEEE has only a few, so the 14% figure is quite solid for a non-core area. Moreover in the just completed US report we saw only about 7% of the Non-Patent References in this area go to IEEE.
 - In the Robotics and Intelligent Manufacturing category, 53.67% of the patent references are to articles published in IEEE journals or in proceedings of IEEE sponsored conferences. Second place RELX receives about one-fifth as many references in the category.
 - Patents related to Power Systems and Transmission also reference IEEE publications most frequently. The 3,815 references (36.54%) 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, 60% of the scientific references from patents go to IEEE journal or conference papers. The second most referenced publisher is 3GPP with only 16% of all references.
 - In Wind Energy IEEE has a big lead and actually has more references than the next 20 publishers combined.
 - In broadcasting technologies IEEE leads with 40.95% of the references, and has at least 3 times as many references as anyone else.

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I. Introduction

In previous studies of US patents, it has been shown that patents reference papers from IEEE journals much more often than papers from other journal publishers. In this report, we examine results from WIPO (World Intellectual Property Organization) patent documents to determine if the worldwide trends are similar to the US trends.

WIPO does not actually grant patents per se, instead organizations can file a WIPO (also known as a PCT for Patent Cooperation Treaty) application. This single filing makes it easier to obtain a patent in up to 152 different countries with a single application. Thus in general, a WIPO application suggests that an organization feels the invention is important enough to file in multiple countries. As part of the WIPO application an international searcher identifies relevant prior art that may limit the claims or scope of the invention. Some of this prior art may be scientific papers, conference papers, or standards documents. It is this subset of prior art (also known as Non-Patent References (NPRs) or Non-Patent Literature (NPLs)) that we are concerned with in this study.

This report covers references from WIPO applications published between January 2002 and December 2017. Although this report is related to a number of US patent reports we have undertaken, 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 fourteen 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 WIPO Documents for Each Category Covered in this Study

Category	# Patents 2002-2017
AI/Artificial Intelligence	3468
Autonomous Vehicles	727
Broadcasting	72901
Computer Hardware	114023
Computer Software	123650
Diagnosis/Surgery/Medical Instruments	169479
Information Storage	25611
IOT/Internet of Things	4648
Power Systems	85751
Robotics and Intelligent Manufacturing	16365
Semiconductors/Solid-State Devices/Electronics	93527
Smart Grid/Smart Meters/Energy Infrastructure	1509
Telecom and Other Communications	329076
Wind Energy	8009

II. Methodology

This study is based on referencing patterns from patents to prior art documents. When an inventor files a patent through WIPO, a professional patent examiner will typically reference earlier documents to show that the new invention either builds upon, or improves upon, what came earlier. These prior art references will either clarify or limit the claims of the new invention to show what is actually new in the claimed invention.

As an example, Figure 1 shows a WIPO document owned by Siemens. The prior art references on this patent come in two forms - references to earlier patents, and Non-Patent Citations. The latter are often to scientific publications, such as those produced by IEEE. In this report we are primarily concerned with these Non-Patent Citations, 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 30 companies with the most WIPO documents published in 2017. 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 WIPO documents in fourteen technology categories from all companies, universities, government agencies, and individuals. The fourteen technology categories examined are shown in Table 1 above. Analysis of this document 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 and examiners 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 mis-spellings 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
Globecom '97
IEEE Globecom, Global Telecommunications Conference and Exhibiton
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 in order 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 of the different variants of a conference were collected under a single name). As an example, all of the variants shown in Table 2 are assigned to the name ‘<conf> IEEE Global Telecommunications Conference (GLOBECOM)’.

We then looked 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 US report, we looked up the top 100 most referenced conferences in order to identify the primary sponsors or hosts. In this current report we have identified the sponsors for the top 1,200+ most referenced conferences. These 1,200+ conferences are listed under more than 10,000 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 “IEEE802.3” 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/Thomson Reuters,

Elsevier/SCOPUS, and 1790 Analytics, LLC. This is not a severe limitation, since these databases include more than 100 IEEE journals, 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 all of these problems, so that we generate an accurate match between the patent references and 45,000+ journals. After identifying all of the relevant journals, we then used the ISI and SCOPUS databases and web research to identify the publisher of each journal

III. Results

References from Top 30 Patenting Organizations

Table 3 shows the 30 firms that were granted the largest number of US patents in 2017. 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 of the subsidiary names for each company to ensure that our patent counts are accurate.

We identified the top 30 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 30 firms shown in Table 3. This figure shows that patents issued to the top 30 firms between 2002 and 2017 reference IEEE papers, conferences, and standards more than 40,000 times. This is a little over 10,000 more references than the second place 3rd Generation Partnership Project has. About 26% of all references from the top 30 firms go to IEEE documents.

Table 4 illustrates the reference distribution of Koninklijke Philips N.V., which is among the top WIPO patent producers in 2017. This reference distribution is typical of the top 30 firms. The references from Philips to IEEE are actually to a number of different IEEE journals and conferences, and standards. In this table, IEEE journals are highlighted in yellow, IEEE conferences are highlighted in orange, and IEEE standards are highlighted in pink. The top overall reference is to IEEE is to the International Electron Device Meeting. The top IEEE journals are *IEEE Transactions of Medical Imaging* and *IEEE International Conference on Image Processing*.

Table 3 – Top-WIPO Patenting Firms in 2017

Rank	Full Parent Name	2017 WIPO Count	2002-2017 WIPO Count
1	Huawei Technologies Company Ltd.	4055	30276
2	ZTE Corp.	3354	24318
3	Intel Corporation	2670	15912
4	Mitsubishi Electric Corp	2553	16546
5	Hitachi Ltd	2359	21509
6	Qualcomm Inc	2215	23931
7	Sony Corp	2054	18314
8	LG Electronics Inc.	1944	15471
9	Samsung Electronics Co Ltd	1828	14481
10	BOE Technology Group Ltd	1815	5830
11	Bosch (Robert) GmbH	1737	31015
12	TCL Corp	1616	6498
13	Microsoft Corporation	1588	12207
14	Ericsson	1573	22416
15	Panasonic Corporation	1501	37711
16	Koninklijke Philips N.V.	1405	35092
17	Siemens Aktiengesellschaft	1294	30342
18	NEC Corp	1117	14781
19	General Electric Company	1108	16311
20	Denso Corp	1088	4475
21	Sumitomo Electric Industries Ltd.	1066	6616
22	Fuji Film Holdings Corp	1061	9397
23	Hon Hai Precision Industry Co. Ltd.(aka Foxconn)	1021	15725
24	Olympus Corp.	1001	7221
25	HP Inc	955	10119
26	DowDuPont	884	20191
27	Alibaba Group Holding Ltd	856	2032
28	LG Chem Ltd.	855	5538
29	Halliburton Co. (Holding)	845	6630
30	Nokia Corp	809	23205

Notice that 31 of the top 65 journals and conferences referenced by Philips patents are published or sponsored by IEEE. Seven of the top 65 journals and conferences are published or sponsored by RELX/Elsevier.

References from Companies in Fourteen 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 other 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 the leading companies.

Table 4 – Reference Distribution from K. Philips N.V. WIPO Publications 2002-2017

References	Journal/Conference/Standard
825	MAGNETIC RESONANCE IN MEDICINE
678	<conf> SMRM/ISMRM (Int Soc Mag Res Med) Misc Conf
413	Proc SPIE
372	IEEE tr MEDICAL IMAGING
338	<conf> IEEE int conf on imag proc (ICIP)
284	MEDICAL PHYSICS
250	Proceedings of the SPIE
228	PHYSICS IN MEDICINE AND BIOLOGY
193	<std> IEEE 802 Series Standard
189	<conf> IEEE Int Conf Acous, Speech, and Sig Proc (ICASSP)
189	APPLIED PHYSICS LETTERS
176	<conf> IEEE eng in med and bio soc (EMBS)
159	<std> 3GPP General Partnership Project Tech Spec
155	IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY
142	IEEE tr CONSUMER ELECTRONICS
134	NATURE
134	Misc SPIE
128	<conf> IEEE VTC
111	IEEE tr IMAGE PROCESSING
109	Misc Optical Society of America
108	J Mag Res imag
107	<conf> IEEE Nuclear sci symp and med imag conf
105	JOURNAL OF APPLIED PHYSICS
105	IEEE tr NUCLEAR SCIENCE
103	IEEE tr BIOMEDICAL ENGINEERING
103	JPN J APPL PHYS
99	<conf> IEEE int conf on Multimedia and Expo (ICME)
99	SIGNAL PROCESSING-IMAGE COMMUNICATION
97	IEEE JOURNAL OF SOLID-STATE CIRCUITS
93	MEDICAL IMAGE ANALYSIS
91	<std> IETF Std
91	IEEE Unseparated
90	IEEE Globecom Conf
88	<conf> IEEE int symp on Circuits and sys (ISCAS)
86	IEEE tr PATTERN ANALYSIS AND MACHINE INTELLIGENCE
84	<conf> SID (Soc Inf Disp) Misc Conf
81	<conf> IEEE Comp Soc comp Vision and Pattern Recognition
79	JOURNAL OF THE AMERICAN CHEMICAL SOCIETY
79	MAGNETIC RESONANCE IMAGING
77	<conf> IEEE int conf on Consumer electronic (ICCE)
76	ANGEWANDTE CHEMIE-INTERNATIONAL EDITION
76	IEEE Proceedings
69	IEEE tr Visualization and comp Graphics
69	ELECTRONICS LETTERS
68	JOURNAL OF MAGNETIC RESONANCE
66	Misc ACM
66	IEEE tr COMMUNICATIONS
66	ULTRASOUND IN MEDICINE AND BIOLOGY
64	Elsevier sci Publishers
63	IEEE tr ACOUSTICS SPEECH AND SIGNAL PROCESSING
63	IEEE tr Ultrasonics Ferroelects and Frequency Control
61	Audio eng soc (misc)
61	<conf> IEEE Applied Power Electronic Conf (APEC)
58	<conf> proc ICC SUPERCOMM IEEE int conf on comm
56	<conf> IEEE Misc Conf
55	RADIOLOGY
54	IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS
53	<conf> IAPR int conf on Pattern Recognition (ICPR)
53	JOURNAL OF NUCLEAR MEDICINE
53	comp in Cardiology
53	IEEE COMMUNICATIONS MAGAZINE
52	PATTERN RECOGNITION
51	ANALYTICAL CHEMISTRY
49	JOURNAL OF BIOMEDICAL OPTICS
49	IEEE tr INFORMATION THEORY

As mentioned in the methodology section, we identified all patents in the fourteen 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) 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 seventeen technology areas separately, and the results are summarized in Figures 3-17. The first category shown (in Figure 3) is Artificial Intelligence (AI). We identified all non-patent references on patents related to this technology issued between 2002 and 2017. 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. Thirty seven percent of all science references from these patents go to IEEE journal papers or IEEE sponsored conference papers (the graphs also include standards documents, but the vast majority of the references are to journal or conference papers). In second place is RELX/Elsevier with 13.53% of the references.

Figure 4 shows a similar graph for the category of Autonomous Vehicles. Here again IEEE dominates in references. In this case more than 59% of all references are to IEEE in this category. No other publisher is close. The second ranked publisher (7% of references) is joint sponsorship of a conference between IEEE and the Robotics Society of Japan.

Figure 5 covers Broadcasting patents, which 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, 40.95% of all science references from these patents go to IEEE journal papers or IEEE sponsored conference papers. Several standards organizations are next in references but non has more than 12.51%.

Figures 6 and 7 show referencing patterns from Computer Hardware and Software patents. Here IEEE once again IEEE receives several times as many references as the second place publisher.

Figure 8 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 second in an area that is somewhat 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 22.5% of all references. IEEE who has only a few medical titles is not far behind with 14.82% of the references.

Figure 9 contains the results for the information storage category. In this area, IEEE is particularly dominant. 40.76% of all of the science references from patents in information storage are to papers in IEEE journals or conferences. IEEE's 1,469 references in this category is almost 5 times as many as second place AIP (American Institute of Physics).

Internet-of-Things is an interesting and fast growing area covered in Figure 10. IEEE has a small lead over the 3rd Generation Partnership (3GPP) standards body.

Figure 11 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. 36.54% of science references from patents in this category go to IEEE publications. RELX is second with 25.10% 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, the Robotics market is about a \$20 billion dollar industry 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 12 it looks like those innovations will build upon ideas published in IEEE journal articles or presented at IEEE conferences. We see in that 53.67% 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 9.71% of the science references which is less than 1/5 as many as IEEE.

Figure 13 shows that IEEE with a slight lead in Semiconductor References over the American Institute of Physics. Both organizations each have about 20% of the references followed by RELX with 17%.

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 14, the IEEE provides the bulk of the science base with 60% of all patent references. 3GPP is second with 16.2% of all references.

The Telecommunications category is another strong area for IEEE referencing. IEEE leads with 39.72% of the references followed by 3GPP with 28.68%. All others have 5% or fewer of the references.

Standards documents are referenced increasingly often in Telecommunications patents. Four of the top 5 referenced publishers are standards bodies. Moreover, of the 51,917 references to IEEE, about 8% are to various IEEE standards (mostly to the IEEE 802 family of standards).

Wind Energy patents are another growing area that is somewhat tangential to IEEE core. We see in Figure 16 that in this area 50.59% of all science references from Wind Energy patents go to IEEE journal and conference papers. This is more than 3 times as many references as second place RELX receives, in spite of having fewer journal titles in the area than RELX does.

Figures 3-16 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 fourteen technology categories combined.

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 1997 and 2017 to the 30 organizations with the largest number of WIPO patent documents published in 2017. The second patent set consisted of all WIPO patent documents published between 2002 and 2017 patents in fourteen key technologies: Artificial Intelligence, Autonomous Vehicles, Broadcasting, and several other categories. In both 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.

Specific key results are identified in the Executive Summary.

V. References

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Figure 1: WIPO Sample Document

WO Application

Dorin Comaniciu et al

WO2004081875A2

Priority Date: 2003-03-07

System and method for tracking a global shape of an object in motion

Abstract

A system and method for tracking a global shape of an object in motion is disclosed. One or more control points along an initial contour of the global shape are defined. Each of the one or more control points is tracked as the object is in motion. Uncertainty of a location of a control point in motion is represented using a number of techniques. The uncertainty to constrain the global shape is exploited using a prior shape model. In an alternative embodiment, multiple appearance models are built for each control point and the motion vectors produced by each model are combined in order to track the shape of the object. The movement of the shape of the object can be visually tracked using a display and color vectors.

Inventors: Dorin Comaniciu, Sriram Krishnan, Xiang Sean Zhou, Bogdan Georgescu

Assignee: Siemens Corporate Research Inc. Siemens Medical Solutions Usa Inc

CPC Classifications

G06K9/6247 G06K9/3216 G06K9/629 G06T7/215 G06T7/251 G06K2209/051
G06T2207/10132 G06T2207/30048

Patent Citations

Publication number/Priority date/Publication date/Assignee/Title

US5999651A *1997-06-06/1999-12-07/Matsushita Electric Industrial Co., Ltd./Apparatus and method for tracking deformable objects

Family To Family Citations

US4101961A *1977-02-16/1978-07-18/Nasa/Contour detector and data acquisition system for the left ventricular outline

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US6346124B1 *1998-08-25/2002-02-12/University Of Florida/Autonomous boundary detection system for echocardiographic images

JP4620308B2 *1999-08-27/2011-01-26/レゴ エー/エス/Toy building set

US6597801B1 *1999-09-16/2003-07-22/Hewlett-Packard Development Company L.P./Method for object reg via selection of models with dynamically ordered features

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* Cited by examiner, † Cited by third party

Figure 2 - # and % of WIPO Patent References from Top 30 Companies to Top 20 Publishers, Conference Organizers, and Standards Organizations

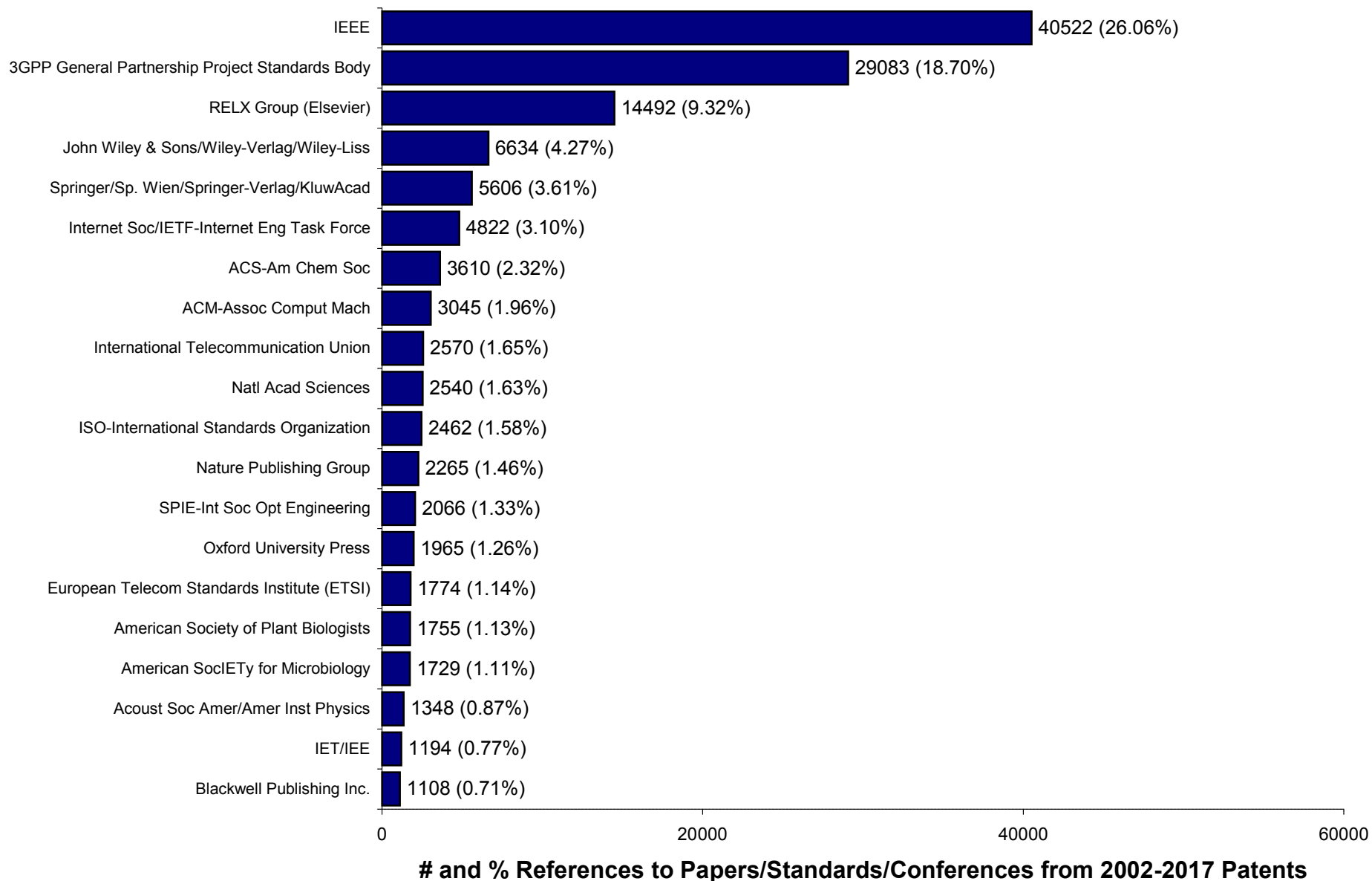


Figure 3 - # and % of Science References from 2002-2017 Artificial Intelligence WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

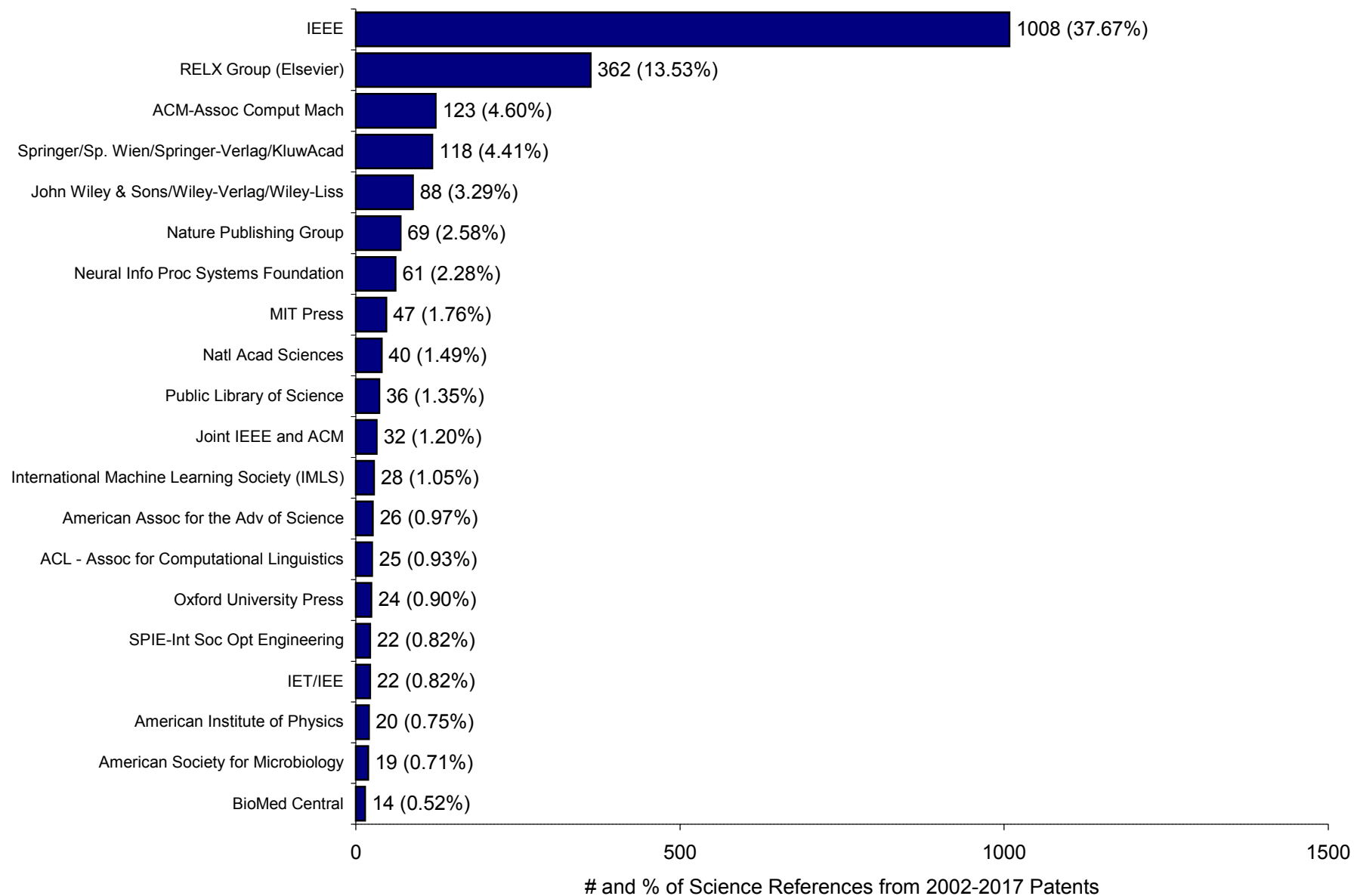


Figure 4 - # and % of Science References from 2002-2017 Autonomous Vehicle WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

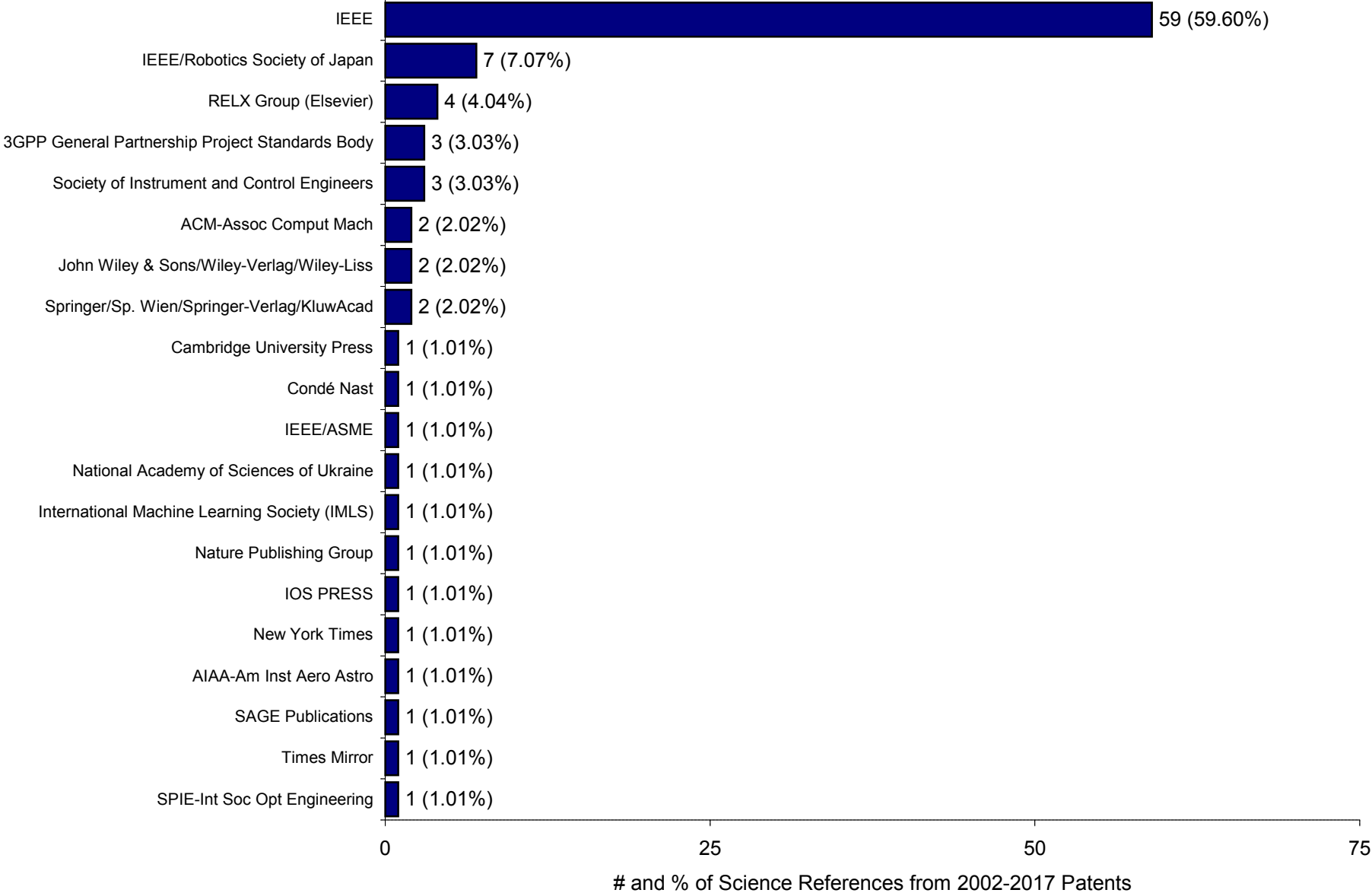


Figure 5: # and % of Science References from 2002-2017 Broadcasting WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

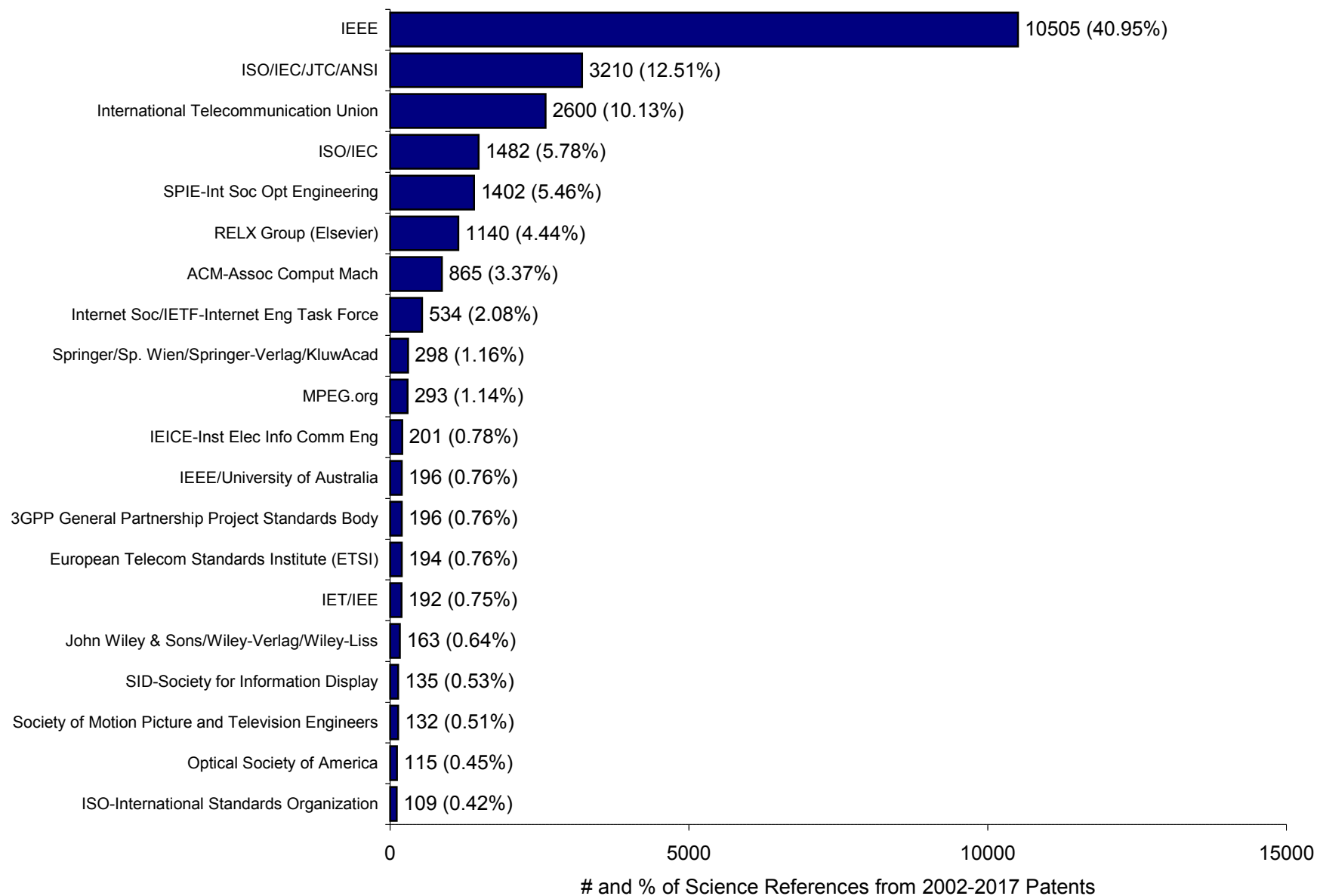


Figure 6 - # and % of Science References from 2002-2017 Computer Hardware WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

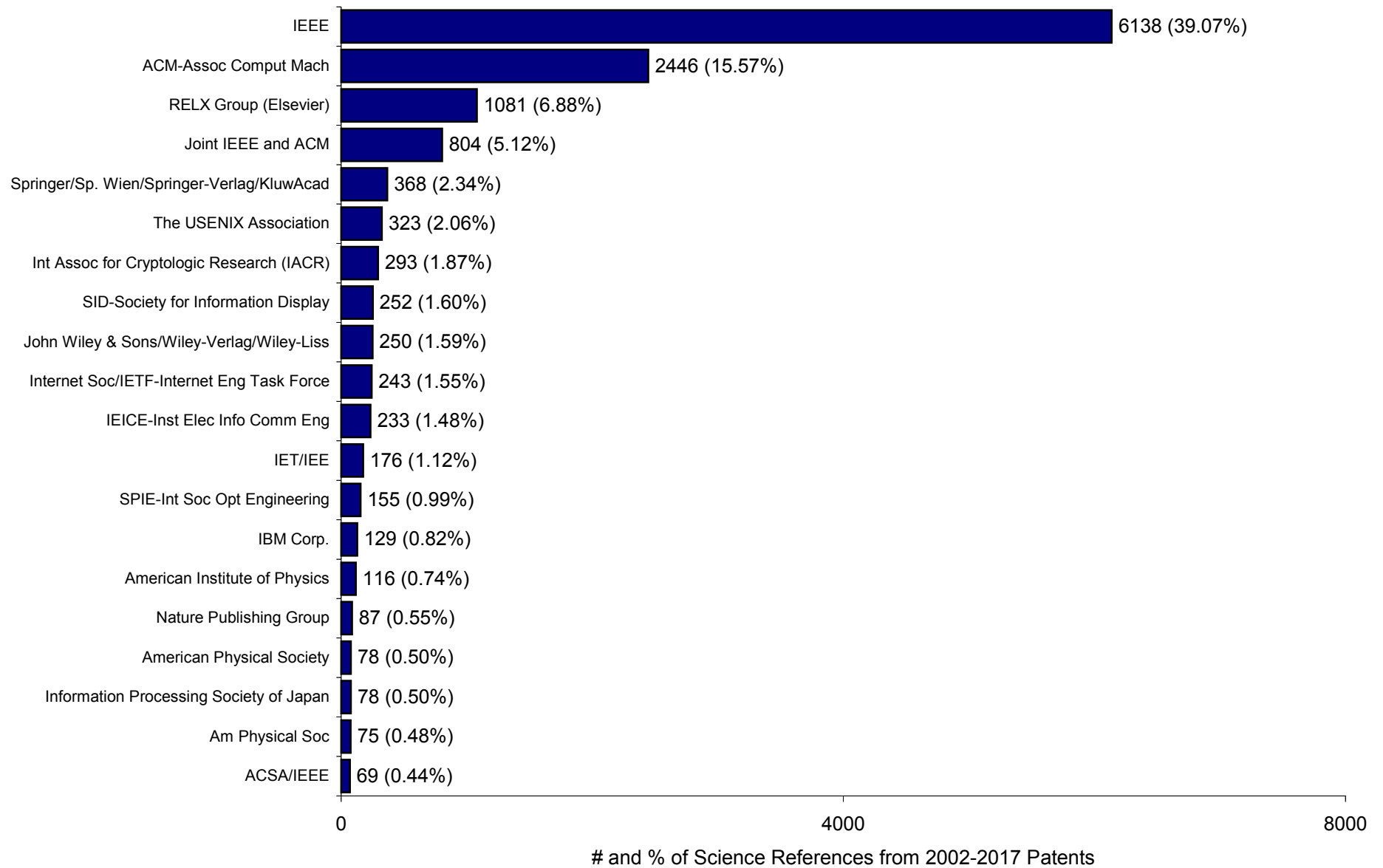


Figure 7 - # and % of Science References from 2002-2017 Computer Software WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

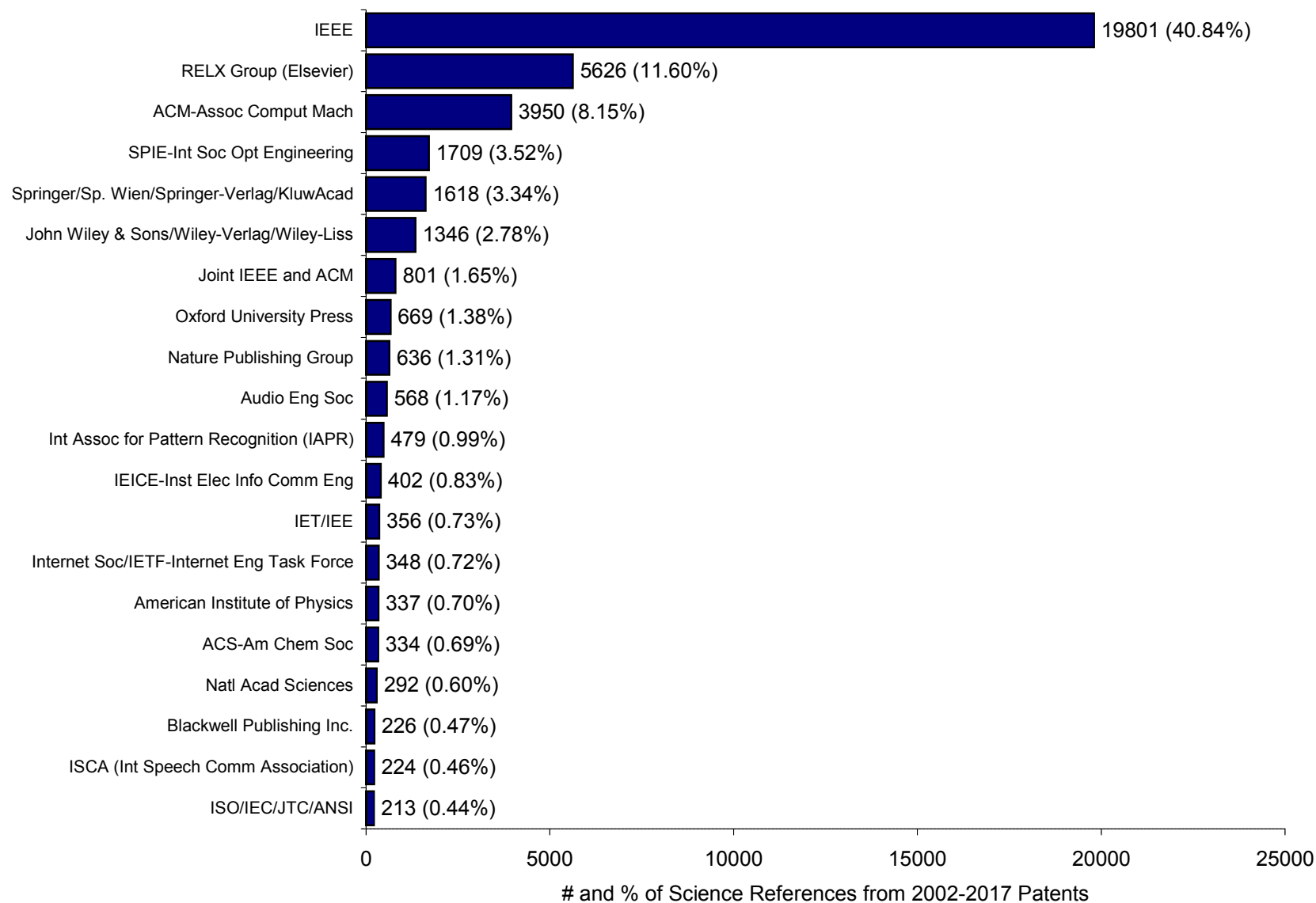


Figure 8 - # and % of Science References from 2002-2017 Medical Device WIPO Patents to Top 20 Publishers and Conference Organizers

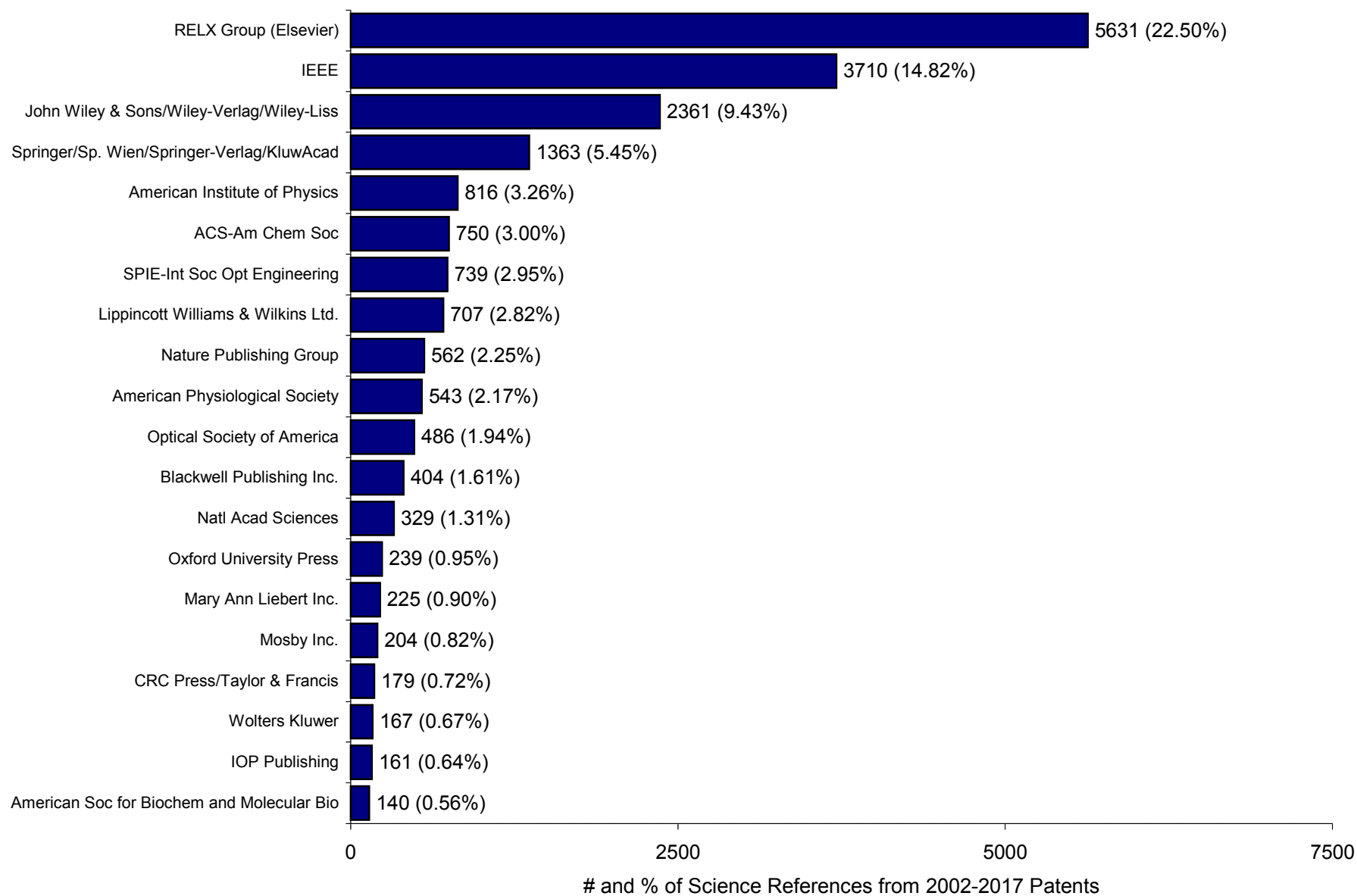


Figure 9 - # and % of Science References from 2002-2017 Information Storage WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

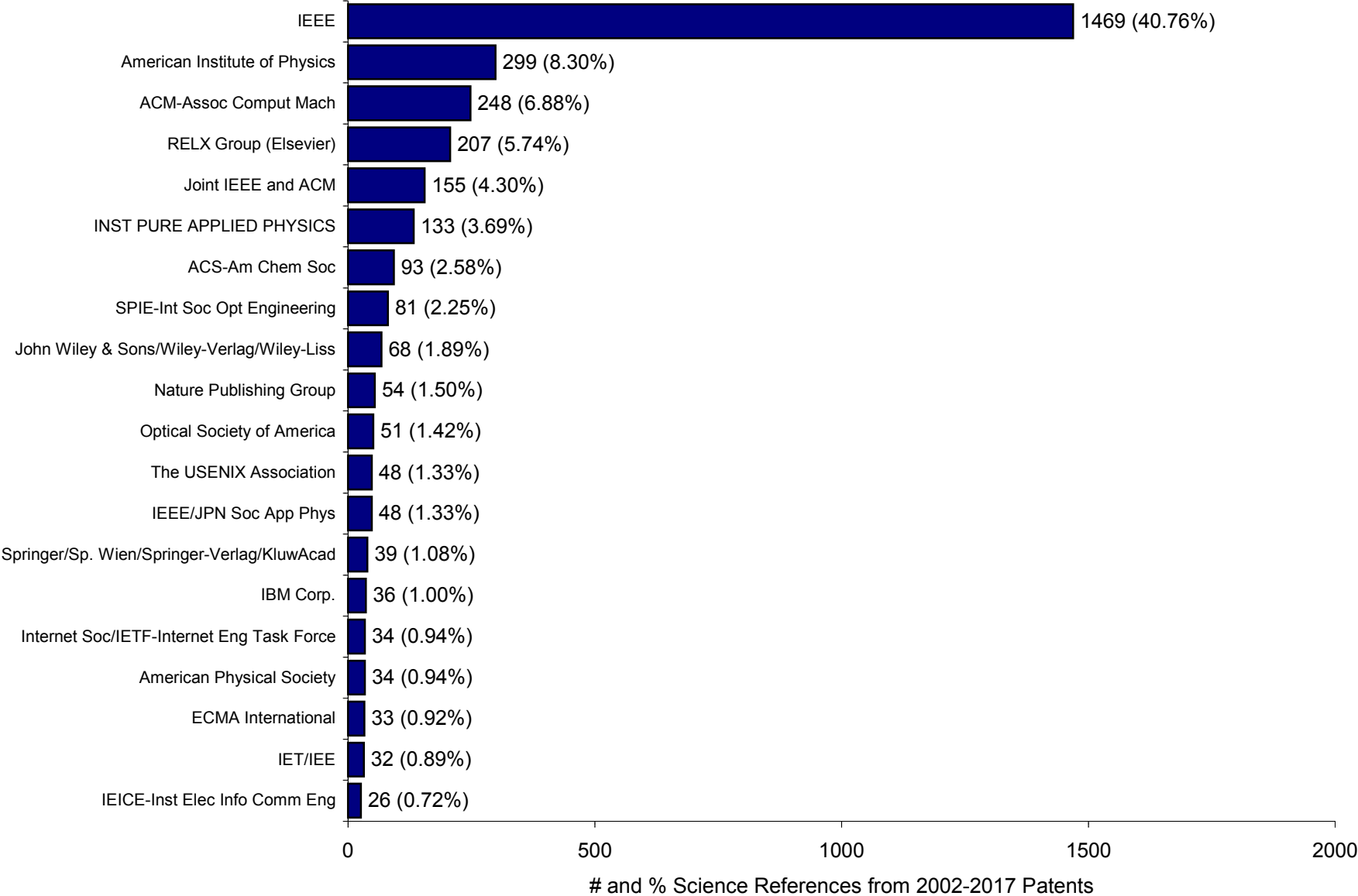


Figure 10 - # and % of Science References from 2002-2017 Internet-Of-Things (IOT) WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

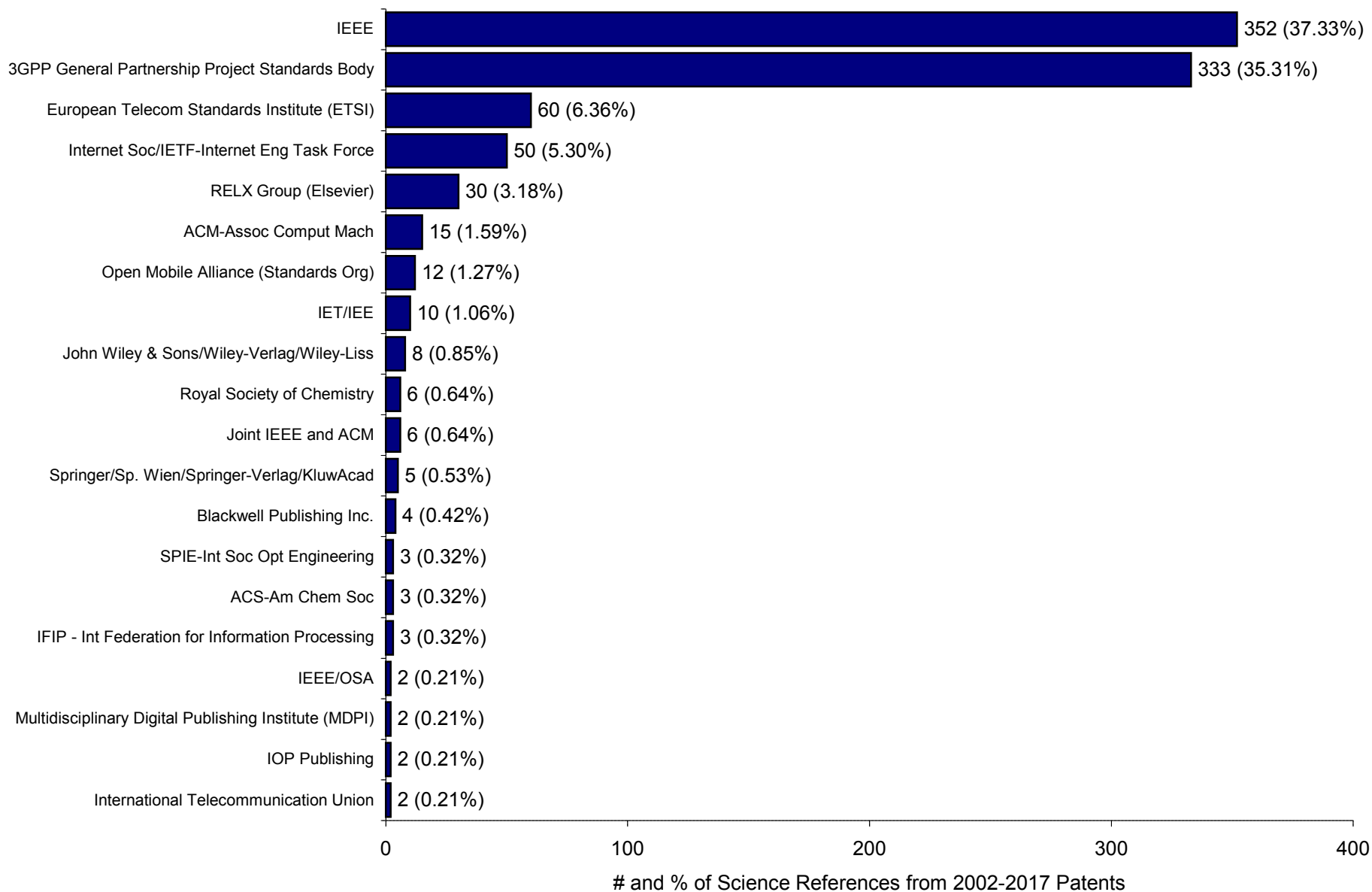


Figure 11 - # and % of Science References from 2002-2017 Power Systems WIPO Patents to Top 20 Publishers and Conference Organizers

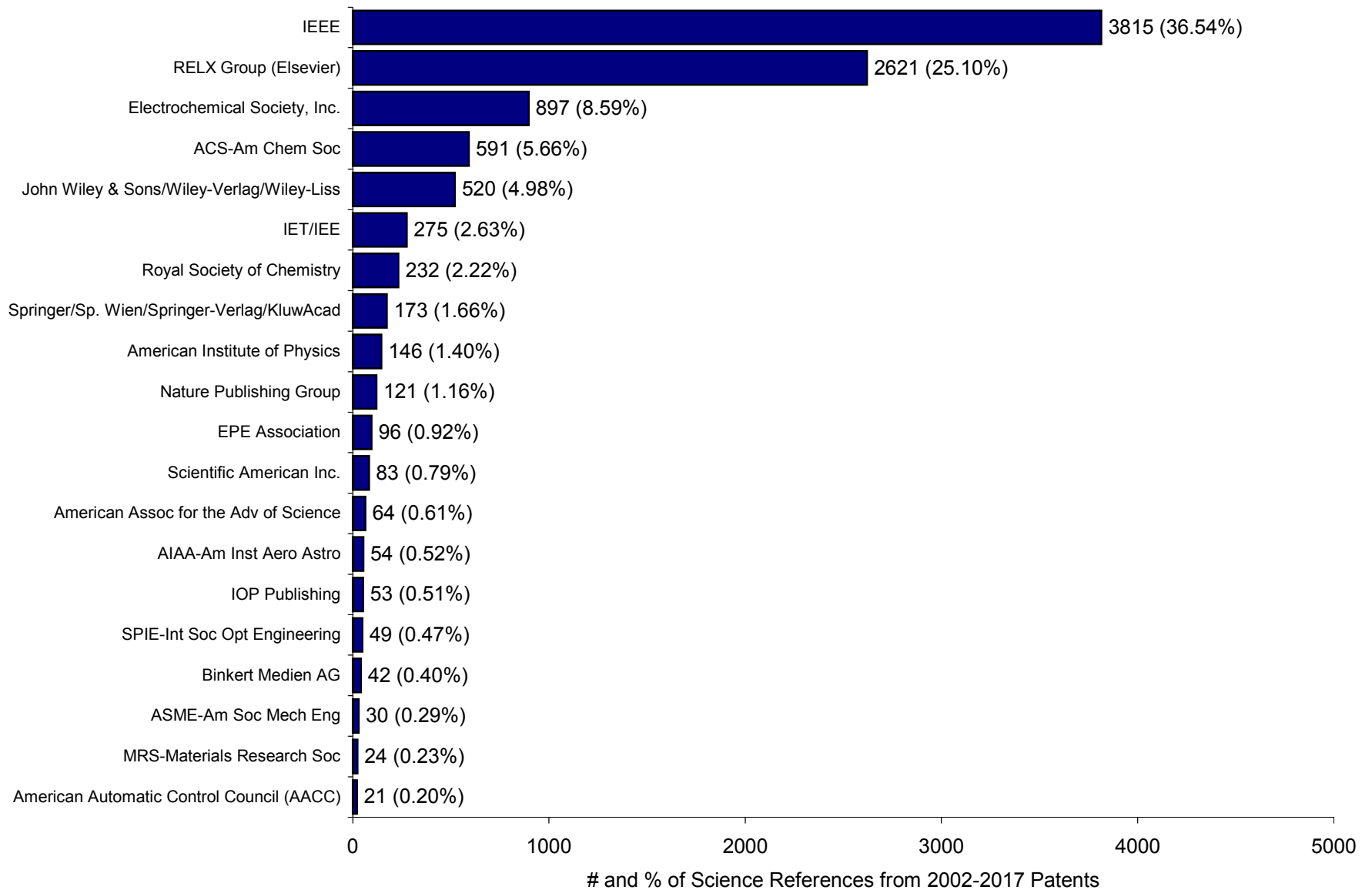


Figure 12 - # and % of Science References from 2002-2017 Robotics and Intelligent Mfg WIPO Patents to Top 20 Publishers and Conference Organizers

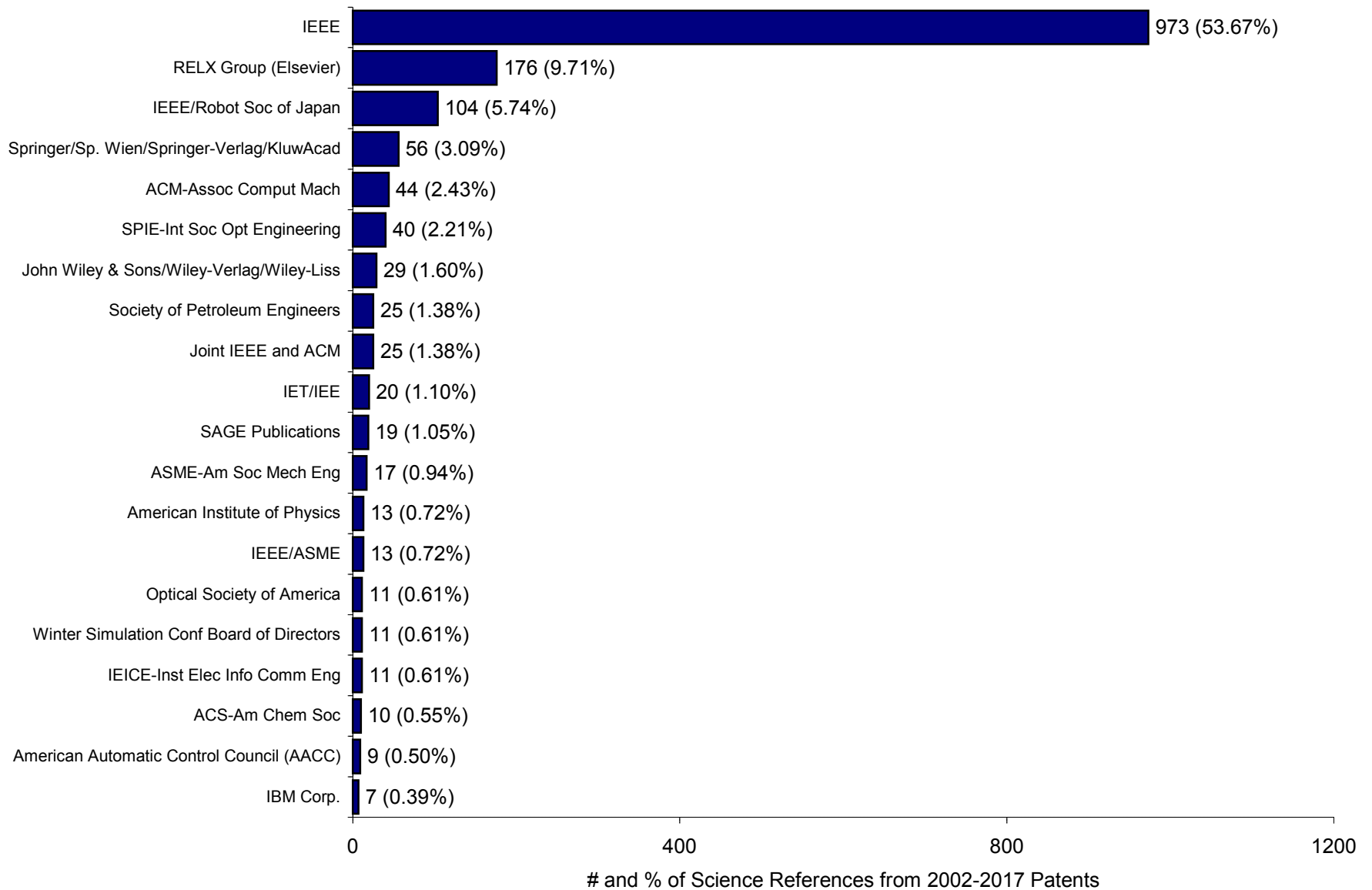


Figure 13 - # and % of Science References from 2002-2017 Semiconductor WIPO Patents to Top 20 Publishers and Conference Organizers

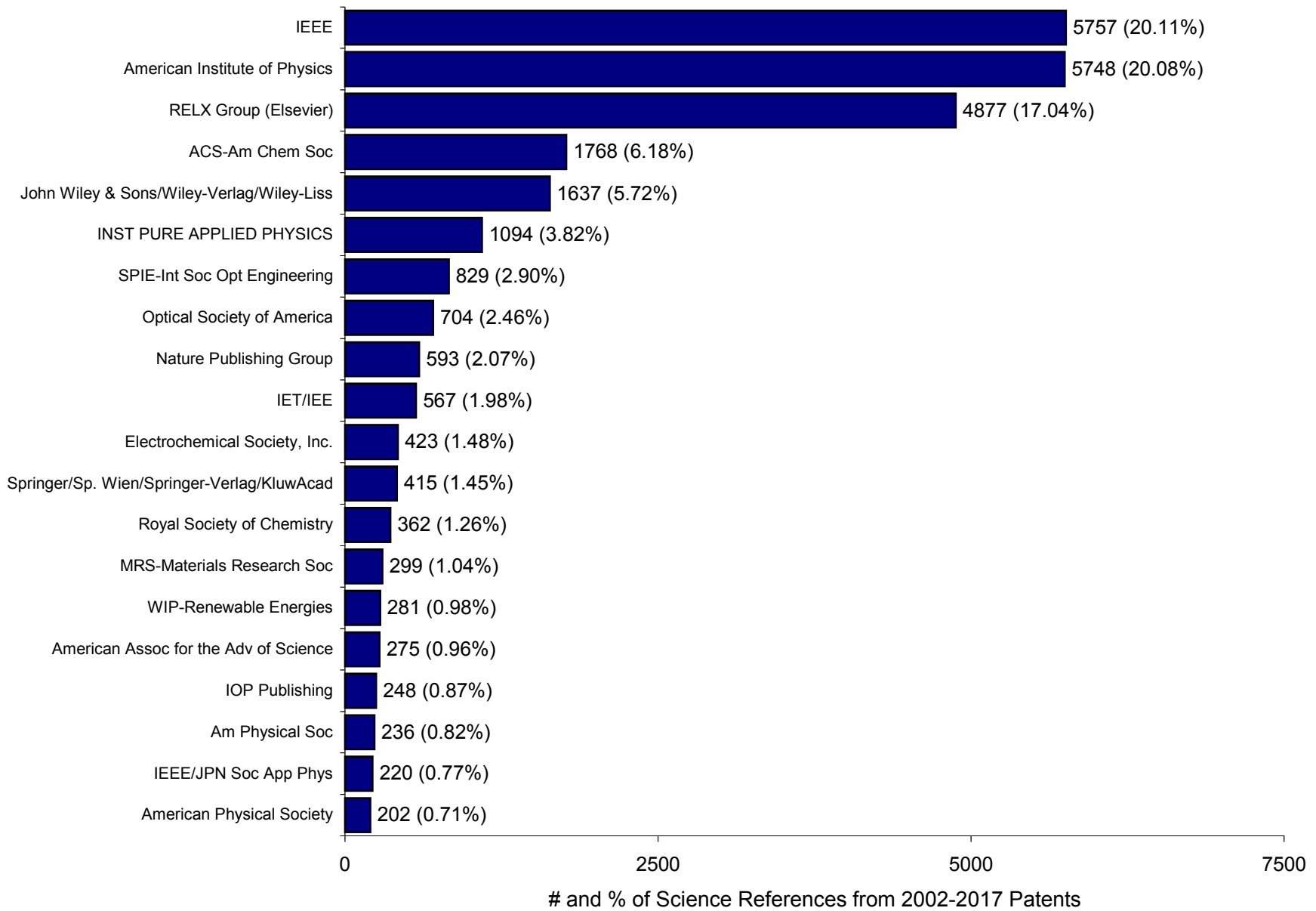


Figure 14 - # and % of Science References from 2002-2017 Smart Meter/Smart Grid WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

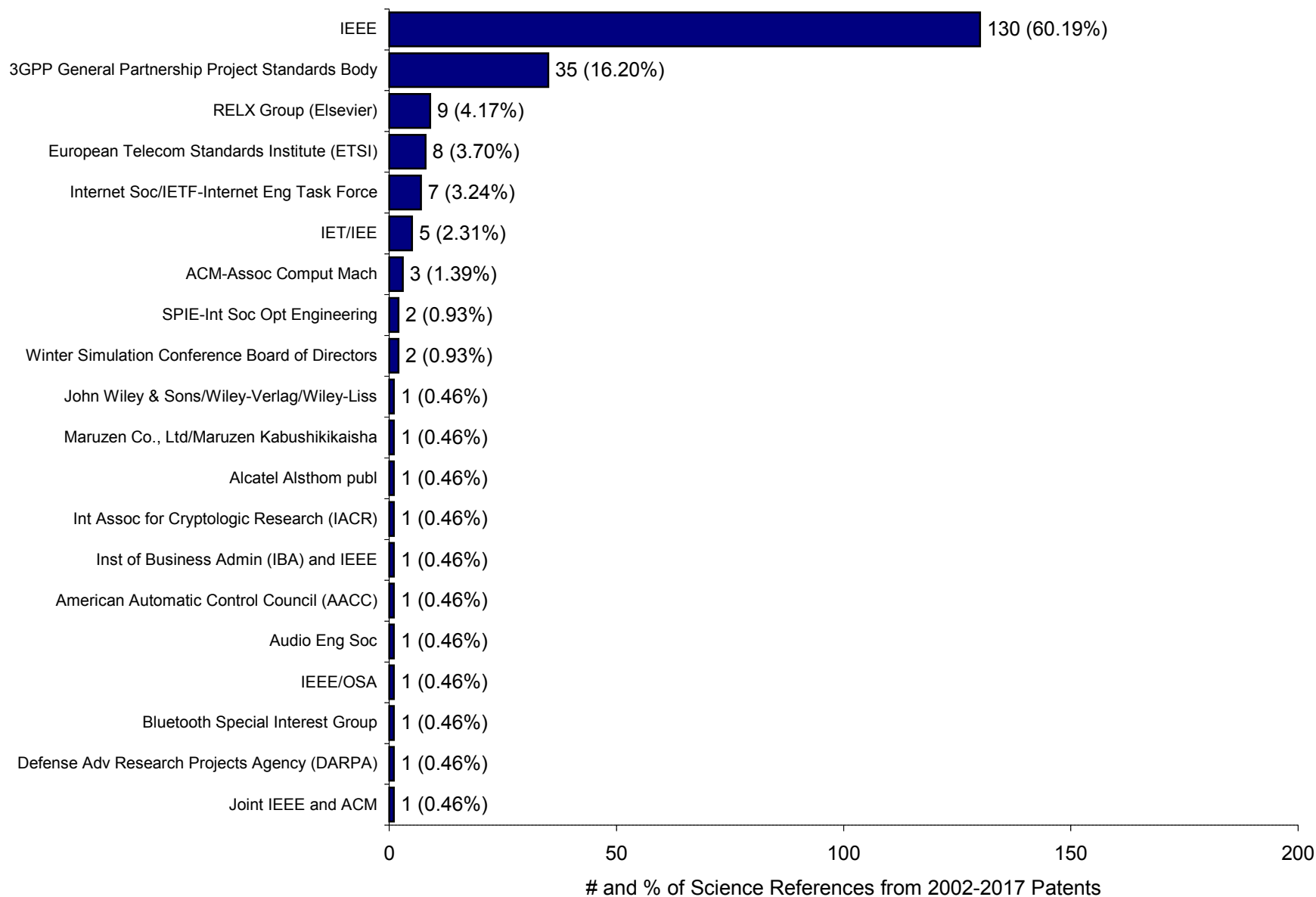


Figure 15 - # and % of Science References from 2002-2017 Telecommunications WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations

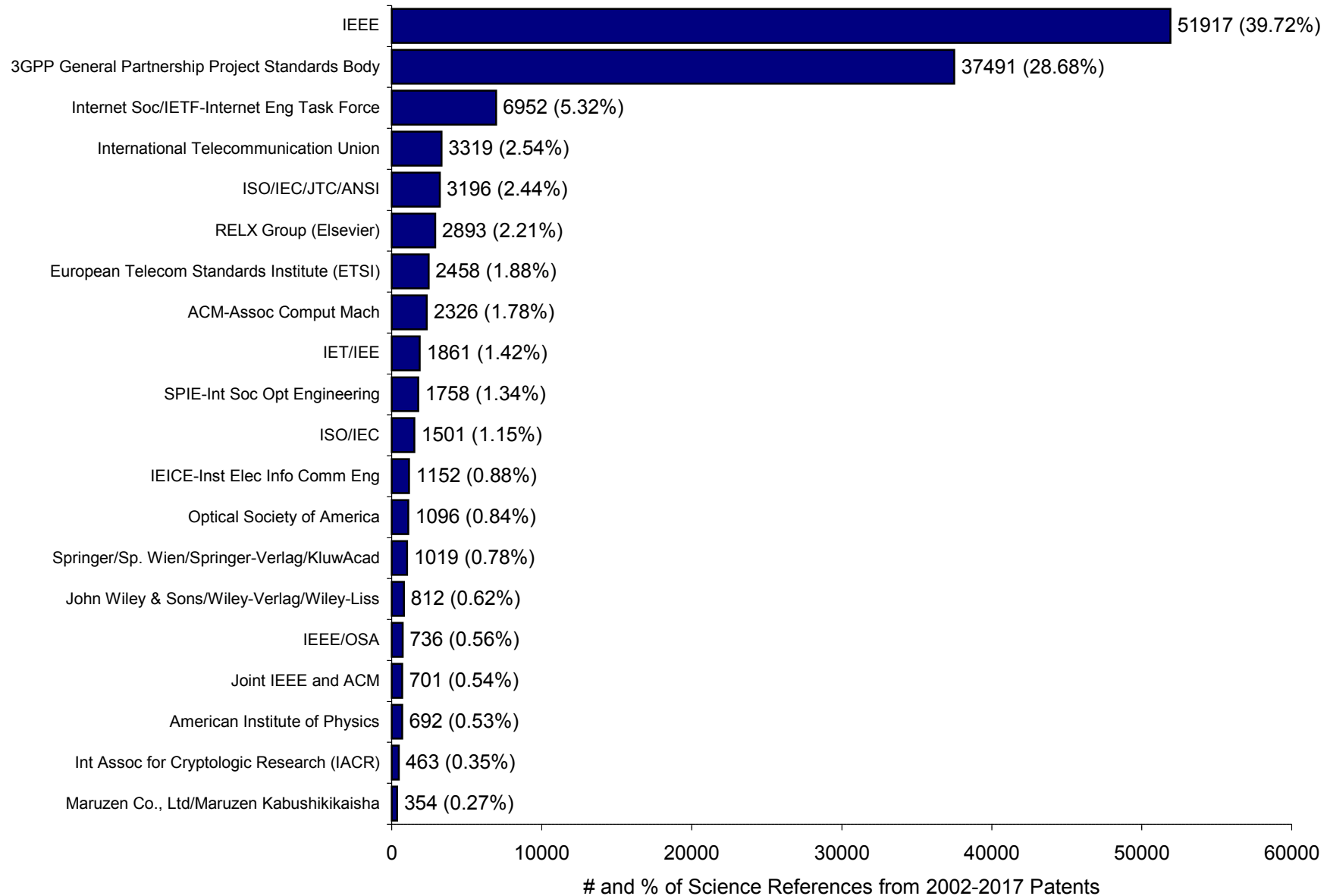
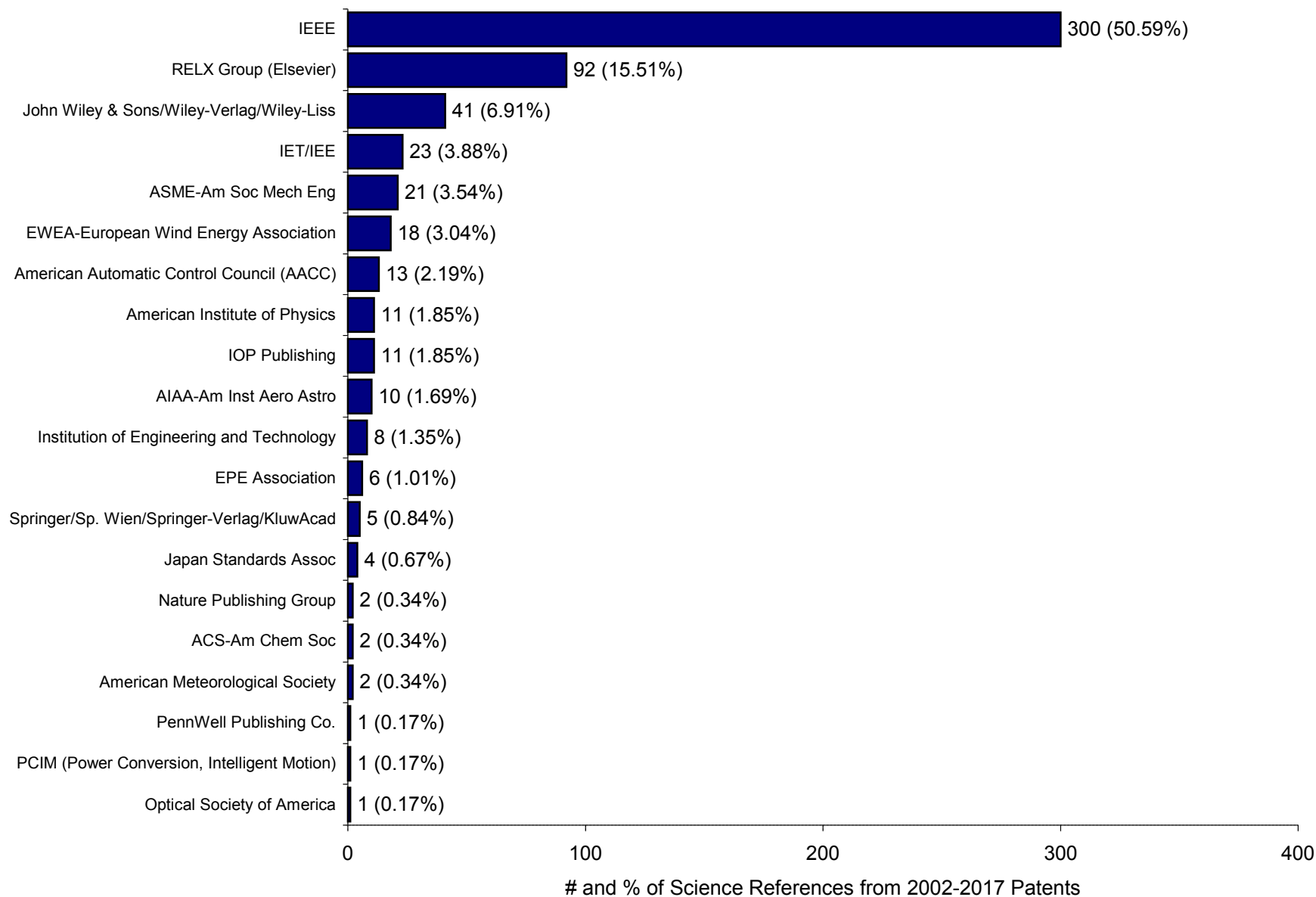


Figure 16 - # and % of Science References from 2002-2017 Wind Energy WIPO Patents to Top 20 Publishers, Conference Organizers, and Standards Organizations



Appendix A - Publishers Receiving Most References from Top 30 Companies
(Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Alibaba Group Holding Ltd		
ACM-Assoc Comput Mach	22	37.3
IEEE	22	37.3
RELX Group (Elsevier)	4	6.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3	5.1
Joint IEEE and ACM	2	3.4
Semantic Web Science Association	1	1.7
Nature Publishing Group	1	1.7
International Association for Cryptologic Research (IACR)	1	1.7
IFIP - International Federation for Information Processing	1	1.7
Association for the Advancement of Artificial Intelligence	1	1.7
SPIE-Int Soc Opt Engineering	1	1.7
BOE Technology Group Ltd		
IEEE	1	50.0
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	50.0
Bosch (Robert) GmbH		
IEEE	955	41.1
RELX Group (Elsevier)	428	18.4
Electrochemical Society, Inc.	82	3.5
American Institute of Physics	77	3.3
ACS-Am Chem Soc	70	3.0
IET/IEE	62	2.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	63	2.7
Springer/Sp. Wien/Springer-Verlag/KluwAcad	60	2.6
SPIE-Int Soc Opt Engineering	44	1.9
SAE-Society of Automobile Engineers	34	1.5
ACM-Assoc Comput Mach	31	1.3
135 others with less than 1% each	417	15.1

Appendix A - Publishers Receiving Most References from Top 30 Companies (Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Denso Corp		
RELX Group (Elsevier)	16	35.6
IEEE	8	17.8
IEICE-Inst Elec Info Comm Eng	4	8.9
SAE-Society of Automobile Engineers	3	6.7
AAAS-Am Assoc Advancement Sci	2	4.4
ACM-Assoc Comput Mach	1	2.2
Penton Media, Inc.	1	2.2
Nature Publishing Group	1	2.2
IET/IEE	1	2.2
Oxford University Press	1	2.2
American Society for Agricultural Engineers	1	2.2
Blackwell Publishing Inc.	1	2.2
Natl Acad Sciences	1	2.2
Institution of Engineering and Technology	1	2.2
IEEE/Eurasip	1	2.2
EDP SCIENCES S A, 17, AVE DU HOGGAR, PA COURTABOEUF, BP 112, LES ULIS CEDE	1	2.2
Acoustical Society of America	1	2.2
DowDuPont		
RELX Group (Elsevier)	6624	20.3
Springer/Sp. Wien/Springer-Verlag/KluwAcad	3856	11.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3396	10.4
Natl Acad Sciences	2257	6.9
ACS-Am Chem Soc	1950	6.0
American Society of Plant Biologists	1754	5.4
Oxford University Press	1670	5.1
Nature Publishing Group	1612	4.9
American SocIETy for Microbiology	1589	4.9
Blackwell Publishing Inc.	958	2.9
AAAS-Am Assoc Advancement Sci	778	2.4
Cell Press	603	1.8
American Society for Biochemistry and Molecular Biology Inc.	570	1.7
Oxford Univ Press	385	1.2
295 others with less than 1% each	4623	11.9
Ericsson		
3GPP General Partnership Project Standards Body	6797	43.1
IEEE	5129	32.5
Internet Soc/IETF-Internet Eng Task Force	1169	7.4
European Telecom Standards Institute (ETSI)	453	2.9
ACM-Assoc Comput Mach	233	1.5
RELX Group (Elsevier)	225	1.4
IET/IEE	176	1.1
ISO/IEC/JTC/ANSI	150	1.0
143 others with less than 1% each	1426	8.0

Appendix A - Publishers Receiving Most References from Top 30 Companies
(Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Fuji Film Holdings Corp		
RELX Group (Elsevier)	344	17.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	194	10.0
Nature Publishing Group	177	9.1
ACS-Am Chem Soc	125	6.5
Cell Press	110	5.7
Natl Acad Sciences	92	4.8
AAAS-Am Assoc Advancement Sci	79	4.1
American SocIETy for Microbiology	68	3.5
IEEE	56	2.9
Oxford University Press	51	2.6
Springer/Sp. Wien/Springer-Verlag/KluwAcad	45	2.3
American Society for Biochemistry and Molecular Biology Inc.	45	2.3
American Society of Hematology	42	2.2
American Institute of Physics	37	1.9
Royal Society of Chemistry	25	1.3
INST PURE APPLIED PHYSICS	25	1.3
SPIE-Int Soc Opt Engineering	19	1.0
108 others with less than 1% each	401	23.9
General Electric Company		
RELX Group (Elsevier)	1220	26.6
ACS-Am Chem Soc	594	13.0
IEEE	481	10.5
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	436	9.5
Springer/Sp. Wien/Springer-Verlag/KluwAcad	132	2.9
Kexue Chubaneshe/Science Press	85	1.9
SPIE-Int Soc Opt Engineering	76	1.7
Royal Society of Chemistry	80	1.7
American Association for Cancer Research	71	1.6
American Institute of Physics	65	1.4
Natl Acad Sciences	65	1.4
Nature Publishing Group	66	1.4
Society of Petroleum Engineers	61	1.3
Lippincott Williams & Wilkins Ltd.	57	1.2
Oxford University Press	49	1.1
American Society for Biochemistry and Molecular Biology Inc.	45	1.0
229 others with less than 1% each	995	18.7

Appendix A - Publishers Receiving Most References from Top 30 Companies (Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Halliburton Co. (Holding)		
Society of Petroleum Engineers	99	23.8
RELX Group (Elsevier)	97	23.3
IEEE	33	7.9
ACS-Am Chem Soc	29	7.0
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	16	3.8
Springer/Sp. Wien/Springer-Verlag/KluwAcad	14	3.4
soc of Exploration Geophysists	10	2.4
Society of Petroleum Engineers, Inc.	8	1.9
SPIE-Int Soc Opt Engineering	8	1.9
American Institute of Physics	7	1.7
American Institute of Mining and Metallurgical Engineers	7	1.7
Pennwell Pub	6	1.4
SPWLA-Society of Petrophysicists and Well Log Analysts	5	1.2
GeoScienceWorld	5	1.2
Gulf Publishing Co.	5	1.2
Hart Energy Publishing	4	1.0
Royal Society of Chemistry	4	1.0
38 others with less than 1% each	59	13.5
Hitachi Ltd		
IEEE	222	27.3
RELX Group (Elsevier)	71	8.7
American Institute of Physics	48	5.9
IEICE-Inst Elec Info Comm Eng	44	5.4
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	32	3.9
INST PURE APPLIED PHYSICS	31	3.8
ACM-Assoc Comput Mach	28	3.4
Nature Publishing Group	26	3.2
IET/IEE	19	2.3
Society of Magnetic Resonance in Medicine (SMRM)	19	2.3
ACS-Am Chem Soc	19	2.3
3GPP General Partnership Project Standards Body	15	1.8
Joint IEEE and ACM	14	1.7
Optical Society of America	12	1.5
SPIE-Int Soc Opt Engineering	9	1.1
Electrochemical Society, Inc.	9	1.1
IEEE/OSA	9	1.1
Oxford University Press	9	1.1
The USENIX Association	8	1.0
American Physiological Society	8	1.0
75 others with less than 1% each	162	18.5

Appendix A - Publishers Receiving Most References from Top 30 Companies (Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 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	1329	60.9
IEEE	304	13.9
International Telecommunication Union	98	4.5
IEICE-Inst Elec Info Comm Eng	92	4.2
SID-Society for Information Display	56	2.6
American Institute of Physics	46	2.1
RELX Group (Elsevier)	34	1.6
INST PURE APPLIED PHYSICS	31	1.4
ACS-Am Chem Soc	24	1.1
SPIE-Int Soc Opt Engineering	22	1.0
45 others with less than 1% each	147	5.5
<i>HP Inc</i>		
IEEE	454	34.6
RELX Group (Elsevier)	161	12.3
American Institute of Physics	107	8.1
SPIE-Int Soc Opt Engineering	81	6.2
ACM-Assoc Comput Mach	76	5.8
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	46	3.5
Joint IEEE and ACM	42	3.2
Am Physical Soc	23	1.8
AAAS-Am Assoc Advancement Sci	24	1.8
American Physical Society	24	1.8
Springer/Sp. Wien/Springer-Verlag/KluwAcad	23	1.8
Internet Soc/IETF-Internet Eng Task Force	22	1.7
ACS-Am Chem Soc	22	1.7
Optical Society of America	15	1.1
87 others with less than 1% each	193	16.5
<i>Huawei Technologies Company Ltd.</i>		
3GPP General Partnership Project Standards Body	2114	35.9
IEEE	1616	27.4
Internet Soc/IETF-Internet Eng Task Force	888	15.1
International Telecommunication Union	332	5.6
European Telecom Standards Institute (ETSI)	112	1.9
ACM-Assoc Comput Mach	83	1.4
ISO/IEC/JTC/ANSI	79	1.3
RELX Group (Elsevier)	68	1.2
84 others with less than 1% each	597	9.4

Appendix A - Publishers Receiving Most References from Top 30 Companies (Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Intel Corporation</i>		
IEEE	1597	45.7
3GPP General Partnership Project Standards Body	735	21.1
ACM-Assoc Comput Mach	184	5.3
RELX Group (Elsevier)	122	3.5
Joint IEEE and ACM	107	3.1
Internet Soc/IETF-Internet Eng Task Force	78	2.2
SPIE-Int Soc Opt Engineering	55	1.6
IET/IEE	57	1.6
American Institute of Physics	44	1.3
Springer/Sp. Wien/Springer-Verlag/KluwAcad	37	1.1
109 others with less than 1% each	475	13.0
<i>Koninklijke Philips N.V.</i>		
IEEE	6594	36.2
RELX Group (Elsevier)	2127	11.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1706	9.4
SPIE-Int Soc Opt Engineering	989	5.4
American Institute of Physics	737	4.0
Society of Magnetic Resonance in Medicine (SMRM)	678	3.7
Springer/Sp. Wien/Springer-Verlag/KluwAcad	454	2.5
ACM-Assoc Comput Mach	402	2.2
ACS-Am Chem Soc	376	2.1
Nature Publishing Group	216	1.2
Optical Society of America	192	1.1
IET/IEE	174	1.0
SID-Society for Information Display	176	1.0
389 others with less than 1% each	3392	15.2
<i>LG Chem Ltd.</i>		
RELX Group (Elsevier)	110	28.6
ACS-Am Chem Soc	64	16.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	53	13.8
Royal Society of Chemistry	15	3.9
INST PURE APPLIED PHYSICS	14	3.6
American Institute of Physics	14	3.6
IEEE	10	2.6
Electrochemical Society, Inc.	9	2.3
Springer/Sp. Wien/Springer-Verlag/KluwAcad	9	2.3
Natl Acad Sciences	8	2.1
SID-Society for Information Display	7	1.8
American SocIETy for Microbiology	6	1.6
Nature Publishing Group	5	1.3
Oxford University Press	5	1.3
33 others with less than 1% each	55	15.0

Appendix A - Publishers Receiving Most References from Top 30 Companies (Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 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	1422	44.6
IEEE	1203	37.7
ISO/IEC/JTC/ANSI	140	4.4
Audio Eng Soc	82	2.6
European Telecom Standards Institute (ETSI)	53	1.7
MPEG.org	45	1.4
Internet Soc/IETF-Internet Eng Task Force	43	1.3
44 others with less than 1% each	201	6.1
<i>Microsoft Corporation</i>		
IEEE	1200	40.3
ACM-Assoc Comput Mach	631	21.2
RELX Group (Elsevier)	179	6.0
Joint IEEE and ACM	104	3.5
Springer/Sp. Wien/Springer-Verlag/KluwAcad	80	2.7
Internet Soc/IETF-Internet Eng Task Force	76	2.6
SPIE-Int Soc Opt Engineering	48	1.6
The USENIX Association	44	1.5
ACL - Association for Computational Linguistics	40	1.3
ISO/IEC/JTC/ANSI	40	1.3
International Telecommunication Union	35	1.2
127 others with less than 1% each	503	15.5
<i>Mitsubishi Electric Corp</i>		
IEEE	889	49.2
3GPP General Partnership Project Standards Body	179	9.9
IEICE-Inst Elec Info Comm Eng	118	6.5
ACM-Assoc Comput Mach	100	5.5
RELX Group (Elsevier)	88	4.9
International Association for Cryptologic Research (IACR)	81	4.5
SPIE-Int Soc Opt Engineering	45	2.5
IET/IEE	38	2.1
Internet Soc/IETF-Internet Eng Task Force	24	1.3
ISO/IEC/JTC/ANSI	22	1.2
International Telecommunication Union	20	1.1
Springer/Sp. Wien/Springer-Verlag/KluwAcad	18	1.0
70 others with less than 1% each	184	11.9

Appendix A - Publishers Receiving Most References from Top 30 Companies
(Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
NEC Corp		
IEEE	1176	30.5
3GPP General Partnership Project Standards Body	1088	28.2
IEICE-Inst Elec Info Comm Eng	292	7.6
ACM-Assoc Comput Mach	224	5.8
Internet Soc/IETF-Internet Eng Task Force	131	3.4
RELX Group (Elsevier)	100	2.6
American Institute of Physics	65	1.7
Joint IEEE and ACM	45	1.2
International Association for Cryptologic Research (IACR)	44	1.1
Springer/Sp. Wien/Springer-Verlag/KluwAcad	44	1.1
IET/IEE	43	1.1
120 others with less than 1% each	606	16.2
Nokia Corp		
3GPP General Partnership Project Standards Body	5525	38.9
IEEE	4622	32.6
Internet Soc/IETF-Internet Eng Task Force	997	7.0
European Telecom Standards Institute (ETSI)	464	3.3
ACM-Assoc Comput Mach	320	2.3
RELX Group (Elsevier)	271	1.9
International Telecommunication Union	142	1.0
189 others with less than 1% each	1848	11.2

Appendix A - Publishers Receiving Most References from Top 30 Companies

(Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
<i>Olympus Corp.</i>		
IEEE	84	27.1
RELX Group (Elsevier)	31	10.0
Nature Publishing Group	17	5.5
SPIE-Int Soc Opt Engineering	11	3.5
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	11	3.5
IEICE-Inst Elec Info Comm Eng	10	3.2
American Institute of Physics	10	3.2
Natl Acad Sciences	9	2.9
Optical Society of America	8	2.6
Springer/Sp. Wien/Springer-Verlag/KluwAcad	8	2.6
ACM-Assoc Comput Mach	6	1.9
Mosby Inc.	6	1.9
American Physical Society	5	1.6
American Association for Cancer Research	5	1.6
Oxford University Press	4	1.3
International Association for Pattern Recognition (IAPR)	4	1.3
American SocIETy for Microbiology	4	1.3
Biophysical Society	4	1.3
Cold Spring Harbor Laboratory Press	4	1.3
AAAS-Am Assoc Advancement Sci	4	1.3
BioMed Central	3	1.0
W J G Press	3	1.0
National Institutes of Health - NIH	3	1.0
American Society for Biochemistry and Molecular Biology Inc.	3	1.0
Joint IEEE and ACM	3	1.0
American Association for Clinical Chemistry, Inc.	3	1.0
42 others with less than 1% each	47	14.1
<i>Panasonic Corporation</i>		
IEEE	1647	30.9
3GPP General Partnership Project Standards Body	1539	28.8
IEICE-Inst Elec Info Comm Eng	357	6.7
Internet Soc/IETF-Internet Eng Task Force	295	5.5
International Telecommunication Union	249	4.7
RELX Group (Elsevier)	164	3.1
American Institute of Physics	120	2.2
INST PURE APPLIED PHYSICS	76	1.4
ISO/IEC/JTC/ANSI	67	1.3
European Telecom Standards Institute (ETSI)	70	1.3
SPIE-Int Soc Opt Engineering	59	1.1
127 others with less than 1% each	693	11.5

Appendix A - Publishers Receiving Most References from Top 30 Companies

(Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Qualcomm Inc		
IEEE	6927	35.7
3GPP General Partnership Project Standards Body	5921	30.5
ISO/IEC/JTC/ANSI	1507	7.8
International Telecommunication Union	1094	5.6
ISO/IEC	711	3.7
RELX Group (Elsevier)	432	2.2
Internet Soc/IETF-Internet Eng Task Force	395	2.0
European Telecom Standards Institute (ETSI)	267	1.4
ACM-Assoc Comput Mach	257	1.3
SPIE-Int Soc Opt Engineering	206	1.1
184 others with less than 1% each	1711	7.4
Samsung Electronics Co Ltd		
IEEE	1111	52.4
3GPP General Partnership Project Standards Body	495	23.4
ISO/IEC/JTC/ANSI	63	3.0
RELX Group (Elsevier)	46	2.2
Internet Soc/IETF-Internet Eng Task Force	46	2.2
International Telecommunication Union	38	1.8
ACM-Assoc Comput Mach	34	1.6
Audio Eng Soc	30	1.4
MPEG.org	22	1.0
IET/IEE	22	1.0
61 others with less than 1% each	212	8.5
Siemens Aktiengesellschaft		
IEEE	3293	39.5
RELX Group (Elsevier)	1373	16.5
Internet Soc/IETF-Internet Eng Task Force	310	3.7
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	274	3.3
Springer/Sp. Wien/Springer-Verlag/KluwAcad	219	2.6
ACM-Assoc Comput Mach	209	2.5
3GPP General Partnership Project Standards Body	193	2.3
American Institute of Physics	186	2.2
SPIE-Int Soc Opt Engineering	183	2.2
ACS-Am Chem Soc	149	1.8
European Telecom Standards Institute (ETSI)	154	1.8
IET/IEE	109	1.3
Joint IEEE and ACM	98	1.2
293 others with less than 1% each	1594	14.9

Appendix A - Publishers Receiving Most References from Top 30 Companies

(Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
Sony Corp		
IEEE	1025	31.9
3GPP General Partnership Project Standards Body	466	14.5
International Telecommunication Union	230	7.2
ACM-Assoc Comput Mach	172	5.4
RELX Group (Elsevier)	158	4.9
ISO/IEC/JTC/ANSI	101	3.1
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	83	2.6
IEICE-Inst Elec Info Comm Eng	71	2.2
Internet Soc/IETF-Internet Eng Task Force	64	2.0
European Telecom Standards Institute (ETSI)	57	1.8
SPIE-Int Soc Opt Engineering	53	1.7
ACS-Am Chem Soc	51	1.6
American Institute of Physics	51	1.6
ISO/IEC	47	1.5
Joint IEEE and ACM	39	1.2
Springer/Sp. Wien/Springer-Verlag/KluwAcad	36	1.1
126 others with less than 1% each	508	14.8
Sumitomo Electric Industries Ltd.		
RELX Group (Elsevier)	93	17.2
IEEE	91	16.9
American Institute of Physics	83	15.4
INST PURE APPLIED PHYSICS	55	10.2
IEICE-Inst Elec Info Comm Eng	31	5.7
Optical Society of America	27	5.0
IET/IEE	24	4.4
IEEE/OSA	18	3.3
3GPP General Partnership Project Standards Body	15	2.8
Japan Society of Applied Physics	14	2.6
Electrochemical Society, Inc.	12	2.2
Springer/Sp. Wien/Springer-Verlag/KluwAcad	6	1.1
IEC-International Electrotechnical Commission	6	1.1
31 others with less than 1% each	65	12.3

Appendix A - Publishers Receiving Most References from Top 30 Companies
(Top 30 Companies in terms of 2017 WIPO Patent Activity; Refs from 2002-2017 Patents)

<i>Publisher</i>	<i># Pat Refs to:</i>	<i>Percent of Total</i>
TCL Corp		
IEEE	10	27.0
SID-Society for Information Display	6	16.2
3GPP General Partnership Project Standards Body	5	13.5
Joint IEEE and ACM	4	10.8
ACM-Assoc Comput Mach	2	5.4
John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	2.7
IET/IEE	1	2.7
ACTA Press	1	2.7
Intel Corp	1	2.7
IP.Com	1	2.7
European Telecom Standards Institute (ETSI)	1	2.7
SPIE-Int Soc Opt Engineering	1	2.7
Maruzen Co., Ltd/Maruzen Kabushikikaisha	1	2.7
Lawrence Erlbaum Associates Inc.	1	2.7
Miller Freeman	1	2.7
ZTE Corp.		
3GPP General Partnership Project Standards Body	1095	68.1
IEEE	243	15.1
Internet Soc/IETF-Internet Eng Task Force	117	7.3
International Telecommunication Union	67	4.2
32 others with less than 1% each	85	5.6

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>AI/Artificial Intelligence</i>										
1	Qualcomm Inc	164	364	45.1	IEEE	164	45.1	RELX Group (Elsevier)	45	12.4
2	INDIVIDUAL PATENTER	86	427	20.1	IEEE	86	20.1	RELX Group (Elsevier)	79	18.5
3	Microsoft Corporation	80	175	45.7	IEEE	80	45.7	ACM-Assoc Comput Mach	18	10.3
4	Google Inc.	49	129	38.0	IEEE	49	38.0	Neural Information Processing Systems Foundation	22	17.1
5	Siemens Aktiengesellschaft	48	100	48.0	IEEE	48	48.0	RELX Group (Elsevier)	15	15.0
6	Commissariat A L'Energie At	39	61	63.9	IEEE	39	63.9	RELX Group (Elsevier)	8	13.1
7	International Business Machi	32	56	57.1	IEEE	32	57.1	RELX Group (Elsevier)	6	10.7
8	Centre National De La Reche	20	52	38.5	IEEE	20	38.5	RELX Group (Elsevier)	8	15.4
9	Mitsubishi Electric Corp	16	25	64.0	IEEE	16	64.0	Neural Information Processing Systems Foundation	4	16.0
10	Telefonica SA	14	39	35.9	IEEE	14	35.9	ACM-Assoc Comput Mach	11	28.2
11	BAE Systems Plc.	12	19	63.2	IEEE	12	63.2	IEEE/RSJ	1	5.3
12	Carl-Zeiss Stiftung	12	19	63.2	IEEE	12	63.2	RELX Group (Elsevier)	4	21.1
13	Aselsan Elektronik Sanayi Ve	10	19	52.6	IEEE	10	52.6	RELX Group (Elsevier)	4	21.1
14	Nokia Corp	10	19	52.6	IEEE	10	52.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2	10.5
15	CARDIOLOGS TECHNOLO	9	16	56.3	IEEE	9	56.3	Neural Information Processing Systems Foundation	2	12.5
16	Koninklijke Philips N.V.	9	32	28.1	IEEE	9	28.1	RELX Group (Elsevier)	7	21.9
17	Canon Inc	8	12	66.7	IEEE	8	66.7	IEEE/JPN Soc App Phys	2	16.7
18	INSTITUT TELECOM-TELE	8	8	100.0	IEEE	8	100.0			
19	TDK Corporation	8	9	88.9	IEEE	8	88.9	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	11.1
20	University of Oxford	8	20	40.0	IEEE	8	40.0	RELX Group (Elsevier)	4	20.0
21	BT Group PLC	7	16	43.8	IEEE	7	43.8	RELX Group (Elsevier)	3	18.8
22	INDIAN INSTITUTE OF TE	7	9	77.8	IEEE	7	77.8	RELX Group (Elsevier)	2	22.2
23	NEC Corp	7	25	28.0	IEEE	7	28.0	ACM-Assoc Comput Mach	6	24.0
24	Thales	7	18	38.9	IEEE	7	38.9	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	11.1
25	Universite Pierre & Marie Cu	7	15	46.7	IEEE	7	46.7	Springer/Sp. Wien/Springer-Verlag/KluwAcad	3	20.0
26	VITO NV	7	12	58.3	IEEE	7	58.3	Nature Publishing Group	3	25.0
27	Vrije Universiteit Brussel	7	16	43.8	IEEE	7	43.8	ACM-Assoc Comput Mach	4	25.0
28	AGT INTERNATIONAL GM	6	10	60.0	IEEE	6	60.0	IEEE/RSJ	1	10.0
29	CEPT SYSTEMS GMBH	6	10	60.0	IEEE	6	60.0	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	10.0
30	Digimarc Corp.	6	10	60.0	IEEE	6	60.0	European Conference on Computer Vision-Google/Microsoft	1	10.0
31	LAPPEENRANNAN TEKNI	6	10	60.0	IEEE	6	60.0	American Automatic Control Council (AACC)	3	30.0
32	MEYER JOEL R	6	10	60.0	IEEE	6	60.0	CRC Press/Taylor & Francis	1	10.0
33	Nuance Communications Inc	6	8	75.0	IEEE	6	75.0	IBM Corp.	1	12.5
34	NUMENTA INC	6	11	54.5	IEEE	6	54.5	Springer/Sp. Wien/Springer-Verlag/KluwAcad	3	27.3
35	Technical University of Den	6	9	66.7	IEEE	6	66.7	NASA-National Aeronautics and Space Admin	2	22.2
36	United States Health & Huma	6	8	75.0	IEEE	6	75.0	RELX Group (Elsevier)	1	12.5
37	US HEALTH	6	8	75.0	IEEE	6	75.0	Association for the Advancement of Artificial Intelligence	1	12.5
38	AUTONOMOUS NON-PRO	5	6	83.3	IEEE	5	83.3	ACM-Assoc Comput Mach	1	16.7
39	EUROPHOTON GMBH GE	5	7	71.4	IEEE	5	71.4	American Institute of Physics	2	28.6

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	EVOLV TECHNOLOGY IN	5	9	55.6	IEEE	5	55.6	European Conference on Computer Vision-Google/Microsoft	2	22.2
41	FRENKEL CHRISTINA	5	12	41.7	IEEE	5	41.7	Natl Acad Sciences	2	16.7
42	FRENKEL DANIEL	5	12	41.7	IEEE	5	41.7	Natl Acad Sciences	2	16.7
43	HAEMMERLING VALENTI	5	12	41.7	IEEE	5	41.7	Natl Acad Sciences	2	16.7
44	LEIBNIZ-INSSTITUT FUER	5	7	71.4	IEEE	5	71.4	American Institute of Physics	2	28.6
45	OLEA MEDICAL	5	12	41.7	IEEE	5	41.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3	25.0
46	PESCIANSCHI DMITRI	5	12	41.7	IEEE	5	41.7	Natl Acad Sciences	2	16.7
47	Politecnico di Torino	5	6	83.3	IEEE	5	83.3	RELX Group (Elsevier)	1	16.7
48	Technicolor SA	5	15	33.3	IEEE	5	33.3	ACM-Assoc Comput Mach	3	20.0
49	Telecom Italia SPA	5	7	71.4	IEEE	5	71.4	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	14.3
50	Thomson Reuters Corp	5	16	31.3	ACM-Assoc Comput Mach	5	31.3	IEEE	5	31.3
51	Universite Paris-Sud 11	5	12	41.7	IEEE	5	41.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2	16.7
52	University of Leicester	5	6	83.3	IEEE	5	83.3	IEEE/RSJ	1	16.7
53	Analog Devices Inc.	4	4	100.0	IEEE	4	100.0			
54	Boeing Co. (The)	4	5	80.0	IEEE	4	80.0	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	20.0
55	Bracco S.P.A.	4	8	50.0	IEEE	4	50.0	RELX Group (Elsevier)	2	25.0
56	CSIC-Consejo Superior De In	4	4	100.0	IEEE	4	100.0			
57	Delphi Automotive PLC	4	5	80.0	IEEE	4	80.0	Multidisciplinary Digital Publishing Institute (MDPI)	1	20.0
58	FIVE APES INC	4	4	100.0	IEEE	4	100.0			
59	Freiburg University	4	18	22.2	IEEE	4	22.2	American Physiological Society	2	11.1
60	INSTITUT MINES-TELECO	4	4	100.0	IEEE	4	100.0			
61	KISTERS AKTIENGESELL	4	9	44.4	RELX Group (Elsevier)	4	44.4	IEEE	4	44.4
62	LafargeHolcim	4	4	100.0	IEEE	4	100.0			
63	Massachusetts Institute of Te	4	272	1.5	RELX Group (Elsevier)	38	14.0	Nature Publishing Group	38	14.0
64	OPTIMINING GMBH	4	7	57.1	IEEE	4	57.1	RELX Group (Elsevier)	2	28.6
65	Schneider Electric S.A.	4	4	100.0	IEEE	4	100.0			
66	United Technologies Corp	4	9	44.4	IEEE	4	44.4	International Machine Learning Society (IMLS)	1	11.1
67	Universidad Politecnica de M	4	4	100.0	IEEE	4	100.0			
68	UNIVERSITE PARIS 13	4	6	66.7	IEEE	4	66.7	World Scientific Publishing Co	1	16.7
69	UNIVERSITEIT VAN AMS	4	9	44.4	Neural Information Processing Systems Found	4	44.4	IEEE	4	44.4
70	Agency for Science Technolo	3	4	75.0	IEEE	3	75.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	25.0
71	ARIA NETWORKS LTD	3	4	75.0	IEEE	3	75.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	25.0
72	ASML Holding NV	3	11	27.3	SPIE-Int Soc Opt Engineering	6	54.5	IEEE	3	27.3
73	Cisco Systems Inc.	3	9	33.3	IEEE	3	33.3	ACM-Assoc Comput Mach	2	22.2
74	Eastman Kodak Company	3	4	75.0	IEEE	3	75.0	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	25.0
75	Ericsson	3	16	18.8	3GPP General Partnership Project Standards	4	25.0	IEEE	3	18.8
76	Fraunhofer Gesellschaft	3	6	50.0	IEEE	3	50.0	International Conference on Digital Audio Effects	1	16.7
77	FUGRO N V	3	3	100.0	IEEE	3	100.0			
78	IDEMIA	3	4	75.0	IEEE	3	75.0	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	25.0
79	INDUSTRY UNIVERSITY C	3	3	100.0	IEEE	3	100.0			
80	Institut National de la Sante e	3	7	42.9	IEEE	3	42.9	AAAS-Am Assoc Advancement Sci	2	28.6

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	MIMOS Berhad	3	9	33.3	Springer/Sp. Wien/Springer-Verlag/KluwAca	4	44.4	IEEE	3	33.3
82	Mitsubishi Heavy Industries	3	5	60.0	IEEE	3	60.0	A B B Corporate Management Services AG	1	20.0
83	Progenics Pharmaceuticals In	3	4	75.0	IEEE	3	75.0	RELX Group (Elsevier)	1	25.0
84	RHEINISCH-WESTFALISC	3	3	100.0	IEEE	3	100.0			
85	SEMEION CENTRO RICER	3	7	42.9	IEEE	3	42.9	RELX Group (Elsevier)	2	28.6
86	SENTIANCE NN	3	6	50.0	IEEE	3	50.0	MIT Press	1	16.7
87	SVENSKA TRACAB AB	3	10	30.0	European Conference on Computer Vision-Go	3	30.0	IEEE	3	30.0
88	Tata Consultancy Services Lt	3	4	75.0	IEEE	3	75.0	ACL - Association for Computational Linguistics	1	25.0
89	UNIV DE LILLE 1	3	8	37.5	IEEE	3	37.5	RELX Group (Elsevier)	2	25.0
90	UNIVERSIDADE DE AVEI	3	3	100.0	IEEE	3	100.0			
91	UNIVERSITE DE BRETAG	3	3	100.0	IEEE	3	100.0			
92	University of Ulster	3	4	75.0	IEEE	3	75.0	RELX Group (Elsevier)	1	25.0
93	UNIVSCIDELILLE	3	8	37.5	IEEE	3	37.5	ACM-Assoc Comput Mach	2	25.0
94	Aerospace Corp.	2	7	28.6	RELX Group (Elsevier)	3	42.9	IEEE	2	28.6
95	Aisin Seiki Co. Ltd.	2	2	100.0	IEEE	2	100.0			
96	Amazon.com Inc.	2	7	28.6	IEEE	2	28.6	MIT Press	2	28.6
97	Apple Inc	2	6	33.3	Cambridge University Press	2	33.3	IEEE	2	33.3
98	ARCTIC ICE MANAGEME	2	2	100.0	IEEE	2	100.0			
99	Asahi Glass Co. Ltd.	2	6	33.3	Society of Glass Technology	3	50.0	IEEE	2	33.3
100	BASF SE	2	7	28.6	AMER SOC TESTING MATERIALS	2	28.6	IEEE	2	28.6

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO 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	INDIVIDUAL PATENTER	7	14	50.0	IEEE	7	50.0	American Automatic Control Council (AACC)	1	7.1
2	Carnegie Mellon University	6	15	40.0	IEEE	6	40.0	IEEE/RSJ	1	6.7
3	GEOLINK LDA	6	15	40.0	IEEE	6	40.0	IOS PRESS	1	6.7
4	INSTITUTO DE TELECOM	6	15	40.0	IEEE	6	40.0	TIMES MIRROR MAG INC, 380 MADISON AVE, NEW YO	1	6.7
5	UNIVERSIDADE DO PORT	6	15	40.0	IEEE	6	40.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	6.7
6	Bosch (Robert) GmbH	5	6	83.3	IEEE	5	83.3	IEEE/RSJ	1	16.7
7	Qualcomm Inc	3	4	75.0	IEEE	3	75.0	3GPP General Partnership Project Standards Body	1	25.0
8	Renault SA	3	4	75.0	IEEE	3	75.0	Cambridge University Press	1	25.0
9	Siemens Aktiengesellschaft	3	5	60.0	IEEE	3	60.0	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	20.0
10	B STRAUTMANN & SOHN	2	2	100.0	IEEE	2	100.0			
11	BIA	2	3	66.7	IEEE	2	66.7	Society of Instrument and Control Engineers	1	33.3
12	CAPOCO DESIGN LTD	2	4	50.0	IEEE	2	50.0	RELX Group (Elsevier)	1	25.0
13	Centre National De La Reche	2	3	66.7	IEEE	2	66.7	American Institute of Physics	1	33.3
14	Continental AG (Germany Fe	2	3	66.7	IEEE	2	66.7	RELX Group (Elsevier)	1	33.3
15	FTS ComputerTechnik	2	2	100.0	IEEE	2	100.0			
16	Honeywell International Inc.	2	2	100.0	IEEE	2	100.0			
17	Panasonic Corporation	2	6	33.3	IEEE	2	33.3	IEEE/RSJ	1	16.7
18	Porsche Automobil Holding	2	2	100.0	IEEE	2	100.0			
19	Raytheon Co.	2	4	50.0	IEEE	2	50.0	AIAA-Am Inst Aero Astro	1	25.0
20	Toyota Motor Corp	2	3	66.7	IEEE	2	66.7	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	33.3
21	Universite D'Aix-Marseille	2	3	66.7	IEEE	2	66.7	American Institute of Physics	1	33.3
22	XOLLAI LLC	2	4	50.0	IEEE	2	50.0	Society of Instrument and Control Engineers	1	25.0
23	BAE Systems Plc.	1	1	100.0	IEEE	1	100.0			
24	Boeing Co. (The)	1	2	50.0	American Physical Society	1	50.0	IEEE	1	50.0
25	CITILOG	1	1	100.0	IEEE	1	100.0			
26	Hon Hai Precision Industry C	1	1	100.0	IEEE	1	100.0			
27	Intel Corporation	1	3	33.3	3GPP General Partnership Project Standards	2	66.7	IEEE	1	33.3
28	KLUNSYS S R L	1	1	100.0	IEEE	1	100.0			
29	Lely Group	1	1	100.0	IEEE	1	100.0			
30	Northrop Grumman Corp	1	1	100.0	IEEE	1	100.0			
31	OCEAN FLOOR GEOPHYSI	1	1	100.0	IEEE	1	100.0			
32	Oshkosh Corporation	1	1	100.0	IEEE	1	100.0			
33	OTRI-UNIVERSIDAD DE A	1	1	100.0	IEEE	1	100.0			
34	QUOVAR MANAGEMEN	1	1	100.0	IEEE	1	100.0			
35	Safran S.A.	1	1	100.0	IEEE	1	100.0			
36	THE GRAY INSURANCE C	1	2	50.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	50.0	IEEE	1	50.0
37	ZOOX INC	1	1	100.0	IEEE	1	100.0			

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO 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	INDIVIDUAL PATENTER	3927	7691	51.1	IEEE	3927	51.1	SPIE-Int Soc Opt Engineering	558	7.3
2	Technicolor SA	1103	2334	47.3	IEEE	1103	47.3	ISO/IEC/JTC/ANSI	292	12.5
3	Koninklijke Philips N.V.	1100	1970	55.8	IEEE	1100	55.8	SPIE-Int Soc Opt Engineering	187	9.5
4	Qualcomm Inc	980	4918	19.9	ISO/IEC/JTC/ANSI	1494	30.4	International Telecommunication Union	1078	21.9
5	Nokia Corp	332	689	48.2	IEEE	332	48.2	ISO/IEC/JTC/ANSI	57	8.3
6	Ericsson	301	758	39.7	IEEE	301	39.7	ISO/IEC/JTC/ANSI	143	18.9
7	Orange	290	500	58.0	IEEE	290	58.0	RELX Group (Elsevier)	37	7.4
8	Samsung Electronics Co Ltd	284	488	58.2	IEEE	284	58.2	ISO/IEC/JTC/ANSI	55	11.3
9	Fraunhofer Gesellschaft	251	579	43.4	IEEE	251	43.4	ISO/IEC/JTC/ANSI	80	13.8
10	Panasonic Corporation	237	785	30.2	IEEE	237	30.2	International Telecommunication Union	234	29.8
11	Microsoft Corporation	205	380	53.9	IEEE	205	53.9	ISO/IEC/JTC/ANSI	32	8.4
12	Sony Corp	203	802	25.3	International Telecommunication Union	221	27.6	IEEE	203	25.3
13	Dolby Laboratories Inc	192	455	42.2	IEEE	192	42.2	International Telecommunication Union	50	11.0
14	Huawei Technologies Compa	186	476	39.1	IEEE	186	39.1	ISO/IEC/JTC/ANSI	72	15.1
15	Nippon Telegraph & Telepho	168	322	52.2	IEEE	168	52.2	International Telecommunication Union	40	12.4
16	Cisco Systems Inc.	149	321	46.4	IEEE	149	46.4	Internet Soc/IETF-Internet Eng Task Force	25	7.8
17	Siemens Aktiengesellschaft	135	284	47.5	IEEE	135	47.5	ISO/IEC/JTC/ANSI	26	9.2
18	Mitsubishi Electric Corp	133	250	53.2	IEEE	133	53.2	SPIE-Int Soc Opt Engineering	30	12.0
19	Intel Corporation	127	201	63.2	IEEE	127	63.2	ISO/IEC	11	5.5
20	HP Inc	126	247	51.0	IEEE	126	51.0	SPIE-Int Soc Opt Engineering	37	15.0
21	ARRIS Group Inc	123	446	27.6	ISO/IEC/JTC/ANSI	128	28.7	IEEE	123	27.6
22	Canon Inc	104	438	23.7	ISO/IEC/JTC/ANSI	121	27.6	IEEE	104	23.7
23	LG Electronics Inc.	94	315	29.8	IEEE	94	29.8	ISO/IEC/JTC/ANSI	72	22.9
24	NEC Corp	87	203	42.9	IEEE	87	42.9	International Telecommunication Union	24	11.8
25	Apple Inc	86	194	44.3	IEEE	86	44.3	ISO/IEC/JTC/ANSI	25	12.9
26	BT Group PLC	81	152	53.3	IEEE	81	53.3	RELX Group (Elsevier)	14	9.2
27	Electronics and Telecommuni	81	160	50.6	IEEE	81	50.6	ISO/IEC/JTC/ANSI	23	14.4
28	Google Inc.	77	139	55.4	IEEE	77	55.4	ISO/IEC	11	7.9
29	NXP Semiconductors NV	69	104	66.3	IEEE	69	66.3	SID-Society for Information Display	7	6.7
30	InterDigital Inc	68	324	21.0	ISO/IEC/JTC/ANSI	120	37.0	IEEE	68	21.0
31	Eastman Kodak Company	59	183	32.2	IEEE	59	32.2	SPIE-Int Soc Opt Engineering	31	16.9
32	Motorola Solutions Inc.	58	97	59.8	IEEE	58	59.8	SPIE-Int Soc Opt Engineering	7	7.2
33	Blackberry Ltd.	52	71	73.2	IEEE	52	73.2	3GPP General Partnership Project Standards Body	5	7.0
34	Centre National De La Reche	52	85	61.2	IEEE	52	61.2	SPIE-Int Soc Opt Engineering	13	15.3
35	Hon Hai Precision Industry C	49	227	21.6	International Telecommunication Union	97	42.7	IEEE	49	21.6
36	Intellectual Ventures Manage	49	61	80.3	IEEE	49	80.3	ACM-Assoc Comput Mach	4	6.6
37	Deutsche Telekom AG	47	69	68.1	IEEE	47	68.1	IEEE/Eurasip	5	7.2
38	Thales	46	82	56.1	IEEE	46	56.1	SPIE-Int Soc Opt Engineering	14	17.1
39	Technische Universitat Berlin	45	53	84.9	IEEE	45	84.9	IEEE/University of Australia	2	3.8

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Bosch (Robert) GmbH	33	61	54.1	IEEE	33	54.1	SPIE-Int Soc Opt Engineering	6	9.8
41	International Business Machi	32	61	52.5	IEEE	32	52.5	ACM-Assoc Comput Mach	14	23.0
42	Kudelski Group SA	32	77	41.6	IEEE	32	41.6	ACM-Assoc Comput Mach	11	14.3
43	UNIVERSITY OF EAST AN	31	48	64.6	IEEE	31	64.6	ACM-Assoc Comput Mach	4	8.3
44	Politecnico di Torino	29	41	70.7	IEEE	29	70.7	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	4.9
45	ZAKRYTOE AKCIONERN	29	41	70.7	IEEE	29	70.7	SPIE-Int Soc Opt Engineering	7	17.1
46	Sisvel Group	28	39	71.8	IEEE	28	71.8	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	5.1
47	Telecom Italia SPA	26	44	59.1	IEEE	26	59.1	RELX Group (Elsevier)	5	11.4
48	URU INC	25	41	61.0	IEEE	25	61.0	ACM-Assoc Comput Mach	3	7.3
49	Imagination Technologies Gr	24	77	31.2	IEEE	24	31.2	RELX Group (Elsevier)	15	19.5
50	Max-Planck Gesellschaft	23	44	52.3	IEEE	23	52.3	ACM-Assoc Comput Mach	10	22.7
51	Vrije Universiteit Brussel	23	28	82.1	IEEE	23	82.1	RELX Group (Elsevier)	2	7.1
52	Advanced Micro Devices Inc	21	38	55.3	IEEE	21	55.3	RELX Group (Elsevier)	6	15.8
53	ECOLE DE TECHBOLOGIE	21	22	95.5	IEEE	21	95.5	SPIE-Int Soc Opt Engineering	1	4.5
54	Nikon Corp.	21	35	60.0	IEEE	21	60.0	RELX Group (Elsevier)	4	11.4
55	British Broadcasting Corpora	20	41	48.8	IEEE	20	48.8	ISO/IEC/JTC/ANSI	9	22.0
56	Agency for Science Technolo	19	31	61.3	IEEE	19	61.3	SPIE-Int Soc Opt Engineering	3	9.7
57	AT&T Inc	18	33	54.5	IEEE	18	54.5	ACM-Assoc Comput Mach	4	12.1
58	AUSTRIAN RESEARCH CE	18	18	100.0	IEEE	18	100.0			
59	EchoStar Corp	18	40	45.0	IEEE	18	45.0	Internet Soc/IETF-Internet Eng Task Force	4	10.0
60	Friedrich-Alexander-Universi	18	37	48.6	IEEE	18	48.6	ISO/IEC	5	13.5
61	Micron Technology Inc.	18	31	58.1	IEEE	18	58.1	SPIE-Int Soc Opt Engineering	3	9.7
62	Tsinghua University	18	29	62.1	IEEE	18	62.1	INRIA Grenoble - Rhône-Alpes	2	6.9
63	EUCLID DISCOVERIES LL	17	43	39.5	IEEE	17	39.5	RELX Group (Elsevier)	10	23.3
64	Fujitsu Limited	17	41	41.5	IEEE	17	41.5	International Telecommunication Union	6	14.6
65	Honeywell International Inc.	17	34	50.0	IEEE	17	50.0	RELX Group (Elsevier)	4	11.8
66	Nanyang Technological Univ	17	19	89.5	IEEE	17	89.5	ISO/IEC/JTC/ANSI	1	5.3
67	Raytheon Co.	17	34	50.0	IEEE	17	50.0	SPIE-Int Soc Opt Engineering	10	29.4
68	Omron Corp.	16	22	72.7	IEEE	16	72.7	INRIA Grenoble - Rhône-Alpes	2	9.1
69	Sagemcom SAS	16	26	61.5	IEEE	16	61.5	European Telecom Standards Institute (ETSI)	3	11.5
70	Xperi Corporation (Formerly	16	24	66.7	IEEE	16	66.7	ACM-Assoc Comput Mach	4	16.7
71	Ecole Polytechnique Federale	15	35	42.9	IEEE	15	42.9	SPIE-Int Soc Opt Engineering	7	20.0
72	Fuji Film Holdings Corp	15	23	65.2	IEEE	15	65.2	ISO/IEC/JTC/ANSI	2	8.7
73	Royal KPN N.V.	15	42	35.7	IEEE	15	35.7	ISO/IEC	12	28.6
74	Harris Corp.	14	21	66.7	IEEE	14	66.7	RELX Group (Elsevier)	2	9.5
75	Kyung Hee University	14	24	58.3	IEEE	14	58.3	ISO/IEC/JTC/ANSI	3	12.5
76	Netherlands Organization for	14	44	31.8	IEEE	14	31.8	ISO/IEC	12	27.3
77	Toshiba Corp	14	55	25.5	International Telecommunication Union	19	34.5	IEEE	14	25.5
78	University of London	14	16	87.5	IEEE	14	87.5	SPIE-Int Soc Opt Engineering	1	6.3
79	Piksel Inc	13	21	61.9	IEEE	13	61.9	ACM-Assoc Comput Mach	6	28.6
80	Quantel Ltd	13	28	46.4	IEEE	13	46.4	RELX Group (Elsevier)	3	10.7

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	STMicroelectronics	13	16	81.3	IEEE	13	81.3	Penton Media, Inc.	1	6.3
82	University of Strasbourg	13	17	76.5	IEEE	13	76.5	SPIE-Int Soc Opt Engineering	2	11.8
83	University of Stuttgart	13	15	86.7	IEEE	13	86.7	ISO/IEC	1	6.7
84	Barco NV Belgium	12	52	23.1	IEEE	12	23.1	SID-Society for Information Display	10	19.2
85	California Institute of Techno	12	12	100.0	IEEE	12	100.0			
86	Casio Computer	12	20	60.0	IEEE	12	60.0	ISO-International Standards Organization	1	5.0
87	Citrix Systems Inc	12	18	66.7	IEEE	12	66.7	IET/IEE	2	11.1
88	DAVIES PAUL R	12	14	85.7	IEEE	12	85.7	Joint IEEE and ACM	2	14.3
89	IBBT	12	14	85.7	IEEE	12	85.7	IEEE/University of Australia	1	7.1
90	Shizuoka University	12	12	100.0	IEEE	12	100.0			
91	Telefonica SA	12	22	54.5	IEEE	12	54.5	International Conference on Digital Audio Effects	3	13.6
92	Universite Catholique De Lo	12	17	70.6	IEEE	12	70.6	ACM-Assoc Comput Mach	2	11.8
93	Atos SE	11	23	47.8	IEEE	11	47.8	International Telecommunication Union	3	13.0
94	Austrian Institute of Technol	11	13	84.6	IEEE	11	84.6	ACM-Assoc Comput Mach	1	7.7
95	Broadcom Ltd	11	23	47.8	IEEE	11	47.8	DOCSIS Std - Cable Labs	3	13.0
96	Commissariat A L'Energie At	11	23	47.8	IEEE	11	47.8	SPIE-Int Soc Opt Engineering	3	13.0
97	Digimarc Corp.	11	19	57.9	IEEE	11	57.9	ACM-Assoc Comput Mach	4	21.1
98	French National Institute for	11	20	55.0	IEEE	11	55.0	RELX Group (Elsevier)	2	10.0
99	Hitachi Ltd	11	18	61.1	IEEE	11	61.1	IEICE-Inst Elec Info Comm Eng	3	16.7
100	Massachusetts Institute of Te	11	49	22.4	ACM-Assoc Comput Mach	22	44.9	IEEE	11	22.4

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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>Computer Hardware</i>										
1	INDIVIDUAL PATENTER	2406	6063	39.7	IEEE	2406	39.7	ACM-Assoc Comput Mach	832	13.7
2	International Business Machi	341	842	40.5	IEEE	341	40.5	ACM-Assoc Comput Mach	159	18.9
3	Qualcomm Inc	339	780	43.5	IEEE	339	43.5	RELX Group (Elsevier)	67	8.6
4	Koninklijke Philips N.V.	292	740	39.5	IEEE	292	39.5	SID-Society for Information Display	77	10.4
5	Microsoft Corporation	247	768	32.2	IEEE	247	32.2	ACM-Assoc Comput Mach	227	29.6
6	Siemens Aktiengesellschaft	192	484	39.7	IEEE	192	39.7	ACM-Assoc Comput Mach	62	12.8
7	Intel Corporation	177	464	38.1	IEEE	177	38.1	ACM-Assoc Comput Mach	111	23.9
8	Ericsson	160	307	52.1	IEEE	160	52.1	ACM-Assoc Comput Mach	35	11.4
9	Nokia Corp	159	391	40.7	IEEE	159	40.7	ACM-Assoc Comput Mach	81	20.7
10	Oracle Corporation	147	374	39.3	IEEE	147	39.3	ACM-Assoc Comput Mach	82	21.9
11	NEC Corp	101	292	34.6	IEEE	101	34.6	ACM-Assoc Comput Mach	56	19.2
12	Sony Corp	90	267	33.7	IEEE	90	33.7	ACM-Assoc Comput Mach	55	20.6
13	Commissariat A L'Energie At	89	159	56.0	IEEE	89	56.0	ACM-Assoc Comput Mach	17	10.7
14	Technicolor SA	81	169	47.9	IEEE	81	47.9	ACM-Assoc Comput Mach	22	13.0
15	Google Inc.	64	214	29.9	IEEE	64	29.9	ACM-Assoc Comput Mach	35	16.4
16	NXP Semiconductors NV	59	107	55.1	IEEE	59	55.1	Joint IEEE and ACM	15	14.0
17	HP Inc	57	182	31.3	IEEE	57	31.3	ACM-Assoc Comput Mach	20	11.0
18	Bosch (Robert) GmbH	52	103	50.5	IEEE	52	50.5	IET/IEE	15	14.6
19	Panasonic Corporation	51	135	37.8	IEEE	51	37.8	IEICE-Inst Elec Info Comm Eng	16	11.9
20	Apple Inc	50	191	26.2	ACM-Assoc Comput Mach	60	31.4	IEEE	50	26.2
21	Sap SE	47	118	39.8	IEEE	47	39.8	ACM-Assoc Comput Mach	24	20.3
22	Orange	46	109	42.2	IEEE	46	42.2	ACM-Assoc Comput Mach	15	13.8
23	BT Group PLC	45	103	43.7	IEEE	45	43.7	RELX Group (Elsevier)	15	14.6
24	Infineon Technologies AG	40	77	51.9	IEEE	40	51.9	International Association for Cryptologic Research (IACR)	14	18.2
25	Softbank Corp	40	90	44.4	IEEE	40	44.4	ACM-Assoc Comput Mach	18	20.0
26	Fujitsu Limited	39	127	30.7	IEEE	39	30.7	IEICE-Inst Elec Info Comm Eng	25	19.7
27	Cisco Systems Inc.	36	82	43.9	IEEE	36	43.9	ACM-Assoc Comput Mach	12	14.6
28	Western Digital Corp.	35	67	52.2	IEEE	35	52.2	ACM-Assoc Comput Mach	4	6.0
29	CA Inc	32	75	42.7	IEEE	32	42.7	ACM-Assoc Comput Mach	10	13.3
30	Raytheon Co.	32	56	57.1	IEEE	32	57.1	SPIE-Int Soc Opt Engineering	4	7.1
31	Math Works Inc (The)	31	78	39.7	IEEE	31	39.7	RELX Group (Elsevier)	18	23.1
32	Gemalto	30	130	23.1	International Association for Cryptologic Rese	36	27.7	IEEE	30	23.1
33	Advanced Micro Devices Inc	29	56	51.8	IEEE	29	51.8	ACM-Assoc Comput Mach	15	26.8
34	Huawei Technologies Compa	29	73	39.7	IEEE	29	39.7	ACM-Assoc Comput Mach	20	27.4
35	Thales	29	63	46.0	IEEE	29	46.0	ACM-Assoc Comput Mach	10	15.9
36	PACT XPP TECHNOLOGIE	28	36	77.8	IEEE	28	77.8	Joint IEEE and ACM	3	8.3
37	Mitsubishi Electric Corp	27	86	31.4	International Association for Cryptologic Rese	33	38.4	IEEE	27	31.4
38	National Instruments Corp.	27	39	69.2	IEEE	27	69.2	RELX Group (Elsevier)	6	15.4
39	Nippon Telegraph & Telepho	27	139	19.4	International Association for Cryptologic Rese	29	20.9	IEICE-Inst Elec Info Comm Eng	27	19.4

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	MIMOS Berhad	26	38	68.4	IEEE	26	68.4	Joint IEEE and ACM	4	10.5
41	Microchip Technology Inc.	25	46	54.3	IEEE	25	54.3	ACM-Assoc Comput Mach	7	15.2
42	General Electric Company	24	37	64.9	IEEE	24	64.9	RELX Group (Elsevier)	3	8.1
43	Honeywell International Inc.	23	41	56.1	IEEE	23	56.1	ACM-Assoc Comput Mach	5	12.2
44	UNIVERSITA_T POTSDAM	23	27	85.2	IEEE	23	85.2	Joint IEEE and ACM	4	14.8
45	Motorola Solutions Inc.	22	44	50.0	IEEE	22	50.0	ACM-Assoc Comput Mach	9	20.5
46	Blackberry Ltd.	21	44	47.7	IEEE	21	47.7	ACM-Assoc Comput Mach	5	11.4
47	Cadence Design Systems Inc	21	36	58.3	IEEE	21	58.3	Joint IEEE and ACM	8	22.2
48	Dell Technologies Inc	21	57	36.8	IEEE	21	36.8	ACM-Assoc Comput Mach	13	22.8
49	SENSEG OY	21	26	80.8	IEEE	21	80.8	ACM-Assoc Comput Mach	5	19.2
50	TDK Corporation	21	35	60.0	IEEE	21	60.0	ACM-Assoc Comput Mach	5	14.3
51	Centre National De La Reche	20	62	32.3	IEEE	20	32.3	RELX Group (Elsevier)	8	12.9
52	Boeing Co. (The)	19	41	46.3	IEEE	19	46.3	RELX Group (Elsevier)	6	14.6
53	CELOXICA LTD	18	30	60.0	IEEE	18	60.0	Joint IEEE and ACM	5	16.7
54	Eastman Kodak Company	18	64	28.1	IEEE	18	28.1	SID-Society for Information Display	10	15.6
55	Hitachi Ltd	18	71	25.4	IEEE	18	25.4	ACM-Assoc Comput Mach	15	21.1
56	InterDigital Inc	18	38	47.4	IEEE	18	47.4	ACM-Assoc Comput Mach	11	28.9
57	Telecom Italia SPA	18	37	48.6	IEEE	18	48.6	International Association for Cryptologic Research (IACR)	5	13.5
58	Amazon.com Inc.	17	37	45.9	IEEE	17	45.9	The USENIX Association	4	10.8
59	BAE Systems Plc.	17	37	45.9	IEEE	17	45.9	ACM-Assoc Comput Mach	4	10.8
60	Citrix Systems Inc	16	48	33.3	IEEE	16	33.3	ACM-Assoc Comput Mach	13	27.1
61	Fraunhofer Gesellschaft	16	33	48.5	IEEE	16	48.5	ACM-Assoc Comput Mach	8	24.2
62	ST-Ericsson SA (Patents split	16	21	76.2	IEEE	16	76.2	ACM-Assoc Comput Mach	2	9.5
63	Airbus SE	15	33	45.5	IEEE	15	45.5	ACM-Assoc Comput Mach	6	18.2
64	Broadcom Ltd	15	19	78.9	IEEE	15	78.9	ACM-Assoc Comput Mach	4	21.1
65	Hewlett Packard Enterprises	14	39	35.9	IEEE	14	35.9	RELX Group (Elsevier)	7	17.9
66	QuickSilver Technology Inc	14	25	56.0	IEEE	14	56.0	Joint IEEE and ACM	5	20.0
67	Telefonica SA	14	32	43.8	IEEE	14	43.8	ACM-Assoc Comput Mach	11	34.4
68	IDEMIA	13	36	36.1	IEEE	13	36.1	International Association for Cryptologic Research (IACR)	7	19.4
69	STMicroelectronics	13	25	52.0	IEEE	13	52.0	International Association for Cryptologic Research (IACR)	2	8.0
70	AB Initio Technology LLC	12	28	42.9	IEEE	12	42.9	ACM-Assoc Comput Mach	8	28.6
71	FTS ComputerTechnik	12	16	75.0	IEEE	12	75.0	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	12.5
72	Giesecke & Devrient Group	12	46	26.1	IEEE	12	26.1	ACM-Assoc Comput Mach	9	19.6
73	Harris Corp.	12	23	52.2	IEEE	12	52.2	ACM-Assoc Comput Mach	4	17.4
74	INCHRON GMBH	12	17	70.6	IEEE	12	70.6	ASME-Am Soc Mech Eng	1	5.9
75	Netapp Inc	12	28	42.9	IEEE	12	42.9	Joint IEEE and ACM	6	21.4
76	Samsung Electronics Co Ltd	12	40	30.0	ACM-Assoc Comput Mach	12	30.0	IEEE	12	30.0
77	TUBITAK	12	15	80.0	IEEE	12	80.0	ACM-Assoc Comput Mach	1	6.7
78	Aselsan Elektronik Sanayi Ve	11	24	45.8	IEEE	11	45.8	RELX Group (Elsevier)	5	20.8
79	INTRINSIC ID BV	11	17	64.7	IEEE	11	64.7	International Association for Cryptologic Research (IACR)	3	17.6
80	Xilinx Inc.	11	18	61.1	IEEE	11	61.1	Joint IEEE and ACM	2	11.1

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81	ABB Ltd	10	34	29.4	IEEE	10	29.4	ACM-Assoc Comput Mach	5	14.7
82	Analog Devices Inc.	10	14	71.4	IEEE	10	71.4	Maruzen Co., Ltd/Maruzen Kabushikikaisha	1	7.1
83	AT&T Inc	10	14	71.4	IEEE	10	71.4	ACM-Assoc Comput Mach	2	14.3
84	COGNITIVE ELECTRONIC	10	10	100.0	IEEE	10	100.0			
85	Imagination Technologies Gr	10	28	35.7	IEEE	10	35.7	Joint IEEE and ACM	7	25.0
86	Immersion Corp.	10	23	43.5	ACM-Assoc Comput Mach	11	47.8	IEEE	10	43.5
87	National University of Singap	10	16	62.5	IEEE	10	62.5	ACM-Assoc Comput Mach	3	18.8
88	Schneider Electric S.A.	10	13	76.9	IEEE	10	76.9	Penton Media, Inc.	1	7.7
89	Texas Instruments Inc	10	11	90.9	IEEE	10	90.9	NORTH-HOLLAND PUBLISHING COMPANY AMSTERD	1	9.1
90	Toshiba Corp	10	32	31.3	IEEE	10	31.3	International Association for Cryptologic Research (IACR)	5	15.6
91	TUBITAK-TURKIYE BILIM	10	14	71.4	IEEE	10	71.4	International Association for Cryptologic Research (IACR)	1	7.1
92	VIA ALLIANCE SEMICON	10	13	76.9	IEEE	10	76.9	IBM Corp.	3	23.1
93	Bundesdruckerei GmbH	9	36	25.0	IEEE	9	25.0	International Telecommunication Union	4	11.1
94	Hon Hai Precision Industry C	9	51	17.6	SID-Society for Information Display	20	39.2	IEEE	9	17.6
95	Massachusetts Institute of Te	9	107	8.4	Nature Publishing Group	21	19.6	Natl Acad Sciences	15	14.0
96	Symantec Corp.	9	29	31.0	IEEE	9	31.0	The USENIX Association	4	13.8
97	Unisys Corp.	9	32	28.1	ACM-Assoc Comput Mach	15	46.9	IEEE	9	28.1
98	Universidad Politecnica de M	9	13	69.2	IEEE	9	69.2	ACM-Assoc Comput Mach	2	15.4
99	Verizon Communications Inc	9	28	32.1	IEEE	9	32.1	Natl Acad Sciences	4	14.3
100	AUTOMATIC PARALLEL	8	10	80.0	IEEE	8	80.0	Maruzen Co., Ltd/Maruzen Kabushikikaisha	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
<i>Computer Software</i>										
1	INDIVIDUAL PATENTER	7540	18298	41.2	IEEE	7540	41.2	RELX Group (Elsevier)	2134	11.7
2	Koninklijke Philips N.V.	1987	4521	44.0	IEEE	1987	44.0	RELX Group (Elsevier)	609	13.5
3	Qualcomm Inc	886	1648	53.8	IEEE	886	53.8	ACM-Assoc Comput Mach	108	6.6
4	Siemens Aktiengesellschaft	726	1605	45.2	IEEE	726	45.2	RELX Group (Elsevier)	277	17.3
5	Fraunhofer Gesellschaft	663	1370	48.4	IEEE	663	48.4	Audio Eng Soc	213	15.5
6	Technicolor SA	530	1057	50.1	IEEE	530	50.1	ACM-Assoc Comput Mach	124	11.7
7	Microsoft Corporation	513	1308	39.2	IEEE	513	39.2	ACM-Assoc Comput Mach	313	23.9
8	Nokia Corp	429	769	55.8	IEEE	429	55.8	ACM-Assoc Comput Mach	83	10.8
9	Orange	316	601	52.6	IEEE	316	52.6	RELX Group (Elsevier)	61	10.1
10	Panasonic Corporation	285	498	57.2	IEEE	285	57.2	IEICE-Inst Elec Info Comm Eng	46	9.2
11	Sony Corp	275	597	46.1	IEEE	275	46.1	ACM-Assoc Comput Mach	51	8.5
12	Google Inc.	262	650	40.3	IEEE	262	40.3	ACM-Assoc Comput Mach	132	20.3
13	Mitsubishi Electric Corp	241	440	54.8	IEEE	241	54.8	RELX Group (Elsevier)	54	12.3
14	Ericsson	234	456	51.3	IEEE	234	51.3	ACM-Assoc Comput Mach	36	7.9
15	International Business Machi	222	639	34.7	IEEE	222	34.7	ACM-Assoc Comput Mach	125	19.6
16	Dolby Laboratories Inc	216	509	42.4	IEEE	216	42.4	Audio Eng Soc	86	16.9
17	NEC Corp	181	465	38.9	IEEE	181	38.9	IEICE-Inst Elec Info Comm Eng	79	17.0
18	Intel Corporation	171	307	55.7	IEEE	171	55.7	ACM-Assoc Comput Mach	36	11.7
19	Apple Inc	167	377	44.3	IEEE	167	44.3	ACM-Assoc Comput Mach	44	11.7
20	Commissariat A L'Energie At	164	310	52.9	IEEE	164	52.9	RELX Group (Elsevier)	43	13.9
21	Eastman Kodak Company	164	349	47.0	IEEE	164	47.0	ACM-Assoc Comput Mach	61	17.5
22	HP Inc	132	287	46.0	IEEE	132	46.0	RELX Group (Elsevier)	40	13.9
23	Friedrich-Alexander-Universi	130	265	49.1	IEEE	130	49.1	Audio Eng Soc	48	18.1
24	Harris Corp.	127	217	58.5	IEEE	127	58.5	RELX Group (Elsevier)	24	11.1
25	Bosch (Robert) GmbH	123	222	55.4	IEEE	123	55.4	RELX Group (Elsevier)	26	11.7
26	BT Group PLC	118	270	43.7	IEEE	118	43.7	RELX Group (Elsevier)	30	11.1
27	Huawei Technologies Compa	116	218	53.2	IEEE	116	53.2	International Telecommunication Union	16	7.3
28	Motorola Solutions Inc.	109	175	62.3	IEEE	109	62.3	ACM-Assoc Comput Mach	10	5.7
29	Nuance Communications Inc	106	188	56.4	IEEE	106	56.4	ISCA (International Speech Communication Association)	30	16.0
30	Centre National De La Reche	97	290	33.4	IEEE	97	33.4	RELX Group (Elsevier)	34	11.7
31	Roche Holding Ltd.	93	309	30.1	IEEE	93	30.1	RELX Group (Elsevier)	34	11.0
32	Xperi Corporation (Formerly	93	142	65.5	IEEE	93	65.5	RELX Group (Elsevier)	13	9.2
33	General Electric Company	91	240	37.9	IEEE	91	37.9	RELX Group (Elsevier)	41	17.1
34	Raytheon Co.	91	183	49.7	IEEE	91	49.7	RELX Group (Elsevier)	26	14.2
35	Honeywell International Inc.	84	136	61.8	IEEE	84	61.8	RELX Group (Elsevier)	17	12.5
36	Oracle Corporation	79	203	38.9	IEEE	79	38.9	ACM-Assoc Comput Mach	53	26.1
37	Telefonica SA	78	170	45.9	IEEE	78	45.9	ACM-Assoc Comput Mach	49	28.8
38	Netherlands Organization for	77	141	54.6	IEEE	77	54.6	RELX Group (Elsevier)	13	9.2
39	Samsung Electronics Co Ltd	76	123	61.8	IEEE	76	61.8	Audio Eng Soc	10	8.1

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Thales	76	168	45.2	IEEE	76	45.2	RELX Group (Elsevier)	21	12.5
41	Airbus SE	72	175	41.1	IEEE	72	41.1	RELX Group (Elsevier)	43	24.6
42	Canon Inc	71	166	42.8	IEEE	71	42.8	RELX Group (Elsevier)	26	15.7
43	Continental AG (Germany Fe	71	112	63.4	IEEE	71	63.4	RELX Group (Elsevier)	8	7.1
44	NXP Semiconductors NV	68	110	61.8	IEEE	68	61.8	ACM-Assoc Comput Mach	9	8.2
45	University of Oxford	67	137	48.9	IEEE	67	48.9	RELX Group (Elsevier)	15	10.9
46	BAE Systems Plc.	66	118	55.9	IEEE	66	55.9	RELX Group (Elsevier)	16	13.6
47	Telecom Italia SPA	66	125	52.8	IEEE	66	52.8	ACM-Assoc Comput Mach	13	10.4
48	University of London	66	139	47.5	IEEE	66	47.5	RELX Group (Elsevier)	19	13.7
49	Nippon Telegraph & Telepho	65	132	49.2	IEEE	65	49.2	IEICE-Inst Elec Info Comm Eng	14	10.6
50	Toyota Motor Corp	64	108	59.3	IEEE	64	59.3	RELX Group (Elsevier)	14	13.0
51	Agency for Science Technolo	61	126	48.4	IEEE	61	48.4	RELX Group (Elsevier)	13	10.3
52	Valeo S.A.	61	92	66.3	IEEE	61	66.3	RELX Group (Elsevier)	6	6.5
53	LG Electronics Inc.	59	248	23.8	ISO/IEC/JTC/ANSI	70	28.2	Audio Eng Soc	62	25.0
54	Blackberry Ltd.	57	89	64.0	IEEE	57	64.0	RELX Group (Elsevier)	11	12.4
55	Cisco Systems Inc.	54	135	40.0	IEEE	54	40.0	Internet Soc/IETF-Internet Eng Task Force	19	14.1
56	Honda Motor Co. Ltd.(Honda	54	83	65.1	IEEE	54	65.1	IEEE/RSJ	7	8.4
57	Massachusetts Institute of Te	54	530	10.2	Nature Publishing Group	107	20.2	Cell Press	73	13.8
58	IDEMIA	52	117	44.4	IEEE	52	44.4	ACM-Assoc Comput Mach	14	12.0
59	Infineon Technologies AG	50	80	62.5	IEEE	50	62.5	Joint IEEE and ACM	14	17.5
60	Advanced Micro Devices Inc	49	88	55.7	IEEE	49	55.7	ACM-Assoc Comput Mach	13	14.8
61	Toshiba Corp	49	90	54.4	IEEE	49	54.4	RELX Group (Elsevier)	7	7.8
62	Daimler AG	46	84	54.8	IEEE	46	54.8	RELX Group (Elsevier)	20	23.8
63	French National Institute for	45	150	30.0	IEEE	45	30.0	RELX Group (Elsevier)	24	16.0
64	ABB Ltd	42	79	53.2	IEEE	42	53.2	RELX Group (Elsevier)	9	11.4
65	Synopsys Inc.	41	82	50.0	IEEE	41	50.0	Joint IEEE and ACM	25	30.5
66	Max-Planck Gesellschaft	39	178	21.9	ACM-Assoc Comput Mach	56	31.5	IEEE	39	21.9
67	Sap SE	39	126	31.0	ACM-Assoc Comput Mach	42	33.3	IEEE	39	31.0
68	Catholic University Leuven	37	122	30.3	IEEE	37	30.3	ACS-Am Chem Soc	19	15.6
69	CSIC-Consejo Superior De In	37	46	80.4	IEEE	37	80.4	SPIE-Int Soc Opt Engineering	3	6.5
70	Voiceage Corporation	37	60	61.7	IEEE	37	61.7	3GPP General Partnership Project Standards Body	6	10.0
71	Institut Polytechnique de Gre	36	44	81.8	IEEE	36	81.8	SPIE-Int Soc Opt Engineering	4	9.1
72	Softbank Corp	36	81	44.4	IEEE	36	44.4	RELX Group (Elsevier)	11	13.6
73	Technische Universitat Berlin	36	59	61.0	IEEE	36	61.0	RELX Group (Elsevier)	4	6.8
74	Yissum Research Developme	36	57	63.2	IEEE	36	63.2	ACM-Assoc Comput Mach	7	12.3
75	TomTom NV	35	63	55.6	IEEE	35	55.6	RELX Group (Elsevier)	7	11.1
76	Aselsan Elektronik Sanayi Ve	34	61	55.7	IEEE	34	55.7	RELX Group (Elsevier)	6	9.8
77	Qinetiq Group Ltd	34	64	53.1	IEEE	34	53.1	RELX Group (Elsevier)	4	6.3
78	Medtronic Inc	33	129	25.6	IEEE	33	25.6	RELX Group (Elsevier)	22	17.1
79	Verizon Communications Inc	33	77	42.9	IEEE	33	42.9	ACM-Assoc Comput Mach	18	23.4
80	Cognex Corp.	32	59	54.2	IEEE	32	54.2	ACM-Assoc Comput Mach	6	10.2

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Ecole Polytechnique Federale	32	69	46.4	IEEE	32	46.4	ACM-Assoc Comput Mach	17	24.6
82	Electronics and Telecommuni	32	75	42.7	IEEE	32	42.7	Audio Eng Soc	11	14.7
83	University of Tokyo	32	52	61.5	IEEE	32	61.5	ACM-Assoc Comput Mach	6	11.5
84	Schneider Electric S.A.	31	52	59.6	IEEE	31	59.6	ASME-Am Soc Mech Eng	4	7.7
85	Technische Universiteit Eind	31	44	70.5	IEEE	31	70.5	American Institute of Physics	4	9.1
86	Broadcom Ltd	30	54	55.6	IEEE	30	55.6	Audio Eng Soc	13	24.1
87	Carl-Zeiss Stiftung	30	89	33.7	IEEE	30	33.7	RELX Group (Elsevier)	17	19.1
88	Xilinx Inc.	30	38	78.9	IEEE	30	78.9	Joint IEEE and ACM	4	10.5
89	CA Inc	29	59	49.2	IEEE	29	49.2	RELX Group (Elsevier)	5	8.5
90	Imperial College	29	66	43.9	IEEE	29	43.9	RELX Group (Elsevier)	10	15.2
91	ZAKRYTOE AKCIONERN	29	42	69.0	IEEE	29	69.0	SPIE-Int Soc Opt Engineering	7	16.7
92	BrainLAB AG	28	90	31.1	IEEE	28	31.1	RELX Group (Elsevier)	15	16.7
93	Boeing Co. (The)	27	106	25.5	RELX Group (Elsevier)	30	28.3	IEEE	27	25.5
94	CUEA Aquitaine	27	43	62.8	IEEE	27	62.8	RELX Group (Elsevier)	5	11.6
95	Technion - Israel Institute of	27	59	45.8	IEEE	27	45.8	ACM-Assoc Comput Mach	13	22.0
96	University of Gent	27	49	55.1	IEEE	27	55.1	RELX Group (Elsevier)	9	18.4
97	Lockheed Martin Corp.	26	47	55.3	IEEE	26	55.3	RELX Group (Elsevier)	6	12.8
98	Omron Corp.	26	44	59.1	IEEE	26	59.1	RELX Group (Elsevier)	3	6.8
99	ST-Ericsson SA (Patents split	26	44	59.1	IEEE	26	59.1	ACM-Assoc Comput Mach	6	13.6
100	University of California	26	386	6.7	Nature Publishing Group	100	25.9	Cell Press	70	18.1

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

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	INDIVIDUAL PATENTER	1098	7341	15.0	RELX Group (Elsevier)	1754	23.9	IEEE	1098	15.0
2	Koninklijke Philips N.V.	610	2255	27.1	IEEE	610	27.1	RELX Group (Elsevier)	295	13.1
3	Medtronic Inc	97	740	13.1	RELX Group (Elsevier)	197	26.6	IEEE	97	13.1
4	Boston Scientific Corp.	89	677	13.1	RELX Group (Elsevier)	206	30.4	IEEE	89	13.1
5	Hitachi Ltd	72	145	49.7	IEEE	72	49.7	Society of Magnetic Resonance in Medicine (SMRM)	19	13.1
6	Ecole Polytechnique Federale	71	213	33.3	IEEE	71	33.3	RELX Group (Elsevier)	42	19.7
7	University of Minnesota (The	58	135	43.0	IEEE	58	43.0	RELX Group (Elsevier)	24	17.8
8	Siemens Aktiengesellschaft	53	203	26.1	IEEE	53	26.1	RELX Group (Elsevier)	31	15.3
9	Massachusetts Institute of Te	48	413	11.6	RELX Group (Elsevier)	78	18.9	IEEE	48	11.6
10	Abbott Laboratories	42	455	9.2	RELX Group (Elsevier)	147	32.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	58	12.7
11	Centre National De La Reche	41	309	13.3	RELX Group (Elsevier)	78	25.2	IEEE	41	13.3
12	Olympus Corp.	41	95	43.2	IEEE	41	43.2	RELX Group (Elsevier)	7	7.4
13	Agency for Science Technolo	34	73	46.6	IEEE	34	46.6	RELX Group (Elsevier)	12	16.4
14	Canon Inc	31	191	16.2	SPIE-Int Soc Opt Engineering	37	19.4	American Institute of Physics	32	16.8
15	Imperial College	29	77	37.7	IEEE	29	37.7	Lippincott Williams & Wilkins Ltd.	12	15.6
16	Commissariat A L'Energie At	27	81	33.3	IEEE	27	33.3	RELX Group (Elsevier)	16	19.8
17	DraegerWerk AG	22	34	64.7	IEEE	22	64.7	Churchill Livingstone	2	5.9
18	General Electric Company	22	111	19.8	IEEE	22	19.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	21	18.9
19	Vanderbilt University	21	29	72.4	IEEE	21	72.4	RELX Group (Elsevier)	2	6.9
20	Qualcomm Inc	19	28	67.9	IEEE	19	67.9	RELX Group (Elsevier)	2	7.1
21	Rhode Island Board of Gover	19	28	67.9	IEEE	19	67.9	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	7.1
22	Swiss Federal Institute of Tec	19	114	16.7	RELX Group (Elsevier)	33	28.9	IEEE	19	16.7
23	University of Florida	19	64	29.7	IEEE	19	29.7	RELX Group (Elsevier)	14	21.9
24	National University of Ireland	18	61	29.5	IEEE	18	29.5	RELX Group (Elsevier)	10	16.4
25	THE REGISTRAR INDIAN I	18	22	81.8	IEEE	18	81.8	RELX Group (Elsevier)	2	9.1
26	University of Connecticut	18	69	26.1	IEEE	18	26.1	RELX Group (Elsevier)	10	14.5
27	Carl-Zeiss Stiftung	17	169	10.1	Optical Society of America	37	21.9	RELX Group (Elsevier)	30	17.8
28	Cleveland Clinic (and Found	17	68	25.0	IEEE	17	25.0	RELX Group (Elsevier)	10	14.7
29	Fraunhofer Gesellschaft	17	52	32.7	IEEE	17	32.7	RELX Group (Elsevier)	14	26.9
30	Johns Hopkins University	17	109	15.6	RELX Group (Elsevier)	28	25.7	IEEE	17	15.6
31	TDK Corporation	17	24	70.8	IEEE	17	70.8	RELX Group (Elsevier)	3	12.5
32	University of California	17	113	15.0	RELX Group (Elsevier)	30	26.5	American Physiological Society	17	15.0
33	Cochlear Ltd	16	26	61.5	IEEE	16	61.5	American Institute of Physics	4	15.4
34	University of London	16	160	10.0	RELX Group (Elsevier)	32	20.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	22	13.8
35	University of Wisconsin	16	71	22.5	IEEE	16	22.5	RELX Group (Elsevier)	10	14.1
36	Johnson & Johnson	15	457	3.3	RELX Group (Elsevier)	118	25.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	58	12.7
37	Partners HealthCare Systems	15	103	14.6	Optical Society of America	24	23.3	RELX Group (Elsevier)	16	15.5
38	University of Oxford	15	74	20.3	IEEE	15	20.3	RELX Group (Elsevier)	13	17.6
39	Institut National de la Sante e	14	277	5.1	RELX Group (Elsevier)	76	27.4	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	26	9.4

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Intuitive Surgical Inc.	14	28	50.0	IEEE	14	50.0	World Academy of Science Engineering and Technology	4	14.3
41	Panasonic Corporation	14	33	42.4	IEEE	14	42.4	IEICE-Inst Elec Info Comm Eng	6	18.2
42	SCUOLA SUPERIORE DI S	14	39	35.9	IEEE	14	35.9	RELX Group (Elsevier)	8	20.5
43	Technical University of Den	14	27	51.9	IEEE	14	51.9	RELX Group (Elsevier)	4	14.8
44	CORTIUS HOLDING BV	13	23	56.5	IEEE	13	56.5	American Physiological Society	4	17.4
45	National University of Singap	13	31	41.9	IEEE	13	41.9	SPIE-Int Soc Opt Engineering	3	9.7
46	Commonwealth Scientific an	12	15	80.0	IEEE	12	80.0	American Physiological Society	2	13.3
47	Dentsply Serona Inc	12	40	30.0	IEEE	12	30.0	RELX Group (Elsevier)	7	17.5
48	Technische Universitat Muni	12	17	70.6	IEEE	12	70.6	American Institute of Physics	1	5.9
49	CSIC-Consejo Superior De In	11	22	50.0	IEEE	11	50.0	Optical Society of America	4	18.2
50	Universite Pierre & Marie Cu	11	62	17.7	RELX Group (Elsevier)	19	30.6	IEEE	11	17.7
51	University of Queensland	11	23	47.8	IEEE	11	47.8	RELX Group (Elsevier)	5	21.7
52	Consiglio Nazionale Delle Ri	10	83	12.0	RELX Group (Elsevier)	23	27.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	11	13.3
53	Michigan State University	10	22	45.5	IEEE	10	45.5	American Physiological Society	4	18.2
54	Moh Holdings Pte Ltd	10	22	45.5	IEEE	10	45.5	SPIE-Int Soc Opt Engineering	3	13.6
55	Netherlands Organization for	10	33	30.3	IEEE	10	30.3	RELX Group (Elsevier)	7	21.2
56	Pennsylvania State University	10	22	45.5	IEEE	10	45.5	SPIE-Int Soc Opt Engineering	8	36.4
57	Virginia Tech University	10	80	12.5	RELX Group (Elsevier)	17	21.3	IEEE	10	12.5
58	BrainLAB AG	9	42	21.4	IEEE	9	21.4	RELX Group (Elsevier)	9	21.4
59	CARDIOLOGS TECHNOLO	9	16	56.3	IEEE	9	56.3	Neural Information Processing Systems Foundation	2	12.5
60	Fuji Film Holdings Corp	9	58	15.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	11	19.0	RELX Group (Elsevier)	10	17.2
61	Procter & Gamble Co.	9	133	6.8	ACS-Am Chem Soc	37	27.8	RELX Group (Elsevier)	17	12.8
62	University of Washington	9	29	31.0	IEEE	9	31.0	American Institute of Physics	5	17.2
63	Accuray Inc	8	19	42.1	IEEE	8	42.1	RELX Group (Elsevier)	4	21.1
64	Analogic Corporation	8	16	50.0	IEEE	8	50.0	American Institute of Physics	2	12.5
65	Bang & Olufsen Holding A/S	8	9	88.9	IEEE	8	88.9	Computers in Cardiology, Inc.	1	11.1
66	Bracco S.P.A.	8	32	25.0	IEEE	8	25.0	RELX Group (Elsevier)	8	25.0
67	COMPUMEDICS LTD	8	8	100.0	IEEE	8	100.0			
68	Med-El GmbH	8	35	22.9	IEEE	8	22.9	RELX Group (Elsevier)	6	17.1
69	Stryker Corp.	8	29	27.6	IEEE	8	27.6	RELX Group (Elsevier)	7	24.1
70	SWISSTOM AG	8	12	66.7	IEEE	8	66.7	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	16.7
71	United States Health & Huma	8	38	21.1	IEEE	8	21.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	6	15.8
72	Universitat Politecnica De Ca	8	23	34.8	IEEE	8	34.8	Optical Society of America	6	26.1
73	University of Michigan	8	52	15.4	RELX Group (Elsevier)	15	28.8	IEEE	8	15.4
74	Baxter International Inc.	7	99	7.1	RELX Group (Elsevier)	25	25.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	15	15.2
75	Becton Dickinson and Co.	7	55	12.7	RELX Group (Elsevier)	13	23.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	9	16.4
76	Callaghan Innovation	7	9	77.8	IEEE	7	77.8	American Physiological Society	1	11.1
77	CENTRE DE RECHERCHE	7	27	25.9	RELX Group (Elsevier)	9	33.3	IEEE	7	25.9
78	Elekta AB	7	37	18.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	15	40.5	American Institute of Physics	7	18.9
79	Erasmus University	7	38	18.4	RELX Group (Elsevier)	12	31.6	SPIE-Int Soc Opt Engineering	8	21.1
80	Gesellschaft fuer Schwerione	7	46	15.2	American Institute of Physics	11	23.9	RELX Group (Elsevier)	7	15.2

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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	Google Inc.	7	24	29.2	IEEE	7	29.2	RELX Group (Elsevier)	6	25.0
82	IEETA-INSTITUTO DE EN	7	9	77.8	IEEE	7	77.8	RELX Group (Elsevier)	1	11.1
83	KONINKLIJKE PHILIPS NV	7	36	19.4	IEEE	7	19.4	American Institute of Physics	5	13.9
84	Mayo Foundation for Medica	7	40	17.5	RELX Group (Elsevier)	8	20.0	IEEE	7	17.5
85	Otto Bock Holding GmbH &	7	15	46.7	IEEE	7	46.7	RELX Group (Elsevier)	2	13.3
86	Purdue University	7	15	46.7	IEEE	7	46.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2	13.3
87	Roche Holding Ltd.	7	105	6.7	RELX Group (Elsevier)	19	18.1	Natl Acad Sciences	11	10.5
88	Second Sight Medical Produc	7	21	33.3	RELX Group (Elsevier)	8	38.1	IEEE	7	33.3
89	SHEFFIELD HALLAM UNI	7	15	46.7	IEEE	7	46.7	RELX Group (Elsevier)	4	26.7
90	Sonova Holding AG	7	42	16.7	Acoustical Society of America	7	16.7	IEEE	7	16.7
91	Sony Corp	7	15	46.7	IEEE	7	46.7	SPIE-Int Soc Opt Engineering	2	13.3
92	Technische Universitat Dresd	7	35	20.0	RELX Group (Elsevier)	8	22.9	IEEE	7	20.0
93	TechUnivDelft	7	19	36.8	IEEE	7	36.8	RELX Group (Elsevier)	4	21.1
94	Tohoku University	7	36	19.4	IEEE	7	19.4	Nature Publishing Group	6	16.7
95	UNIVERSIDADE DE AVEI	7	21	33.3	IEEE	7	33.3	RELX Group (Elsevier)	6	28.6
96	UNIVERSITE CERGY-PON	7	27	25.9	RELX Group (Elsevier)	9	33.3	IEEE	7	25.9
97	Universite Libre de Bruxelles	7	19	36.8	IEEE	7	36.8	RELX Group (Elsevier)	4	21.1
98	University of Bristol	7	19	36.8	IEEE	7	36.8	RELX Group (Elsevier)	5	26.3
99	Aalborg University	6	46	13.0	IEEE	6	13.0	Springer/Sp. Wien/Springer-Verlag/KluwAcad	5	10.9
100	Bardy Diagnostics Inc	6	7	85.7	IEEE	6	85.7	Blackwell Publishing Inc.	1	14.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>Information Storage</i>										
1	INDIVIDUAL PATENTER	615	1591	38.7	IEEE	615	38.7	American Institute of Physics	131	8.2
2	Koninklijke Philips N.V.	218	437	49.9	IEEE	218	49.9	INST PURE APPLIED PHYSICS	42	9.6
3	Western Digital Corp.	206	256	80.5	IEEE	206	80.5	IEEE/JPN Soc App Phys	18	7.0
4	International Business Machi	86	170	50.6	IEEE	86	50.6	ACM-Assoc Comput Mach	20	11.8
5	Qualcomm Inc	67	123	54.5	IEEE	67	54.5	Joint IEEE and ACM	17	13.8
6	Infineon Technologies AG	45	96	46.9	IEEE	45	46.9	American Institute of Physics	11	11.5
7	Technicolor SA	41	96	42.7	IEEE	41	42.7	INST PURE APPLIED PHYSICS	23	24.0
8	Intel Corporation	34	75	45.3	IEEE	34	45.3	Joint IEEE and ACM	14	18.7
9	Oracle Corporation	30	113	26.5	ACM-Assoc Comput Mach	36	31.9	IEEE	30	26.5
10	Sony Corp	30	88	34.1	IEEE	30	34.1	Nikkei Business Publications, Inc.	9	10.2
11	Seagate Technology Plc	28	66	42.4	IEEE	28	42.4	American Institute of Physics	17	25.8
12	NXP Semiconductors NV	22	41	53.7	IEEE	22	53.7	ACM-Assoc Comput Mach	7	17.1
13	Centre National De La Reche	21	57	36.8	IEEE	21	36.8	American Institute of Physics	14	24.6
14	Apple Inc	20	36	55.6	IEEE	20	55.6	Japan Society of Applied Physics	3	8.3
15	Commissariat A L'Energie At	18	83	21.7	IEEE	18	21.7	American Institute of Physics	14	16.9
16	Broadcom Ltd	16	17	94.1	IEEE	16	94.1	IEEE/NASA	1	5.9
17	HP Inc	16	57	28.1	IEEE	16	28.1	Joint IEEE and ACM	9	15.8
18	Micron Technology Inc.	16	28	57.1	IEEE	16	57.1	RELX Group (Elsevier)	2	7.1
19	Nokia Corp	16	35	45.7	IEEE	16	45.7	The USENIX Association	5	14.3
20	Fujitsu Limited	13	45	28.9	IEEE	13	28.9	Joint IEEE and ACM	7	15.6
21	Microsoft Corporation	13	50	26.0	ACM-Assoc Comput Mach	16	32.0	IEEE	13	26.0
22	Advanced Micro Devices Inc	12	43	27.9	IEEE	12	27.9	ACM-Assoc Comput Mach	9	20.9
23	Softbank Corp	12	25	48.0	IEEE	12	48.0	Joint IEEE and ACM	8	32.0
24	Fraunhofer Gesellschaft	11	23	47.8	IEEE	11	47.8	Audio Eng Soc	3	13.0
25	Honeywell International Inc.	11	13	84.6	IEEE	11	84.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	7.7
26	Panasonic Corporation	11	71	15.5	INST PURE APPLIED PHYSICS	12	16.9	IEEE	11	15.5
27	Conversant Intellectual Prope	10	13	76.9	IEEE	10	76.9	Joint IEEE and ACM	1	7.7
28	Universitat Politecnica De Ca	10	12	83.3	IEEE	10	83.3	Natl Acad Sciences	1	8.3
29	NEC Corp	9	27	33.3	IEEE	9	33.3	ACM-Assoc Comput Mach	8	29.6
30	Tel Aviv Univiversity	9	9	100.0	IEEE	9	100.0			
31	Universite de Montpellier	9	10	90.0	IEEE	9	90.0	INST PURE APPLIED PHYSICS	1	10.0
32	Hitachi Ltd	8	26	30.8	IEEE	8	30.8	ACM-Assoc Comput Mach	4	15.4
33	Microchip Technology Inc.	8	12	66.7	IEEE	8	66.7	RELX Group (Elsevier)	2	16.7
34	Motorola Solutions Inc.	8	19	42.1	IEEE	8	42.1	American Institute of Physics	5	26.3
35	ZENO SEMICONDUCTOR I	8	10	80.0	IEEE	8	80.0	IEEE/JPN Soc App Phys	2	20.0
36	BT Group PLC	7	13	53.8	IEEE	7	53.8	RELX Group (Elsevier)	3	23.1
37	King Abdullah University of	7	11	63.6	IEEE	7	63.6	American Institute of Physics	2	18.2
38	TiVo Corp	7	13	53.8	IEEE	7	53.8	ECMA International	2	15.4
39	Universitat Autònoma de Bar	7	9	77.8	IEEE	7	77.8	Joint IEEE and ACM	1	11.1

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Cypress Semiconductor Corp.	6	20	30.0	IEEE	6	30.0	American Institute of Physics	4	20.0
41	Interuniversity MicroElectron	6	15	40.0	IEEE	6	40.0	Joint IEEE and ACM	3	20.0
42	TDK Corporation	6	18	33.3	IEEE	6	33.3	SPIE-Int Soc Opt Engineering	4	22.2
43	Toshiba Corp	6	16	37.5	IEEE	6	37.5	The USENIX Association	3	18.8
44	Cisco Systems Inc.	5	13	38.5	IEEE	5	38.5	International Telecommunication Union	2	15.4
45	Ericsson	5	16	31.3	IEEE	5	31.3	International Association for Cryptologic Research (IACR)	2	12.5
46	National University of Singap	5	5	100.0	IEEE	5	100.0			
47	Rambus Inc.	5	6	83.3	IEEE	5	83.3	ACM-Assoc Comput Mach	1	16.7
48	STMicroelectronics	5	8	62.5	IEEE	5	62.5	IEEE/JPN Soc App Phys	1	12.5
49	University of California	5	6	83.3	IEEE	5	83.3	American Institute of Physics	1	16.7
50	AMPEX CORP	4	4	100.0	IEEE	4	100.0			
51	ARRIS Group Inc	4	9	44.4	IEEE	4	44.4	Baltzer Science Publishers B.V.	1	11.1
52	Bayer AG	4	85	4.7	ACS-Am Chem Soc	57	67.1	RELX Group (Elsevier)	11	12.9
53	California Institute of Techno	4	5	80.0	IEEE	4	80.0	Joint IEEE and ACM	1	20.0
54	Dell Technologies Inc	4	7	57.1	IEEE	4	57.1	RELX Group (Elsevier)	2	28.6
55	Forschungszentrum Julich	4	12	33.3	IEEE	4	33.3	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	16.7
56	Google Inc.	4	5	80.0	IEEE	4	80.0	ACM-Assoc Comput Mach	1	20.0
57	IDATAMAP PTY LTD	4	4	100.0	IEEE	4	100.0			
58	Innovative Network Corporat	4	6	66.7	IEEE	4	66.7	IP.Com	1	16.7
59	Leibniz-Institut fur Festkorpe	4	15	26.7	American Institute of Physics	5	33.3	American Physical Society	4	26.7
60	Massachusetts Institute of Te	4	16	25.0	RELX Group (Elsevier)	4	25.0	IEEE	4	25.0
61	Quantel Ltd	4	12	33.3	IEEE	4	33.3	SPIE-Int Soc Opt Engineering	3	25.0
62	Samsung Electronics Co Ltd	4	20	20.0	American Institute of Physics	7	35.0	IEEE	4	20.0
63	Siemens Aktiengesellschaft	4	15	26.7	ISO/IEC/JTC/ANSI	5	33.3	IEEE	4	26.7
64	TechUnivDelft	4	8	50.0	IEEE	4	50.0	Joint IEEE and ACM	1	12.5
65	Thales	4	15	26.7	Nature Publishing Group	5	33.3	IEEE	4	26.7
66	VERTICAL COMPUTER S	4	8	50.0	IEEE	4	50.0	Very Large Data Base Endowment Inc. (VLDB Endowment)	2	25.0
67	Agency for Science Technolo	3	4	75.0	IEEE	3	75.0	American Institute of Physics	1	25.0
68	Brother Industries Ltd	3	5	60.0	IEEE	3	60.0	RELX Group (Elsevier)	1	20.0
69	Cambridge University	3	35	8.6	American Institute of Physics	21	60.0	IEEE	3	8.6
70	Cirrus Logic Inc.	3	3	100.0	IEEE	3	100.0			
71	COPPEREYE LTD	3	5	60.0	IEEE	3	60.0	Very Large Data Base Endowment Inc. (VLDB Endowment)	2	40.0
72	Electronics and Telecommuni	3	7	42.9	IEEE	3	42.9	Electronics and Telecommunications Research Institute	1	14.3
73	Global Foundries Inc	3	3	100.0	IEEE	3	100.0			
74	Hon Hai Precision Industry C	3	15	20.0	INST PURE APPLIED PHYSICS	6	40.0	IEEE	3	20.0
75	Imperial College	3	4	75.0	IEEE	3	75.0	IET/IEE	1	25.0
76	INGENIA HOLDINGS (UK)	3	15	20.0	American Institute of Physics	8	53.3	IEEE	3	20.0
77	Intellectual Ventures Manage	3	5	60.0	IEEE	3	60.0	ACM-Assoc Comput Mach	1	20.0
78	IOMEGA CORP	3	4	75.0	IEEE	3	75.0	INST PURE APPLIED PHYSICS	1	25.0
79	KASENNA INC	3	4	75.0	IEEE	3	75.0	RELX Group (Elsevier)	1	25.0
80	Kyushu Institute of Technolo	3	4	75.0	IEEE	3	75.0	Joint IEEE and ACM	1	25.0

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	LG Electronics Inc.	3	10	30.0	IEEE	3	30.0	SPIE-Int Soc Opt Engineering	2	20.0
82	Marvell Technology Group Lt	3	7	42.9	IEEE	3	42.9	ECMA International	1	14.3
83	Orange	3	8	37.5	RELX Group (Elsevier)	3	37.5	IEEE	3	37.5
84	Pendrell Corp.	3	3	100.0	IEEE	3	100.0			
85	RHEINISCH-WESTFA_LIS	3	11	27.3	IEEE	3	27.3	RELX Group (Elsevier)	2	18.2
86	Rohde & Schwarz GmbH &	3	5	60.0	IEEE	3	60.0	RELX Group (Elsevier)	1	20.0
87	SILICON BASIS LTD	3	3	100.0	IEEE	3	100.0			
88	ACTIONS SEMICONDUCT	2	2	100.0	IEEE	2	100.0			
89	ANALOGIES SA	2	3	66.7	IEEE	2	66.7	United Business Media/UBM Tech	1	33.3
90	AVIRTEC CORP	2	2	100.0	IEEE	2	100.0			
91	Carnegie Mellon University	2	7	28.6	American Institute of Physics	3	42.9	IEEE	2	28.6
92	CARSHA CO LTD	2	2	100.0	IEEE	2	100.0			
93	Comtech Telecommunication	2	2	100.0	IEEE	2	100.0			
94	Dartmouth College	2	4	50.0	IEEE	2	50.0	American Institute of Physics	2	50.0
95	DISCTRONICS LICENSING	2	2	100.0	IEEE	2	100.0			
96	Dolby Laboratories Inc	2	10	20.0	European Telecom Standards Institute (ETSI)	2	20.0	ISO/IEC	2	20.0
97	DUBLIN INSTITUTE OF TE	2	6	33.3	IEEE	2	33.3	International Society for Music Information Retrieval Confere	1	16.7
98	EDGEWARE AB	2	2	100.0	IEEE	2	100.0			
99	EUCLID VISION TECHNOL	2	3	66.7	IEEE	2	66.7	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	33.3
100	EXPWAY	2	3	66.7	IEEE	2	66.7	ACM-Assoc Comput Mach	1	33.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
<i>IOT/Internet of Things</i>										
1	INDIVIDUAL PATENTER	69	135	51.1	IEEE	69	51.1	3GPP General Partnership Project Standards Body	27	20.0
2	LG Electronics Inc.	65	80	81.3	IEEE	65	81.3	3GPP General Partnership Project Standards Body	15	18.8
3	Siemens Aktiengesellschaft	44	60	73.3	IEEE	44	73.3	RELX Group (Elsevier)	5	8.3
4	Qualcomm Inc	19	76	25.0	3GPP General Partnership Project Standards	53	69.7	IEEE	19	25.0
5	Nokia Corp	17	49	34.7	3GPP General Partnership Project Standards	27	55.1	IEEE	17	34.7
6	Intel Corporation	16	46	34.8	3GPP General Partnership Project Standards	30	65.2	IEEE	16	34.8
7	Schneider Electric S.A.	14	14	100.0	IEEE	14	100.0			
8	TECHNISCHE UNIVERSIT	13	16	81.3	IEEE	13	81.3	Winter Simulation Conference Board of Directors	2	12.5
9	ABB Ltd	12	16	75.0	IEEE	12	75.0	RELX Group (Elsevier)	2	12.5
10	InterDigital Inc	12	58	20.7	3GPP General Partnership Project Standards	22	37.9	European Telecom Standards Institute (ETSI)	14	24.1
11	Ericsson	10	125	8.0	3GPP General Partnership Project Standards	68	54.4	European Telecom Standards Institute (ETSI)	23	18.4
12	Koninklijke Philips N.V.	10	16	62.5	IEEE	10	62.5	3GPP General Partnership Project Standards Body	2	12.5
13	Boeing Co. (The)	6	7	85.7	IEEE	6	85.7	RELX Group (Elsevier)	1	14.3
14	Deutsche Telekom AG	6	15	40.0	IEEE	6	40.0	ACM-Assoc Comput Mach	5	33.3
15	Huawei Technologies Compa	6	22	27.3	3GPP General Partnership Project Standards	16	72.7	IEEE	6	27.3
16	Electronics and Telecommuni	5	5	100.0	IEEE	5	100.0			
17	NEC Corp	5	24	20.8	3GPP General Partnership Project Standards	11	45.8	IEEE	5	20.8
18	Rockwell Automation Inc	5	6	83.3	IEEE	5	83.3	Springer/Sp. Wien/Springer-Verlag/KluwAcad	1	16.7
19	Cisco Systems Inc.	4	5	80.0	IEEE	4	80.0	Internet Soc/IETF-Internet Eng Task Force	1	20.0
20	DE ENTRAMBASAGUAS B	4	4	100.0	IEEE	4	100.0			
21	King Abdullah University of	4	24	16.7	IEEE	4	16.7	Blackwell Publishing Inc.	4	16.7
22	RODILLA SALA VICENTE	4	4	100.0	IEEE	4	100.0			
23	Somfy SA	4	5	80.0	IEEE	4	80.0	IET/IEE	1	20.0
24	Blackberry Ltd.	3	3	100.0	IEEE	3	100.0			
25	Convida Wireless LLC	3	31	9.7	European Telecom Standards Institute (ETSI)	9	29.0	Internet Soc/IETF-Internet Eng Task Force	7	22.6
26	FUNDACIO PER A LA UNI	3	3	100.0	IEEE	3	100.0			
27	Itron Inc.	3	4	75.0	IEEE	3	75.0	Joint IEEE and ACM	1	25.0
28	OVERKIZ	3	6	50.0	IFIP - International Federation for Information	3	50.0	IEEE	3	50.0
29	Samsung Electronics Co Ltd	3	27	11.1	3GPP General Partnership Project Standards	24	88.9	IEEE	3	11.1
30	Savant Systems Llc	3	3	100.0	IEEE	3	100.0			
31	ZENERGY POWER PTY LT	3	3	100.0	IEEE	3	100.0			
32	Bayer AG	2	2	100.0	IEEE	2	100.0			
33	Bosch (Robert) GmbH	2	3	66.7	IEEE	2	66.7	RELX Group (Elsevier)	1	33.3
34	HP Inc	2	2	100.0	IEEE	2	100.0			
35	KT Corp.	2	2	100.0	IEEE	2	100.0			
36	Rosenberger GmbH	2	2	100.0	IEEE	2	100.0			
37	RWE Ag	2	2	100.0	IEEE	2	100.0			
38	SK Telecom Co. Ltd.	2	2	100.0	IEEE	2	100.0			
39	Zumtobel AG	2	2	100.0	IEEE	2	100.0			

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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	BOULMAKOUL AZEDINE	1	4	25.0	RELX Group (Elsevier)	2	50.0	IEEE	1	25.0
41	Commonwealth Scientific an	1	1	100.0	IEEE	1	100.0			
42	DALSSAOUI ABDELLAH	1	4	25.0	RELX Group (Elsevier)	2	50.0	IEEE	1	25.0
43	DE QUEIROZ SILVA RENA	1	1	100.0	IEEE	1	100.0			
44	Eaton Corp.	1	1	100.0	IEEE	1	100.0			
45	Giesecke & Devrient Group	1	4	25.0	3GPP General Partnership Project Standards	2	50.0	European Telecom Standards Institute (ETSI)	1	25.0
46	I-CONSERVE LLC	1	1	100.0	IEEE	1	100.0			
47	KARIM LAMIA	1	4	25.0	RELX Group (Elsevier)	2	50.0	IET/IEE	1	25.0
48	LAPP INSULATOR GMBH	1	1	100.0	IEEE	1	100.0			
49	Legrand S.A.	1	1	100.0	IEEE	1	100.0			
50	Microsoft Corporation	1	1	100.0	IEEE	1	100.0			
51	Motorola Solutions Inc.	1	1	100.0	IEEE	1	100.0			
52	NOVACCESS SA	1	1	100.0	IEEE	1	100.0			
53	NXP Semiconductors NV	1	3	33.3	3GPP General Partnership Project Standards	2	66.7	IEEE	1	33.3
54	Oracle Corporation	1	1	100.0	IEEE	1	100.0			
55	Orange	1	3	33.3	European Telecom Standards Institute (ETSI)	1	33.3	IEEE	1	33.3
56	REACTIVE TECHNOLOGI	1	1	100.0	IEEE	1	100.0			
57	SINTEF	1	2	50.0	IEEE	1	50.0	Internet Soc/IETF-Internet Eng Task Force	1	50.0
58	Supercom Ltd	1	2	50.0	IEEE	1	50.0	Institute of Business Adminsitration (IBA) and IEEE	1	50.0
59	TCL Corp	1	1	100.0	IEEE	1	100.0			
60	Telecom Italia SPA	1	2	50.0	American Automatic Control Council (AACC)	1	50.0	IEEE	1	50.0
61	Thales	1	1	100.0	IEEE	1	100.0			
62	UNIVERSIDAD DE MURCI	1	3	33.3	ACM-Assoc Comput Mach	2	66.7	IEEE	1	33.3
63	VECTOR ENERGY CORP	1	1	100.0	IEEE	1	100.0			
64	Verizon Communications Inc	1	1	100.0	IEEE	1	100.0			
65	Wayne State University (Detr	1	1	100.0	IEEE	1	100.0			
66	WIRELESS READING SYS	1	1	100.0	IEEE	1	100.0			

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

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	INDIVIDUAL PATENTER	943	2631	35.8	IEEE	943	35.8	RELX Group (Elsevier)	674	25.6
2	ABB Ltd	453	541	83.7	IEEE	453	83.7	IET/IEE	35	6.5
3	Siemens Aktiengesellschaft	341	462	73.8	IEEE	341	73.8	RELX Group (Elsevier)	55	11.9
4	General Electric Company	139	200	69.5	IEEE	139	69.5	RELX Group (Elsevier)	23	11.5
5	Koninklijke Philips N.V.	122	190	64.2	IEEE	122	64.2	ACS-Am Chem Soc	21	11.1
6	Vestas Wind Systems A/S	83	165	50.3	IEEE	83	50.3	RELX Group (Elsevier)	22	13.3
7	Bosch (Robert) GmbH	80	288	27.8	IEEE	80	27.8	Electrochemical Society, Inc.	72	25.0
8	Qualcomm Inc	76	87	87.4	IEEE	76	87.4	IET/IEE	4	4.6
9	Alstom	69	87	79.3	IEEE	69	79.3	IET/IEE	9	10.3
10	Schneider Electric S.A.	58	66	87.9	IEEE	58	87.9	IET/IEE	4	6.1
11	CPG TECHNOLOGIES LLC	51	89	57.3	IEEE	51	57.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	24	27.0
12	NXP Semiconductors NV	47	60	78.3	IEEE	47	78.3	ACS-Am Chem Soc	3	5.0
13	Centre National De La Reche	43	264	16.3	RELX Group (Elsevier)	111	42.0	IEEE	43	16.3
14	SMA Solar Technology AG	39	46	84.8	IEEE	39	84.8	RELX Group (Elsevier)	2	4.3
15	Ericsson	34	43	79.1	IEEE	34	79.1	EPE Association	3	7.0
16	Mitsubishi Electric Corp	34	42	81.0	IEEE	34	81.0	IET/IEE	5	11.9
17	Delta Electronics Inc	31	32	96.9	IEEE	31	96.9	URSI-International Union of Radio Science	1	3.1
18	Ingteam Corporation SA	31	38	81.6	IEEE	31	81.6	RELX Group (Elsevier)	5	13.2
19	Valeo S.A.	30	30	100.0	IEEE	30	100.0			
20	Eaton Corp.	28	35	80.0	IEEE	28	80.0	IET/IEE	3	8.6
21	Technical University of Den	28	76	36.8	RELX Group (Elsevier)	29	38.2	IEEE	28	36.8
22	Fraunhofer Gesellschaft	26	81	32.1	IEEE	26	32.1	RELX Group (Elsevier)	23	28.4
23	Continental AG (Germany Fe	24	41	58.5	IEEE	24	58.5	RELX Group (Elsevier)	9	22.0
24	Texas Instruments Inc	23	24	95.8	IEEE	23	95.8	EPE Association	1	4.2
25	UNIVERSITA' DEGLI STU	23	23	100.0	IEEE	23	100.0			
26	Raytheon Co.	22	24	91.7	IEEE	22	91.7	IET/IEE	1	4.2
27	Analog Devices Inc.	21	24	87.5	IEEE	21	87.5	Nature Publishing Group	1	4.2
28	Commissariat A L'Energie At	21	328	6.4	RELX Group (Elsevier)	156	47.6	Electrochemical Society, Inc.	44	13.4
29	University of Aberdeen	21	30	70.0	IEEE	21	70.0	RELX Group (Elsevier)	4	13.3
30	Emerson Electric Co.	19	25	76.0	IEEE	19	76.0	AIAA-Am Inst Aero Astro	2	8.0
31	Microchip Technology Inc.	19	25	76.0	IEEE	19	76.0	Reed Business	2	8.0
32	Renault SA	18	40	45.0	IEEE	18	45.0	RELX Group (Elsevier)	17	42.5
33	AMS AG	17	20	85.0	IEEE	17	85.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	5.0
34	ST-Ericsson SA (Patents split	17	21	81.0	IEEE	17	81.0	IET/IEE	2	9.5
35	Danfoss A/S	16	20	80.0	IEEE	16	80.0	SPIE-Int Soc Opt Engineering	4	20.0
36	Enercon GmbH	15	18	83.3	IEEE	15	83.3	RELX Group (Elsevier)	1	5.6
37	Enphase Energy Inc	15	15	100.0	IEEE	15	100.0			
38	HP Inc	15	31	48.4	IEEE	15	48.4	RELX Group (Elsevier)	8	25.8
39	Huawei Technologies Compa	15	17	88.2	IEEE	15	88.2	IET/IEE	1	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
40	Safran S.A.	15	17	88.2	IEEE	15	88.2	AIAA-Am Inst Aero Astro	1	5.9
41	Toyota Motor Corp	15	317	4.7	RELX Group (Elsevier)	135	42.6	Electrochemical Society, Inc.	53	16.7
42	Battelle Memorial Institute	14	52	26.9	RELX Group (Elsevier)	20	38.5	IEEE	14	26.9
43	Cirrus Logic Inc.	14	14	100.0	IEEE	14	100.0			
44	TDK Corporation	14	23	60.9	IEEE	14	60.9	RELX Group (Elsevier)	3	13.0
45	Honeywell International Inc.	13	22	59.1	IEEE	13	59.1	RELX Group (Elsevier)	5	22.7
46	Panasonic Corporation	13	80	16.3	RELX Group (Elsevier)	24	30.0	Electrochemical Society, Inc.	21	26.3
47	Rag Foundation	13	47	27.7	RELX Group (Elsevier)	21	44.7	IEEE	13	27.7
48	Zumtobel AG	13	13	100.0	IEEE	13	100.0			
49	Institut Polytechnique de Gre	12	31	38.7	RELX Group (Elsevier)	13	41.9	IEEE	12	38.7
50	Massachusetts Institute of Te	12	202	5.9	ACS-Am Chem Soc	46	22.8	RELX Group (Elsevier)	43	21.3
51	STMicroelectronics	12	23	52.2	IEEE	12	52.2	RELX Group (Elsevier)	6	26.1
52	Wartsila Oyj	12	14	85.7	IEEE	12	85.7	RELX Group (Elsevier)	1	7.1
53	American Superconductor Co	11	15	73.3	IEEE	11	73.3	IET/IEE	2	13.3
54	Ecole Polytechnique Federale	11	16	68.8	IEEE	11	68.8	Royal Society of Chemistry	2	12.5
55	Energy Research Centre of th	11	31	35.5	RELX Group (Elsevier)	12	38.7	IEEE	11	35.5
56	Infineon Technologies AG	11	15	73.3	IEEE	11	73.3	IET/IEE	2	13.3
57	Intel Corporation	11	12	91.7	IEEE	11	91.7	European Microwave Association	1	8.3
58	Johnson Controls Internation	11	35	31.4	RELX Group (Elsevier)	15	42.9	IEEE	11	31.4
59	Maschinenfabrik Reinhausen	11	17	64.7	IEEE	11	64.7	IET/IEE	2	11.8
60	Daikin Industries Ltd	10	18	55.6	IEEE	10	55.6	IET/IEE	6	33.3
61	On Semiconductor Corporati	10	10	100.0	IEEE	10	100.0			
62	Rolls Royce Holdings Plc	10	31	32.3	IEEE	10	32.3	American Institute of Physics	7	22.6
63	Stadtwerke-Konsortium Rhei	10	10	100.0	IEEE	10	100.0			
64	Swatch Group AG (The)	10	23	43.5	IEEE	10	43.5	RELX Group (Elsevier)	7	30.4
65	Technische Universitat Dresd	10	21	47.6	IEEE	10	47.6	RELX Group (Elsevier)	9	42.9
66	Vertiv Corp	10	12	83.3	IEEE	10	83.3	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	16.7
67	Advanced Energy Industries I	9	11	81.8	IEEE	9	81.8	IET/IEE	1	9.1
68	Apple Inc	9	25	36.0	IEEE	9	36.0	RELX Group (Elsevier)	6	24.0
69	INSTITUT NATIONAL POL	9	12	75.0	IEEE	9	75.0	RELX Group (Elsevier)	1	8.3
70	NEC Corp	9	30	30.0	RELX Group (Elsevier)	10	33.3	IEEE	9	30.0
71	Nidec Corp.	9	10	90.0	IEEE	9	90.0	RELX Group (Elsevier)	1	10.0
72	Nokia Corp	9	16	56.3	IEEE	9	56.3	ACS-Am Chem Soc	2	12.5
73	Osram Licht AG	9	10	90.0	IEEE	9	90.0	IET/IEE	1	10.0
74	Thales	9	12	75.0	IEEE	9	75.0	Saint John Patrick Publishers Ltd	1	8.3
75	Universitat Politecnica De Ca	9	11	81.8	IEEE	9	81.8	IET/IEE	1	9.1
76	UNIVERSITE DE LUXEMB	9	10	90.0	IEEE	9	90.0	IET/IEE	1	10.0
77	University of Colorado (The	9	11	81.8	IEEE	9	81.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	9.1
78	Bayerische Motoren Werke A	8	38	21.1	RELX Group (Elsevier)	12	31.6	IEEE	8	21.1
79	Fronius International GmbH	8	10	80.0	IEEE	8	80.0	RELX Group (Elsevier)	2	20.0
80	INESC PORTO-INSTITUTO	8	9	88.9	IEEE	8	88.9	Korean Institute of Power Electronics	1	11.1

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Institut Francais du Petrole	8	15	53.3	IEEE	8	53.3	EPE Association	3	20.0
82	Meidensha Corp	8	16	50.0	IEEE	8	50.0	IET/IEE	7	43.8
83	Microsemi Corp	8	8	100.0	IEEE	8	100.0			
84	MPPC TECHNOLOGY	8	11	72.7	IEEE	8	72.7	RELX Group (Elsevier)	3	27.3
85	Power Integrations Inc.	8	11	72.7	IEEE	8	72.7	Maruzen Co., Ltd/Maruzen Kabushikikaisha	3	27.3
86	Rohm Co. Ltd.	8	10	80.0	IEEE	8	80.0	IP.Com	2	20.0
87	Semikron International Gmb	8	9	88.9	IEEE	8	88.9	PCIM (Power Conversion, Intelligent Motion)	1	11.1
88	SolarEdge Technologies Inc	8	9	88.9	IEEE	8	88.9	Scripta Pub Co.	1	11.1
89	Total SA	8	24	33.3	IEEE	8	33.3	Electrochemical Society, Inc.	7	29.2
90	University of Auckland	8	11	72.7	IEEE	8	72.7	SPIE-Int Soc Opt Engineering	2	18.2
91	Bombardier Inc.	7	7	100.0	IEEE	7	100.0			
92	CONSTRUCTIONS ELECT	7	7	100.0	IEEE	7	100.0			
93	Hella KG Hueck & Co.	7	7	100.0	IEEE	7	100.0			
94	Imperial College	7	35	20.0	RELX Group (Elsevier)	14	40.0	IEEE	7	20.0
95	Integrated Device Technolog	7	8	87.5	IEEE	7	87.5	IET/IEE	1	12.5
96	INTERNATIONAL POWER	7	7	100.0	IEEE	7	100.0			
97	Karlsruher Institut Fuer Tech	7	30	23.3	RELX Group (Elsevier)	7	23.3	IEEE	7	23.3
98	Motorola Solutions Inc.	7	18	38.9	IEEE	7	38.9	Electrochemical Society, Inc.	5	27.8
99	National University of Ireland	7	25	28.0	IEEE	7	28.0	IOP Publishing	6	24.0
100	Sapienza University of Rome	7	22	31.8	RELX Group (Elsevier)	7	31.8	IEEE	7	31.8

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO 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	INDIVIDUAL PATENTER	341	623	54.7	IEEE	341	54.7	RELX Group (Elsevier)	65	10.4
2	ABB Ltd	85	130	65.4	IEEE	85	65.4	RELX Group (Elsevier)	11	8.5
3	Ecole Polytechnique Federale	29	51	56.9	IEEE	29	56.9	IEEE/RSJ	5	9.8
4	Siemens Aktiengesellschaft	29	53	54.7	IEEE	29	54.7	RELX Group (Elsevier)	7	13.2
5	Commissariat A L'Energie At	27	50	54.0	IEEE	27	54.0	RELX Group (Elsevier)	5	10.0
6	Kuka AG	27	46	58.7	IEEE	27	58.7	RELX Group (Elsevier)	6	13.0
7	German Aerospace Center (D	25	35	71.4	IEEE	25	71.4	ACM-Assoc Comput Mach	3	8.6
8	Koninklijke Philips N.V.	21	38	55.3	IEEE	21	55.3	Springer/Sp. Wien/Springer-Verlag/KluwAcad	5	13.2
9	Toyota Motor Corp	21	32	65.6	IEEE	21	65.6	IEEE/RSJ	3	9.4
10	Irobot Corp	20	28	71.4	IEEE	20	71.4	IEEE/RSJ	4	14.3
11	Honda Motor Co. Ltd.(Honda	18	22	81.8	IEEE	18	81.8	ACL - Association for Computational Linguistics	1	4.5
12	Softbank Corp	16	23	69.6	IEEE	16	69.6	IEEE/RSJ	3	13.0
13	Centre National De La Reche	14	31	45.2	IEEE	14	45.2	IEEE/RSJ	4	12.9
14	SCUOLA SUPERIORE DI S	14	23	60.9	IEEE	14	60.9	IEEE/RSJ	4	17.4
15	Qualcomm Inc	12	16	75.0	IEEE	12	75.0	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	12.5
16	SYNTOUCH LLC	12	13	92.3	IEEE	12	92.3	ACM-Assoc Comput Mach	1	7.7
17	Sony Corp	11	17	64.7	IEEE	11	64.7	IEICE-Inst Elec Info Comm Eng	3	17.6
18	Boeing Co. (The)	10	22	45.5	IEEE	10	45.5	RELX Group (Elsevier)	4	18.2
19	CELOXICA LTD	10	18	55.6	IEEE	10	55.6	Joint IEEE and ACM	3	16.7
20	Daimler AG	9	13	69.2	IEEE	9	69.2	Binkert Medien AG	1	7.7
21	MAY PATENTS LTD	9	15	60.0	IEEE	9	60.0	Joint IEEE and ACM	3	20.0
22	Airbus SE	8	11	72.7	IEEE	8	72.7	RELX Group (Elsevier)	1	9.1
23	Fondazione Istituto Italiano	8	13	61.5	IEEE	8	61.5	IEEE/RSJ	3	23.1
24	Vanderbilt University	8	9	88.9	IEEE	8	88.9	RELX Group (Elsevier)	1	11.1
25	ABRAMONTE FRANK	7	10	70.0	IEEE	7	70.0	RELX Group (Elsevier)	2	20.0
26	BRAINTECH CANADA IN	7	11	63.6	IEEE	7	63.6	RELX Group (Elsevier)	2	18.2
27	French National Institute for	7	11	63.6	IEEE	7	63.6	ACM-Assoc Comput Mach	2	18.2
28	ROBART GMBH	7	7	100.0	IEEE	7	100.0			
29	SABANCI UNIVERSITY	7	12	58.3	IEEE	7	58.3	IEEE/ASME	2	16.7
30	Swiss Federal Institute of Tec	7	11	63.6	IEEE	7	63.6	ACM-Assoc Comput Mach	3	27.3
31	BERKSHIRE GREY INC	6	8	75.0	IEEE	6	75.0	ASME-Am Soc Mech Eng	1	12.5
32	Durr AG	6	8	75.0	IEEE	6	75.0	SAGE Publications	1	12.5
33	Harris Corp.	6	8	75.0	IEEE	6	75.0	IEEE/RSJ	2	25.0
34	Massachusetts Institute of Te	6	7	85.7	IEEE	6	85.7	IEEE/RSJ	1	14.3
35	Math Works Inc (The)	6	6	100.0	IEEE	6	100.0			
36	NXP Semiconductors NV	6	7	85.7	IEEE	6	85.7	Joint IEEE and ACM	1	14.3
37	Rethink Robotics Inc	6	8	75.0	IEEE	6	75.0	MIT/MIT Press	1	12.5
38	University of Oxford	6	6	100.0	IEEE	6	100.0			
39	University of Stuttgart	6	8	75.0	IEEE	6	75.0	SPIE-Int Soc Opt Engineering	2	25.0

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	BIA	5	7	71.4	IEEE	5	71.4	Society of Instrument and Control Engineers	1	14.3
41	Bosch (Robert) GmbH	5	12	41.7	IEEE	5	41.7	RELX Group (Elsevier)	2	16.7
42	Cadence Design Systems Inc	5	7	71.4	IEEE	5	71.4	Joint IEEE and ACM	1	14.3
43	CSIC-Consejo Superior De In	5	6	83.3	IEEE	5	83.3	RELX Group (Elsevier)	1	16.7
44	Google Inc.	5	9	55.6	IEEE	5	55.6	SAGE Publications	2	22.2
45	Intuitive Surgical Inc.	5	13	38.5	IEEE	5	38.5	RELX Group (Elsevier)	2	15.4
46	Queen's Univerity of Kingsto	5	6	83.3	IEEE	5	83.3	RELX Group (Elsevier)	1	16.7
47	SABANCI UNIVERSITESI	5	6	83.3	IEEE	5	83.3	RELX Group (Elsevier)	1	16.7
48	UNIVERSITA' DEGLI STU	5	6	83.3	IEEE	5	83.3	RELX Group (Elsevier)	1	16.7
49	Agency for Science Technolo	4	4	100.0	IEEE	4	100.0			
50	Battelle Memorial Institute	4	8	50.0	IEEE	4	50.0	Society of Instrument and Control Engineers	1	12.5
51	Callaghan Innovation	4	5	80.0	IEEE	4	80.0	SPIE-Int Soc Opt Engineering	1	20.0
52	Carnegie Mellon University	4	5	80.0	IEEE	4	80.0	CRC Press/Taylor & Francis	1	20.0
53	Duke University	4	7	57.1	IEEE	4	57.1	SPIE-Int Soc Opt Engineering	3	42.9
54	Freiburg University	4	6	66.7	IEEE	4	66.7	RELX Group (Elsevier)	2	33.3
55	FRIEDRICH-SCHILLER-UN	4	6	66.7	IEEE	4	66.7	SPIE-Int Soc Opt Engineering	2	33.3
56	FUNDACION FATRONIK	4	4	100.0	IEEE	4	100.0			
57	Hexagon AB	4	7	57.1	IEEE	4	57.1	RELX Group (Elsevier)	2	28.6
58	Honeywell International Inc.	4	7	57.1	IEEE	4	57.1	AIAA-Am Inst Aero Astro	2	28.6
59	Intel Corporation	4	9	44.4	IEEE	4	44.4	RELX Group (Elsevier)	2	22.2
60	KASTANIENBAUM GMBH	4	8	50.0	IEEE	4	50.0	RELX Group (Elsevier)	2	25.0
61	National University of Singap	4	5	80.0	IEEE	4	80.0	ACM-Assoc Comput Mach	1	20.0
62	PDF Solutions	4	4	100.0	IEEE	4	100.0			
63	TECHNISCHE UNIVERSIT	4	10	40.0	IEEE	4	40.0	American Automatic Control Council (AACC)	2	20.0
64	Teradyne Inc.	4	4	100.0	IEEE	4	100.0			
65	Thales	4	4	100.0	IEEE	4	100.0			
66	WILLIAMSON MATTHEW	4	5	80.0	IEEE	4	80.0	SAGE PUBLICATIONS INC	1	20.0
67	Xilinx Inc.	4	5	80.0	IEEE	4	80.0	Joint IEEE and ACM	1	20.0
68	ZENROBOTICS OY	4	5	80.0	IEEE	4	80.0	IEEE/RSJ	1	20.0
69	Canon Inc	3	6	50.0	IEEE	3	50.0	IEEE/RSJ	1	16.7
70	CARMEL-HAIFA UNIVERS	3	3	100.0	IEEE	3	100.0			
71	Cisco Systems Inc.	3	4	75.0	IEEE	3	75.0	ACM-Assoc Comput Mach	1	25.0
72	Council of Scientific and Ind	3	3	100.0	IEEE	3	100.0			
73	COUPLING WAVE SOLUTI	3	4	75.0	IEEE	3	75.0	IET/IEE	1	25.0
74	Ericsson	3	5	60.0	IEEE	3	60.0	RELX Group (Elsevier)	1	20.0
75	FARAHAT WALEED A	3	3	100.0	IEEE	3	100.0			
76	General Electric Company	3	4	75.0	IEEE	3	75.0	RELX Group (Elsevier)	1	25.0
77	International Business Machi	3	15	20.0	IBM Corp.	4	26.7	ACM-Assoc Comput Mach	3	20.0
78	Interuniversity MicroElectron	3	4	75.0	IEEE	3	75.0	IBM Corp.	1	25.0
79	Johnson Controls Internation	3	3	100.0	IEEE	3	100.0			
80	MacDonald Dettwiler & Asso	3	5	60.0	IEEE	3	60.0	ASME-Am Soc Mech Eng	1	20.0

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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	NEC Corp	3	6	50.0	IEEE	3	50.0	ACM-Assoc Comput Mach	2	33.3
82	Norwegian Univ Of Science	3	3	100.0	IEEE	3	100.0			
83	PROPHET CONTROL SYST	3	3	100.0	IEEE	3	100.0			
84	Raytheon Co.	3	10	30.0	IEEE	3	30.0	IEEE/RSJ	3	30.0
85	Samsung Electronics Co Ltd	3	3	100.0	IEEE	3	100.0			
86	Sew-Eurodrive GmbH & Co.	3	3	100.0	IEEE	3	100.0			
87	Stanford University	3	5	60.0	IEEE	3	60.0	RELX Group (Elsevier)	1	20.0
88	SYMAX SYSTEMTECHNI	3	3	100.0	IEEE	3	100.0			
89	Syntest Technologies Inc	3	3	100.0	IEEE	3	100.0			
90	Technion - Israel Institute of	3	3	100.0	IEEE	3	100.0			
91	Tetra Laval International	3	4	75.0	IEEE	3	75.0	Optical Society of America	1	25.0
92	THE SHADOW ROBOT CO	3	5	60.0	IEEE	3	60.0	Natl Acad Sciences	1	20.0
93	Tokyo Institute of Technolog	3	3	100.0	IEEE	3	100.0			
94	University of Bristol	3	3	100.0	IEEE	3	100.0			
95	University of London	3	4	75.0	IEEE	3	75.0	RELX Group (Elsevier)	1	25.0
96	University of Surrey	3	5	60.0	IEEE	3	60.0	RELX Group (Elsevier)	1	20.0
97	WFL MILLTURN TECHNO	3	3	100.0	IEEE	3	100.0			
98	AALBORG UNIV	2	4	50.0	IEEE	2	50.0	IEEE/ASME	1	25.0
99	Aalborg University	2	4	50.0	IEEE	2	50.0	IEEE/ASME	1	25.0
100	ACTIVE S R L	2	2	100.0	IEEE	2	100.0			

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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>Semiconductors/Solid-State Devices/Electronics</i>										
1	INDIVIDUAL PATENTER	2370	10117	23.4	IEEE	2370	23.4	American Institute of Physics	2144	21.2
2	Koninklijke Philips N.V.	175	672	26.0	IEEE	175	26.0	American Institute of Physics	112	16.7
3	Commissariat A L'Energie At	171	857	20.0	RELX Group (Elsevier)	196	22.9	American Institute of Physics	175	20.4
4	International Business Machi	156	410	38.0	IEEE	156	38.0	American Institute of Physics	83	20.2
5	Cree Inc.	141	372	37.9	IEEE	141	37.9	American Institute of Physics	78	21.0
6	Fraunhofer Gesellschaft	130	505	25.7	IEEE	130	25.7	RELX Group (Elsevier)	98	19.4
7	NXP Semiconductors NV	121	219	55.3	IEEE	121	55.3	American Institute of Physics	30	13.7
8	Infineon Technologies AG	120	302	39.7	IEEE	120	39.7	RELX Group (Elsevier)	46	15.2
9	NEC Corp	106	193	54.9	IEEE	106	54.9	American Institute of Physics	32	16.6
10	Advanced Micro Devices Inc	104	196	53.1	IEEE	104	53.1	IEEE/JPN Soc App Phys	24	12.2
11	Western Digital Corp.	98	197	49.7	IEEE	98	49.7	American Institute of Physics	40	20.3
12	Centre National De La Recherche	85	714	11.9	RELX Group (Elsevier)	172	24.1	American Institute of Physics	162	22.7
13	Intel Corporation	81	186	43.5	IEEE	81	43.5	RELX Group (Elsevier)	13	7.0
14	Bosch (Robert) GmbH	72	205	35.1	IEEE	72	35.1	RELX Group (Elsevier)	42	20.5
15	Soitec SA	71	328	21.6	American Institute of Physics	87	26.5	RELX Group (Elsevier)	72	22.0
16	Siemens Aktiengesellschaft	67	282	23.8	RELX Group (Elsevier)	92	32.6	IEEE	67	23.8
17	Panasonic Corporation	63	245	25.7	IEEE	63	25.7	American Institute of Physics	62	25.3
18	Osram Licht AG	62	501	12.4	American Institute of Physics	177	35.3	RELX Group (Elsevier)	74	14.8
19	Qualcomm Inc	62	120	51.7	IEEE	62	51.7	RELX Group (Elsevier)	14	11.7
20	Texas Instruments Inc	58	73	79.5	IEEE	58	79.5	RELX Group (Elsevier)	10	13.7
21	Applied Materials Inc.	55	215	25.6	American Institute of Physics	55	25.6	IEEE	55	25.6
22	Ecole Polytechnique Federale	53	248	21.4	ACS-Am Chem Soc	56	22.6	IEEE	53	21.4
23	Raytheon Co.	53	126	42.1	IEEE	53	42.1	American Institute of Physics	18	14.3
24	Sin-American Silicon	50	74	67.6	IEEE	50	67.6	RELX Group (Elsevier)	8	10.8
25	STMicroelectronics	50	108	46.3	IEEE	50	46.3	RELX Group (Elsevier)	17	15.7
26	Massachusetts Institute of Te	49	481	10.2	American Institute of Physics	133	27.7	RELX Group (Elsevier)	75	15.6
27	Motorola Solutions Inc.	48	162	29.6	American Institute of Physics	51	31.5	IEEE	48	29.6
28	Thales	43	176	24.4	IEEE	43	24.4	American Institute of Physics	36	20.5
29	Interuniversity MicroElectron	42	202	20.8	IEEE	42	20.8	RELX Group (Elsevier)	40	19.8
30	Micron Technology Inc.	41	159	25.8	IEEE	41	25.8	American Institute of Physics	34	21.4
31	Nokia Corp	39	158	24.7	IEEE	39	24.7	American Institute of Physics	30	19.0
32	Corning Inc.	38	179	21.2	IEEE	38	21.2	RELX Group (Elsevier)	32	17.9
33	Fujitsu Limited	37	104	35.6	IEEE	37	35.6	American Institute of Physics	33	31.7
34	Oclaro Inc	37	76	48.7	IEEE	37	48.7	American Institute of Physics	11	14.5
35	Tohoku University	35	87	40.2	IEEE	35	40.2	American Institute of Physics	22	25.3
36	DowDuPont	33	380	8.7	RELX Group (Elsevier)	107	28.2	American Institute of Physics	73	19.2
37	Tokyo Electron Limited	31	157	19.7	RELX Group (Elsevier)	39	24.8	American Institute of Physics	32	20.4
38	Xtrion NV	31	44	70.5	IEEE	31	70.5	American Institute of Physics	3	6.8
39	Energy Research Centre of th	30	85	35.3	IEEE	30	35.3	RELX Group (Elsevier)	20	23.5

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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	Honeywell International Inc.	30	72	41.7	IEEE	30	41.7	American Institute of Physics	12	16.7
41	Eastman Kodak Company	28	247	11.3	American Institute of Physics	66	26.7	ACS-Am Chem Soc	35	14.2
42	Hon Hai Precision Industry C	28	103	27.2	IEEE	28	27.2	American Institute of Physics	26	25.2
43	Sumitomo Electric Industries	28	211	13.3	American Institute of Physics	58	27.5	INST PURE APPLIED PHYSICS	48	22.7
44	TDK Corporation	28	106	26.4	RELX Group (Elsevier)	33	31.1	IEEE	28	26.4
45	AMS AG	27	38	71.1	IEEE	27	71.1	IET/IEE	3	7.9
46	Forschungsverbund Berlin e.	27	135	20.0	American Institute of Physics	37	27.4	IEEE	27	20.0
47	ABB Ltd	25	49	51.0	IEEE	25	51.0	RELX Group (Elsevier)	9	18.4
48	Northrop Grumman Corp	25	74	33.8	IEEE	25	33.8	American Institute of Physics	13	17.6
49	University of California	24	130	18.5	American Institute of Physics	39	30.0	IEEE	24	18.5
50	Canon Inc	23	230	10.0	American Institute of Physics	67	29.1	RELX Group (Elsevier)	37	16.1
51	Murata Manufacturing Co. Lt	22	35	62.9	IEEE	22	62.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	4	11.4
52	Sony Corp	22	157	14.0	RELX Group (Elsevier)	29	18.5	American Institute of Physics	24	15.3
53	Ministry of Economy Trade a	20	104	19.2	American Institute of Physics	32	30.8	IEEE	20	19.2
54	Foundation for Advancement	19	34	55.9	IEEE	19	55.9	RELX Group (Elsevier)	6	17.6
55	Georgia Institute of Technolo	19	79	24.1	IEEE	19	24.1	American Institute of Physics	17	21.5
56	Royal DSM NV	19	40	47.5	IEEE	19	47.5	RELX Group (Elsevier)	14	35.0
57	Shin-Etsu Chemical Co. Ltd.	19	80	23.8	American Institute of Physics	22	27.5	IEEE	19	23.8
58	University of Michigan	19	148	12.8	American Institute of Physics	54	36.5	RELX Group (Elsevier)	24	16.2
59	Innovative Network Corporat	18	32	56.3	IEEE	18	56.3	American Institute of Physics	6	18.8
60	Japan Science and Technolog	18	100	18.0	American Institute of Physics	40	40.0	IEEE	18	18.0
61	Qinetiq Group Ltd	18	70	25.7	IEEE	18	25.7	American Institute of Physics	14	20.0
62	Amberwave Inc	17	89	19.1	American Institute of Physics	34	38.2	IEEE	17	19.1
63	Carl-Zeiss Stiftung	17	98	17.3	WIP-Renewable Energies	27	27.6	American Institute of Physics	18	18.4
64	Coherent Inc.	17	111	15.3	Optical Society of America	29	26.1	SPIE-Int Soc Opt Engineering	17	15.3
65	Forschungszentrum Julich	17	88	19.3	American Institute of Physics	20	22.7	IEEE	17	19.3
66	Hamamatsu Photonics KK	17	43	39.5	IEEE	17	39.5	American Institute of Physics	13	30.2
67	HP Inc	17	127	13.4	American Institute of Physics	35	27.6	RELX Group (Elsevier)	32	25.2
68	Princeton University	17	163	10.4	American Institute of Physics	46	28.2	RELX Group (Elsevier)	37	22.7
69	Technische Universitat Berlin	17	71	23.9	American Institute of Physics	34	47.9	IEEE	17	23.9
70	Unisantis Electronics Ltd	17	19	89.5	IEEE	17	89.5	RELX Group (Elsevier)	1	5.3
71	Microchip Technology Inc.	16	35	45.7	IEEE	16	45.7	RELX Group (Elsevier)	5	14.3
72	Mitsubishi Electric Corp	16	41	39.0	IEEE	16	39.0	American Institute of Physics	5	12.2
73	NGK Insulators Ltd.	16	47	34.0	INST PURE APPLIED PHYSICS	20	42.6	IEEE	16	34.0
74	Toshiba Corp	16	73	21.9	American Institute of Physics	29	39.7	IEEE	16	21.9
75	University of Sheffield	16	44	36.4	IEEE	16	36.4	American Institute of Physics	12	27.3
76	Xilinx Inc.	16	23	69.6	IEEE	16	69.6	RELX Group (Elsevier)	2	8.7
77	3M Co	15	112	13.4	American Institute of Physics	23	20.5	RELX Group (Elsevier)	16	14.3
78	Karlsruher Institut Fuer Tech	15	51	29.4	IEEE	15	29.4	American Institute of Physics	10	19.6
79	Max-Planck Gesellschaft	15	122	12.3	Optical Society of America	21	17.2	RELX Group (Elsevier)	20	16.4
80	National University of Ireland	15	58	25.9	IEEE	15	25.9	RELX Group (Elsevier)	13	22.4

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Semiconductor Energy Labor	15	58	25.9	American Institute of Physics	20	34.5	IEEE	15	25.9
82	University of New Mexico	15	29	51.7	IEEE	15	51.7	American Institute of Physics	10	34.5
83	Agency for Science Technolo	14	53	26.4	American Institute of Physics	17	32.1	IEEE	14	26.4
84	Boeing Co. (The)	14	53	26.4	IEEE	14	26.4	American Institute of Physics	9	17.0
85	Ecole Polytechnique (France)	14	128	10.9	RELX Group (Elsevier)	27	21.1	American Institute of Physics	25	19.5
86	General Electric Company	14	75	18.7	American Institute of Physics	18	24.0	RELX Group (Elsevier)	17	22.7
87	G-RAY SWITZERLAND SA	14	92	15.2	RELX Group (Elsevier)	17	18.5	IEEE	14	15.2
88	Merck KGaA (Germany)	14	812	1.7	ACS-Am Chem Soc	190	23.4	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	137	16.9
89	Technical University of Den	14	91	15.4	RELX Group (Elsevier)	22	24.2	IEEE	14	15.4
90	Analog Devices Inc.	13	23	56.5	IEEE	13	56.5	American Institute of Physics	3	13.0
91	Ericsson	13	30	43.3	IEEE	13	43.3	SPIE-Int Soc Opt Engineering	5	16.7
92	Fuji Film Holdings Corp	13	112	11.6	American Institute of Physics	16	14.3	WIP-Renewable Energies	16	14.3
93	University of Stuttgart	13	28	46.4	IEEE	13	46.4	RELX Group (Elsevier)	9	32.1
94	Bayer AG	12	59	20.3	ACS-Am Chem Soc	17	28.8	IEEE	12	20.3
95	Catholic University Leuven	12	63	19.0	RELX Group (Elsevier)	17	27.0	IEEE	12	19.0
96	CENTROTHERM PHOTOV	12	22	54.5	IEEE	12	54.5	WIP-Renewable Energies	5	22.7
97	GOLD STANDARD SIMUL	12	13	92.3	IEEE	12	92.3	American Institute of Physics	1	7.7
98	IBA Ion Beam Applications S	12	38	31.6	RELX Group (Elsevier)	15	39.5	IEEE	12	31.6
99	Rohm Co. Ltd.	12	60	20.0	American Institute of Physics	19	31.7	INST PURE APPLIED PHYSICS	17	28.3
100	Chinese Academy of Science	11	30	36.7	IEEE	11	36.7	RELX Group (Elsevier)	8	26.7

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

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	INDIVIDUAL PATENTER	43	85	50.6	IEEE	43	50.6	3GPP General Partnership Project Standards Body	23	27.1
2	Siemens Aktiengesellschaft	25	30	83.3	IEEE	25	83.3	RELX Group (Elsevier)	4	13.3
3	TECHNISCHE UNIVERSIT	13	16	81.3	IEEE	13	81.3	Winter Simulation Conference Board of Directors	2	12.5
4	ABB Ltd	10	10	100.0	IEEE	10	100.0			
5	Koninklijke Philips N.V.	9	15	60.0	IEEE	9	60.0	3GPP General Partnership Project Standards Body	2	13.3
6	Qualcomm Inc	9	23	39.1	3GPP General Partnership Project Standards	13	56.5	IEEE	9	39.1
7	Schneider Electric S.A.	7	7	100.0	IEEE	7	100.0			
8	Boeing Co. (The)	6	6	100.0	IEEE	6	100.0			
9	Electronics and Telecommuni	5	5	100.0	IEEE	5	100.0			
10	Nokia Corp	4	8	50.0	IEEE	4	50.0	3GPP General Partnership Project Standards Body	2	25.0
11	Blackberry Ltd.	3	3	100.0	IEEE	3	100.0			
12	Ericsson	3	11	27.3	3GPP General Partnership Project Standards	7	63.6	IEEE	3	27.3
13	Intel Corporation	3	3	100.0	IEEE	3	100.0			
14	Itron Inc.	3	4	75.0	IEEE	3	75.0	Joint IEEE and ACM	1	25.0
15	ZENERGY POWER PTY LT	3	3	100.0	IEEE	3	100.0			
16	Bosch (Robert) GmbH	2	3	66.7	IEEE	2	66.7	RELX Group (Elsevier)	1	33.3
17	HP Inc	2	2	100.0	IEEE	2	100.0			
18	InterDigital Inc	2	7	28.6	European Telecom Standards Institute (ETSI)	2	28.6	IEEE	2	28.6
19	KT Corp.	2	2	100.0	IEEE	2	100.0			
20	Rosenberger GmbH	2	2	100.0	IEEE	2	100.0			
21	Samsung Electronics Co Ltd	2	2	100.0	IEEE	2	100.0			
22	SK Telecom Co. Ltd.	2	2	100.0	IEEE	2	100.0			
23	Cisco Systems Inc.	1	2	50.0	Internet Soc/IETF-Internet Eng Task Force	1	50.0	IEEE	1	50.0
24	DE QUEIROZ SILVA RENA	1	1	100.0	IEEE	1	100.0			
25	Eaton Corp.	1	1	100.0	IEEE	1	100.0			
26	I-CONSERVE LLC	1	1	100.0	IEEE	1	100.0			
27	LAPP INSULATOR GMBH	1	1	100.0	IEEE	1	100.0			
28	Motorola Solutions Inc.	1	1	100.0	IEEE	1	100.0			
29	NXP Semiconductors NV	1	3	33.3	3GPP General Partnership Project Standards	2	66.7	IEEE	1	33.3
30	REACTIVE TECHNOLOGI	1	1	100.0	IEEE	1	100.0			
31	RWE Ag	1	1	100.0	IEEE	1	100.0			
32	SINTEF	1	2	50.0	IEEE	1	50.0	Internet Soc/IETF-Internet Eng Task Force	1	50.0
33	Supercom Ltd	1	2	50.0	IEEE	1	50.0	Institute of Business Admnsitration (IBA) and IEEE	1	50.0
34	TCL Corp	1	1	100.0	IEEE	1	100.0			
35	Telecom Italia SPA	1	2	50.0	IEEE	1	50.0	American Automatic Control Council (AACC)	1	50.0
36	VECTOR ENERGY CORP	1	1	100.0	IEEE	1	100.0			
37	Wayne State University (Detr	1	1	100.0	IEEE	1	100.0			
38	WIRELESS READING SYS	1	1	100.0	IEEE	1	100.0			

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO 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	INDIVIDUAL PATENTER	18746	36935	50.8	IEEE	18746	50.8	3GPP General Partnership Project Standards Body	4341	11.8
2	Qualcomm Inc	4967	15974	31.1	3GPP General Partnership Project Standards	5894	36.9	IEEE	4967	31.1
3	Ericsson	4488	14702	30.5	3GPP General Partnership Project Standards	6865	46.7	IEEE	4488	30.5
4	Nokia Corp	3800	12408	30.6	3GPP General Partnership Project Standards	5521	44.5	IEEE	3800	30.6
5	Koninklijke Philips N.V.	2221	3636	61.1	IEEE	2221	61.1	RELX Group (Elsevier)	190	5.2
6	Technicolor SA	1552	2981	52.1	IEEE	1552	52.1	ISO/IEC/JTC/ANSI	285	9.6
7	Huawei Technologies Compa	1420	5513	25.8	3GPP General Partnership Project Standards	2117	38.4	IEEE	1420	25.8
8	Siemens Aktiengesellschaft	1230	2436	50.5	IEEE	1230	50.5	Internet Soc/IETF-Internet Eng Task Force	283	11.6
9	Orange	1158	2110	54.9	IEEE	1158	54.9	Internet Soc/IETF-Internet Eng Task Force	237	11.2
10	LG Electronics Inc.	1119	2894	38.7	3GPP General Partnership Project Standards	1457	50.3	IEEE	1119	38.7
11	Panasonic Corporation	1105	3826	28.9	3GPP General Partnership Project Standards	1538	40.2	IEEE	1105	28.9
12	Intel Corporation	1027	2170	47.3	IEEE	1027	47.3	3GPP General Partnership Project Standards Body	775	35.7
13	Samsung Electronics Co Ltd	984	1840	53.5	IEEE	984	53.5	3GPP General Partnership Project Standards Body	520	28.3
14	InterDigital Inc	713	2563	27.8	3GPP General Partnership Project Standards	1338	52.2	IEEE	713	27.8
15	NEC Corp	711	2536	28.0	3GPP General Partnership Project Standards	1087	42.9	IEEE	711	28.0
16	Nippon Telegraph & Telepho	653	3111	21.0	3GPP General Partnership Project Standards	1967	63.2	IEEE	653	21.0
17	Motorola Solutions Inc.	579	1156	50.1	IEEE	579	50.1	3GPP General Partnership Project Standards Body	275	23.8
18	Mitsubishi Electric Corp	530	1065	49.8	IEEE	530	49.8	3GPP General Partnership Project Standards Body	176	16.5
19	Cisco Systems Inc.	512	1342	38.2	IEEE	512	38.2	Internet Soc/IETF-Internet Eng Task Force	378	28.2
20	Sony Corp	511	1769	28.9	IEEE	511	28.9	3GPP General Partnership Project Standards Body	474	26.8
21	Fraunhofer Gesellschaft	495	990	50.0	IEEE	495	50.0	ISO/IEC/JTC/ANSI	80	8.1
22	Thales	486	763	63.7	IEEE	486	63.7	IET/IEE	45	5.9
23	Electronics and Telecommuni	423	669	63.2	IEEE	423	63.2	3GPP General Partnership Project Standards Body	112	16.7
24	NXP Semiconductors NV	398	535	74.4	IEEE	398	74.4	3GPP General Partnership Project Standards Body	17	3.2
25	BT Group PLC	396	826	47.9	IEEE	396	47.9	Internet Soc/IETF-Internet Eng Task Force	96	11.6
26	Microsoft Corporation	386	767	50.3	IEEE	386	50.3	ACM-Assoc Comput Mach	69	9.0
27	RPX Corp	353	607	58.2	IEEE	353	58.2	3GPP General Partnership Project Standards Body	81	13.3
28	Blackberry Ltd.	341	1685	20.2	3GPP General Partnership Project Standards	1045	62.0	IEEE	341	20.2
29	Raytheon Co.	337	482	69.9	IEEE	337	69.9	SPIE-Int Soc Opt Engineering	22	4.6
30	Bosch (Robert) GmbH	296	424	69.8	IEEE	296	69.8	IET/IEE	18	4.2
31	Fujitsu Limited	295	969	30.4	3GPP General Partnership Project Standards	471	48.6	IEEE	295	30.4
32	International Business Machi	279	512	54.5	IEEE	279	54.5	Internet Soc/IETF-Internet Eng Task Force	53	10.4
33	Telecom Italia SPA	270	488	55.3	IEEE	270	55.3	Internet Soc/IETF-Internet Eng Task Force	47	9.6
34	Marvell Technology Group Lt	249	319	78.1	IEEE	249	78.1	3GPP General Partnership Project Standards Body	22	6.9
35	Centre National De La Reche	246	474	51.9	IEEE	246	51.9	Optical Society of America	33	7.0
36	Hon Hai Precision Industry C	241	1927	12.5	3GPP General Partnership Project Standards	1386	71.9	IEEE	241	12.5
37	ZTE Corp.	235	1574	14.9	3GPP General Partnership Project Standards	1083	68.8	IEEE	235	14.9
38	Toshiba Corp	229	376	60.9	IEEE	229	60.9	Internet Soc/IETF-Internet Eng Task Force	41	10.9
39	Commissariat A L'Energie At	213	318	67.0	IEEE	213	67.0	Internet Soc/IETF-Internet Eng Task Force	19	6.0

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Dolby Laboratories Inc	213	496	42.9	IEEE	213	42.9	International Telecommunication Union	50	10.1
41	Canon Inc	198	566	35.0	IEEE	198	35.0	ISO/IEC/JTC/ANSI	121	21.4
42	HP Inc	177	364	48.6	IEEE	177	48.6	SPIE-Int Soc Opt Engineering	35	9.6
43	ST-Ericsson SA (Patents split	160	233	68.7	IEEE	160	68.7	3GPP General Partnership Project Standards Body	42	18.0
44	BAE Systems Plc.	156	227	68.7	IEEE	156	68.7	IET/IEE	9	4.0
45	ARRIS Group Inc	151	500	30.2	IEEE	151	30.2	ISO/IEC/JTC/ANSI	129	25.8
46	Infineon Technologies AG	150	238	63.0	IEEE	150	63.0	3GPP General Partnership Project Standards Body	23	9.7
47	Broadcom Ltd	142	212	67.0	IEEE	142	67.0	3GPP General Partnership Project Standards Body	11	5.2
48	Telefonica SA	141	423	33.3	IEEE	141	33.3	3GPP General Partnership Project Standards Body	94	22.2
49	Apple Inc	139	372	37.4	IEEE	139	37.4	3GPP General Partnership Project Standards Body	81	21.8
50	Airbus SE	137	268	51.1	IEEE	137	51.1	SPIE-Int Soc Opt Engineering	18	6.7
51	European Space Agency (The	137	176	77.8	IEEE	137	77.8	ION-The Inst of Navigation	14	8.0
52	Agency for Science Technolo	136	179	76.0	IEEE	136	76.0	SPIE-Int Soc Opt Engineering	7	3.9
53	Google Inc.	135	251	53.8	IEEE	135	53.8	3GPP General Partnership Project Standards Body	25	10.0
54	Harris Corp.	135	179	75.4	IEEE	135	75.4	SPIE-Int Soc Opt Engineering	5	2.8
55	Deutsche Telekom AG	131	391	33.5	IEEE	131	33.5	3GPP General Partnership Project Standards Body	99	25.3
56	Analog Devices Inc.	128	145	88.3	IEEE	128	88.3	SPIE-Int Soc Opt Engineering	3	2.1
57	Boeing Co. (The)	120	199	60.3	IEEE	120	60.3	ION-The Inst of Navigation	10	5.0
58	Emirates Telecommunication	115	131	87.8	IEEE	115	87.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3	2.3
59	Khalifa University of Science	115	131	87.8	IEEE	115	87.8	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3	2.3
60	Netherlands Organization for	108	232	46.6	IEEE	108	46.6	3GPP General Partnership Project Standards Body	31	13.4
61	Microchip Technology Inc.	104	129	80.6	IEEE	104	80.6	Audio Eng Soc	3	2.3
62	AT&T Inc	101	204	49.5	IEEE	101	49.5	Internet Soc/IETF-Internet Eng Task Force	25	12.3
63	Continental AG (Germany Fe	101	147	68.7	IEEE	101	68.7	RELX Group (Elsevier)	4	2.7
64	Massachusetts Institute of Te	93	239	38.9	IEEE	93	38.9	ACM-Assoc Comput Mach	32	13.4
65	Innovative Network Corporat	85	292	29.1	3GPP General Partnership Project Standards	187	64.0	IEEE	85	29.1
66	German Aerospace Center (D	82	98	83.7	IEEE	82	83.7	SPIE-Int Soc Opt Engineering	5	5.1
67	Honeywell International Inc.	81	138	58.7	IEEE	81	58.7	RELX Group (Elsevier)	10	7.2
68	ABB Ltd	79	99	79.8	IEEE	79	79.8	ACM-Assoc Comput Mach	4	4.0
69	Rohde & Schwarz GmbH &	77	112	68.8	IEEE	77	68.8	3GPP General Partnership Project Standards Body	11	9.8
70	Leonardo Spa (formerly Fim	76	132	57.6	IEEE	76	57.6	SPIE-Int Soc Opt Engineering	9	6.8
71	STMicroelectronics	76	100	76.0	IEEE	76	76.0	European Telecom Standards Institute (ETSI)	7	7.0
72	Lenovo Group Ltd	75	464	16.2	3GPP General Partnership Project Standards	314	67.7	IEEE	75	16.2
73	Japan Science and Technolog	74	127	58.3	IEEE	74	58.3	IEICE-Inst Elec Info Comm Eng	10	7.9
74	Centre Nationale D'Etudes Sp	73	129	56.6	IEEE	73	56.6	ION-The Inst of Navigation	18	14.0
75	Xilinx Inc.	72	78	92.3	IEEE	72	92.3	IEEE/Eurasip	1	1.3
76	Coriant	70	114	61.4	IEEE	70	61.4	IEEE/OSA	13	11.4
77	Swiss Federal Institute of Tec	70	119	58.8	IEEE	70	58.8	ACM-Assoc Comput Mach	25	21.0
78	Teledyne Technologies Incor	70	86	81.4	IEEE	70	81.4	Springer/Sp. Wien/Springer-Verlag/KluwAcad	3	3.5
79	Qinetiq Group Ltd	69	122	56.6	IEEE	69	56.6	CRC Press/Taylor & Francis	7	5.7
80	Technische Universitat Berlin	67	99	67.7	IEEE	67	67.7	3GPP General Partnership Project Standards Body	8	8.1

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	Commscope Inc.	66	96	68.8	IEEE	66	68.8	Internet Soc/IETF-Internet Eng Task Force	8	8.3
82	KT Corp.	66	106	62.3	IEEE	66	62.3	3GPP General Partnership Project Standards Body	15	14.2
83	Synaptics Inc.	66	84	78.6	IEEE	66	78.6	RELX Group (Elsevier)	3	3.6
84	Tel Aviv University	64	83	77.1	IEEE	64	77.1	IET/IEE	4	4.8
85	Texas Instruments Inc	63	91	69.2	IEEE	63	69.2	3GPP General Partnership Project Standards Body	18	19.8
86	Ecole Polytechnique Federale	62	95	65.3	IEEE	62	65.3	ACM-Assoc Comput Mach	9	9.5
87	Oracle Corporation	62	132	47.0	IEEE	62	47.0	Internet Soc/IETF-Internet Eng Task Force	21	15.9
88	Technische Universitat Dresd	62	72	86.1	IEEE	62	86.1	IBM Corp.	4	5.6
89	Technische Universitat Muni	62	95	65.3	IEEE	62	65.3	ACM-Assoc Comput Mach	7	7.4
90	Northrop Grumman Corp	61	97	62.9	IEEE	61	62.9	IET/IEE	7	7.2
91	Advanced Micro Devices Inc	60	87	69.0	IEEE	60	69.0	RELX Group (Elsevier)	8	9.2
92	CPG TECHNOLOGIES LLC	60	116	51.7	IEEE	60	51.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	30	25.9
93	MIMOS Berhad	60	94	63.8	IEEE	60	63.8	Internet Soc/IETF-Internet Eng Task Force	8	8.5
94	Royal KPN N.V.	60	155	38.7	IEEE	60	38.7	3GPP General Partnership Project Standards Body	37	23.9
95	Atos SE	58	135	43.0	IEEE	58	43.0	Internet Soc/IETF-Internet Eng Task Force	34	25.2
96	Gemalto	58	258	22.5	3GPP General Partnership Project Standards	70	27.1	IEEE	58	22.5
97	Kyocera Corp.	58	357	16.2	3GPP General Partnership Project Standards	275	77.0	IEEE	58	16.2
98	REARDEN LLC	58	62	93.5	IEEE	58	93.5	3GPP General Partnership Project Standards Body	3	4.8
99	INSTITUT MINES-TELECO	57	98	58.2	IEEE	57	58.2	International Association for Cryptologic Research (IACR)	13	13.3
100	SK Telecom Co. Ltd.	57	81	70.4	IEEE	57	70.4	Internet Soc/IETF-Internet Eng Task Force	9	11.1

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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>Wind Energy</i>										
1	INDIVIDUAL PATENTER	92	183	50.3	IEEE	92	50.3	RELX Group (Elsevier)	36	19.7
2	Vestas Wind Systems A/S	87	174	50.0	IEEE	87	50.0	RELX Group (Elsevier)	22	12.6
3	Ingteam Corporation SA	29	36	80.6	IEEE	29	80.6	RELX Group (Elsevier)	7	19.4
4	Siemens Aktiengesellschaft	28	41	68.3	IEEE	28	68.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	5	12.2
5	General Electric Company	19	39	48.7	IEEE	19	48.7	RELX Group (Elsevier)	9	23.1
6	UNIVERSITY OF ZAGREB	13	13	100.0	IEEE	13	100.0			
7	ABB Ltd	11	17	64.7	IEEE	11	64.7	American Automatic Control Council (AACC)	1	5.9
8	Enercon GmbH	10	11	90.9	IEEE	10	90.9	RELX Group (Elsevier)	1	9.1
9	Woodward Inc	8	8	100.0	IEEE	8	100.0			
10	Senvion SE	7	20	35.0	IEEE	7	35.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	4	20.0
11	Nordex SE	6	9	66.7	IEEE	6	66.7	RELX Group (Elsevier)	3	33.3
12	UNIVERSIDAD PUBLICA	5	6	83.3	IEEE	5	83.3	Instrument Society of America	1	16.7
13	NEWCASTLE INNOVATIO	4	4	100.0	IEEE	4	100.0			
14	WIND TO POWER SYSTE	4	6	66.7	IEEE	4	66.7	IET/IEE	2	33.3
15	KK-ELECTRONIC A/S	3	4	75.0	IEEE	3	75.0	RELX Group (Elsevier)	1	25.0
16	Moog Inc	3	3	100.0	IEEE	3	100.0			
17	VESTAS WIND SYS AS	3	5	60.0	IEEE	3	60.0	American Automatic Control Council (AACC)	2	40.0
18	3E	2	3	66.7	IEEE	2	66.7	RELX Group (Elsevier)	1	33.3
19	APPLUS NORCONTROL S	2	2	100.0	IEEE	2	100.0			
20	Bosch (Robert) GmbH	2	7	28.6	IEEE	2	28.6	American Automatic Control Council (AACC)	1	14.3
21	Consiglio Nazionale Delle Ri	2	3	66.7	IEEE	2	66.7	RELX Group (Elsevier)	1	33.3
22	KITENERGY S R L	2	3	66.7	IEEE	2	66.7	American Automatic Control Council (AACC)	1	33.3
23	RHAMAN SHAH ARIFUR	2	2	100.0	IEEE	2	100.0			
24	University of Manchester	2	2	100.0	IEEE	2	100.0			
25	University of Western Ontari	2	2	100.0	IEEE	2	100.0			
26	UPTIME HOLDING GMBH	2	2	100.0	IEEE	2	100.0			
27	VERTICAL WIND AB	2	2	100.0	IEEE	2	100.0			
28	VRB POWER SYSTEMS IN	2	3	66.7	IEEE	2	66.7	RELX Group (Elsevier)	1	33.3
29	3W Power SA	1	2	50.0	RELX Group (Elsevier)	1	50.0	IEEE	1	50.0
30	Airbus SE	1	3	33.3	RELX Group (Elsevier)	1	33.3	American Institute of Physics	1	33.3
31	American Superconductor Co	1	3	33.3	Compass Publications, Inc.	1	33.3	IEEE	1	33.3
32	BLUE H INTELLECTUAL P	1	1	100.0	IEEE	1	100.0			
33	Daewoo Shipbuilding & Mari	1	2	50.0	IET/IEE	1	50.0	IEEE	1	50.0
34	Energy Research Centre of th	1	12	8.3	RELX Group (Elsevier)	5	41.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	2	16.7
35	FUNDACIAN CENER-CIE	1	3	33.3	American Automatic Control Council (AACC)	2	66.7	IEEE	1	33.3
36	GREEN POWER TECHNOL	1	1	100.0	IEEE	1	100.0			
37	HAO YUSHAN	1	1	100.0	IEEE	1	100.0			
38	INEO DEFENSE	1	1	100.0	IEEE	1	100.0			
39	INVENTUS HOLDINGS LL	1	1	100.0	IEEE	1	100.0			

Appendix B: Top 100 Organizations That Cite IEEE; (2002-2017 WIPO Patents by Category)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
40	Mitsubishi Heavy Industries	1	7	14.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	3	42.9	Institute of Electrical Engineers of Japan	1	14.3
41	NATIONAL RENEWABLE	1	1	100.0	IEEE	1	100.0			
42	Ogin Inc (Formerly FloDesig	1	3	33.3	RELX Group (Elsevier)	1	33.3	IEEE	1	33.3
43	ONSEMBLE LLC	1	1	100.0	IEEE	1	100.0			
44	POWEROASIS LTD	1	2	50.0	RELX Group (Elsevier)	1	50.0	IEEE	1	50.0
45	Qinetiq Group Ltd	1	3	33.3	IET/IEE	2	66.7	IEEE	1	33.3
46	SMA Solar Technology AG	1	1	100.0	IEEE	1	100.0			
47	SOCIETE D'ETUDES ET D'	1	1	100.0	IEEE	1	100.0			
48	Technical University of Den	1	2	50.0	IEEE	1	50.0	IET/IEE	1	50.0
49	THE ENGINEERING BUSIN	1	1	100.0	IEEE	1	100.0			
50	University of SouthHampton	1	2	50.0	IEEE	1	50.0	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	50.0
51	Wilic Sarl	1	1	100.0	IEEE	1	100.0			
52	WONGALEA HOLDINGS P	1	1	100.0	IEEE	1	100.0			

Appendix C: Top Organizations from All Categories Combined (WIPO Patents 2002-2017)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
1	INDIVIDUAL PATENTER	37155	105422	35.2	IEEE	37155	35.2	RELX Group (Elsevier)	12603	12.0
2	Qualcomm Inc	6522	18951	34.4	IEEE	6522	34.4	3GPP General Partnership Project Standards Body	5921	31.2
3	Koninklijke Philips N.V.	6201	16185	38.3	IEEE	6201	38.3	RELX Group (Elsevier)	1731	10.7
4	Ericsson	4968	15629	31.8	3GPP General Partnership Project Standards Body	6883	44.0	IEEE	4968	31.8
5	Nokia Corp	4516	13975	32.3	3GPP General Partnership Project Standards Body	5537	39.6	IEEE	4516	32.3
6	Siemens Aktiengesellschaft	3088	6783	45.5	IEEE	3088	45.5	RELX Group (Elsevier)	922	13.6
7	Technicolor SA	2216	4366	50.8	IEEE	2216	50.8	ISO/IEC/JTC/ANSI	308	7.1
8	Panasonic Corporation	1596	5074	31.5	IEEE	1596	31.5	3GPP General Partnership Project Standards Body	1542	30.4
9	Huawei Technologies Company	1591	5855	27.2	3GPP General Partnership Project Standards Body	2119	36.2	IEEE	1591	27.2
10	Intel Corporation	1546	3373	45.8	IEEE	1546	45.8	3GPP General Partnership Project Standards Body	775	23.0
11	Orange	1531	2857	53.6	IEEE	1531	53.6	Internet Soc/IETF-Internet Eng Task Force	248	8.7
12	Fraunhofer Gesellschaft	1499	3825	39.2	IEEE	1499	39.2	RELX Group (Elsevier)	399	10.4
13	LG Electronics Inc.	1188	3183	37.3	3GPP General Partnership Project Standards Body	1458	45.8	IEEE	1188	37.3
14	Microsoft Corporation	1184	2946	40.2	IEEE	1184	40.2	ACM-Assoc Comput Mach	627	21.3
15	NEC Corp	1148	3681	31.2	IEEE	1148	31.2	3GPP General Partnership Project Standards Body	1088	29.6
16	International Business Machines Corporation	1116	2738	40.8	IEEE	1116	40.8	ACM-Assoc Comput Mach	339	12.4
17	Samsung Electronics Co Ltd	1099	2087	52.7	IEEE	1099	52.7	3GPP General Partnership Project Standards Body	521	25.0
18	Commissariat A L'Energie Atomique	996	4169	23.9	RELX Group (Elsevier)	997	23.9	IEEE	996	23.9
19	Sony Corp	973	3037	32.0	IEEE	973	32.0	3GPP General Partnership Project Standards Body	474	15.6
20	Mitsubishi Electric Corp	889	1784	49.8	IEEE	889	49.8	3GPP General Partnership Project Standards Body	179	10.0
21	ABB Ltd	844	1230	68.6	IEEE	844	68.6	RELX Group (Elsevier)	87	7.1
22	Motorola Solutions Inc.	783	1615	48.5	IEEE	783	48.5	3GPP General Partnership Project Standards Body	275	17.0
23	Bosch (Robert) GmbH	780	1754	44.5	IEEE	780	44.5	RELX Group (Elsevier)	299	17.0
24	Nippon Telegraph & Telephone	774	3528	21.9	3GPP General Partnership Project Standards Body	1970	55.8	IEEE	774	21.9
25	NXP Semiconductors NV	770	1208	63.7	IEEE	770	63.7	RELX Group (Elsevier)	69	5.7
26	InterDigital Inc	750	2646	28.3	3GPP General Partnership Project Standards Body	1338	50.6	IEEE	750	28.3
27	Thales	694	1369	50.7	IEEE	694	50.7	RELX Group (Elsevier)	103	7.5
28	Centre National De La Recherche Scientifique	678	4655	14.6	RELX Group (Elsevier)	1102	23.7	IEEE	678	14.6
29	Cisco Systems Inc.	614	1588	38.7	IEEE	614	38.7	Internet Soc/IETF-Internet Eng Task Force	409	25.8
30	Raytheon Co.	580	1101	52.7	IEEE	580	52.7	SPIE-Int Soc Opt Engineering	96	8.7
31	BT Group PLC	576	1228	46.9	IEEE	576	46.9	Internet Soc/IETF-Internet Eng Task Force	101	8.2
32	Google Inc.	480	1263	38.0	IEEE	480	38.0	ACM-Assoc Comput Mach	174	13.8
33	Electronics and Telecommunications Research Institute	464	800	58.0	IEEE	464	58.0	3GPP General Partnership Project Standards Body	112	14.0
34	Infineon Technologies AG	448	910	49.2	IEEE	448	49.2	RELX Group (Elsevier)	85	9.3
35	HP Inc	445	1210	36.8	IEEE	445	36.8	RELX Group (Elsevier)	137	11.3
36	Dolby Laboratories Inc	441	1052	41.9	IEEE	441	41.9	Audio Eng Soc	92	8.7
37	Blackberry Ltd.	421	1822	23.1	3GPP General Partnership Project Standards Body	1045	57.4	IEEE	421	23.1
38	Fujitsu Limited	419	1429	29.3	3GPP General Partnership Project Standards Body	471	33.0	IEEE	419	29.3
39	General Electric Company	412	1373	30.0	IEEE	412	30.0	RELX Group (Elsevier)	275	20.0
40	Canon Inc	400	1568	25.5	IEEE	400	25.5	American Institute of Physics	169	10.8

Appendix C: Top Organizations from All Categories Combined (WIPO Patents 2002-2017)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
41	Honeywell International Inc.	397	788	50.4	IEEE	397	50.4	RELX Group (Elsevier)	128	16.2
42	Apple Inc	395	1052	37.5	IEEE	395	37.5	ACM-Assoc Comput Mach	115	10.9
43	Massachusetts Institute of Tec	392	4696	8.3	RELX Group (Elsevier)	606	12.9	ACS-Am Chem Soc	603	12.8
44	RPX Corp	372	653	57.0	IEEE	372	57.0	3GPP General Partnership Project Standards Body	81	12.4
45	Telecom Italia SPA	362	671	53.9	IEEE	362	53.9	Internet Soc/IETF-Internet Eng Task Force	52	7.7
46	Western Digital Corp.	358	558	64.2	IEEE	358	64.2	American Institute of Physics	46	8.2
47	Toshiba Corp	342	669	51.1	IEEE	342	51.1	American Institute of Physics	47	7.0
48	Oracle Corporation	333	843	39.5	IEEE	333	39.5	ACM-Assoc Comput Mach	175	20.8
49	Airbus SE	323	812	39.8	IEEE	323	39.8	RELX Group (Elsevier)	137	16.9
50	Hon Hai Precision Industry Cc	304	2191	13.9	3GPP General Partnership Project Standards Bc	1386	63.3	IEEE	304	13.9
51	Harris Corp.	294	469	62.7	IEEE	294	62.7	RELX Group (Elsevier)	33	7.0
52	Agency for Science Technolog	292	583	50.1	IEEE	292	50.1	RELX Group (Elsevier)	45	7.7
53	Ecole Polytechnique Federale	285	1055	27.0	IEEE	285	27.0	RELX Group (Elsevier)	139	13.2
54	BAE Systems Plc.	276	532	51.9	IEEE	276	51.9	RELX Group (Elsevier)	48	9.0
55	Advanced Micro Devices Inc	272	516	52.7	IEEE	272	52.7	RELX Group (Elsevier)	45	8.7
56	Marvell Technology Group Lt	271	361	75.1	IEEE	271	75.1	Internet Soc/IETF-Internet Eng Task Force	23	6.4
57	Eastman Kodak Company	268	993	27.0	IEEE	268	27.0	RELX Group (Elsevier)	100	10.1
58	Netherlands Organization for	244	746	32.7	IEEE	244	32.7	RELX Group (Elsevier)	106	14.2
59	ZTE Corp.	243	1596	15.2	3GPP General Partnership Project Standards Bc	1084	67.9	IEEE	243	15.2
60	ST-Ericsson SA (Patents split	240	344	69.8	IEEE	240	69.8	3GPP General Partnership Project Standards Body	42	12.2
61	Boeing Co. (The)	236	625	37.8	IEEE	236	37.8	RELX Group (Elsevier)	113	18.1
62	Telefonica SA	233	625	37.3	IEEE	233	37.3	ACM-Assoc Comput Mach	103	16.5
63	Continental AG (Germany Fed	227	375	60.5	IEEE	227	60.5	RELX Group (Elsevier)	33	8.8
64	Hitachi Ltd	211	639	33.0	IEEE	211	33.0	IEICE-Inst Elec Info Comm Eng	44	6.9
65	Analog Devices Inc.	207	260	79.6	IEEE	207	79.6	SPIE-Int Soc Opt Engineering	7	2.7
66	Broadcom Ltd	205	319	64.3	IEEE	205	64.3	Audio Eng Soc	13	4.1
67	Friedrich-Alexander-Universit	196	412	47.6	IEEE	196	47.6	Audio Eng Soc	48	11.7
68	Schneider Electric S.A.	190	255	74.5	IEEE	190	74.5	RELX Group (Elsevier)	12	4.7
69	STMicroelectronics	186	338	55.0	IEEE	186	55.0	RELX Group (Elsevier)	31	9.2
70	Microchip Technology Inc.	184	263	70.0	IEEE	184	70.0	ACM-Assoc Comput Mach	9	3.4
71	University of Oxford	180	983	18.3	IEEE	180	18.3	RELX Group (Elsevier)	172	17.5
72	Swiss Federal Institute of Tech	172	740	23.2	IEEE	172	23.2	RELX Group (Elsevier)	121	16.4
73	Texas Instruments Inc	169	220	76.8	IEEE	169	76.8	3GPP General Partnership Project Standards Body	18	8.2
74	Qinetiq Group Ltd	167	442	37.8	IEEE	167	37.8	RELX Group (Elsevier)	39	8.8
75	ARRIS Group Inc	165	554	29.8	IEEE	165	29.8	ISO/IEC/JTC/ANSI	130	23.5
76	Toyota Motor Corp	158	761	20.8	RELX Group (Elsevier)	230	30.2	IEEE	158	20.8
77	Deutsche Telekom AG	151	473	31.9	IEEE	151	31.9	3GPP General Partnership Project Standards Body	99	20.9
78	Interuniversity MicroElectroni	151	507	29.8	IEEE	151	29.8	American Institute of Physics	64	12.6
79	University of London	150	699	21.5	IEEE	150	21.5	RELX Group (Elsevier)	120	17.2
80	Cree Inc.	146	379	38.5	IEEE	146	38.5	American Institute of Physics	78	20.6

Appendix C: Top Organizations from All Categories Combined (WIPO Patents 2002-2017)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
81	IDEMIA	146	320	45.6	IEEE	146	45.6	International Association for Cryptologic Research (IACR)	27	8.4
82	European Space Agency (The)	144	196	73.5	IEEE	144	73.5	ION-The Inst of Navigation	14	7.1
83	Medtronic Inc	144	950	15.2	RELX Group (Elsevier)	244	25.7	IEEE	144	15.2
84	TDK Corporation	143	325	44.0	IEEE	143	44.0	RELX Group (Elsevier)	68	20.9
85	Softbank Corp	141	335	42.1	IEEE	141	42.1	Joint IEEE and ACM	29	8.7
86	University of California	135	1131	11.9	RELX Group (Elsevier)	151	13.4	IEEE	135	11.9
87	Xilinx Inc.	135	166	81.3	IEEE	135	81.3	Joint IEEE and ACM	7	4.2
88	Imperial College	132	557	23.7	IEEE	132	23.7	RELX Group (Elsevier)	96	17.2
89	Xperi Corporation (Formerly	131	219	59.8	IEEE	131	59.8	RELX Group (Elsevier)	18	8.2
90	AT&T Inc	130	273	47.6	IEEE	130	47.6	Internet Soc/IETF-Internet Eng Task Force	28	10.3
91	Technische Universitat Berlin	127	274	46.4	IEEE	127	46.4	American Institute of Physics	38	13.9
92	Valeo S.A.	127	175	72.6	IEEE	127	72.6	RELX Group (Elsevier)	12	6.9
93	Japan Science and Technology	125	482	25.9	IEEE	125	25.9	American Institute of Physics	83	17.2
94	Northrop Grumman Corp	124	297	41.8	IEEE	124	41.8	American Institute of Physics	30	10.1
95	German Aerospace Center (De	122	209	58.4	IEEE	122	58.4	RELX Group (Elsevier)	23	11.0
96	Rohde & Schwarz GmbH & C	122	179	68.2	IEEE	122	68.2	3GPP General Partnership Project Standards Body	11	6.1
97	Emirates Telecommunications	121	143	84.6	IEEE	121	84.6	AMER TELEPHONE TELEGRAPH CO, 550 MADISON AVE	3	2.1
98	Khalifa University of Science	121	146	82.9	IEEE	121	82.9	AMER TELEPHONE TELEGRAPH CO, 550 MADISON AVE	3	2.1
99	MIMOS Berhad	121	229	52.8	IEEE	121	52.8	RELX Group (Elsevier)	18	7.9
100	CPG TECHNOLOGIES LLC	120	220	54.5	IEEE	120	54.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	58	26.4
101	Innovative Network Corporati	120	370	32.4	3GPP General Partnership Project Standards B	187	50.5	IEEE	120	32.4
102	Tel Aviv Univiversity	120	476	25.2	IEEE	120	25.2	RELX Group (Elsevier)	69	14.5
103	Corning Inc.	117	830	14.1	RELX Group (Elsevier)	162	19.5	IEEE	117	14.1
104	Carl-Zeiss Stiftung	113	1313	8.6	SPIE-Int Soc Opt Engineering	299	22.8	Optical Society of America	223	17.0
105	Technical University of Denm	112	499	22.4	RELX Group (Elsevier)	115	23.0	IEEE	112	22.4
106	Honda Motor Co. Ltd.(Honda	110	239	46.0	IEEE	110	46.0	RELX Group (Elsevier)	46	19.2
107	Nuance Communications Inc	110	195	56.4	IEEE	110	56.4	ISCA (International Speech Communication Association)	30	15.4
108	Boston Scientific Corp.	108	733	14.7	RELX Group (Elsevier)	214	29.2	IEEE	108	14.7
109	Roche Holding Ltd.	108	951	11.4	RELX Group (Elsevier)	188	19.8	IEEE	108	11.4
110	Technische Universitat Munic	107	280	38.2	IEEE	107	38.2	RELX Group (Elsevier)	39	13.9
111	Alstom	106	160	66.3	IEEE	106	66.3	RELX Group (Elsevier)	14	8.8
112	Lenovo Group Ltd	103	524	19.7	3GPP General Partnership Project Standards B	315	60.1	IEEE	103	19.7
113	Micron Technology Inc.	103	309	33.3	IEEE	103	33.3	American Institute of Physics	42	13.6
114	Vestas Wind Systems A/S	102	193	52.8	IEEE	102	52.8	RELX Group (Elsevier)	25	13.0
115	Centre Nationale D'Etudes Sp	101	209	48.3	IEEE	101	48.3	RELX Group (Elsevier)	27	12.9
116	Commonwealth Scientific and	100	172	58.1	IEEE	100	58.1	RELX Group (Elsevier)	11	6.4
117	Max-Planck Gesellschaft	100	1053	9.5	RELX Group (Elsevier)	164	15.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	120	11.4
118	French National Institute for R	99	248	39.9	IEEE	99	39.9	ACM-Assoc Comput Mach	34	13.7
119	Leonardo Spa (formerly Finme	99	190	52.1	IEEE	99	52.1	SPIE-Int Soc Opt Engineering	17	8.9
120	Synaptics Inc.	97	128	75.8	IEEE	97	75.8	RELX Group (Elsevier)	6	4.7

Appendix C: Top Organizations from All Categories Combined (WIPO Patents 2002-2017)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
121	Gemalto	96	427	22.5	IEEE	96	22.5	International Association for Cryptologic Research (IACR)	71	16.6
122	Sap SE	94	268	35.1	IEEE	94	35.1	ACM-Assoc Comput Mach	68	25.4
123	Technische Universitat Dresde	94	386	24.4	IEEE	94	24.4	RELX Group (Elsevier)	64	16.6
124	Institut Polytechnique de Gren	93	178	52.2	IEEE	93	52.2	RELX Group (Elsevier)	39	21.9
125	National University of Ireland	93	333	27.9	IEEE	93	27.9	RELX Group (Elsevier)	55	16.5
126	Osram Licht AG	93	565	16.5	American Institute of Physics	181	32.0	IEEE	93	16.5
127	University of Florida	92	257	35.8	IEEE	92	35.8	American Institute of Physics	37	14.4
128	King Abdullah University of S	91	962	9.5	ACS-Am Chem Soc	222	23.1	RELX Group (Elsevier)	119	12.4
129	University of Minnesota (The	90	322	28.0	IEEE	90	28.0	RELX Group (Elsevier)	75	23.3
130	Lockheed Martin Corp.	89	247	36.0	IEEE	89	36.0	RELX Group (Elsevier)	24	9.7
131	CSIC-Consejo Superior De In	88	460	19.1	IEEE	88	19.1	RELX Group (Elsevier)	76	16.5
132	Applied Materials Inc.	86	397	21.7	American Institute of Physics	93	23.4	IEEE	86	21.7
133	Teledyne Technologies Incorp	86	148	58.1	IEEE	86	58.1	RELX Group (Elsevier)	11	7.4
134	AMS AG	84	128	65.6	IEEE	84	65.6	American Institute of Physics	11	8.6
135	Bayerische Motoren Werke A	83	153	54.2	IEEE	83	54.2	RELX Group (Elsevier)	21	13.7
136	Oclaro Inc	83	236	35.2	IEEE	83	35.2	IET/IEE	37	15.7
137	Universitat Politecnica De Cat	83	171	48.5	IEEE	83	48.5	Optical Society of America	16	9.4
138	Stanford University	82	392	20.9	IEEE	82	20.9	American Institute of Physics	51	13.0
139	Daimler AG	81	175	46.3	IEEE	81	46.3	RELX Group (Elsevier)	41	23.4
140	University of Gent	81	356	22.8	IEEE	81	22.8	RELX Group (Elsevier)	58	16.3
141	NVIDIA Corp.	80	160	50.0	IEEE	80	50.0	3GPP General Partnership Project Standards Body	30	18.8
142	Olympus Corp.	79	216	36.6	IEEE	79	36.6	RELX Group (Elsevier)	13	6.0
143	3M Co	78	844	9.2	RELX Group (Elsevier)	181	21.4	ACS-Am Chem Soc	104	12.3
144	Cambridge University	77	687	11.2	American Institute of Physics	127	18.5	RELX Group (Elsevier)	105	15.3
145	Catholic University Leuven	77	506	15.2	RELX Group (Elsevier)	96	19.0	IEEE	77	15.2
146	Politecnico di Torino	77	148	52.0	IEEE	77	52.0	RELX Group (Elsevier)	16	10.8
147	Sumitomo Electric Industries	77	428	18.0	IEEE	77	18.0	American Institute of Physics	72	16.8
148	Commscope Inc.	76	124	61.3	IEEE	76	61.3	Internet Soc/IETF-Internet Eng Task Force	8	6.5
149	Coriant	75	120	62.5	IEEE	75	62.5	IEEE/OSA	13	10.8
150	Porsche Automobil Holding S	75	160	46.9	IEEE	75	46.9	RELX Group (Elsevier)	23	14.4
151	Verizon Communications Inc	75	172	43.6	IEEE	75	43.6	ACM-Assoc Comput Mach	26	15.1
152	California Institute of Technol	73	221	33.0	IEEE	73	33.0	American Institute of Physics	37	16.7
153	Soitec SA	73	346	21.1	American Institute of Physics	91	26.3	RELX Group (Elsevier)	76	22.0
154	Advantest Corp.	72	100	72.0	IEEE	72	72.0	IET/IEE	6	6.0
155	Analogic Corporation	72	120	60.0	IEEE	72	60.0	RELX Group (Elsevier)	11	9.2
156	Safran S.A.	72	208	34.6	IEEE	72	34.6	RELX Group (Elsevier)	40	19.2
157	University of Michigan	72	356	20.2	American Institute of Physics	72	20.2	IEEE	72	20.2
158	Yissum Research Developmen	71	636	11.2	ACS-Am Chem Soc	127	20.0	RELX Group (Elsevier)	89	14.0
159	CA Inc	70	155	45.2	IEEE	70	45.2	ACM-Assoc Comput Mach	17	11.0
160	New Jersey Institute of Techn	70	100	70.0	IEEE	70	70.0	ACM-Assoc Comput Mach	3	3.0

Appendix C: Top Organizations from All Categories Combined (WIPO Patents 2002-2017)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
161	Atos SE	69	165	41.8	IEEE	69	41.8	Internet Soc/IETF-Internet Eng Task Force	36	21.8
162	HRL Laboratories LLC	69	152	45.4	IEEE	69	45.4	IET/IEEE	25	16.4
163	INSTITUT MINES-TELECO	69	113	61.1	IEEE	69	61.1	International Association for Cryptologic Research (IACR)	13	11.5
164	Kyocera Corp.	69	406	17.0	3GPP General Partnership Project Standards B	275	67.7	IEEE	69	17.0
165	Tohoku University	69	212	32.5	IEEE	69	32.5	American Institute of Physics	27	12.7
166	Intellectual Ventures Manage	68	92	73.9	IEEE	68	73.9	ACM-Assoc Comput Mach	5	5.4
167	KT Corp.	68	108	63.0	IEEE	68	63.0	3GPP General Partnership Project Standards Body	15	13.9
168	Royal KPN N.V.	68	174	39.1	IEEE	68	39.1	3GPP General Partnership Project Standards Body	37	21.3
169	National University of Singap	67	196	34.2	IEEE	67	34.2	RELX Group (Elsevier)	27	13.8
170	Synopsys Inc.	67	137	48.9	IEEE	67	48.9	Joint IEEE and ACM	30	21.9
171	Eaton Corp.	66	100	66.0	IEEE	66	66.0	RELX Group (Elsevier)	11	11.0
172	National Institute of Informati	65	181	35.9	IEEE	65	35.9	IEICE-Inst Elec Info Comm Eng	37	20.4
173	Battelle Memorial Institute	64	396	16.2	RELX Group (Elsevier)	93	23.5	IEEE	64	16.2
174	China National Chemical Cor	64	298	21.5	IEEE	64	21.5	American Institute of Physics	24	8.1
175	Cirrus Logic Inc.	64	86	74.4	IEEE	64	74.4	Audio Eng Soc	5	5.8
176	Freiburg University	64	379	16.9	RELX Group (Elsevier)	72	19.0	IEEE	64	16.9
177	Emerson Electric Co.	63	180	35.0	IEEE	63	35.0	RELX Group (Elsevier)	40	22.2
178	Rambus Inc.	63	80	78.8	IEEE	63	78.8	IEEE/JPN Soc App Phys	4	5.0
179	Technion - Israel Institute of T	63	366	17.2	IEEE	63	17.2	RELX Group (Elsevier)	57	15.6
180	University of Tokyo	63	209	30.1	IEEE	63	30.1	American Institute of Physics	25	12.0
181	Schlumberger Ltd.	62	559	11.1	RELX Group (Elsevier)	89	15.9	Society of Exploration Geophysicists	85	15.2
182	TomTom NV	62	129	48.1	IEEE	62	48.1	RELX Group (Elsevier)	15	11.6
183	Nanyang Technological Unive	61	137	44.5	IEEE	61	44.5	RELX Group (Elsevier)	10	7.3
184	Vrije Universiteit Brussel	61	242	25.2	IEEE	61	25.2	RELX Group (Elsevier)	35	14.5
185	Imagination Technologies Gro	60	159	37.7	IEEE	60	37.7	RELX Group (Elsevier)	22	13.8
186	Cadence Design Systems Inc	59	97	60.8	IEEE	59	60.8	Joint IEEE and ACM	22	22.7
187	FTS ComputerTechnik	59	86	68.6	IEEE	59	68.6	ACM-Assoc Comput Mach	9	10.5
188	Math Works Inc (The)	59	135	43.7	IEEE	59	43.7	RELX Group (Elsevier)	27	20.0
189	United Technologies Corp	59	157	37.6	IEEE	59	37.6	RELX Group (Elsevier)	33	21.0
190	Valtion Teknillinen Tutkimus	59	119	49.6	IEEE	59	49.6	RELX Group (Elsevier)	17	14.3
191	Xtrion NV	59	89	66.3	IEEE	59	66.3	RELX Group (Elsevier)	10	11.2
192	Zebra Technologies Corp.	59	95	62.1	IEEE	59	62.1	RELX Group (Elsevier)	10	10.5
193	Endress+Hauser (International	58	177	32.8	IEEE	58	32.8	RELX Group (Elsevier)	46	26.0
194	Harvard University	58	919	6.3	Nature Publishing Group	105	11.4	RELX Group (Elsevier)	103	11.2
195	INSTITUT TELECOM-TEL	58	64	90.6	IEEE	58	90.6	RELX Group (Elsevier)	1	1.6
196	REARDEN LLC	58	65	89.2	IEEE	58	89.2	ACM-Assoc Comput Mach	3	4.6
197	SK Telecom Co. Ltd.	58	83	69.9	IEEE	58	69.9	Internet Soc/IETF-Internet Eng Task Force	9	10.8
198	Abbott Laboratories	57	559	10.2	RELX Group (Elsevier)	171	30.6	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	61	10.9
199	Murata Manufacturing Co. Lt	57	99	57.6	IEEE	57	57.6	RELX Group (Elsevier)	8	8.1
200	Universite Pierre & Marie Cur	57	298	19.1	RELX Group (Elsevier)	62	20.8	IEEE	57	19.1

Appendix C: Top Organizations from All Categories Combined (WIPO Patents 2002-2017)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
201	University of Surrey	57	145	39.3	IEEE	57	39.3	RELX Group (Elsevier)	21	14.5
202	Forschungszentrum Julich	56	478	11.7	RELX Group (Elsevier)	126	26.4	IEEE	56	11.7
203	Georgia Institute of Technolog	56	303	18.5	IEEE	56	18.5	Nature Publishing Group	52	17.2
204	University of Illinois	56	297	18.9	IEEE	56	18.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	43	14.5
205	Citrix Systems Inc	55	151	36.4	IEEE	55	36.4	Internet Soc/IETF-Internet Eng Task Force	25	16.6
206	DowDuPont	55	1063	5.2	RELX Group (Elsevier)	284	26.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	145	13.6
207	Politecnico di Milano	55	184	29.9	IEEE	55	29.9	RELX Group (Elsevier)	28	15.2
208	Seagate Technology Plc	55	111	49.5	IEEE	55	49.5	American Institute of Physics	18	16.2
209	Aselsan Elektronik Sanayi Ve	54	101	53.5	IEEE	54	53.5	RELX Group (Elsevier)	11	10.9
210	Israel Aerospace Industries Ltc	54	77	70.1	IEEE	54	70.1	IET/IEE	3	3.9
211	Renault SA	54	106	50.9	IEEE	54	50.9	RELX Group (Elsevier)	26	24.5
212	Saab AB	54	64	84.4	IEEE	54	84.4	Springer/Sp. Wien/Springer-Verlag/KluwAcad	2	3.1
213	ASML Holding NV	53	543	9.8	SPIE-Int Soc Opt Engineering	224	41.3	American Institute of Physics	62	11.4
214	Microsemi Corp	53	67	79.1	IEEE	53	79.1	RELX Group (Elsevier)	4	6.0
215	TechUnivDelft	53	235	22.6	RELX Group (Elsevier)	58	24.7	IEEE	53	22.6
216	Telnet PLC	53	113	46.9	IEEE	53	46.9	Optical Society of America	13	11.5
217	University of Scotland	53	164	32.3	IEEE	53	32.3	RELX Group (Elsevier)	18	11.0
218	University of Wisconsin	53	445	11.9	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	117	26.3	IEEE	53	11.9
219	Cornell University	52	244	21.3	IEEE	52	21.3	RELX Group (Elsevier)	30	12.3
220	Institut National Des Sciences	52	243	21.4	IEEE	52	21.4	RELX Group (Elsevier)	49	20.2
221	Technische Universiteit Eindh	52	144	36.1	IEEE	52	36.1	American Institute of Physics	17	11.8
222	Fuji Film Holdings Corp	51	364	14.0	RELX Group (Elsevier)	56	15.4	IEEE	51	14.0
223	Universidad Politecnica de Me	51	116	44.0	IEEE	51	44.0	American Institute of Physics	12	10.3
224	Carnegie Mellon University	50	242	20.7	IEEE	50	20.7	RELX Group (Elsevier)	44	18.2
225	Qatar Foundation	50	141	35.5	ACM-Assoc Comput Mach	52	36.9	IEEE	50	35.5
226	Sagemcom SAS	50	86	58.1	IEEE	50	58.1	European Telecom Standards Institute (ETSI)	12	14.0
227	Sin-American Silicon	50	84	59.5	IEEE	50	59.5	American Institute of Physics	11	13.1
228	Thermo Fisher Scientific Inc	50	892	5.6	RELX Group (Elsevier)	213	23.9	ACS-Am Chem Soc	119	13.3
229	Universite de Rennes 1	50	163	30.7	IEEE	50	30.7	RELX Group (Elsevier)	40	24.5
230	University of Bristol	50	130	38.5	IEEE	50	38.5	RELX Group (Elsevier)	16	12.3
231	Council of Scientific and Indu	49	601	8.2	RELX Group (Elsevier)	176	29.3	ACS-Am Chem Soc	87	14.5
232	General Dynamics Corp	49	104	47.1	IEEE	49	47.1	3GPP General Partnership Project Standards Body	33	31.7
233	Ministry of Economy Trade ar	49	293	16.7	American Institute of Physics	57	19.5	IEEE	49	16.7
234	Swatch Group AG (The)	49	91	53.8	IEEE	49	53.8	RELX Group (Elsevier)	20	22.0
235	UNIVERSIDADE DE COIM	49	88	55.7	IEEE	49	55.7	RELX Group (Elsevier)	10	11.4
236	CUEA Aquitaine	48	293	16.4	RELX Group (Elsevier)	75	25.6	IEEE	48	16.4
237	Consiglio Nazionale Delle Ric	47	422	11.1	RELX Group (Elsevier)	84	19.9	IEEE	47	11.1
238	DNA ELECTRONICS LTD	47	69	68.1	IEEE	47	68.1	RELX Group (Elsevier)	12	17.4
239	Universite D'Aix-Marseille	47	264	17.8	RELX Group (Elsevier)	56	21.2	IEEE	47	17.8
240	Vodafone Group Plc	47	192	24.5	3GPP General Partnership Project Standards B	84	43.8	IEEE	47	24.5

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
241	Karlsruher Institut fuer Techn	46	273	16.8	RELX Group (Elsevier)	61	22.3	IEEE	46	16.8
242	TE Connectivity Ltd	46	121	38.0	IEEE	46	38.0	RELX Group (Elsevier)	12	9.9
243	Viasat	46	63	73.0	IEEE	46	73.0	trouble	5	7.9
244	Sapienza University of Rome	45	113	39.8	IEEE	45	39.8	RELX Group (Elsevier)	20	17.7
245	Technische Universitat Wien	45	98	45.9	IEEE	45	45.9	American Institute of Physics	10	10.2
246	Universite Joseph Fourier	45	181	24.9	IEEE	45	24.9	RELX Group (Elsevier)	45	24.9
247	University of Glasgow	45	156	28.8	IEEE	45	28.8	American Institute of Physics	30	19.2
248	Hexagon AB	44	110	40.0	IEEE	44	40.0	RELX Group (Elsevier)	10	9.1
249	Voiceage Corporation	44	67	65.7	IEEE	44	65.7	3GPP General Partnership Project Standards Body	6	9.0
250	Ecole Polytechnique (France)	43	318	13.5	RELX Group (Elsevier)	65	20.4	American Institute of Physics	56	17.6
251	Institut National de la Sante et	43	755	5.7	RELX Group (Elsevier)	175	23.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	78	10.3
252	Michigan State University	43	163	26.4	IEEE	43	26.4	RELX Group (Elsevier)	24	14.7
253	SMA Solar Technology AG	43	51	84.3	IEEE	43	84.3	WIP-Renewable Energies	2	3.9
254	Aalborg University	42	108	38.9	IEEE	42	38.9	RELX Group (Elsevier)	11	10.2
255	Bayer AG	42	586	7.2	RELX Group (Elsevier)	145	24.7	ACS-Am Chem Soc	132	22.5
256	BrainLAB AG	42	148	28.4	IEEE	42	28.4	RELX Group (Elsevier)	29	19.6
257	Danaher Corp.	42	363	11.6	RELX Group (Elsevier)	59	16.3	IEEE	42	11.6
258	Dell Technologies Inc	42	123	34.1	IEEE	42	34.1	ACM-Assoc Comput Mach	26	21.1
259	Energy Research Centre of the	42	127	33.1	IEEE	42	33.1	RELX Group (Elsevier)	40	31.5
260	International Electronics & En	42	84	50.0	IEEE	42	50.0	SPIE-Int Soc Opt Engineering	11	13.1
261	Mediatek Inc.	42	139	30.2	3GPP General Partnership Project Standards B	53	38.1	IEEE	42	30.2
262	RUEHRMAIR ULRICH	42	76	55.3	IEEE	42	55.3	American Institute of Physics	8	10.5
263	Tokyo Electron Limited	42	228	18.4	RELX Group (Elsevier)	61	26.8	IEEE	42	18.4
264	UNIVERSIDADE DO PORT	42	128	32.8	IEEE	42	32.8	RELX Group (Elsevier)	21	16.4
265	University of Sheffield	42	202	20.8	RELX Group (Elsevier)	47	23.3	IEEE	42	20.8
266	University of SouthHampton	42	215	19.5	IEEE	42	19.5	Optical Society of America	29	13.5
267	Amazon.com Inc.	41	132	31.1	IEEE	41	31.1	ACM-Assoc Comput Mach	28	21.2
268	Kudelski Group SA	41	99	41.4	IEEE	41	41.4	ACM-Assoc Comput Mach	13	13.1
269	Universitat Autonoma de Barc	41	115	35.7	IEEE	41	35.7	RELX Group (Elsevier)	29	25.2
270	Adaptive Spectrum & Signal	40	49	81.6	IEEE	40	81.6	International Telecommunication Union	4	8.2
271	Hewlett Packard Enterprises	40	140	28.6	IEEE	40	28.6	ACM-Assoc Comput Mach	27	19.3
272	IBBT VZW	40	60	66.7	IEEE	40	66.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	5	8.3
273	Ingteam Corporation SA	40	50	80.0	IEEE	40	80.0	RELX Group (Elsevier)	8	16.0
274	Nikon Corp.	40	140	28.6	IEEE	40	28.6	SPIE-Int Soc Opt Engineering	28	20.0
275	Omron Corp.	40	70	57.1	IEEE	40	57.1	RELX Group (Elsevier)	4	5.7
276	Saudi Arabian Oil Company (40	316	12.7	RELX Group (Elsevier)	94	29.7	Society of Petroleum Engineers	51	16.1
277	ThyssenKrupp	40	82	48.8	IEEE	40	48.8	RELX Group (Elsevier)	17	20.7
278	Cognex Corp.	38	75	50.7	IEEE	38	50.7	RELX Group (Elsevier)	8	10.7
279	Elbit Systems Ltd	38	89	42.7	IEEE	38	42.7	SPIE-Int Soc Opt Engineering	17	19.1
280	EXCEM	38	41	92.7	IEEE	38	92.7	Joint IEEE and ACM	3	7.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
281	INDIAN INSTITUTE OF TE	38	56	67.9	IEEE	38	67.9	RELX Group (Elsevier)	7	12.5
282	National Instruments Corp.	38	55	69.1	IEEE	38	69.1	RELX Group (Elsevier)	6	10.9
283	Universidad Politecnica de Va	38	99	38.4	IEEE	38	38.4	RELX Group (Elsevier)	15	15.2
284	Universite Catholique De Lou	38	205	18.5	RELX Group (Elsevier)	49	23.9	IEEE	38	18.5
285	UNIVERSITE DU LUXEMB	38	77	49.4	IEEE	38	49.4	RELX Group (Elsevier)	17	22.1
286	University of Texas	38	460	8.3	RELX Group (Elsevier)	75	16.3	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	47	10.2
287	Columbia University	37	121	30.6	IEEE	37	30.6	American Institute of Physics	16	13.2
288	GAPWAVES AB	37	49	75.5	IEEE	37	75.5	IET/IEE	10	20.4
289	Sanken Electric Co. Ltd.	37	67	55.2	IEEE	37	55.2	RELX Group (Elsevier)	15	22.4
290	Teradyne Inc.	37	44	84.1	IEEE	37	84.1	Primedia Business Magazines & Media Inc.	2	4.5
291	Tokyo Institute of Technology	37	128	28.9	IEEE	37	28.9	ACS-Am Chem Soc	13	10.2
292	Tsinghua University	37	93	39.8	IEEE	37	39.8	RELX Group (Elsevier)	11	11.8
293	UNIVERSITY OF EAST AN	37	74	50.0	IEEE	37	50.0	ACM-Assoc Comput Mach	8	10.8
294	Bracco S.P.A.	36	140	25.7	IEEE	36	25.7	RELX Group (Elsevier)	34	24.3
295	Fondazione Istituto Italiano d	36	262	13.7	RELX Group (Elsevier)	54	20.6	ACS-Am Chem Soc	43	16.4
296	FUNDACIO PRIVADA CEN	36	39	92.3	IEEE	36	92.3	IET/IEE	2	5.1
297	Johnson Controls International	36	85	42.4	IEEE	36	42.4	RELX Group (Elsevier)	23	27.1
298	Korea Advanced Institute for S	36	81	44.4	IEEE	36	44.4	RELX Group (Elsevier)	7	8.6
299	Partners HealthCare Systems I	36	661	5.4	RELX Group (Elsevier)	117	17.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	68	10.3
300	Tata Consultancy Services Ltd	36	58	62.1	IEEE	36	62.1	RELX Group (Elsevier)	8	13.8
301	Universite Paris-Sud 11	36	262	13.7	RELX Group (Elsevier)	47	17.9	IEEE	36	13.7
302	Coherent Logix Inc	35	44	79.5	IEEE	35	79.5	SPIE-Int Soc Opt Engineering	2	4.5
303	DraegerWerk AG	35	67	52.2	IEEE	35	52.2	RELX Group (Elsevier)	7	10.4
304	Hamamatsu Photonics KK	35	148	23.6	IEEE	35	23.6	American Institute of Physics	24	16.2
305	University of Stuttgart	35	107	32.7	IEEE	35	32.7	RELX Group (Elsevier)	27	25.2
306	Yonsei University	35	66	53.0	IEEE	35	53.0	3GPP General Partnership Project Standards Body	7	10.6
307	Agfa Gevaert N.V.	34	178	19.1	SPIE-Int Soc Opt Engineering	38	21.3	IEEE	34	19.1
308	Infinera Corporation	34	76	44.7	IEEE	34	44.7	IET/IEE	11	14.5
309	ROKE MANOR RESEARCH	34	61	55.7	IEEE	34	55.7	RELX Group (Elsevier)	4	6.6
310	Sierra Wireless Inc.	34	51	66.7	IEEE	34	66.7	European Telecom Standards Institute (ETSI)	4	7.8
311	UK Ministry of Defence	34	82	41.5	IEEE	34	41.5	RELX Group (Elsevier)	15	18.3
312	Accenture Ltd.	33	107	30.8	IEEE	33	30.8	ACM-Assoc Comput Mach	22	20.6
313	Forschungsverbund Berlin e.V	33	194	17.0	American Institute of Physics	54	27.8	IEEE	33	17.0
314	Giesecke & Devrient Group	33	153	21.6	IEEE	33	21.6	RELX Group (Elsevier)	21	13.7
315	GSF-National Research Center	33	126	26.2	IEEE	33	26.2	American Institute of Physics	28	22.2
316	GUNTURKUN ULAS	33	34	97.1	IEEE	33	97.1	IET/IEE	1	2.9
317	Johns Hopkins University	33	388	8.5	RELX Group (Elsevier)	112	28.9	IEEE	33	8.5
318	Merck KGaA (Germany)	33	1888	1.7	ACS-Am Chem Soc	473	25.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	272	14.4
319	Technische Universitat Darms	33	74	44.6	IEEE	33	44.6	RELX Group (Elsevier)	12	16.2
320	UNIVERSITE DE BRETAG	33	53	62.3	IEEE	33	62.3	RELX Group (Elsevier)	6	11.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
321	Universiteit Twente	33	140	23.6	IEEE	33	23.6	RELX Group (Elsevier)	16	11.4
322	University of Connecticut	33	173	19.1	RELX Group (Elsevier)	35	20.2	IEEE	33	19.1
323	University of Strathclyde	33	122	27.0	IEEE	33	27.0	RELX Group (Elsevier)	20	16.4
324	Autoliv Inc.	32	43	74.4	IEEE	32	74.4	SPIE-Int Soc Opt Engineering	6	14.0
325	British Broadcasting Corporat	32	59	54.2	IEEE	32	54.2	ISO/IEC/JTC/ANSI	9	15.3
326	Itron Inc.	32	58	55.2	IEEE	32	55.2	Internet Soc/IETF-Internet Eng Task Force	8	13.8
327	Kuka AG	32	52	61.5	IEEE	32	61.5	RELX Group (Elsevier)	7	13.5
328	MBDA France SA	32	63	50.8	IEEE	32	50.8	IET/IEE	8	12.7
329	Petroleum Research & Develo	32	317	10.1	RELX Group (Elsevier)	60	18.9	Society of Petroleum Engineers	45	14.2
330	Quantel Ltd	32	61	52.5	IEEE	32	52.5	SPIE-Int Soc Opt Engineering	5	8.2
331	Rayspan Corp	32	48	66.7	IEEE	32	66.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	6	12.5
332	Sisvel Group	32	48	66.7	IEEE	32	66.7	Springer/Sp. Wien/Springer-Verlag/KluwAcad	3	6.3
333	Teliasonera AB	32	76	42.1	IEEE	32	42.1	Internet Soc/IETF-Internet Eng Task Force	15	19.7
334	Cypress Semiconductor Corp.	31	60	51.7	IEEE	31	51.7	RELX Group (Elsevier)	6	10.0
335	Delta Electronics Inc	31	32	96.9	IEEE	31	96.9	URSI-International Union of Radio Science	1	3.1
336	Furukawa Electric Co. Ltd.	31	149	20.8	IEEE	31	20.8	IEICE-Inst Elec Info Comm Eng	29	19.5
337	HUAWEI TECH CO LTD	31	46	67.4	IEEE	31	67.4	Joint IEEE and ACM	3	6.5
338	Maxim Integrated Products Inc	31	35	88.6	IEEE	31	88.6	American Institute of Physics	2	5.7
339	Stichting voor de Technische	31	112	27.7	IEEE	31	27.7	RELX Group (Elsevier)	20	17.9
340	University of Alberta	31	79	39.2	IEEE	31	39.2	American Institute of Physics	8	10.1
341	Yeda Research and Developm	31	313	9.9	RELX Group (Elsevier)	63	20.1	ACS-Am Chem Soc	32	10.2
342	Agilent Technologies Inc	30	194	15.5	RELX Group (Elsevier)	64	33.0	IEEE	30	15.5
343	Compagnie Generale des Esta	30	84	35.7	IEEE	30	35.7	RELX Group (Elsevier)	18	21.4
344	Danfoss A/S	30	58	51.7	IEEE	30	51.7	SPIE-Int Soc Opt Engineering	11	19.0
345	Flir Systems AB	30	86	34.9	IEEE	30	34.9	SPIE-Int Soc Opt Engineering	19	22.1
346	Ligado Networks (formerly Li	30	35	85.7	IEEE	30	85.7	3GPP General Partnership Project Standards Body	1	2.9
347	Rag Foundation	30	261	11.5	RELX Group (Elsevier)	100	38.3	IEEE	30	11.5
348	Shizuoka University	30	47	63.8	IEEE	30	63.8	Electrochemical Society, Inc.	3	6.4
349	TiVo Corp	30	65	46.2	IEEE	30	46.2	ACM-Assoc Comput Mach	14	21.5
350	Amedeus IT Group SA	29	67	43.3	IEEE	29	43.3	ACM-Assoc Comput Mach	20	29.9
351	Asahi Glass Co. Ltd.	29	108	26.9	IEEE	29	26.9	RELX Group (Elsevier)	15	13.9
352	Convida Wireless LLC	29	117	24.8	3GPP General Partnership Project Standards B	31	26.5	Internet Soc/IETF-Internet Eng Task Force	29	24.8
353	Kyushu Institute of Technolog	29	48	60.4	IEEE	29	60.4	Joint IEEE and ACM	5	10.4
354	Netapp Inc	29	73	39.7	IEEE	29	39.7	The USENIX Association	10	13.7
355	Norwegian Univ Of Science &	29	68	42.6	IEEE	29	42.6	ACS-Am Chem Soc	6	8.8
356	On Semiconductor Corporatio	29	40	72.5	IEEE	29	72.5	RELX Group (Elsevier)	3	7.5
357	Osaka Prefecture University	29	74	39.2	IEEE	29	39.2	American Institute of Physics	10	13.5
358	Qorvo	29	47	61.7	IEEE	29	61.7	RELX Group (Elsevier)	6	12.8
359	TEKCEM	29	30	96.7	IEEE	29	96.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	1	3.3
360	Universite de Montpellier	29	263	11.0	RELX Group (Elsevier)	55	20.9	ACS-Am Chem Soc	53	20.2

Appendix C: Top Organizations from All Categories Combined (WIPO Patents 2002-2017)

rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
361	University of Southern Califor	29	153	19.0	IEEE	29	19.0	RELX Group (Elsevier)	26	17.0
362	VITO NV	29	66	43.9	IEEE	29	43.9	RELX Group (Elsevier)	7	10.6
363	ZAKRYTOE AKCIONERNO	29	42	69.0	IEEE	29	69.0	SPIE-Int Soc Opt Engineering	7	16.7
364	Charles Stark Draper Laborato	28	140	20.0	IEEE	28	20.0	RELX Group (Elsevier)	20	14.3
365	Dublin City University	28	125	22.4	RELX Group (Elsevier)	37	29.6	IEEE	28	22.4
366	Fujikara Ltd.	28	155	18.1	IEICE-Inst Elec Info Comm Eng	30	19.4	IEEE	28	18.1
367	INSTITUTO DE TELECOM	28	48	58.3	IEEE	28	58.3	Internet Soc/IETF-Internet Eng Task Force	3	6.3
368	PACT XPP TECHNOLOGIE	28	40	70.0	IEEE	28	70.0	Joint IEEE and ACM	4	10.0
369	Purdue University	28	90	31.1	IEEE	28	31.1	RELX Group (Elsevier)	21	23.3
370	Rosenberger GmbH	28	46	60.9	IEEE	28	60.9	European Microwave Association	10	21.7
371	Skyworks Solutions Inc	28	34	82.4	IEEE	28	82.4	American Institute of Physics	3	8.8
372	UNIVERSIDADE DE AVEIR	28	111	25.2	IEEE	28	25.2	RELX Group (Elsevier)	19	17.1
373	UNIVERSITE DE TECHNO	28	78	35.9	IEEE	28	35.9	RELX Group (Elsevier)	15	19.2
374	Chinese Academy of Science	27	105	25.7	IEEE	27	25.7	RELX Group (Elsevier)	20	19.0
375	Electricite de Frace	27	138	19.6	RELX Group (Elsevier)	49	35.5	IEEE	27	19.6
376	Pioneer Corp.	27	88	30.7	IEEE	27	30.7	American Institute of Physics	20	22.7
377	Princeton University	27	205	13.2	American Institute of Physics	49	23.9	RELX Group (Elsevier)	42	20.5
378	Procter & Gamble Co.	27	398	6.8	RELX Group (Elsevier)	112	28.1	ACS-Am Chem Soc	52	13.1
379	University of Arizona	27	165	16.4	IEEE	27	16.4	Optical Society of America	23	13.9
380	Vanderbilt University	27	93	29.0	IEEE	27	29.0	ACS-Am Chem Soc	21	22.6
381	Barco NV Belgium	26	92	28.3	IEEE	26	28.3	SPIE-Int Soc Opt Engineering	11	12.0
382	E M W Antenna Co Ltd	26	32	81.3	IEEE	26	81.3	IET/IEE	4	12.5
383	Hong Kong University of Scie	26	29	89.7	IEEE	26	89.7	SPIE-Int Soc Opt Engineering	1	3.4
384	JACOBS UNIVERSITY BRE	26	37	70.3	IEEE	26	70.3	ACS-Am Chem Soc	5	13.5
385	Johnson & Johnson	26	619	4.2	RELX Group (Elsevier)	157	25.4	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	70	11.3
386	Kyoto University	26	270	9.6	American Institute of Physics	38	14.1	ACS-Am Chem Soc	33	12.2
387	M/A-COM Technology Soluti	26	46	56.5	IEEE	26	56.5	3GPP General Partnership Project Standards Body	4	8.7
388	Royal DSM NV	26	150	17.3	RELX Group (Elsevier)	53	35.3	IEEE	26	17.3
389	State University of New York	26	86	30.2	IEEE	26	30.2	ACS-Am Chem Soc	13	15.1
390	UNIVERSITA_T POTSDAM	26	36	72.2	IEEE	26	72.2	Joint IEEE and ACM	4	11.1
391	University of Strasbourg	26	325	8.0	RELX Group (Elsevier)	91	28.0	ACS-Am Chem Soc	50	15.4
392	UT-Battelle LLC	26	188	13.8	American Institute of Physics	34	18.1	RELX Group (Elsevier)	34	18.1
393	Cleveland Clinic (and Foundat	25	176	14.2	RELX Group (Elsevier)	30	17.0	IEEE	25	14.2
394	Conversant Intellectual Proper	25	32	78.1	IEEE	25	78.1	Joint IEEE and ACM	3	9.4
395	EchoStar Corp	25	51	49.0	IEEE	25	49.0	Internet Soc/IETF-Internet Eng Task Force	4	7.8
396	ECOLE DE TECHBOLOGIE	25	27	92.6	IEEE	25	92.6	RELX Group (Elsevier)	1	3.7
397	Gesellschaft fuer Schwerionen	25	119	21.0	RELX Group (Elsevier)	25	21.0	IEEE	25	21.0
398	Hella KG Hueck & Co.	25	33	75.8	IEEE	25	75.8	SPIE-Int Soc Opt Engineering	2	6.1
399	Institut Pasteur	25	53	47.2	IEEE	25	47.2	RELX Group (Elsevier)	7	13.2
400	Maxlinear Inc	25	36	69.4	IEEE	25	69.4	Scripta Pub Co.	3	8.3

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
401	NewSouth Innovations Pty Li	25	51	49.0	IEEE	25	49.0	American Institute of Physics	11	21.6
402	Queen's University of Belfast	25	100	25.0	IEEE	25	25.0	RELX Group (Elsevier)	19	19.0
403	QuickSilver Technology Inc	25	43	58.1	IEEE	25	58.1	Joint IEEE and ACM	7	16.3
404	SCUOLA SUPERIORE DI S	25	66	37.9	IEEE	25	37.9	RELX Group (Elsevier)	10	15.2
405	Semiconductor Energy Labora	25	78	32.1	IEEE	25	32.1	American Institute of Physics	22	28.2
406	TECHNISCHE UNIVERSIT	25	55	45.5	IEEE	25	45.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	6	10.9
407	Trinity College Dublin	25	97	25.8	IEEE	25	25.8	RELX Group (Elsevier)	14	14.4
408	United States Health & Huma	25	772	3.2	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	132	17.1	ACS-Am Chem Soc	132	17.1
409	UNIVERSITE DE BRETAG	25	51	49.0	IEEE	25	49.0	RELX Group (Elsevier)	9	17.6
410	University of St. Andrews	25	233	10.7	ACS-Am Chem Soc	37	15.9	American Institute of Physics	34	14.6
411	URU INC	25	41	61.0	IEEE	25	61.0	Neural Information Processing Systems Foundation	3	7.3
412	Aware Inc.	24	39	61.5	IEEE	24	61.5	International Telecommunication Union	8	20.5
413	Centre Suisse d'Electronique e	24	73	32.9	IEEE	24	32.9	RELX Group (Elsevier)	12	16.4
414	Ecole Centrale de Lyon	24	79	30.4	IEEE	24	30.4	RELX Group (Elsevier)	18	22.8
415	Halliburton Co. (Holding)	24	191	12.6	RELX Group (Elsevier)	50	26.2	IEEE	24	12.6
416	Los Alamos National Security	24	47	51.1	IEEE	24	51.1	RELX Group (Elsevier)	11	23.4
417	National Research Council of	24	106	22.6	IEEE	24	22.6	RELX Group (Elsevier)	20	18.9
418	Rhode Island Board of Govern	24	41	58.5	IEEE	24	58.5	Joint IEEE and ACM	3	7.3
419	SRI International	24	77	31.2	IEEE	24	31.2	SPIE-Int Soc Opt Engineering	9	11.7
420	TECHNISCHE UNIVERSIT	24	58	41.4	IEEE	24	41.4	RELX Group (Elsevier)	8	13.8
421	Texas Tech University	24	91	26.4	RELX Group (Elsevier)	26	28.6	IEEE	24	26.4
422	Total SA	24	257	9.3	RELX Group (Elsevier)	83	32.3	IEEE	24	9.3
423	UNIVERSITA' DEGLI STUD	24	45	53.3	IEEE	24	53.3	RELX Group (Elsevier)	8	17.8
424	University of Manchester	24	248	9.7	RELX Group (Elsevier)	51	20.6	IEEE	24	9.7
425	University of Warwick	24	165	14.5	ACS-Am Chem Soc	44	26.7	IEEE	24	14.5
426	University of Washington	24	200	12.0	RELX Group (Elsevier)	33	16.5	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	32	16.0
427	Ygomi LLC	24	31	77.4	IEEE	24	77.4	Europe Media Publications	2	6.5
428	Adobe Systems Inc.	23	82	28.0	ACM-Assoc Comput Mach	29	35.4	IEEE	23	28.0
429	CELOXICA LTD	23	39	59.0	IEEE	23	59.0	Joint IEEE and ACM	6	15.4
430	DEPARTMENT OF ELECT	23	26	88.5	IEEE	23	88.5	IEEE/JPN Soc App Phys	2	7.7
431	DIRECTV Group Inc. (The)	23	40	57.5	IEEE	23	57.5	ACM-Assoc Comput Mach	4	10.0
432	Elekta AB	23	86	26.7	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	25	29.1	IEEE	23	26.7
433	Erasmus University	23	143	16.1	RELX Group (Elsevier)	32	22.4	IEEE	23	16.1
434	FARO Technologies Inc.	23	61	37.7	IEEE	23	37.7	SPIE-Int Soc Opt Engineering	18	29.5
435	Hokkaido University	23	143	16.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	25	17.5	IEEE	23	16.1
436	KONINKLIJKE PHILIPS NV	23	127	18.1	John Wiley & Sons/Wiley-Verlag/Wiley-Liss	31	24.4	IEEE	23	18.1
437	Longsand Ltd	23	50	46.0	IEEE	23	46.0	ACM-Assoc Comput Mach	6	12.0
438	M/A-COM INC	23	35	65.7	IEEE	23	65.7	Primedia	2	5.7
439	Osaka University	23	143	16.1	IEEE	23	16.1	American Institute of Physics	22	15.4
440	SENSEG OY	23	29	79.3	IEEE	23	79.3	ACM-Assoc Comput Mach	5	17.2

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
441	Seoul National University	23	108	21.3	IEEE	23	21.3	RELX Group (Elsevier)	16	14.8
442	Universidad de Barcelona	23	111	20.7	RELX Group (Elsevier)	24	21.6	IEEE	23	20.7
443	Universidad De Granada	23	40	57.5	IEEE	23	57.5	American Institute of Physics	3	7.5
444	University of Aberdeen	23	73	31.5	IEEE	23	31.5	RELX Group (Elsevier)	18	24.7
445	AB Initio Technology LLC	22	54	40.7	IEEE	22	40.7	ACM-Assoc Comput Mach	16	29.6
446	Alibaba Group Holding Ltd	22	60	36.7	ACM-Assoc Comput Mach	22	36.7	IEEE	22	36.7
447	American Superconductor Cor	22	63	34.9	IEEE	22	34.9	RELX Group (Elsevier)	12	19.0
448	BCE Inc	22	34	64.7	IEEE	22	64.7	Internet Soc/IETF-Internet Eng Task Force	4	11.8
449	Digimarc Corp.	22	38	57.9	IEEE	22	57.9	SPIE-Int Soc Opt Engineering	6	15.8
450	ECI Telecom Ltd.	22	64	34.4	IEEE	22	34.4	Internet Soc/IETF-Internet Eng Task Force	17	26.6
451	Finisar Corp	22	48	45.8	IEEE	22	45.8	IEEE/OSA	6	12.5
452	INSTITUTO SUPERIOR TE	22	84	26.2	IEEE	22	26.2	RELX Group (Elsevier)	19	22.6
453	Kathrein-Werke KG	22	31	71.0	IEEE	22	71.0	IET/IEE	6	19.4
454	L-3 Communications Holding:	22	47	46.8	IEEE	22	46.8	SPIE-Int Soc Opt Engineering	8	17.0
455	MEDISO ORVOSI BEREND	22	23	95.7	IEEE	22	95.7	ACM-Assoc Comput Mach	1	4.3
456	Naspers Ltd	22	62	35.5	IEEE	22	35.5	ACM-Assoc Comput Mach	19	30.6
457	OZYEGIN UNIVERSITESI	22	32	68.8	IEEE	22	68.8	American Institute of Physics	2	6.3
458	Trumpf GmbH & Co KG	22	77	28.6	IEEE	22	28.6	Optical Society of America	14	18.2
459	Universite Libre de Bruxelles	22	180	12.2	RELX Group (Elsevier)	34	18.9	IEEE	22	12.2
460	University of British Columbia	22	76	28.9	IEEE	22	28.9	ACM-Assoc Comput Mach	15	19.7
461	University of Claude Bernard	22	519	4.2	RELX Group (Elsevier)	125	24.1	ACS-Am Chem Soc	81	15.6
462	Asahi Kasei Corp.	21	93	22.6	IEEE	21	22.6	RELX Group (Elsevier)	18	19.4
463	Austrian Institute of Technolo	21	77	27.3	IEEE	21	27.3	ACS-Am Chem Soc	8	10.4
464	Ben-Gurion University of the	21	109	19.3	IEEE	21	19.3	RELX Group (Elsevier)	19	17.4
465	CANADIAN SPACE AGEN	21	23	91.3	IEEE	21	91.3	CRC Press/Taylor & Francis	1	4.3
466	Carestream Health Inc	21	303	6.9	ACS-Am Chem Soc	73	24.1	RELX Group (Elsevier)	55	18.2
467	Casio Computer	21	60	35.0	IEEE	21	35.0	RELX Group (Elsevier)	9	15.0
468	ConvergeOne Inc	21	39	53.8	IEEE	21	53.8	SPIE-Int Soc Opt Engineering	3	7.7
469	ExxonMobil Corp	21	341	6.2	RELX Group (Elsevier)	68	19.9	soc of Exploration Geophysists	39	11.4
470	INDIAN INSTITUTE OF TE	21	27	77.8	IEEE	21	77.8	ACM-Assoc Comput Mach	2	7.4
471	Institut Francais du Petrole	21	152	13.8	RELX Group (Elsevier)	37	24.3	IEEE	21	13.8
472	Irobot Corp	21	33	63.6	IEEE	21	63.6	IEEE/RSJ	4	12.1
473	ISTANBUL TEKNIK UNIVE	21	30	70.0	IEEE	21	70.0	ACS-Am Chem Soc	2	6.7
474	ITT Corp	21	52	40.4	IEEE	21	40.4	SPIE-Int Soc Opt Engineering	10	19.2
475	MKS Instruments Inc.	21	114	18.4	Optical Society of America	37	32.5	IEEE	21	18.4
476	Pennsylvania State University	21	152	13.8	ACS-Am Chem Soc	28	18.4	RELX Group (Elsevier)	22	14.5
477	Rohm Co. Ltd.	21	81	25.9	American Institute of Physics	22	27.2	IEEE	21	25.9
478	Universidad de Sevilla	21	58	36.2	IEEE	21	36.2	ACS-Am Chem Soc	14	24.1
479	Universite de Lorraine	21	114	18.4	RELX Group (Elsevier)	30	26.3	IEEE	21	18.4
480	University of Sydney	21	59	35.6	IEEE	21	35.6	RELX Group (Elsevier)	5	8.5

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rank	assignee	# IEEE Refs	Total Science Refs	% IEEE Refs	Top Referenced Organization	# Refs	% Refs	2nd Most Referenced Organization	# Refs	% Refs
481	ATG ADVANCED SWISS T	20	26	76.9	IEEE	20	76.9	ACM-Assoc Comput Mach	2	7.7
482	B & LT & GT COM	20	29	69.0	IEEE	20	69.0	RELX Group (Elsevier)	3	10.3
483	CAMBRIDGE CONSULTA	20	30	66.7	IEEE	20	66.7	SPIE-Int Soc Opt Engineering	4	13.3
484	Diehl Stiftung & Co.	20	34	58.8	IEEE	20	58.8	IET/IEE	3	8.8
485	Enercon GmbH	20	24	83.3	IEEE	20	83.3	RELX Group (Elsevier)	2	8.3
486	EUCLID DISCOVERIES LL	20	47	42.6	IEEE	20	42.6	RELX Group (Elsevier)	11	23.4
487	GOTTFRIED WILHELM LE	20	36	55.6	IEEE	20	55.6	ACM-Assoc Comput Mach	4	11.1
488	GROUPE DES ECOLES DE	20	25	80.0	IEEE	20	80.0	Fault Diagnosis and Tolerance in Cryptography (FDTC)	1	4.0
489	Kyung Hee University	20	36	55.6	IEEE	20	55.6	ISO/IEC/JTC/ANSI	3	8.3
490	Kyushu University	20	106	18.9	RELX Group (Elsevier)	24	22.6	IEEE	20	18.9
491	Maschinenfabrik Reinhausen	20	38	52.6	IEEE	20	52.6	IET/IEE	4	10.5
492	METAIL LTD	20	55	36.4	ACM-Assoc Comput Mach	23	41.8	IEEE	20	36.4
493	O2i SA	20	42	47.6	IEEE	20	47.6	Joint IEEE and ACM	9	21.4
494	PDF Solutions	20	23	87.0	IEEE	20	87.0	Joint IEEE and ACM	3	13.0
495	RAI RADIOTELEVISIONE I	20	40	50.0	IEEE	20	50.0	IABM/IET/IEEE	6	15.0
496	Shin-Etsu Chemical Co. Ltd.	20	98	20.4	American Institute of Physics	27	27.6	IEEE	20	20.4
497	Symantec Corp.	20	60	33.3	IEEE	20	33.3	ACM-Assoc Comput Mach	9	15.0
498	THE CENTRE FOR INTEG	20	44	45.5	IEEE	20	45.5	American Institute of Physics	11	25.0
499	Twitter Inc	20	30	66.7	IEEE	20	66.7	Springer/Sp. Wien/Springer-Verlag/KluwAcad	4	13.3
500	University of Queensland	20	56	35.7	IEEE	20	35.7	RELX Group (Elsevier)	15	26.8