IEEE Future Directions Newsletter

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IEEE Future Directions Initiatives Report on New Developments

On 20-21 November 2019, the IEEE Future Directions Committee (FDC) Meeting was held as part of the IEEE Meeting Series in Boston, Massachusetts. This two-day event brought together FDC, initiative leaders, collaborators, and staff to discuss current and future prospects for FDC. The attendees participated in discussions highlighting recent accomplishments, latest developments, potential collaborations, and new opportunities to grow and expand IEEE Future Directions and its offerings.

Read the Summary Report

Top Students Put Heads Together at ASU NeuroTech Workshop

Monique Clement, *Arizona State University*

The first IEEE Brain NeuroTech Entrepreneurs Workshop brought graduate students and professionals from around the world to Arizona State University to learn and practice entrepreneurship strategies. ASU hosted the workshop 13-15 December 2019, to inspire, empower and connect exceptional graduate students who aspire to be entrepreneurs. The workshop, sponsored by the IEEE Brain Initiative, drew 30 graduate students from seven countries for its first class of participants. Selected through a highly-competitive application process that drew more than 100 interested students, the participants joined the workshop to further develop entrepreneurial techniques that would help them be successful in their future. Learn more.

New Educational Offerings

A new IEEE Future Networks 3-course program produced in cooperation with Nokia focusing

on 5G Networks is now available on the IEEE Learning Network (ILN). These courses were designed to help technical professionals receive an in-depth view of performance requirements, future scenarios, and the roadmap to implementation. Take the courses today. Professional credits are available.

Brought to you by IEEE Educational Activities, the podcast *IEEE Tech Talk: Innovation at Work* will give you a chance to hear from industry experts and innovators on the latest advancements in technology and engineering, STEM education, and more. Listen now to the first episode where Steve Vozar, CTO and Co-founder of May Mobility speaks about autonomous vehicles.

IEEE Future Directions Technical Communities

IEEE Future Directions is committed to providing the best knowledge, resources, and opportunities in emerging technologies within IEEE. As we evolve and expand our offerings, subscription to our current Future Directions Technical Communities for IEEE Society members will be free as a Society member benefit. IEEE Members and non-members will pay a fee. These communities include: Blockchain, Brain, Digital Reality, Future Networks, and Rebooting Computing. Details of this change, including IEEE member and IEEE Student member rates, can be reviewed as you renew your membership for 2020.

As a participant of our Technical Communities, you will receive access to our growing suite of content, including online courses, webinars, white papers, videos, and more at discounted rates.

Thank you for being a part of our Technical Communities. We value your involvement and look forward to your continued participation in IEEE Future Directions.

Technology Policy and Ethics

IEEE Future Directions considers the reflection of technology through the lens of social implications a key tenet of our work as we incubate and promote technologies. We are currently seeking submissions of original content for 2020, articles of 800-1200 words on the social implications of technology, including but not limited to policy and ethics topics. If interested, please email FDPolicyEthics@ieee.org. Learn more about submitting an article through the author guidelines.

The Faustian Bargain - The Promise of AI and the Destruction of Jobs, Part 1
Frank Groom, *Ball State University, Muncie, Indiana*

Programmed technology progresses in an irregular fashion, first promising great things, and delivering only a little, but gradually adjusting and delivering with second and third attempts. The failures and disappointments are magnified, and the successes are overlooked or diminished. But the progression continues. Programmed technology eliminates jobs as intended, but also creates new ones in different, frequently new areas.

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Cyber-physical Forest Protection Systems, Part 1

Emad Roshandel, *Eram Sanat Mooj Gostar Company, Iran and* Mohammad Khosravi, *Shiraz University of Technology, Iran*

The vast earth forests are burning in fire, and human beings cannot retard the fire in time. Therefore, a large area of the earth's lungs is removed because of the inability of forest protectors in turning the fire off and stopping the fire growth in the center of forests. The forest fires can be categorized into two separate categories which are environmental and human-made causes. When there is no rain for several consecutive months, the dry tree foliage and branches are the available fuels to start a forest fire. In this condition, environmental events (e.g., lightning and volcanic activities) and human-made fires like traditional tribal fires or carelessness camp-fires can be the sources of the initial fire for such fuels. Literature has tried to introduce different protection and preventing systems to stop forest fires. Unfortunately, it could be claimed that the proposed methods have not been adequately useful in the protection of the jungles.

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The following article, published in May 2019, is re-printed here as the highest viewed article of 2019:

Current State of API Security and Machine Learning

Fatima Hussain, Brett Noye, Salah Sharieh, and Wilf Tonsmann, *Royal Bank of Canada, Toronto*

The adaptation of application program interface (API)s in every enterprise is the emerging business trend, and at the same time it diversifies the threat domain for businesses. APIs are becoming the new and most important infrastructure layer on the Internet and are the most vulnerable point of attacks in modern systems. Each API adds new dimensions to security threats and attack vectors to corporate data and applications, therefore critically forfeiting the business systems. Traditional security features for APIs protection are provided through API gateways, and it had been nothing more than API keys and username/password combinations (HTTP authentication). On the other hand, intruders and hackers are getting smarter. Combining the proliferation of social engineering platforms with recent technological advancements, the ability to gain access to confidential data has become both easier and common. APIs funnel data among applications, a multitude of various API users, and cloud infrastructure, therefore sensitive / confidential information might get exposed to unauthorized users, if API security is not carefully crafted. Using a holistic approach to securing APIs not only addresses the vulnerability issues, but offers protection for all of the infrastructure, networks and information.

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Current Activities in our Technical Communities

IEEE DataPort™ is now available for use! Go to ieee-dataport.org to be connected to this valuable one-stop shop data repository which serves the growing Big Data technical community. Sign up for the IEEE DataPort™ Newsletter to

get weekly updates, including the latest and most popular data-sets, delivered to your inbox.

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IEEE Blockchain and the University of Colorado Blockchain Alliance (UCBA) will co-host the IEEE Blockchain Transactive Energy Summit on 3-4 February 2020 in Boulder, Colorado, USA. This special two-day event will focus on applications of blockchain in the transactive energy space and will feature keynotes, tutorials, peer-reviewed technical paper presentations, posters, demos, and exhibitions from world-leading service providers, solution vendors, research institutes, open-source projects, and academia. Register now.

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IEEE Brain has published a new white paper, Future Neural Therapeutics: Closed-Loop Control of Neural Activity, identifying technology challenges and advancements required to promote development of next generation closed-loop neural systems. We welcome your comments on this white paper. As feedback is received, this paper will be updated periodically, serving as a template for the development of a more comprehensive technology roadmap(s).

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The *IEEE Transactions on Cloud Computing* is a scholarly journal dedicated to the multidisciplinary field of cloud computing. It publishes peer-reviewed articles that present innovative research ideas and application results of cloud computing, focusing on key technical issues related to theory, algorithms, systems, applications, and performance.

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The 2019 IEEE Secure Development Conference (SecDev) was held 25-27 September in McLean, VA. The event served as a venue for presenting ideas, research, and experience related to the development of secure systems. View the Proceedings of SecDev 2019.

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Read the latest IEEE Digital Reality white paper, *Platforms: Infrastructures for a New Economy*, which describes how the Digital Transformation is driving the development of tremendously complex infrastructures known as platforms which are changing the economic environment of many industries, including automotive, healthcare, smart cities, and more. Access the white paper.

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The International Network Generations Roadmap (INGR) has been released as an exclusive benefit to IEEE Future Networks Initiative community participants. The document seeks to help industry reduce technical and engineering risks associated with the migration to 5G and beyond. Consisting of nine separate chapters that span different aspects of 5G networks (security, massive MIMO, standards, hardware, and more), the INGR looks ahead to the future of networks using 3-year, 5-year, and 10-year horizons. Access the document.

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The 2020 IEEE 6th World Forum on Internet of Things (WF-IoT 2020) is the premier IEEE conference on IoT and will be held in New Orleans, Louisiana, USA on 5-9 April 2020. This 4-day event includes many keynote speeches delivered by distinguished speakers from industry, academia and the public sector; panels and forums; technical sessions featuring peer-reviewed technical papers; workshops focusing on the latest trends in various technologies; tutorials delivered by experts in respective disciplines; sessions for practitioners, policy makers, and executives; and exhibits - all conducted in a relaxing environment accompanied by an excellent social program. For more information and to register, please visit the conference website.

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Mobile technology has come a long way since the days when devices were produced unchecked, had a small number of capabilities and were of questionable quality. Such current and future devices are expected to revolutionize health care as we know it not just enabling patients in remote places to get the health care they need, but also enabling everyone to get some treatments at home without visiting the physician's office. An upcoming special issue of the IEEE Life Sciences Technical Community

Newsletter will feature articles describing and discussing the promise and the challenges of this emerging field.

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IEEE Transactions on Quantum Engineering (TQE), a new open-access electronic journal supported by the IEEE Quantum Initiative, invites paper submissions on Engineering Applications of Quantum Computing, Information, Communication, Software, Hardware, and Devices. For further information, visit the publication's website.

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Selected video presentations from IEEE Rebooting Computing Week 2019 are now available for on-demand viewing. IEEE Rebooting Computing Week is IEEE's premier event focused on exploring the next era in computing. Available videos include the 2019 International Conference on Rebooting Computing (ICRC) keynote "Developing Our Quantum Future" by Dr. Krysta Svore, Microsoft, and the 2019 IEEE Industry Summit sessions with leading industry experts. Access the videos on IEEE.tv.

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Interested in participating in an IEEE Standards Working Group on Smart Cities? If yes, please consider participating in the IEEE Working Group P2784 - Guide for the Technology and Process Framework for Planning a Smart City. This guide will provide a framework that outlines technologies and processes for planning the evolution of a smart city. This framework will provide a methodology for municipalities and technology integrators to use as a tool to plan for innovative and technology solutions for smart cities. Visit the working group website for more information.

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Couldn't make the IEEE Smart Grid Workshop on Cybersecurity? Download the presentations from the IEEE Smart Grid Resource Center.

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IEEE SDN now offers a collection of online courses in the field of Software Defined Networking, Network Function Virtualization, and related technologies. Learn from industry experts about topics that include the fundamentals of SDN and NFV, security and management challenges, the latest SDN open source platforms, and more. Participants also have the opportunity to earn Continuing Education Units (CEUs) and Professional Development Hours (PDHs) with each course. Access the courses.

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The IEEE Sustainable ICT initatitive's mission is to build a holistic approach to sustainability through ICT by incorporating green metrics through IEEE technical domains and foster the incorporation of green metrics and standards in design concepts for various technical domains. The initiative brings together expertise from different fields, in conferences and publications, with a view to foster holistic design and standardization approaches. Please join our Technical Community to help drive this very important topic.

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The TEC eNewsletter will again be published on a quarterly basis starting with the latest issue that includes several refereed articles on electric vehicle charging infrastructure and management, noise issues with electric transportation systems, an interesting electric machine design, and several others. Read more.

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IEEE Future Directions Events

IEEE Blockchain Transactive Energy Summit, 3-4 February 2020, Boulder, Colorado, USA

2020 IEEE World Forum on Internet of Things (WF-IoT), 5-9 April 2020, New Orleans, Louisiana, USA

2020 IEEE Transportation Electrification Conference & Expo (ITEC), 24-26 June 2020, Chicago, Illinois, USA

2020 6th IEEE International Conference on Network Softwarization (NetSoft), 29 June - 3 July 2020, Ghent, Belgium

2020 3rd IEEE 5G World Forum (5GWF'20), 10-12 September 2020, Bangalore, India

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