IEEE Future Directions Newsletter

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Future Directions Small Projects

The Future Directions Committee has identified various technology areas that are currently in the "Small Project" phase. In this phase, each of the small projects is working towards the path of becoming an initiative in the near future. With volunteer leadership designated to each project, teams have been meeting regularly to ideate, build a framework, and rally the tech community (both internally and externally) on the respective area of focus. Two of the small projects are highlighted below: Digital Privacy and Public Safety Technology.

[Digital Privacy](#)
SAs every aspect of our lives become increasingly "digital," digital privacy has become a top social concern. Given the growing importance and power of cyberspace, societies are quickly trying to define and navigate the future of digital privacy and determine technological solutions, new policies, and frameworks needed to protect individuals while maintaining support for digital services. There are several broad areas where the landscape is undefined, where policies still need to be developed, and where IEEE expertise may greatly impact the future of "privacy" online. The Digital Privacy Project is exploring how IEEE can best add to this discussion – bringing the perspective of technologists – to help advance solutions to protect personal and private information.

[Public Safety Technology:](#)
The IEEE Public Safety Technology Task Force is organizing the next IEEE Future Tech Forum Roundtable. Register now to hear presentations and conversation between experts who will discuss different ways technology can improve current Public Safety practices, including AI/ML, communications networks, smart cities, and the "Whole Community" approach. And if you have not already, please download the group's free white paper, "Public Safety Technology: Gaps and Opportunities."

Technology, Policy and Ethics

IEEE Future Directions Technology, Policy and Ethics publishes articles addressing issues in current and future technologies, including the social and ethical considerations. We are currently seeking submissions of original content, articles of 800-1200 words on the 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.

Measuring Trust for Accountability in an Untrusted Digital World

Professor Lisa G. Short, *Founder P&L Digital Edge [UK] and Hephaestus Collective [UK], and Chief Research Officer & Group Chair Global Foundation for Cyber Studies & Research [Washington]*

Over the past year, there have been quantum leaps in innovation, digital transformation, online and social media adoption, and in the growth trajectories of Environmental, Social, and Governmental (ESG) assets. At odds with this, which diminishes their collective socioeconomic benefit, is the impact from vertiginous surges in cyber-attacks/malicious cyber activities, unprecedented rises in misinformation, disinformation, social engineering, and online harm behaviors. These include disproportionate increases in gender abuse and cyberbullying. Collectively, there is a commonality in the characteristics of these surges. They are borderless, ubiquitous, have endemic trust issues, and they negatively impact many people as well as the planet.

There is a real urgency to advance disruptive technology that can ensure authentic impact data metrics, which will spur positive human cultures and improvements, and to have these technologies adopted by social media giants ahead of potential impugnment due to compliance or regulatory breaches. The pressing question of Society 5.0 is how can foundational blockchain technologies utilize data to eliminate perpetrators of these abuses, online harms, and untrustworthy information to result in positive ESG outcomes that align to the objectives of the Sustainable Development Goals (SDG's)?

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Best Practices for Community Engagement in Smart Cities

Yinka Ajibola and Rabia Daud, *Ball State University;* Rebecca Hammons*, Associate Professor, Center for Information & Communication Sciences*

Effective smart city solutions are built on strong community engagement, which serves as a collaborative means for making policies and decisions. It allows community members to participate in the conversation, enhancing community support for smart city initiatives.

We wanted to learn how community engagement and inclusiveness are addressed in contemporary smart city initiatives and conducted interviews with five city planners. This article describes the outcomes of our research.

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Dietary Changes and SARS-CoV-2: Strengthening Immune Response

Shagufta Henna, *Senior member IEEE; Rajinder Singh, Letterkenny Institute of Technology, Letterkenny, Co. Donegal*

SARS-CoV-2 is the new strain of highly contagious coronavirus affecting the world in diverse ways, such as economic, social, and health-wise. Recent studies have investigated the importance of human innate immune response in COVID-19 pathophysiology. These studies show that different social and environmental factors, such as an unbalanced diet and lifestyle changes can result in psychological and physicochemical stress resulting in a compromised immune response. This article aims to determine the correlation between diet and the mortality rate experienced by different countries. Moreover, it compares the obesity and undernourishment data of the countries with COVID-19 infections to reveal the relationships. The work uses machine learning algorithms to analyze this data to predict COVID-19 deaths.

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An Overview on Quantum Image Watermarking for Security of COVID-19 Patient Record

Ashima Anand, *NIT Hamirpur, H.P., India, pursuing a Ph.D. from NIT Patna, India; Amit Kumar Singh, Computer Science and Engineering Department at the National Institute of Technology Patna, Bihar, India*

The basics of Quantum Information Processing (QIP) is summarized below, in addition to a comprehensive survey of quantum image-based data hiding techniques. QIP is more efficient and provides higher security than classical information processing. A comparative analysis of the Flexible Representation of Quantum Images (FRQI) and Novel Enhanced Quantum Representation (NEQR) model is also presented. QIP is used in various potential applications, hence offering an interesting and demanding area for researchers. Some of the important applications include medicine, military, environmental monitoring, image processing, communications, computations, and cryptography. This article focuses on the processing of information that can be represented using quantum mechanics.

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Activities in Our Current Technical Communities

The IEEE Healthcare: Blockchain & AI Virtual Series is a fully virtual event series designed to convene a robust and vibrant community around the topic of blockchain and AI-enabled healthcare. Register now for the Final Celebration & Awards Ceremony on 1 December 2021 at the IEEE Healthcare: Blockchain & AI website.

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Join the next Digital Reality Webinar, co-sponsored by IEEE TEC, The Power of AI: Future of Public Transportation with Alex Wallar, Co-Founder and CTO of The Routing Company, on 9 December 2021. This webinar will describe how such a transit system operates, how we've been able to optimize the routes for thousands of vehicles in real-time, and how demand-responsive bus systems pave the way for

equitable transportation for all. Read the latest ebook by Roberto Saracco, Post Pandemic Megatrends, which addresses the big question for companies: Will our life go back to the pre-pandemic "normal" or will there be a new normal?

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The 5G Workshop on First Responder and Tactical Networks on 14 December will highlight how 5G can benefit emergency services and defense applications. The Future Networks Testbed Workshop on 16-17 December will focus on the testing requirements for future networking technologies. The latest issue of the Future Networks Tech Focus has been published with articles on Metantenna Technologies, Radio Propagation Modelling, and Optical Transport. The last INGR Webinar of the year will be on Advanced Solutions for 5G and Beyond Satellite Systems. Registration remains open for an all-on-demand experience of the recent 5G World Forum and Connecting the Unconnected Summit!

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IEEE Quantum invites you to attend the CEO Summit on Quantum Computing, a special virtual event on Wednesday, 1 December 2021. This summit will feature keynote talks and roundtable discussions with quantum industry executives from around the world. Reserve your seat today for this free event as we look to address future challenges and opportunities of the quantum computing industry.

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IEEE Future Directions Small Projects:

Smart Lighting, Telepresence, and LEO SatS all held their very first workshops this fall. The workshops had speakers from all over the globe providing key insights into their industries.

The 1st IEEE Smart Lighting Workshop is now available on-demand. The Future of Telepresence Workshop recordings are now available on-demand on IEEE.tv. The IEEE Low Earth Orbit Satellites and Systems Workshop has concluded and is available on-demand.

Activities in Our Graduated Technical Communities

Registration is now open for the IEEE Brain Future

Directions in Consumer Neurotechnology Workshop. The two-day virtual event is designed to assemble groups working towards bringing neurotechnology to a broader consumer audience. It will be held from Tuesday 30-November to Wednesday 1-December 2021. To view the preliminary agenda and register for free, visit the workshop website.

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IEEE Cloud Computing is now the IEEE Technical Committee on Cloud Computing. The community provides a forum for members to broaden professional contacts, facilitates information exchange, and stimulates the growth of research, education and industry in cloud computing. Visit the IEEE TCCLD web portal to learn more.

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The IEEE Cybersecurity Initiative (CYBSI) was launched in 2014 by the IEEE Computer Society and the IEEE Future Directions Committee. Its aims are to (1) provide the go-to online presence for security and privacy (S&P) professionals; (2) improve the comprehension of cybersecurity by students and educators; and (3) improve S&P designs and implementations by professionals. Visit the Cybersecurity web portal to learn more.

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The 5th IEEE Internet of Things (IoT) Vertical and Topical Summit at RWW 2022 addresses the crucial role that active and passive electromagnetic sensor systems play in IoT, and where their design for sustainability is essential. The summit will explore approaches for creating sustainable sensor systems and networks, energy-efficient hardware design, including energy management for long-lived or remote sensor systems, efficient methods for processing sensor data, and finally, a wide range of use cases. The upcoming summit examines how sensor systems support sustainability and how emerging artificial intelligence (AI)-based processing methods can lead to significant improvements in performance and viability. This includes the sensors themselves, the accompanying architectures, supporting infrastructure, and underlying technologies necessary for creating value, such as communications, computing, data storage, and power. The IoT Summit is a six-day event sponsored by the multi-society IEEE IoT Initiative and MTT. The hybrid program will be delivered on 10-16 January 2022. Learn more.

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The intersection of medicine, life sciences, physical sciences, and engineering is a rapidly growing field, producing benefits for humanity and offering meaningful career paths. The IEEE Life Sciences Community brings together engineers, computer scientists, life scientists, medical practitioners, and researchers to advance the application of engineering and technology to the life sciences. Visit the LSTC web portal to learn more.

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The Task Force on Rebooting Computing (TFRC), housed within IEEE Computer Society, is the new home for the IEEE Rebooting Computing Initiative. Founded in 2013 by the IEEE Future Directions Committee, Rebooting Computing has provided an international, interdisciplinary environment where experts from a wide variety of computer-related fields can come together to explore novel approaches to future computing. Visit the Rebooting Computing web portal to learn more.

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IEEE Smart Grid provides expertise and guidance for individuals and organizations involved in the modernization and optimization of the power grid. IEEE Smart Grid Initiative was conceptualized and led under the direction of Wanda Reder, former President of the IEEE Power & Energy Society, as a New Initiative in IEEE Future Directions Committee (FDC) in 2011. Visit the Smart Grid web portal to learn more.

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IEEE Smart Cities brings together IEEE's broad array of technical societies and organizations to advance the state of the art for smart city technologies for the benefit of society and to set the global standard in this regard by serving as a neutral broker of information amongst industry, academic, and government stakeholders. Visit the Smart Cities web portal to learn more.

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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 in the eLearning modules.

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The IEEE Sustainable ICT initiative is pleased to announce a webinar on Tuesday, 30 November with guest speaker, Volker Ziegler, a leader in 6G Research with Nokia Bell Labs. Volker will discuss "Communications in the 2030s - Objectives of Sustainability on the Path to 6G". In this webinar, the sustainability approach will be presented including aspects of energy efficiency, circular economy, and sustainable supply chains. 5G network build-out and 5G evolution are successfully underway and have shown positive impacts on sustainability and energy efficiency performance. Please register today.

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TEC has just relaunched its Resource Center. Check out the following 2021 webinar/panels now available: Modeling Power Electronics for Electric Powertrain Applications; Wireless Power Transfer – The Invisible Truth; Adaptive EMC Design for Wide Bandgap Power Converters in Aviation Applications; and Power Electronics for Precision Farming with Sustainable and Cleaner Environments. Visit the TEC web portal to learn more.

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IEEE Future Directions Events

- IEEE Brain: Future Directions in Consumer Neurotechnology
  30 November - 1 December 2021, Online
- 2021 International Conference on Rebooting Computing (ICRC)
  30 November - 2 December 2021, Online
- 2021 IEEE Healthcare: Blockchain & AI Virtual Series: A Celebration and Awards Event
  1 December 2021, Online
- CEO Summit on Quantum Computing
  1 December 2021, Online

- [IEEE European Public Policy Webinar on Grid Stability](#)
  1 December 2021, Online
- [2021 IEEE 5G Workshop on First Responder and Tactical Networks](#)
  14 December 2021, Online
- [Future Networks Testbed Requirements, Challenges and Opportunities](#)
  16-17 December 2021, Online

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