



IEEE-GHTC 2020

10th IEEE Global Humanitarian Technology Conference

October 29-November 1, 2020

Virtual from Seattle, Washington, USA



IEEE GHTC 2020

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Virtual October 29 - November 1, 2020

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Welcome from the Conference Chair

A Cairde,

Céad Míle Fáilte romhaibh go léir to the 10th annual IEEE Global Humanitarian Technology Conference (GHTC) hosted by IEEE Region 6, IEEE Seattle Section and IEEE Society on Social Implications of Technology, and Technical Co-Sponsored by IEEE-USA, IEEE Consumer Technology Society, IEEE Engineering Medicine and Biology Society, IEEE Microwave Theory and Techniques Society, IEEE Power and Energy Society and IEEE Smart Village, with continued Patronage by IEEE Humanitarian Activities Committee and Joe Decuir.

IEEE GHTC brings together stakeholders from around the world sharing a common interest in addressing societal challenges at home and abroad. Supporting achievement of the UN Sustainable Development Goals (SDGs), GHTC provides a platform for practitioners and researchers, technologists and engineers, as well as policy makers and funding institutions to share knowledge and experiences, build capacity and facilitate relationship building.

This year's program features plenary panels focused on *Celebrating the 10th Anniversary of IEEE GHTC*, *“Technology-enabled climb up the demand-driven energy ladder: Interoperability, Growth, All-access”* and *“IEEE HAC COVID Response”*. These panels are complemented by parallel tracks showcasing professional and volunteer activities in Energy, Health, Agriculture, Connectivity, Education, Disaster Mitigation, Water and Sanitation, and other Sustainable Development related topics.

As this year's conference is entirely online, Unconference Networking Sessions are particularly important, to facilitate delegates to share personal experience and insights and dedicate time for knowledge sharing. Our objective as a Community is to be inclusive, allowing delegates to influence topics and issues to be discussed, and share expertise. I am grateful to Tom Coughlin, former IEEE USA President for seeding and moderating discussion on Diversity and Inclusion in Engineering in one of these Unconference Sessions.

Keynote speakers this year include Toshi Fukuda, IEEE President, Kathy Land, IEEE President-Elect and Melissa Sassi, Chief Penguin, IBM Hyper Protect Accelerator.

On Thursday, there are several special events open to all conference delegates:

- Half-day Workshops (Sustainable Project Design Considering COVID-19 Pandemic, Applied Machine Learning for Social Good and Fundamentals of Off-Grid Electrical Systems)
- Student Poster Competition

On behalf of the Conference Committee I would like to thank everyone who has contributed to this year's conference – in particular the experts who volunteered their time to provide constructive, actionable feedback to improve the quality and impact of papers in the conference proceedings. It is my pleasure to acknowledge the great contribution made each year by Ed Perkins, Conference Vice-Chair, as well the dedication of the 2020 Technical Program Chair, Prof Pali Singh, and the 2020 Track Chairs.

Please take the opportunity during and after the conference to share your ideas of how we should continue to innovate as we start preparing for the 11th anniversary of GHTC in 2021.



Prof. Paul M Cunningham
Conference Chair, IEEE GHTC 2020
Dublin, Ireland

Welcome from the Technical Program Chair

The IEEE GHTC 2020 Technical Program Committee welcomes you to the 10th IEEE Global Humanitarian Technology Conference. We are excited about this year's conference and believe it will help advance technology for the betterment of society.

Over the last 10 years, GHTC has established itself as a leading conference on Sustainable Development and Humanitarian Technology in the US. People from all over the world have gathered together every year to share insights, learn from colleagues, and discuss new ways to use or develop appropriate technology to help impoverished populations. The 2020 Program Committee has worked hard to maintain high quality standards.

This year we have accepted about 120 papers covering several of the United Nations' Sustainable Development Goals (SDGs) topics, with parallel sessions focused on Health, Energy, Education, Agriculture, Connectivity, Water and Sanitation, Disaster Mitigation, and other Sustainable Development related topics. These will be complemented by thematically focused plenary panels and pre-conference workshops, as well as contributions by 2020 IEEE President Toshio Fukuda and President-Elect Kathy Land, and Melissa Sassi, Chief Penguin, IBM Z and Chair of IEEE's Digital Intelligence Working Group.

I would like to personally acknowledge the hard work, dedication and enthusiasm demonstrated by this year's Track Chairs (Miriam Cunningham - Health, Paul Gardner-Stephen - Disaster Mitigation, Iain Hunt - Clean Water & Sanitation, Musi Lopez - Education, Khanjan Mehta - Agriculture, Stephen Suffian - Decent Work, Javier Urquizo - Energy, Adil Usman - Connectivity), as well as all of the 2020 Program Committee Members, and thank them for their important contribution to the success of this conference.

Traditional breaks will be maintained this year to allow you time for virtual knowledge sharing and networking among participants. I invite you to take advantage of thematically focused networking Sessions to enhance your personal and professional growth, network, and learn about new projects. We hope you enjoy the conference!



Pritpal ("Pali") Singh, PhD
Technical Program Chair, GHTC 2020

Sponsors

Organizational Patrons



**Humanitarian Activities
Committee**

The [IEEE Humanitarian Activities Committee](#) (HAC) supports strengthening the capacity and impact of IEEE volunteers, staff and OUs involved in sustainable development and humanitarian technology-related activities around the world. IEEE HAC facilitates necessary education and training, builds strategic partnerships, provides funding for projects and events and supports IEEE SIGHT (Special Interest Group on Humanitarian Technology) activities.



IEEE Seattle Section
<http://ieee-seattle.org/>

Individual Patrons

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IEEE Engineering Medicine & Biology Society



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Committees

Organizing Committee

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Finance Chair / Treasurer	Titus Lo
Technical Program Chair	Pritpal (Pali) Singh
Plenary/Keynote/Panels	Paul Cunningham
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Sponsors	Joe Decuir
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A/V Committee Member	Erik Godo
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Student Posters Chair	Mostafa Mortezaie

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IEEE CES	Tom Coughlin
IEEE MTT	Tim Lee
IEEE SSIT	Jay Pearlman
IEEE SIGHT	Daniel Lottis
IEEE-USA	Tom Coughlin
IEEE Smart Village	Robin Podmore
IEEE EPICS	Mostafa Mortezaie

Program Committee

Affordable & Clean Energy	Javier Urquizo
Agriculture & Food Security	Khanjan Mehta
Clean Water & Sanitation	Iain Hunt
Connectivity & Communication in Support of Development	Adil Usman
Decent Work and Economic Growth	Stephen Suffian
Disaster Mitigation, Preparedness, Response & Recovery	Paul Gardner-Stephen
Good Health and Well Being	Miriam Cunningham
Quality Education	Musi Lopez
Other Related United Nations Sustainable Development Goals	Javier Urquizo

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Committees

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Advisor, R6 Director	Keith Moore
Advisor, R6 Director-elect	Tim Lee
Advisor	Daniel Lottis
Advisor	Ed Aoki
Advisor	Ed Perkins
Advisor	Lewis Terman

Track Chairs

Title Name		Affiliation	Country	Track(s)
Ms. Miriam	Cunningham	IIMC / IST-Africa	Ireland	Good Health and Well Being (SDG3)
Dr. Paul	Gardner-Stephen	Flinders University	Australia	Disaster Mitigation, Preparedness, Response & Recovery
Mr. Iain	Hunt	Villanova University	USA	Clean Water & Sanitation (SDG6)
Dr. Maria Guadalupe	Lopez Molina	Universidad Iberoamericana Puebla	Mexico	Quality Education (SDG4)
Prof. Khanjan	Mehta	Lehigh University	USA	Agriculture & Food Security (SDG2)
Mr. Stephen	Suffian	Villanova University	USA	Decent Work and Economic Growth (SDG8)
Mr. Javier	Urquizo	Villanova University	USA	Affordable & Clean Energy (SDG7)
Mr. Javier	Urquizo	Villanova University	USA	Other Related United Nations Sustainable Development Goals
Dr. Adil	Usman	Indian Institute of Technology Mandi	India	Connectivity & Communication in Support of Development

TPC Members

Title	Name	Affiliation	Country
Mr.	Satish Babu	Chair, SSIT Chapter, IEEE Kerala Section	India
Mr.	Bai Blyden	N/a	USA
Dr.	Suryadip Chakraborty	Johnson C. Smith University	USA

Committees

Prof. Paul	Cunningham	IIMC / mHealth4Afrika / IST-Africa Institute	Ireland
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Mr. Rajesh	Pindoriya	Indian Institute of Technology Mandi	India
Mr. Dhruv	Rao	The Pennsylvania State University	United Arab Emirates
Dr. Sarah	Ritter	Penn State University	USA
Dr. Lewis	Terman	IEEE	USA
Mr. Narasimha Sai	Yamanoor	Self	USA
Mr. Srihari	Yamanoor	Self	USA

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Mr.	Rahmad	Dawood Universitas Syiah Kuala	Indonesia
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Dr.	Behnam	Dezfouli Santa Clara University	USA
Dr.	Laura	Doyle Santa Clara University	USA
Dr.	Andrew	Drain Engineers Without Borders	Cambodia
Prof.	Anna	Förster ComNets, University of Bremen	Germany
Prof.	Walter	Franco Politecnico di Torino	Italy
Mr.	Dave	Goldsmith KiloWatts for Humanity	USA
Ms.	Bhavana	H Institute of Management Indore	India
Mr.	Felix	Holl University of California	Germany
Ms.	Rabia	Khan Washington State University	USA

Committees

Dr.	Albert	Ko	Lingnan University	USA
Dr.	Sharad	Kumar	Institute of Advanced Research Gandhinagar	India
Dr.	David	Lansdale	Beyond Chacay Foundation	Ecuador
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Mr.	Kenji	Ushimaru	Infra Innovations, Inc.	USA
Dr.	Wenbo	Wang	Intellectual Ventures Lab	USA
Dr.	Damith	Wickramanayake	University of Technology Jamaica	Jamaica
Dr.	Ackim	Zulu	University of Zambia	Zambia

Invited Speakers

Toshio Fukuda **2020 IEEE President & CEO**

Topic: “Advancing Technology for Humanity”



Toshio Fukuda is a professor of mechatronics engineering at Meijo University in Nagoya, Japan. He is also a professor at the Beijing Institute of Technology and professor emeritus at Nagoya University. His research focuses on intelligent robotic systems and micro-nano robotics. He has published more than 2,000 articles in scientific journals, conference proceedings, and reports.

An IEEE Fellow, Toshio was director of IEEE Region 10 in 2013 and 2014 and IEEE Division X director/delegate in 2001 and 2002, and 2017 and 2018. He was president of the IEEE Robotics and Automation Society in 1988 and 1989 and general chair of the IEEE International Symposium on Micro-Nano Mechatronics from 1990 to 2012. He has served on several IEEE boards and committees.

He graduated from Waseda University, Tokyo, Japan and received the Master of Engineering degree and the Doctor of Engineering degree both from the University of Tokyo. He joined the National Mechanical Engineering Laboratory in Japan in 1977, the Science University of Tokyo in 1981, and then joined Department of Mechanical Engineering, Nagoya University, Japan in 1989.

Susan (Kathy) Land **IEEE President-elect 2020**

Topic: “IEEE’s Humanitarian Efforts”



As a Program Manager for a United States Federal Government agency. Ms. Land has served three terms on the Institute of Electrical and Electronics Engineers (IEEE) Board of Directors. She served as a member of the IEEE-USA Board of Directors (2013, 2016), as a member of Region 3 Executive Committee (2016, 2017), was President of the IEEE Computer Society in 2009. She has more than 30 years of industry experience in the application of software engineering methodologies, the management of information systems, and leadership of software development teams.

Ms. Land is IEEE President-Elect, an IEEE Fellow, and is the author or co-author of a number of texts, papers, webinars all supporting sound software engineering principles and practical application of software process methodologies.

For additional information: www.susankathyland.com

Invited Speakers

Melissa Sassi IEEE Digital Intelligence Working Group

Topic: “DQ, a measure for determining one’s digital intelligence”

Abstract:

Join this session led by Melissa Sassi, Chief Penguin of IBM Z and Chair of IEEE’s Digital Intelligence Working Group, to learn about the first global standard for digital skills and readiness that was recently endorsed by the IEEE Standards Board. We know what IQ means, right? We also have a definition for EQ, thanks to Daniel Goleman. Now, the world welcomes DQ, a measure for determining one’s digital intelligence. In this session, we will take a journey through the following competencies: (1) digital citizen identity, (2) usage and screen time, (3) safety and cyberbullying, (4) cyber security, (5) emotional intelligence and empathy, (6) communication and digital footprint, (7) literacy and critical thinking, and (8) rights and privacy management. See you there!

Bio:



As IBM Z’s Chief Penguin, Melissa created her own IBM penguin title and leads Student & Entrepreneur Experience worldwide. She’s a Call for Code Judge focused on solving the world’s challenges via tech innovation. Prior to IBM, Melissa was an energy and internet access impact investor at Microsoft. As Founder & CEO of MentorNations, Melissa created a youth-led digital skills movement teaching tens of thousands of youth to code in twelve countries. She’s Chair of IEEE’s Digital Intelligence Working Group & Founding Member of Coalition for Digital Intelligence with WEF, OECD, IEEE & DQ Institute. She holds several Board positions in digital inclusion nonprofits.

As a PhD candidate, she researches the digital inclusion of underserved communities. She serves on a UN Round Table for the High-Level Panel for Digital Cooperation & is an avid speaker on digital skills, tech entrepreneurship, community building, youth empowerment, imposter syndrome & personal branding.

Conference Schedule

NOTE: All Times are Pacific Time - Add 3 hours for ET and 7 hours for GMT

Thursday, October 29			
Time	Room 1	Room 2	Room 3
08:00-09:00	W1: Workshop 1: Sustainable Project Design		
09:00-12:00	Considering COVID-19 Pandemic	W2: Workshop 2: Machine Learning for Social Good	W3: Workshop 3: Fundamentals of Off-Grid Electrical Systems
12:00-13:00	TH-L: Lunch break		
13:00-13:20	Plenary: CO: Conference Overview		
13:30-14:30	TH-H1: Health Session 1: Promoting Health Care Delivery	TH-ACE1: Affordable and Clean Energy 1: Energy for Cooking & Agriculture	TH-WASH 1: Water and Sanitation 1: Water Quality and Treatment
14:30-15:30			
15:35-16:45	TH-PP: Opening Session with IEEE Presidents		
17:00-19:00	SPC: Student Poster Competition		

Friday, October 30			
Time	Room 1	Room 2	Room 3
08:00-09:00	F-PL1: PANEL: "Technology-enabled climb up the demand-driven energy ladder: Interoperability, Growth, All-access"		
09:10-10:50	F-H2: Health Session 2: Supporting Diagnosis and Treatment	F-ACE2: Affordable and Clean Energy 2: Wind Energy and Microgrids	F-WASH2: Water and Sanitation 2: Monitoring, Data and Evidence
10:50-11:30			
11:30-12:15	F-L: Lunch Break		
12:20-14:20	F-H3: Health Session 3: Diagnosis	F-ACE3: Affordable and Clean Energy 3: Field Experiences	F-CC1: Connectivity and Connection 1: Remote Connectivity
14:20-14:40			
14:40-15:20	F-HN: Networking Sessions	F-ACEN: Networking Sessions	F-CCN: Networking Sessions
14:50-15:10	F-EPICS: EPICS in IEEE - empowering students solve local community problems		

Conference Schedule

Saturday, October 31			
Time	Room 1	Room 2	Room 3
08:00-10:00	SA-H4: Health Session 4: Medical Technology	SA-AG1: Agriculture 1: Irrigation and Water Management	SA-CC2: Connectivity and Communication 2: Behavioral Pattern Recognition
10:10-11:10	SA-PL1: PANEL: IEEE HAC COVID Response		
11:10-12:00	SA-L: Lunch Break		
12:00-13:30	ANNV: GHTC 10th Anniversary Celebration		
13:40-15:00	SA-H5: Health Session 5: Assistive Solutions	SA-AG2: Agriculture 2: Context Appropriate Technology	SA-CC3: Connectivity and Communication 3: Image Enhancement Techniques
15:00-15:20			SA-CCN: Networking Sessions
15:20-16:00	SA-HN: Networking Sessions	SA-AGN: Networking Sessions	
15:30-16:30	SA-DV: Diversity and Inclusion in Engineering		

Sunday All Times are Pacific Time - Add 3 hours for ET and 8 hours for GMT

Sunday, November 1			
Time	Room 1	Room 2	Room 3
08:00-09:30	SU-UN1: Other UN SDGs 1: Decent Work and Economic Growth	SU-AG3: Agriculture 3: Gender Equity and Nutrition	SU-DM1: Disaster Mitigation 1: Innovating Service Delivery in Crisis
09:40-11:00	SU-UN2: Other UN SDGs 2: Technology and Development	SU-CC4: Connectivity and Communication 4: Technologies for Human Sciences	SU-DM2: Disaster Mitigation 2: Communications and Remote Sensing
11:00-12:00	SU-L: Lunch Break		
12:00-13:00	CLOS: Closing Session & Keynote		
13:10-14:30	SU-UN3: Other UN SDGs 3: Crisis Response	SU-ED: Quality Education	SU-DM3: Disaster Mitigation 3: Data-Oriented Interventions
14:30-14:50			
14:50-15:30			

Workshops

Sustainable Project Design Considering COVID-19 Pandemic

IEEE Humanitarian Activity Committee (HAC)

29th October Thursday 08:00 - 12:00 (PT), 11:00 - 15:00 (ET), 15:00 - 19:00 (GMT)

Trainer: Prof. Dr. Shaikh Fattah, Education Chair, IEEE HAC

Objective:

The whole world is now passing through a very critical time. Each and every day many people are dying and we are losing our friends and relatives. Every sector in our society is facing severe challenges, such as health, education, business, trades, marketing, and establishment. Many volunteers have involved themselves to serve the community and many others humanitarian technology (HT) are eager to do so. However, because of its multifarious adverse effects on a majority population of the local community, it is not very easy to design an effective humanitarian technology (HT) project which can offer sustainable impact. The conventional project design and implementation approaches may need to be modified in an adaptive manner depending on various inter-link circumstances. The objective of this workshop is to offer a training on HT project design and implementation, especially considering the during and after COVID-19 pandemic situations from local and global perspectives.

Outcome:

By successfully participating the workshop a participant will be able to

- Understand sustainable development, humanitarian technology, choice of UN SDGs for a particular project
- Understand the role of community need assessment and stakeholder mapping in identifying suitable input, output, outcome for an effective HT project design in pandemic
- Understand the critical steps in HT project design and social impacts

Advantages:

The workshop consists of three interactive training sessions.

In each training session, after the formal lecture offered by the workshop trainer, interactive group activities will be conducted and participants are expected to discuss with other members in the group to come up with appropriate decisions. There will be options for question-answer and brief group presentation.

Another advantage of joining this HAC Workshop is that the participants will be getting motivation to carryout HAC Education online modules. After attending this workshop the participants will find HAC Education Online Modules very interesting. These modules are available in the IEEE Learning Network (ILN). In these modules, they will find further details with some reference materials on the workshop topics along with several practice exercises.

Workshops

Moreover, for interaction with many enthusiastic volunteers attending IEEE HAC Education initiatives, participants can join the IEEE HAC Education Forum (online facebook group).

Program Schedule:

Interactive HAC Workshop	
29 October Thursday 08:00 - 12:00 (PT), 11:00 - 15:00 (ET), 15:00 - 19:00 (GMT)	
Trainer: <i>Dr. Shaikh Fattah</i> , IEEE HAC Education Chair	
Session-01 (45 min)	
Lecture-01:	Sustainable development, UN SDGs, humanitarian technology projects, sectors affected by COVID-19 pandemic
Interactive Session-01:	Ignite session to think about a potential HT project suitable for fighting against during/after COVID19 pandemic
Learning Outcome-01:	Understand sustainable development, humanitarian technology, choice of UN SDGs for a particular project
Session-02 (60 min)	
Lecture-02:	Community engagement, systems thinking approach in sustainable HT project design and theory of change
Interactive Session-02:	Identifying community needs, stakeholders, and possible input, output and outcome of a chosen HT project
Learning Outcome-02:	Understand the role of community need assessment and stakeholder mapping in identifying suitable input, output, outcome for an effective HT project design in pandemic
Session-03 (75 min)	
Lecture-03:	Major steps and challenges in HT project design, participatory design, assessment techniques, evaluating social return on investment
Interactive Session-03:	Design and present an effective HT project and make active participation in discussing projects from other participants
Learning Outcome-03:	Understand the critical steps in HT project design and social impacts

Workshops

Trainer's Brief Biography

Dr. Shaikh Fattah

Professor, BUET and Education Chair, IEEE HAC



Dr. Shaikh Fattah received a Ph.D. degree in ECE from Concordia University, Canada and later he was a visiting Postdoc at Princeton University, New Jersey, USA. He received B.Sc. and M.Sc. degrees from BUET, Bangladesh, where he is currently serving as Professor, Department of EEE and Director, INPE. His research interests include biomedical engineering, signal processing, machine learning, humanitarian technology and deep learning. He published more than **200** international journal/conference papers and delivered more than **60** Keynote/invited talks in many countries. In his more than 20 years of professional career, he has been extensively involved in several humanitarian technology projects/research. He is the Education Chair of IEEE Humanitarian Activity Committee (HAC) (2018-2020), Chair of IEEE PES-HAC, and committee member of IEEE Smart Village Education. Under his leadership

five online modules were created and placed in IEEE learning network and he himself conducted many training/workshops on these topics in nine different countries, which impacted more than 3000 volunteers.

Dr. Fattah served as the Chair of IEEE EMBS Bangladesh Chapter during 2017-2019 and the chapter received 2020 EMBS Outstanding Regional Chapter Award. He is the Founding Chair of IEEE RAS and SSIT Bangladesh Chapters. He is the founding Vice-Chair of IEEE SPS and IAS Bangladesh Chapters. He was the IEEE Bangladesh Section Chair during 2015-2016. He served key positions in many international conferences, such as the General Chair of 5th IEEE R10 Humanitarian Technology Conference, ICAICT 2020, IEEE BECITHCON 2019, IEEE RAAICON 2019, Technical Program Chair of IEEE TENSYPMP 2020, ICREST 2019, ICAEE 2019, 2017, IEEE WIECON-ECE 2016 and 2017, and MediTec 2016. He is serving various positions in global IEEE, such as committee member of: IEEE PES LRP, IEEE SSIT SDHT, and various committees of IEEE R10. He served IEEE EAB and IEEE SIGHT.

Dr. Fattah received several awards, e.g. Concordia University's Distinguished Doctoral Dissertation Prize (ENS, 2009), Dr. Rashid Gold Medal (in MSc), 2007 URSI Canadian Young Scientist Award, and BAS-TWAS Young Scientists Prize (2014), 2016 IEEE MGA Achievement Award, 2017 IEEE R10 HTA Outstanding Volunteer Award and 2018 IEEE R10 Outstanding Volunteer Award. He is the Editor of IEEE PES Enews, Lead Editor of R10 Newsletter and Editorial Board Member of IEEE Access. He is a Senior Member of IEEE and Fellow of IEB.

E-mail: fattah@eee.buet.ac.bd; fattah92@gmail.com; s.a.fattah@ieee.org

Workshops

Applied Machine Learning for Social Good Workshop

Thursday, October 29, 09:00 - 12:00 (PT), 12:00 - 15:00 (ET), 16:00 - 19:00 (GMT)

Organizers

- Rakshit Agrawal, Camio Inc.
Organizer of Applied ML for Social Good Tutorial at GHTC 2019
- Charles Delahunt, Global Health Labs, Bellevue, WA, University of Washington,
Applied Math Dept

Learning Objective

This session will focus on how to effectively apply Machine Learning (ML) methods for social good, with examples drawn from health care applications for Low and Middle Income Countries (LMICs). We will discuss a user-centric framework that includes: (i) working with field partners to identify projects and define performance specs; (ii) building partnerships to ensure successful deployment; (iii) ML considerations such as tailoring ML metrics to the use-case.

Agenda

The workshop is 3 hours:

1. Introduction to the concepts of developing ML solutions for social good applications.
2. Several invited talks (~20 minutes) on key topics, along with Q/A.
3. Further resources and discussion as wished

Invited Talks

1. **Identifying and defining projects:** Noni Gachuhi, Shannon Kuyper (Global Health Labs, Global Development Technologies Portfolio)
 - a. Working with field partners to identify target problems
 - b. Researching appropriate product performance specs
 - c. User-centric design and iterative feedback from the field
 - d. Example: Cervical cancer screening in remote settings
2. **Commercialization:** Craig Nakagawa (Global Good, Partner Development).
 - a. Receptiveness to ML in LMIC – high willingness to adopt
 - b. Importance of engagement by local groups and partners for successful deployments.
Example: health care clusters in LMIC.
 - c. Partnering with the private sector for large-scale deployment
3. **Case study: Lung Ultrasound:** Rachel Millin (Global Health Labs, ML team)

Workshops

- a. Overview of the GHL lung ultrasound project, including
 - b. use-cases
 - c. commercial partners and their different product goals
 - d. data, data collection, and annotation
 - e. ML models
 - f. some results
4. **Tailoring metrics to guide ML development:** Charles Delahunt (Global Health Labs; U. of Washington, Applied Math)
 - a. Limitations of standard ML metrics (e.g. AUC)
 - b. Importance of product performance specs (as opposed to generic metrics)
 - c. Tailoring/defining the metrics of model outputs to the particular task
 - d. Examples: Malaria detection; grain moisture prediction.
5. **Introduction to Deep Neural Nets:** Sourabh Kulhare (Global Health Labs, ML team)
 - a. Introduction
 - b. Some system details (data, annotation, architectures, etc)
 - c. Examples
 - d. Tips-observations-pitfalls of set-up and training

Outcomes

We hope that the participants will acquire: (i) a systematic framework for effectively applying ML to societal challenges; (ii) key principles for effective deployments grounded in concrete examples; and (iii) a sense of ML's role in the framework.

Instructor Bios:

Global Health Labs (Bellevue, WA) is a research lab that develops innovative solutions to address unmet needs in primary health care centers and the last mile in Low and Middle Income Countries (LMIC). It is funded by Bill Gates.

Rakshit Agrawal is an Applied Scientist at Camio working on Machine Learning and Computer Vision. He completed his PhD from the University of California, Santa Cruz with a dissertation on "Generalized Learning Models for Structured Data". His research interests span AI, Machine Learning, Crowdsourcing, HCI, ICTD and AI for Social Good. He also developed and taught the UCSC course on Applied Machine Learning for Social Good.

Noni Gahuchi has a public health background and spent 16 years living and working across Africa and Asia, designing and delivering health programs for reproductive health, malaria, and HIV prevention. In her current role at Global Health Labs, she oversees a portfolio of health technology products intended for use at primary health care in low resource settings.

Workshops

Shannon Kuyper leads a product development team at Global Health Labs that is focused on sound strategy support to assist in translation of ideas to products, with an emphasis on areas such as early technology/user experience and iterative field/prototype evaluations prior to handoff to manufacturing partners. Previously she worked at Philips in New Product Introduction for ultrasound, and her educational background is in Chemistry.

Craig Nakagawa is an impact-driven technology executive with over 20 years of experience developing and launching global health technologies and services in low and middle-income countries. Currently, he is advising the World Health Organization on how technology can support COVID vaccine introductions. He is also a Senior Operating Partner with Bamboo Finance, an Swiss-based impact fund investing in low and middle-income markets.

Rachel Millin has a background in medical imaging, neuroscience, and machine learning. She is currently an Associate Scientist at Global Health Labs, where she develops machine learning products that address medical challenges in LMICs.

Charles Delahunt has applied Machine Learning to health care needs in LMICs for the past 7 years, and is part of the ML team at Global Health Labs. He also does basic research on Machine Learning methods, in the Applied Math department at the University of Washington.

Sourabh Kulhare is a Research Scientist at Global Health Laboratories applying Machine Learning and computer vision algorithms to different modalities of health care data. He completed his Master's at Rochester Institute of Technology, NY with the thesis "Deep Learning for Semantic Video Understanding". His research is focused on efficient deep learning, object detection, neural attention, spatio-temporal modeling, and language modeling.

Workshops

Fundamentals of Off-Grid Electrical Systems

Thursday, October 29, 09:00 - 12:00 (PT), 12:00 - 15:00 (ET), 16:00 - 19:00 (GMT)

Instructor: Henry Louie, PhD Associate Professor, Fr. Wood Research Chair, SEATTLE UNIVERSITY

This half-day tutorial covers the contextual, technical, and practical implementation aspects of off-grid electrical systems in developing countries. These off-grid systems include mini-grids, micro-grids, energy kiosks, solar home systems and solar lanterns. System architectures and components, including small-scale solar, wind, hydro, biomass and conventional generation sets, batteries and converters are covered. The mini/micro-grid design process is discussed. Pre-implementation best practices, including site assessment and considerations for business model development are discussed. The instructor draws upon his firsthand experience and contemporary research to provide attendees with the foundational knowledge needed to implement or study off-grid systems. The tutorial is based on the book “*Off-Grid Electrical Systems in Developing Countries*”.



Dr. Henry Louie received his B.S.E.E. degree from Kettering University in 2002, his M.S. degree from the University of Illinois at Urbana-Champaign in 2004 and his PhD in Electrical Engineering from the University of Washington in 2008. He is a Professor in the Department of Electrical and Computer Engineering at Seattle University. In 2015 Dr. Louie was Fulbright Scholar to Copperbelt University in Kitwe, Zambia. He is the President and Co-founder of KiloWatts for Humanity, a non-profit organization providing off-grid electricity access and business opportunities in sub-Saharan Africa. Dr. Louie is an Associate Editor for *Energy for Sustainable Development* and is a founding member of the IEEE PES Working Group on Sustainable Energy Systems for Developing Communities. Dr. Louie is recognized as an IEEE Distinguished Lecturer for his expertise on energy poverty. He is a Senior Member of the IEEE and was a registered professional engineer in Zambia. He previously served as Vice President of Membership & Image of the IEEE Power & Energy Society.

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Energy Panel: Technology-enabled climb up the demand-driven energy ladder: *Interoperability, Growth, All-access*

Date: October 30, Friday, 0800 - 0900 (PT), 11:00 - 12:00 (ET), 15:00 - 16:00 (GMT)

Authors/Organisers:

Dr. Jelena Popovic, University of Twente

Dr. Nishant Narayan, TUDelft Global Initiative;

Panelists:

Makena Ireri (CLASP, Collaborative Labeling and Appliance Standards Program)

Drew Corbyn (GOGLA, Global Off-Grid Lighting Association)

Dr. Deepak Divan (Georgia Tech)

Prof. Izael P. Da Silva (Strathmore University)

Nithya Menon (Okra)

Dr. Henry Louie (Seattle University)

Abstract:

Ensuring universal, affordable and sustainable energy access is one of the biggest societal challenges of our time. As of 2020, close to a billion people worldwide live without electricity, and another two billion have unreliable access. The centralized electricity grid is, due to cost, mismatch to the user needs and challenges around financial feasibility, not always the optimal choice, especially for remote, rural contexts. Decentralized, bottom-up approaches, such as solar home systems and microgrids, have emerged as a response to shortcomings of the centralized grid approach, but affordability, scalability, path to growth and long-term sustainability remain a challenge.

Solutions that enable bottom-up growth of the energy system and enabling interoperability of existing approaches could address some of these challenges. Alternative innovation approaches enabled by open source, localization, collaborative business models could also be part of the solution. There is already pioneering work and initiatives in this direction by CLASP, GOGLA, academia, private sector, etc.

CLASP will fund R&D projects related to interoperability through the Low Energy Inclusive Appliances (LEIA) programme. IEEE PELS (Power Electronics Society) engaged with Energy Access through running a global challenge Empower a Billion Lives (EBL), and including Energy Access as a new topic in its long-range planning, as power electronics is a key technology in these innovative approaches. Bottom-up solutions have been the subject of both research and several off-grid companies have ventured in this direction, some of them presenting their solutions within the Empower a Billion Lives Challenge. SoULS, an IIT Bombay initiative (and the global EBL winner) has implemented large scale local assembly of an open source solar lantern design in rural India etc. Despite the commendable efforts of many initiatives in this direction, there is still room for cross-organizational collaborations and leveraging effective synergies.

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This panel aims to create a dialogue between various stakeholders on technology-enabled path forward towards universal energy access. The panel will throw a spotlight on:

- Diverse perspectives on the issues of interoperability/all-access/etc.
- Technological challenges and opportunities to make it happen
- Role of different stakeholders (including different IEEE societies)

The discussions of this panel are expected to form the basis to move forward with cross-cutting dialogue and initiatives (including providing input to the second round of IEEE PELS Empower a Billion Lives Challenge).

Panelists

Makena Ireri



Makena is a Manager at CLASP. She manages research for the organization's Clean Energy Access programs, primarily the Efficiency's for Access coalition and its flagship programme Low Energy Inclusive Appliances program (LEIA). Makena develops and implements research projects that support the energy access sector to accelerate the social and environmental benefits of access to energy services in Africa and Asia. Through her work, she helps fill technical, market, consumer, and impact data gaps for a variety of off-grid appliance technologies e.g. fridges, solar water pumps, agricultural processors, and cold chain technologies. Her research also covers diverse themes like productive use, interoperability of off grid systems, affordability, and resilience. Makena is an Energy Generalist with over 8 years' experience in a range of energy contexts. She spent four years as a civil engineer with the UK's largest engineering consultancy (Atkins) working in the civil nuclear energy sectors. She worked both in new asset development and in supporting the UK's largest energy utility (EDF). Since moving into Clean Energy Access, she has gained experience in SME advisory, Innovations in funding for and accelerating energy access, research, and analyses to support sectoral action and development project management.

Drew Corbyn



Drew is the Head of Performance & Investment at GOGLA. He has more than 14 years' experience working with companies, governments, donors and NGOs to catalyse markets in the off-grid light and power sector.

In his current role, Drew leads a team to promote business products, services and practices that create value for consumers. He's most proud to have led an industry initiative to establish the GOGLA Consumer Protection Code, and loves working with off-grid solar companies to help drive cutting-edge technological innovation in villages and homes across

Africa.

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Drew holds a master's degree in mechanical engineering from the University of Nottingham and has lived and worked in Asia, Africa, Latin America and Europe. His love for the mountains has brought him to live in the Netherlands.

Dr. Deepak Divan



Dr. Deepak Divan is Professor, John E Pippin Chair, GRA Eminent Scholar and Director of the Center for Distributed Energy at the Georgia Institute of Technology in Atlanta, GA. His field of research is in the areas of power electronics, power systems, smart grids and distributed control of power systems. He works closely with utilities, industry and is actively involved in research, teaching, entrepreneurship and starting new ventures.

Dr. Divan also serves as Founder and Chief Scientist at Varentec, in Santa Clara, CA, and was President and CTO from 2011-14, leading the company as it developed its suite of innovative distributed real-time grid control technologies. Varentec is funded by leading green-tech Venture Capital firm Khosla Ventures and renowned investor Bill Gates.

Dr. Divan is an elected Member of the US National Academy of Engineering, member of the National Academies Board on Energy and Environmental Systems, a Fellow of the IEEE, past President of the IEEE Power Electronics Society, and is a recipient of the IEEE William E Newell Field Medal. He has 40 years of academic and industrial experience, 65 issued and pending patents, and over 400 refereed publications. He has founded or seeded several new ventures including Soft Switching Technologies, Innovolt, Varentec and Smart Wires, which together have raised >\$160M in venture funding. He received his B. Tech from IIT Kanpur, and his MS and PhD degrees from the University of Calgary, Canada.

Prof. Izael Pereira Da Silva



Prof. Izael Pereira Da Silva has a PhD in Power Systems Engineering from the University of Sao Paulo (Brazil). He is also a Certified Energy Manager (CEM). At present he is a Professor at Strathmore University and the Deputy Vice Chancellor – Research and Innovation. He is the Director of the Strathmore Energy Research Centre, SERC. The centre does training, research, testing and consultancy in energy related topics. His topics of interest are: Rural Electrification, Renewable Energy, Energy Efficiency, Energy Policy, Sustainable Environment and Demand Side Management.

In March 2012 Prof Da Silva together with other partners won a project sponsored by DFID and DANIDA and managed by the World Bank to set up the first Climate Innovation Centre (CIC) in the world. It is housed in Strathmore and serves SMEs financially and technically to solve challenges posed by the adverse impact of climate change either by mitigation or adaptation. Prof Da Silva has written quite extensively in the field of energy.

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In 2013 he was honoured by the Brazilian Government with the title of “Comendador da Ordem do Rio Branco” for his services towards education and poverty alleviation in Africa. In October 2014, after more than one year of efforts together with seven other colleagues he managed to get the Association of Energy Engineers – AEE to approve the Association of Energy Professionals (Eastern Africa) as a chapter of AEE for the five countries of East Africa plus Ethiopia and South-Sudan. Prof Da Silva is the first elected President and founding member of the AEP(EA).

Nithya Menon



Nithya Menon is the product development lead and part of the founding team of Okra, an IoT technology company developing a smart, decentralized microgrid solution to get reliable and affordable energy to off-grid communities across Asia. She has a diverse technology background in software and electronics engineering and has dedicated her career towards sustainable development sectors in SE Asia, developing tools and services to empower rural communities.

Dr. Henry Louie



Dr. Henry Louie received his B.S.E.E. degree from Kettering University in 2002, his M.S. degree from the University of Illinois at Urbana-Champaign in 2004 and his PhD in Electrical Engineering from the University of Washington in 2008. He is a Professor in the Department of Electrical and Computer Engineering at Seattle University. In 2015 Dr. Louie was Fulbright Scholar to Copperbelt University in Kitwe, Zambia. He is the President and Co-founder of KiloWatts for Humanity, a non-profit organization providing off-grid electricity access and business opportunities in sub-Saharan Africa. Dr. Louie is an Associate Editor for *Energy for Sustainable Development* and is a founding member of the IEEE PES Working Group on Sustainable Energy Systems for Developing Communities. Dr. Louie is recognized as an IEEE Distinguished Lecturer for his expertise on energy poverty. He is a Senior Member of the IEEE and the Chair of the IEEE PES/IAS PowerAfrica Steering Committee. He previously served as Vice President of Membership & Image of the IEEE Power & Energy Society.

Plenary Panels

IEEE Humanitarian Activities Committee (HAC) Panel on COVID-19

Date: October 31, Saturday, 1010 - 1110 (PT), 1310 - 1410 (ET), 1710 - 1810 (GMT)

This panel will address how IEEE HAC & SIGHT responded to the COVID pandemic.

Panelists:

- Kartik Kulkarni (HAC Chair),
- Sampath Veeraraghavan (SIGHT Chair and 2021 HAC Chair),
- John Funso (HAC Partnerships Chair, R8 Humanitarian Coordinator, and also a COVID project lead), and
- Pia Torres (HAC Project Support and Oversight Ad Hoc Chair and HAC/SIGHT COVID CoP lead)

Topics:

- How HAC/SIGHT responded to the COVID pandemic – vision and process improvements
- Providing volunteer engagement opportunities despite the pandemic
- Elements of a strong proposal
- Support from Communities of Practice
- Examples of some funded projects
- Building collaboration opportunities, for example, with Societies
- How this will lead to next year's program

Panelist Bios:



Kartik Kulkarni is the Chair of the IEEE Humanitarian Activities Committee, the strategic, global arm of the IEEE Board of Directors that manages IEEE's portfolio of programs and multi-million dollar project investments that leverage 400k+ engineers in 160+ countries in applying and advancing technology solutions for sustainable development. In 2019, Kartik has spearheaded social impact measurement of IEEE's sustainable development projects around the world, using the technique of SocialROI. Kartik also heads Oracle's team architecting the Blockchain Transaction Engine; he is a co-inventor on 10+ US Patents, both granted and pending. The DiscoverE Foundation recognized Kartik as a 2015 USA's New Face of Engineering.



Sampath Veeraraghavan is the Chair of IEEE SIGHT and 2021 IEEE HAC Chair. He is a globally renowned technologist is best known for his pioneering leadership and technological innovations in developing large-scale computing systems, advanced software technologies and systems engineering solutions to solve complex real-world computing challenges across multidisciplinary domains such as healthcare, disabilities, education, poverty alleviation, assistive technologies and security. He received his M.S. degree in Electrical Engineering from Tufts University,

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Massachusetts, USA (2010) and B.E. degree in Computer Science and Engineering from Anna University, Tamil Nadu, India (2005). He is the founder/president of the technology-based humanitarian program “The Brahmam Innovations” which aims to address global humanitarian and sustainable development challenges through technological innovations. For over a decade, he delivered technology-driven sustainable programs that brought together the engineering community, non-profit organizations, governmental agencies and disability advocacy groups to improve the living conditions of children with disabilities, impoverished women and students in developing nations. He works as a Senior Technical Program Manager at Amazon, Massachusetts, USA.



John Oyewole Funso-Adebayo is HAC Partnerships Chair, R8 Humanitarian Coordinator, and a COVID project lead. He is the 18th National Chairman of the Nigerian Institute of Electrical and Electronic Engineers (NIEEE), a division of the Nigerian Society of Engineers. His personal goals and interests are in the areas of renewable energy through innovations and infrastructure to sustain cities and communities, globally. He is an off-grid and mobile broadband subject matter expert for design, implementation and upgrade with expansion opportunities. He delights in producing affordable and sustainable electricity for home-use, as well as designing and installing cheap internet access. He also carries out onsite training in all these. He has a postgraduate degree in Communications and an undergraduate degree in Power systems.



Pia Torres is Chair of the HAC Project Support and Oversight Ad Hoc. She is Electronics Engineer of the Faculty of Exact Sciences and Technology of the Tucumán National University, Argentina. Diploma in Project Management (PMI) ® from the University of Buenos Aires. Participant of the “Energy Leaders Training Program” – Argentine Chapter of the World Council of Energy (CACME-WEC). Business Development Manager at SINERGEIA – Energy Service Co. specialized in Energy Efficiency and Renewable Energies. Work experience related to engineering practice in industry, project management, process optimization, production, operation and O&M in several industries: Oil & Gas, Nuclear, Food & Beverage, Energy, IT, etc. Volunteer for 18 years in IEEE – Promoted to Senior Member in 2018. IEEE Industry Applications Society Board Member-at-Large, IEEE Industry Applications Society Distinguished Lecturer. IEEE Young Professionals & IEEE Technology and Engineering Management Argentina Chair. IEEE Joint Chapter #1 (IAS-IES-PELS-RAC-CSS-VTS) Vice Chair. IEEE Women in Engineering Argentina Past Chair. Roboteam Initiative Program Manager. IEEE WIE International Leadership Summit Buenos Aires, Argentina 2019 General Chair.

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GHTC 10th Anniversary

Date: October 31, Saturday, 1200 - 1330 (PT), 1500 - 1630 (ET), 1900 - 2030 (GMT)



GHTC 2020 celebrates the 10th anniversary for IEEE GHTC. The anniversary program will consist of some remarks and two panel discussions, one on the evolution of GHTC and the other on IEEE's role in Humanitarian Technology.

GHTC Evolution – Panel – IEEE GHTC has allowed members to showcase projects and be exposed to resources that were not commonly known within the IEEE family. GHTC created a community of volunteers who wanted to make a difference and become a facilitator for volunteers, university programs, NGO's, foundations, etc. to work together. The conference mission and goals have morphed over the years. The approaches to member and service related projects have changed. The addition of academic research presentations and university projects have all had an impact on the Conference.

IEEE's Role in Humanitarian Technology and Sustainable Development – Panel – Realizing IEEE's Vision for Aligning the "Advancing Technology for Humanity" from an Aspirational Statement to Promoting Member Engagement with Sustainable Development and Humanitarian Service Providers. Panelists will explore how IEEE operationalized the broader IEEE humanitarian interests into an event (or series of events). The approaches to member and service related projects have changed.

"GHTC evolution" – Panel Description

IEEE GHTC has allowed members to showcase projects be exposed to resources that were not commonly known within the IEEE family. GHTC created a community of volunteers who wanted to make a difference and become a facilitator for volunteers, university programs, NGO's, foundations, etc. to work together. The conference mission and goals have morphed over the years. The IEEE's approaches to member and service related projects have changed. The addition of academic research presentations and university projects have all had an impact on the Conference. As of year-end 2019, total downloads of all papers since the 1st GHTC in 2011: 333,786 – see [published GHTC proceedings in IEEE Xplore](#).

This panel session will engage GHTC Founders is a discussion on how GHTC came to be and how it has evolved over the past ten years.

Panelists

- Paul Kostek
- Keith Moore
- Mike Andrews
- Ed Perkins

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PAUL KOSTEK

Paul Kostek is a consultant and IEEE volunteer. Currently he is a member of the IEEE Humanitarian Activities Committee and was the inaugural Chair of GHTC in 2011 and 12.

KEITH MOORE



Keith Moore currently works for the United States Army Information Systems Engineering Command at Fort Huachuca, Arizona and volunteers as the IEEE Region 6 Director. His career has taken him around the world to design, implement, and maintain computer and communications systems. He has served in a number of volunteer and other organizations to work with others for the good of all stakeholders. These experiences have involved organizations as varied as federal and state governments, Big Brothers/Big Sisters, local and indigenous churches, Civil Air Patrol, Scouts, Cyber Patriot Competition, and others. He has served as a professional engineer, adjunct engineering professor, science fair judge, mentor, and coach. He holds a bachelors degree in electrical and computer engineering and a masters degree in business administration and management information systems.

MIKE ANDREWS



Mr. Andrews is Managing Partner of Andrews & Associates, a consulting firm specializing in new product development, business and management development, and Emergency Planning for business, schools and government entities.

Mr. Andrews is a Senior Life Member of IEEE and is currently serving IEEE members as the Past Director (Director 2013-14), AdCom member for the Technology and Engineering Management Society (TEMS) and past Vice President of Membership, Marketing and Communications; IEEE Vision, Innovation and Challenges Summit (VICS) Chair; IEEE Honors Awards Event Committee; IEEE Life Members Committee and Region 6 Life Members Affinity Group Coordinator; EPICS Committee; Executive Producer of the IEEE Rising Stars Conference, and member of the Phoenix Section Executive Committee.

Mr. Andrews' commitment to the community includes serving as Arizona Region Coordinator for the Future City Competition, President of the Smart Education Foundation, host to the SMART Competition, the Salvation Army Advisory Board past chair and current member, Commissioner on the City of Phoenix Youth and Education Commission; member of the Grand Canyon

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University Engineering Advisory Board, and the Williams Institute for Ethics and Management Board of Directors.

He was awarded an IEEE Millennium Medal for outstanding achievements and contributions to IEEE and the IEEE-USA Robert S. Walleigh Award for Distinguished Contributions to Engineering Professionalism. Mike has also received the Salvation Army Sally Award for outstanding volunteerism, Hon Kachina Award (Excellence in Volunteerism, State of Arizona, AIA – Arizona Award of Distinction, Williams Institute for Ethics and Management (Board of Directors), Salvation Army Southwest Region Advisory Board (Chair, 2013-2015), The Collaboration for a New Century/Arizona LeaderForce (Business Champion).



ED PERKINS

Ed Perkins is a consultant and IEEE volunteer. He was Region 6 Director when GHTC was formed in 2011 and 2012. He is a member of the GHTC Advisory Board and has been on the GHTC committee since 2011.

“IEEE’s Role in Humanitarian Technology and Sustainable Development” – Panel Description

Realizing IEEE’s Vision for Aligning the “Advancing Technology for Humanity” from an Aspirational Statement to Promoting Member Engagement with Sustainable Development and Humanitarian Service Providers.

This panel session will engage IEEE leaders in a “Why” based discussion about IEEE’s internalizing the concept of advancing technology for humanity, and for promoting Member Engagement with Humanitarian Service Providers.

Panelists

Moderator: Mike Andrews

- Roberto de Marca, IEEE President & CEO, 2014
- Russ Lefevre, IEEE-USA President, 2008
- Lew Terman, IEEE President & CEO, 2008
- John Vig, IEEE President & CEO, 2009

Our panel members will provide a perspective on the vision that drove IEEE to make a bold move into spotlighting how the technology, for which our members were responsible for developing, could be used to improve all of humanity. We will discuss the challenge of moving outside our comfort zone, identifying partners and solidifying relationships.

A complicating factor is the IEEE leadership structure. The IEEE President serves for only one year. Since any major change in focus would require a strategic approach, presidents-elect, presidents and past-presidents would have to share the same vision, goals, and organizational

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aspirations. The panel members will explore how that evolution was accomplished and what is next for IEEE as it continues to advance technology for humanity.

ROBERTO de MARCA



Roberto received his degree in Electrical Engineering from the Catholic University in Rio de Janeiro. He worked one year in the data communications department of EMBRATEL, then the government owned long-distance carrier. He then received Fulbright Scholarship for graduate studies at the University of Southern California, where he earned a Ph.D. in Electrical Engineering. Since 1978 Prof. de Marca has been on the faculty of the Catholic University, Rio de Janeiro, having held several leadership positions including Associate Academic Vice President, Director of Development and Vice-Dean of Science and Engineering Center. Throughout his career Roberto built an extensive international experience enjoying appointments in universities and industrial laboratories in different countries. Twice on leave he served as Scientific Consultant with AT&T Bell Laboratories, Murray Hill. In 2008 he was a Visiting Professor with the Hong Kong University of Science and Technology. He also held a Guest Scientist appointment with NEC Network Research Laboratories in Heidelberg, Germany. His technical activities at Bell Labs and NEC resulted in patents in the area of mobile communications.

Earlier in his career he was also a Visiting Professor at the Politecnico di Torino, Italy, and a visiting scholar at UCLA, University of Toronto and Telecom Paris.

As Scientific Director of the Brazilian National Research Council, managing a 300 million dollar research funding program, Dr. de Marca authorized the startup money for the national research network that led the way to the widespread use of Internet in Brazil. He was a delegate to several ITU meetings where the wireless 3G specifications were developed and chaired one of the working groups. Recently, he served three years as a member of the presidential advisory committee of Finep, the largest Brazilian funding agency/bank for research and innovation.

RUSSELL LEFEVRE



Russell Lefevre, B.S., M.S., Ph.D., is a Fellow of the IEEE and of AAAS. He is a Past President of IEEE-USA and IEEE Aerospace and Electronic Systems Society. During 2001, Dr. Lefevre was an IEEE-USA Congressional Fellow as Science Advisor to Senator Jay Rockefeller. He was Chair of the IEEE Steering Committee on Electric Vehicles, Founding Chair of the IEEE Humanitarian Technology Committee and a founding member of the IEEE Smart Grid Committee. He has an appointment as Adjunct Professor of Physics and Electrical Engineering at the University of North Dakota. He is currently a member of the Board of Governors of the IEEE Society on the Social Implications of Technology. He is a member of the Board of the Metropolitan Water District of Southern CA.

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LEWIS M. TERMAN



After receiving a Ph.D from Stanford in 1961, Lew worked at the IBM T. J. Watson Research Center for 45 years + 1 day, except for two years as the President of the IBM Academy of Technology in the IBM Corporate site in Somers, NY. He worked on semiconductor devices, circuits, technology and systems. He received six IBM Outstanding Contribution Awards, and three IBM Corporate Contribution Awards.

He joined the IRE (the predecessor of IEEE) in 1958, and has had numerous IEEE positions, including President of the Solid-State Circuits Society, President of the Electron Devices Society, Division 1 Director, Chair of the IEEE Awards Board, TAB Vice President, and the 2008 IEEE President. He has been involved in the creation of six new IEEE conferences, including GHTC.

He received the IEEE Solid-State Circuits Technical Field Award “For leadership in the field of MOS Devices and Circuits for Semiconductor Memories”, and the IEEE Society on Social Implications of Technology Brian O’Connell Award in 2016 for contributions to the advancement of SSIT. He was elected to the TAB Hall of Honor in 2018. He is an IEEE Life Fellow and a member of the US National Academy of Engineering.

He is currently the Secretary of the SSIT and is on the advisory committee for GHTC.

JOHN VIG



John Vig was born in Budapest, Hungary. His family entered the USA, as refugees, when he was 14. He received his Ph.D. in Physics from Rutgers – The State University (NJ, USA). Throughout his professional career, working as a physicist, electronics engineer and program manager, he performed and led research aimed at developing precision clocks, sensors and low-noise oscillators. In 1989, he was elected Fellow of the IEEE “for contributions to the technology of quartz crystals for precision frequency control and timing.” He is now working as a part-time consultant and full-time volunteer.

John’s service to IEEE included serving as the IEEE President & CEO in 2009, six years on Board of Directors, Vice President of Technical Activities and the Director of Division IX.

He has been awarded 55 patents, has published more than 100 papers and nine book chapters, and his papers have been cited more than 5,000 times. He serves as a volunteer on his hometown’s Environmental Commission; and on his County’s Environmental Council. In his spare time, he and his wife enjoy ballroom dancing.

Special Sessions

GHTC 2020 Special Sessions

Conference Overview (Thursday Oct. 29 1300 - 1315 (PDT), 1600 - 1615 (EDT), 2000 - 2015 (GMT))

Must attend Overview of GHTC 2020 Virtual Program, technical sessions and navigation mechanics with Conference Chair, Paul Cunningham, Vice Chair, Ed Perkins, and Program Chair Pritpal Singh.

Opening Session (Thursday Oct. 29 1535 - 1645 (PT), 1835 - 1945 (ET), 2235 - 2345 (GMT))

Remarks on IEEE's role in Humanitarian Activities by 2020 IEEE President Toshio Fukuda and 2021 President-elect Susan (Kathy) Land

Student Poster Competition (Thursday Oct. 29 1700 - 1900 (PT), 2000 - 2200 (ET), 0000 - 0200 (GMT))

GHTC 2020 invites undergraduate students to submit abstracts for the Student Poster Competition. Students were invited to send in ideas or designs for developing projects/products supporting the Key focus areas of GHTC 2020.

Participate in the Student Poster Competition and vote for the best poster for the People's Choice Award.

Special Interest Session: "EPICS in IEEE – empowering students solve local community problems" (Friday Oct. 30 1450 - 1510 (PT), 1750 - 1810 (ET), 2150 - 2210 (GMT))

How to execute a community service project with IEEE's support (through EPICS in IEEE).

Special Interest Session: Diversity and Inclusion in Engineering (Saturday Oct. 31 1530 - 1630 (PT), 1830 - 1930 (ET), 2230 - 2330 (GMT))

Interactive discussion led by Tom Coughlin, past President IEEE-USA

This talk discusses the IEEE response to institutional racism and the issues with diversity and inclusion in the engineering professions. It also gives several examples of what IEEE members have done to help improve diversity and inclusions and ends with a discussion with the attendees on what they can do to improve diversity and inclusion in the technical professions.

Closing Session and Keynote (Sunday Nov. 1 1200 - 1300 (PST), 1500 - 1600 (EST), 2000 - 2100 (GMT))

Closing remarks and presentation on Digital Literacy with Melissa Sassi, "DQ, a measure for determining one's digital intelligence"

Presentations Schedule

Thursday, October 29

Thursday, October 29 0800 - 1200 (PT), 1100 - 1500 (ET), 1500 - 1900 (GMT)

W1: Workshop 1: Sustainable Project Design Considering COVID-19 Pandemic

Interactive IEEE HAC Workshop at GHTC 2020
Room 1

Trainer: Prof. Dr. Shaikh Fattah, Education Chair, IEEE HAC

The objective of this workshop is to offer a training on humanitarian technology (HT) project design and implementation, especially considering the during and after COVID-19 pandemic situations from local and global perspectives. The conventional project design and implementation approaches may need to be modified in an adaptive manner depending on various inter-link circumstances.

The workshop consists of three interactive training sessions.

In each training session, after the formal lecture offered by the workshop trainer, interactive group activities will be conducted and participants are expected to discuss with other members in the group to come up with appropriate decisions. There will be options for question-answer and brief group presentation.

Thursday, October 29 0900 - 1200 (PT), 1200 - 1500 (ET), 1600 - 1900 (GMT)

W2: Workshop 2: Machine Learning for Social Good

Room: room 2

Chairs: Rakshit Agrawal (Camio, USA), Charles B. Delahunt (Global Health Labs, USA)

Organizers

Rakshit Agrawal, Camio Inc.

Organizer of Applied ML for Social Good Tutorial at GHTC 2019

Charles Delahunt, Intellectual Ventures Lab / Global Good, Bellevue, WA

University of Washington, Applied Math Dept

Learning Objective

This session will focus on topics around the usage of machine learning (ML) methods in order to assist social good applications. We will discuss a framework centered around identifying the important societal challenges where problems can be defined for ML capabilities. We then describe the process to develop machine learning models and deploy them in the real world.

Agenda

Presentations Schedule

The workshop is 3 hours:

Introduction to the concepts of developing ML solutions for social good applications.

Several short invited talks (~25 minutes) on key topics, connected together with contextual material, along with Q/A.

Closing, further resources, questions and discussion as wished.

W3: Workshop 3: Fundamentals of Off-Grid Electrical Systems

Room: room 3

Instructor: Henry Louie, PhD Associate Professor, Fr. Wood Research Chair, SEATTLE UNIVERSITY

Chair: Henry Louie (Seattle University, USA)

This half-day tutorial covers the contextual, technical, and practical implementation aspects of off-grid electrical systems in developing countries. These off-grid systems include mini-grids, micro-grids, energy kiosks, solar home systems and solar lanterns. System architectures and components, including small-scale solar, wind, hydro, biomass and conventional generation sets, batteries and converters are covered. The mini/micro-grid design process is discussed. Pre-implementation best practices, including site assessment and considerations for business model development are discussed. The instructor draws upon his firsthand experience and contemporary research to provide attendees with the foundational knowledge needed to implement or study off-grid systems. The tutorial is based on the book "Off-Grid Electrical Systems in Developing Countries".

Thursday, October 29 1200 - 1300 (PT), 1500 - 1600 (ET), 1900 - 2000 (GMT)

TH-L: Lunch break

Thursday, October 29 1300 - 1320 (PT), 1600 - 1620 (ET), 2000 - 2020 (GMT)

CO: Conference Overview

Room: plenary

Chairs: Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland), Pritpal Singh (Villanova University, USA)

Overview of GHTC 2020 Virtual Program, technical sessions and navigation mechanics with Conference Chair, Paul Cunningham, Vice Chair, Ed Perkins, and Program Chair Pritpal Singh.

Presentations Schedule

Thursday, October 29 13:30 - 15:30 (PT), 16:30 - 18:30 (ET), 20:30 - 22:30 (GMT)

TH-ACE1: Affordable and Clean Energy 1: Energy for Cooking & Agriculture

Room: room 2

Chairs: Pritpal Singh (Villanova University, USA), Viviana Villavicencio (Villanova University, USA)

- 13:30 *Study on charcoal scarcity and the limitations of existing cooking fuel alternatives*
Lauren Judkins, Felix Estevez Hilario and Jacob Rogers (Penn State University, USA);
John Gershenson (The Pennsylvania State University, USA)
- 13:50 *A market assessment for modern cooking in Malawi*
Will Coley, Aran Eales, Damien Frame and Stuart Galloway (University of Strathclyde, United Kingdom (Great Britain)); Lloyd Archer (United Purpose Malawi, Malawi)
- 14:10 *Can Modifications Make Electric Pressure Cookers 'Minigrid Friendly?'*
Daniel Zimmerle, Casey Quinn, Jason Quinn, Maggie Clark and John Volckens
(Colorado State University, USA)
- 14:30 *Using Solar Electric Cooking to Kickstart Universal Energy Access in the Developing World*
Siu-Cheung Mok (Engineers Without Borders (Hong Kong) & Display Research Laboratory, Hong Kong); Viveik Saigal (One Plus One Eleven, Hong Kong)
- 14:50 *Irrigation Load Optimization for Enhanced Agricultural Productivity in Rural Microgrid Clusters*
Raj Vignesh Karunakaran, Rohitaa Ravikumar, Karthni Lakshmanan and Marjerie Suresh
(SSN College of Engineering, India); Vineeth Vijayaraghavan (Solarillion Foundation, India)
- 15:10 *How Modeling the Adoption of Household Clean Energy Technologies can Inform Stakeholder Decisions*
Erin E Peiffer and Nordica MacCarty (Oregon State University, USA)

TH-H1: Health Session 1: Promoting Health Care Delivery

Room 1

Chairs: Miriam Cunningham (IIMC / IST-Africa, Ireland), Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

- 13:30 *Data-Centric Operations Design for Disseminating a Biomedical Screening Technology: A Case Study*
Naakesh Gomanie, Zachary Day, Noah Weaver, Anneke Roy, Spencer Moros and Khanjan Mehta (Lehigh University, USA)
- 13:50 *Fulfilling the promise of community-based health navigators*
Satya Sai Srinivas (Accenture Solutions Pvt Ltd, India); Nataraj Kuntagod (Accenture, India); Rambhau Rote, Sanjay Podder, Giju Mathew and Ravi Viswanathan (Accenture Solutions Pvt Ltd, India)

Presentations Schedule

14:10 *Managing Knowledge in Computational Models for Global Food, Nutrition and Health Technologies*

Kudakwashe Dube (Massey University, New Zealand); Scott McLachlan (Queen Mary University of London, United Kingdom (Great Britain)); Ngonidzashe Zanamwe (University of Zimbabwe, Zimbabwe); Evangelia Kyrimi and Norman Fenton (Queen Mary University of London, United Kingdom (Great Britain))

14:30 *Rapidly Deployable Containerized Medical Clinic for Refugee Settings*

Elena A van Hove, Cody Van Cleve, Alexander Mobley and Samantha Janko (Arizona State University, USA); Asa Plum (Corporate Interior Solutions, USA); Alberto Zamudio (Industrial Water Innovations, USA); Justin Schmaltz (SolarNow, Uganda); Jamie Nollette (Pipeline Worldwide, USA); Jessy Hampton (Medical Team International, USA); Nathan G Johnson (Arizona State University, USA)

14:50 *Swoop Aero deploying the future of healthcare through air logistics*

Sabrina Ravail (Swoop Aero Pty Ltd, Australia)

Thursday, October 29 13:30 - 14:30 (PT), 16:30 - 17:30 (ET), 20:30 - 21:30 (GMT)

TH-WASH 1: Water and Sanitation 1: Water Quality and Treatment

Room: room 3

Chairs: Clement A Cid (California Institute of Technology, USA), Navid Shaghghi (Santa Clara University, USA)

13:30 *UV Meter for Testing Quality of Water treated by a Solar Water Disinfection System*

Javier Urquizo, Christa Cook, Wesley Shugart-Schmidt, Viviana Villavicencio and Pritpal Singh (Villanova University, USA)

13:50 *A Review of Desalination Technologies for Low-Resource Settings*

Aya Bseiso (Student Partner, USA); Nathan Arnett (Pennsylvania State University, USA); Nicole Opalinski (Environment Expert, USA); Khanjan Mehta (Lehigh University, USA)

14:10 *Comparison and evaluation of coagulant/disinfectant point-of-use water treatment performance*

Leigh A Borrett and Caetano Dorea (University of Victoria, Canada)

Thursday, October 29 15:35 - 16:45 (PT), 18:35 - 19:45 (ET), 22:35 - 23:45 (GMT)

TH-PP: Opening Session with IEEE Presidents

Room: plenary

Chair: Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

LIVE - Remarks on IEEE's role in Humanitarian Activities

2020 IEEE President Toshio Fukuda, "Advancing Technology for Humanity"

2021 President-elect Susan (Kathy) Land, "IEEE's Humanitarian Efforts"

Presentations Schedule

**Thursday, October 29 17:00 - 19:00 (PT), 20:00 - 22:00 (ET), 00:00 - 02:00 +1
(GMT)**

SPC: Student Poster Competition

Room: plenary

Chair: Mostafa Mortezaie (DeVry University, USA)

Student contestants will present their posters depicting their ideas or designs for developing projects/products supporting the Key focus areas of GHTC 2020.

Cash Prizes will be awarded.

Attendees can participate in the Student Poster Competition and chose the best poster for the People's Choice Award.

Presentations Schedule

Friday, October 30

Friday, October 30 08:00 - 09:00 (PT), 11:00 - 12:00 (ET), 15:00 - 16:00 (GMT)

F-PL1: ENERGY PANEL: "Technology-enabled climb up the demand-driven energy ladder: Interoperability, Growth, All-access"

Room: plenary

Chairs: Nishant Narayan (Delft University of Technology, The Netherlands), Jelena Popovic (University of Twente & Klimop Energy, The Netherlands)

Ensuring universal, affordable and sustainable energy access is one of the biggest societal challenges of our time. Decentralized, bottom-up approaches, such as solar home systems and microgrids, have emerged as a response to shortcomings of the centralized grid approach, but affordability, scalability, path to growth and long-term sustainability remain a challenge.

Authors/Organisers:

Dr. Jelena Popovic, University of Twente

Dr. Nishant Narayan, TUDelft Global Initiative;

Panelists:

Makena Ileri (CLASP, Collaborative Labeling and Appliance Standards Program)

Drew Corbyn (GOGLA, Global Off-Grid Lighting Association)

Dr. Deepak Divan (Georgia Tech)

Prof. Izael P. Da Silva (Strathmore University)

Nithya Menon (Okra)

Dr. Henry Louie (Seattle University)

Friday, October 30 09:10 - 11:30 (PT), 12:10 - 14:30 (ET), 16:10 - 18:30 (GMT)

F-ACE2: Affordable and Clean Energy 2: Wind Energy and Microgrids

Room: room 2

Chairs: Henry Louie (Seattle University, USA), Daniel Zimmerle (Colorado State University, USA)

9:10 Whole systems assessment of current and future wind speed and energy trends in rural Peru

Cristina Benzo, Pritpal Singh, Iain Hunt and Alfonso Ortega (Villanova University, USA)

9:30 Design and Optimization of a Novel, Low-cost, Compact Wind Power Generator for Autonomous Environmental Sensing

Akhilesh V Balasingam (Independent Researcher, USA)

9:50 Application of Synchronous Condensers for Enhanced Resilience of a Renewable Energy dominated Electric Grid

Sarbajit Basu, Vishawjit Roy and Michael Giesselmann (Texas Tech University, USA)

Presentations Schedule

10:10 *In-Band Communications for DC Microgrids*

Joseph C Decuir (University of Washington & IEEE Region 6 Seattle Section, USA)

10:30 *Poverty Mapping in Sub Saharan Africa Using Night Time Light Pollution Data*

Kathleen Davies, Alfred Alsop and Jonathan Bowes (University of Strathclyde, United Kingdom (Great Britain))

10:50 *Time-Efficient Fault Diagnosis of a BLDC Motor Drive Deployed in Electric Vehicle Applications*

Adil Usman (Indian Institute of Technology Mandi, India); Bharat Singh Rajpurohit (IIT Mandi, India)

11:10 *Prosumer Based Economic Model for Energy Sharing between Microgrids in a Rural Indian Village Scenario*

Aditya Srikanth and Gayathri Narayana Yegna Narayanan (SSN College of Engineering, India); Shyam Kumar Lakshmanan and Hari Vignesh B (SRM Institute of Science and Technology, India); Janani Jayaraman (Sri Sivasubramaniya Nadar College of Engineering, India); Vineeth Vijayaraghavan (Solarillion Foundation, India)

F-H2: Health Session 2: Supporting Diagnosis and Treatment

Room 1

Chairs: Miriam Cunningham (IIMC / IST-Africa, Ireland), Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

9:10 *A Novel E-Junction Lateral Flow Immunoassay for Widespread Sickle Cell Screening in Low and Middle-Income Countries*

Maria Lancia, Tiffany Pang, Ashleigh Crawford, Jannah Wing, Khanjan Mehta and Xuanhong Cheng (Lehigh University, USA)

9:30 *Deep Learning on Edge Device for Early Prescreening of Skin Cancers in Rural Communities*

Chee Jen Ngeh, Chen Ma and Tommy Kuan-Wei Ho (University of Washington, USA); Yuntao Wang (Tsinghua University, China & University of Washington, USA); John Raiti (University of Washington, USA)

9:50 *Target product profiles for devices to diagnose urinary schistosomiasis in Nigeria*

Merlijn Sluiter and Adeola Onasanya (Researcher, The Netherlands); Oladimeji Oladepo (University of Ibadan, Nigeria); Jo Engelen (Delft University of Technology, The Netherlands); Maryam Keshinro (LUMC, The Netherlands); Temitope Agbana, G-Young Van and Jan-Carel Diehl (Delft University of Technology, The Netherlands)

10:10 *Schistoscope: Smartphone versus Raspberry Pi based low cost diagnostic device for urinary Schistosomiasis*

Jan-Carel Diehl (Delft University of Technology, The Netherlands); Prosper Oyibo (TU Delft / University of Lagos, The Netherlands); Temitope Agbana, G-Young Van and Gleb Vdovin (Delft University of Technology, The Netherlands); Satyajith Jujjavarapu (TU Delft / University of Lagos, The Netherlands); Wellington Aghoghovwia Oyibo (University of Lagos, Nigeria)

10:30 *The embodiment of low-field MRI for the diagnosis of infant hydrocephalus in Uganda*

Presentations Schedule

Jan-Carel Diehl and Frank Doesum (Delft University of Technology, The Netherlands); Martien Bakker and Martin van Gijzen (TU Delft, The Netherlands); Thomas O'Reilly (LUMC, The Netherlands); Ivan Muhumuza (MUST, The Netherlands); Johnes Obungoloch (MUST, Uganda); Edith Mbabazi Kabachelor (Cure Hospital, Uganda)

10:50 *Remote sensing and on-site characterization of wetlands as potential habitats for malaria vectors - A pilot study in southern Germany*
Martin Schmieder (Neu-Ulm University of Applied Sciences (HNU), Germany); Felix Holl (Neu-Ulm University of Applied Sciences); Marina Fotteler, Michael Örtl and Elmar Buchner (Neu-Ulm University of Applied Sciences, Germany); Walter Swoboda (Fakultät Gesundheitsmanagement Hochschule Neu-Ulm, Germany)

Friday, October 30 09:10 - 10:50 (PT), 12:10 - 13:50 (ET), 16:10 - 17:50 (GMT)

F-WASH2: Water and Sanitation 2: Monitoring, Data and Evidence

Room: room 3

Chair: Iain Hunt (Villanova University, USA)

9:10 *A Non-Intrusive Water Consumption Monitoring System*

James Adrian Somontina and Erees Queen Macabebe (Ateneo de Manila University, Philippines)

9:30 *Monitoring and Modeling Glyphosate Transport in the Belize River Watershed*

Barbara A Astmann, Pedro J Martin and Shakira R Hobbs (University of Kentucky, USA)

9:50 *The Reality of Evidence-based Decision Making in Humanitarian Programming: An Exploratory Study of WASH Programs in Uganda*

Milan Khanpour (Radboud University, The Netherlands); Kenny Meesters (Tilburg University, The Netherlands); David Paulus (Delft University of Technology, The Netherlands)

10:10 *Self-diagnosis and smart maintenance prototype for sustainable and desirable onsite sanitation*

Clement A Cid and Eitam Shafran (California Institute of Technology, USA); Sara Iben Jellal (UPHF, France); Josh Field, Ronan Le Floch--Best and Caroline Paules (California Institute of Technology, USA); Yassin El Hilali (UPHF, France); Michael R. Hoffmann (Caltech, USA)

10:30 *DOxy: Dissolved Oxygen Monitoring*

Navid Shaghghi, Tiana Nguyen, Jayati Patel, Ariane Soriano and Jesse Mayer (Santa Clara University, USA)

Friday, October 30 11:30 - 12:15 (PT), 14:30 - 15:15 (ET), 18:30 - 19:15 (GMT)

F-L: Lunch Break

Presentations Schedule

Friday, October 30 12:20 - 14:40 (PT), 15:20 - 17:20 (ET), 19:20 - 21:40 (GMT)

F-ACE3: Affordable and Clean Energy 3: Field Experiences

Room: room 2

Chair: Adil Usman (Indian Institute of Technology Mandi, India)

12:20 *Impact Assessment of Solar Home System Rehabilitation in the Rural Community "Cerrito de los Morreños", Ecuador*

Viviana Villavicencio (Villanova University, USA); Ruben Hidalgo (Escuela Superior Politécnica del Litoral, Ecuador); Javier Urquizo (Villanova University, USA); Jaqueline Litardo and Alexis Lema (Escuela Superior Politécnica del Litoral, Ecuador); Pritpal Singh (Villanova University, USA); Guillermo Soriano (Escuela Superior Politécnica del Litoral, Ecuador)

12:40 *Remote Assessment of Battery Degradation-Related Service Interruptions in an Energy Kiosk*

Lane D Smith (University of Washington, USA); Henry Louie (Seattle University, USA); Steve Szablya and Dave Goldsmith (KiloWatts for Humanity, USA)

13:00 *An Exploratory Study on Renewable Energy at Philippine General Hospital*

Kaitlyn M Alcazaren and Pritpal Singh (Villanova University, USA)

13:20 *Performance Analysis of a Community-Based Off-Grid PV System*

Erees Queen Macabebe (Ateneo de Manila University, Philippines); Alex Chapuis (Institut Catholique d'Arts et Métiers, France); Aaron Keith Y. Chan (Ateneo de Manila University, Philippines)

13:40 *Lessons Learned - Developing Off-Grid Energy Systems During the COVID-19 Pandemic*

Tam Kemabonta and Abiye Geoffrey (Entric Energy, Nigeria)

14:00 *Sustainable Delivery Models for Achieving SDG7: Lessons from an Energy Services Social Enterprise in Malawi*

Aran Eales (University of Strathclyde, United Kingdom (Great Britain))

14:20 *Portable DC Power Monitoring*

Eli Countrywood and Jose Tapia (University of Washington Bothell, USA); Joseph C Decuir (University of Washington & IEEE Region 6 Seattle Section, USA); Alexander A Anderson (EmpowerPack Social Purpose Corp & Incremental Systems Corp, USA)

Friday, October 30 12:20 - 14:40 (PT), 15:20 - 17:20 (ET), 19:20 - 21:40 (GMT)

F-CC1: Connectivity and Connection 1: Remote Connectivity

Room: room 3

Chair: Michael Brisbois (IEEE & Self, USA)

12:20 *Implementing Solar-Powered HAPS for Rural broadband Connectivity: Concepts, Challenges & Mitigation*

Ogbonnaya Anicho, Philip B Charlesworth, Gurvinder Baicher and Atulya K Nagar (Liverpool Hope University, United Kingdom (Great Britain))

Presentations Schedule

12:40 *Proof-of-Concept Prototype of Wideband VHF-based Video Streaming for e-Health Interventions in Remote Rural Areas*

Wookwon Lee, Mustafah Altamimi, Juliyana Patrik Arockia Doss, Omar M Salameh, Rhea Bryan Rivera and Nicholas B. Conklin (Gannon University, USA)

13:00 *Experiments on the Smart Village Testbed*

Shultz A Hartgrove IV, Sakshi Ranjan and Alan Mickelson (University of Colorado at Boulder, USA)

13:20 *LokaLTE: 600 MHz Community LTE Networks for Rural Areas in the Philippines*

Calvin Artemies Hilario (Advanced Science and Technology Institute & University of the Philippines - Diliman, Philippines); Mary Claire Barela (University of the Philippines, Philippines); Mar Francis De Guzman (Advanced Science and Technology Institute & University of the Philippines Diliman, Philippines); Rizza Loquias (University of the Philippines Diliman, Philippines); Ramon Vann Cleff B. Raro (University of the Philippines Diliman & DOST Advanced Science and Technology Institute, Philippines); Jean Jay J Quitayen (Advanced Science and Technology Institute & Department of Science and Technology, Philippines); Joel Joseph Jr. S. Marciano (University of the Philippines & Wireless Communications Engineering Laboratory, Philippines)

13:40 *Transforming One-Stop E-Services in Iraq: Focusing on perception of Blockchain Technology in Digital Identity System*

Milad Mohammed Al-Musawi (SungKyunKwan University & SKKU, Iraq)

14:00 *GoodBuys*

Olivia Hess, Adi Relan and Navid Shaghaghi (Santa Clara University, USA)

Friday, October 30 12:20 - 14:40 (PT), 15:20 - 17:20 (ET), 19:20 - 21:40 (GMT)

F-H3: Health Session 3: Diagnosis

Room 1

Chairs: Miriam Cunningham (IIMC / IST-Africa, Ireland), Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

12:20 *Induced Acoustic Resonance for Noninvasive Bone Fracture Detection Using Digital Signal Processing and Machine Learning*

Isaac Boger (University of Washington, USA & Tsinghua University, China); Jay Chakalasiya (University of Washington, USA); Kenneth Christofferson (University of Washington, USA & Tsinghua University, China); Yuntao Wang (Tsinghua University, China & University of Washington, USA); John Raiti (University of Washington, USA)

12:40 *FPGA-based Edge Inferencing for Fall Detection*

Kishore Bharathkumar, Christopher Paolini and Mahasweta Sarkar (San Diego State University, USA)

13:00 *Utility of a Novel, Combined Biofeedback-Virtual Reality Tool as Add-on Treatment for Chronic Migraine*

Robin Yang (Global Innovation Exchange Institute, Tsinghua University); Haoran (Frank) Zhou, Ke Wang and Ami Cuneo (University of Washington, USA); Yuntao Wang (Department of Computer Science and Technology, Tsinghua University); John Raiti and Natalia Murinova (University of Washington, USA)

Presentations Schedule

13:20 *Designing an Appropriate Climate Health Interface for Guided Self-Diagnosis in Low-income Communities within Nigeria*

Waku Ken-Opurum (Columbia University in the City of New York, USA); Bobuchi Ken-Opurum (Carnegie Mellon University, USA); Aimebonomon Idahosa (IU School Medical School - Arnett, USA)

13:40 *Development of a non-invasive device for electro-stimulation of the posterior tibial nerve in patients with urinary incontinence at the central military hospital - Bogota 2020*

Tito Alberto Nuncira Gacharna and John Ariza (Hospital Militar Central, Colombia); Yeison Javier Fonseca Rojas and Maria Eugenia Lambertinez Rivera (Universidad ECCI, Colombia); Mateo Tejada Hernandez (Universidad de los Andes, Colombia); Vanessa Hernandez Vasquez and Joffre Alejandro Guzman Laguna (Hospital Militar Central, Colombia); Monica Andrea Lopez Gonzalez (Fundación Domynet, Colombia); Hernando Hernandez Silva (Universidad ECCI, Colombia); Robinson Trujillo (Hospital Militar Central, Colombia)

14:00 *Expanding eVision's Scope of Influenza Forecasting*

Navid Shaghghi, Andres Calle and George Kouretas (Santa Clara University, USA)

14:20 *Stabilizing COVID-19 Infections in US by Feedback Control based Test and Quarantine*
Abhishek Dutta (University of Connecticut, USA)

Friday, October 30 14:20 - 15:00 (PT), 17:20 - 18:00 (ET), 21:20 - 22:00 (GMT)

F-CCN: Networking Sessions

Room: room 3

Chair: Michael Brisbois (IEEE & Self, USA)

Friday, October 30 14:40 - 15:20 (PT), 17:40 - 18:20 (ET), 21:40 - 22:20 (GMT)

F-ACEN: Networking Sessions

Room: room 2

Chair: Adil Usman (Indian Institute of Technology Mandi, India)

F-HN: Networking Sessions

Room 1

Chair: Miriam Cunningham (IIMC / IST-Africa, Ireland)

Friday, October 30 14:50 - 15:10 (PT), 17:50 - 18:10 (ET), 21:50 - 22:10 (GMT)

F-EPICS: EPICS in IEEE - empowering students solve local community problems

Room: plenary

Presentation on EPICS in IEEE and how to execute a community service project with IEEE's support (through EPICS in IEEE).

Presentations Schedule

Saturday, October 31

Saturday, October 31 08:00 - 10:00 (PT), 11:00 - 13:00 (ET), 15:00 - 17:00 (GMT)

SA-AG1: Agriculture 1: Irrigation and Water Management

Room: room 2

Chairs: Swagatam Bose Choudhury (Tata Consultancy Services Limited, India), Khanjan Mehta (Lehigh University, USA)

- 8:00 *Addressing Water Insecurity with a Greywater Hydroponics System in South Africa*
Alex Estrada, Carson Edgerton, Kathryn Fairchok, Michele Parker, Andrew Jezak and Claire Pavelka (Santa Clara University, USA); Hohyun Lee (Santa Clara University, USA); Laura Doyle and Andrew Feldmeth (Santa Clara University, USA)
- 8:20 *Algorithms to predict moisture content of grain using relative humidity time-series*
Charles B. Delahunt (Global Health Labs, USA); Wenbo Wang (Intellectual Ventures Lab, USA); Simon Ghionea (Global Good Research, USA); Andrew Miller (Intellectual Ventures Laboratory, USA); Austin Chan (University of Washington, USA); Anjali Sehrawat (Global Good Research, USA); Couros Meharian (Global Health Laboratories, USA); Michael Friend (Intellectual Ventures Laboratory, USA)
- 8:40 *A fuzzy irrigation control system*
Gilberto Souza (Centro Universitário da FEI, Brazil); Plinio Thomaz Aquino-Jr (Centro Universitario FEI, Brazil); Rodrigo Filev Maia (Deakin University, Australia); Carlos Kamienski (Universidade Federal do ABC, Brazil); Juha-Pekka Soininen (VTT Technical Research Centre, Finland)
- 9:00 *Irrigation Detection by Car: Computer Vision and Sensing for the Detection and Geolocation of Irrigated and Non-irrigated Farmland*
Weifan Jiang, Vivek Kumar, Nikhil Mehta, Jack M Bott and Vijay Modi (Columbia University, USA)
- 9:20 *Assessment of Solar Aided Agriculture in Rwanda*
Jiashu Yang (University of Colorado at Boulder, USA); Janelle Isenhardt and Kellen Kennedy (University of Colorado Boulder, USA); Rajan Kapur (Twyce Energy Ltd., USA); Shultz A Hartgrove IV and Alan Mickelson (University of Colorado at Boulder, USA)

SA-CC2: Connectivity and Communication 2: Behavioral Pattern Recognition

Room: room 3

Chair: Adil Usman (Indian Institute of Technology Mandi, India)

- 8:00 *Internet and Happiness in West Africa: The Next Billion Users are Not a Single Entity*
Wai Ching Ng and Charles Burke (National University of Singapore, Singapore)
- 8:20 *A study of spot recommendation personalization by considering personality traits*
Momo Ito (Ochanomizu University, Japan); Miki Enoki (IBM Research - Tokyo, Japan); Masato Oguchi (Ochanomizu University, Japan)

Presentations Schedule

8:40 *An approach to human iris recognition using quantitative analysis of image features and machine learning*

Abolfazl Zargari Khuzani (The Department of Electrical and Computer Engineering, University of California, Santa Cruz, USA.); Najmeh Mashhadi (The Department of Computer Science and Engineering, University of California, Santa Cruz, USA.); Morteza Heidari (School of Electrical & Computer Engineering, University of Oklahoma, Norman, USA.); Donya Khaledyan (Faculty of Electrical Engineering, Shahid Beheshti University, Tehran, Iran.)

9:00 *A Practical Method for Pupil segmentation in challenging conditions*

Donya Khaledyan and Mohammad Eshghi (Faculty of Electrical Engineering, Shahid Beheshti University, Tehran, Iran); Morteza Heidari (School of Electrical & Computer Engineering, University of Oklahoma, Norman, USA); Abolfazl Zargari Khuzani (The Department of Electrical and Computer Engineering, University of California, Santa Cruz, USA); Najmeh Mashhadi (The Department of Computer Science and Engineering, University of California, Santa Cruz, USA)

9:20 *The Buschfunk Project: Offline Communication for Everyone*

Lars Baumgärtner (Technische Universität Darmstadt, Germany); Patrick Lieser (Technical University of Darmstadt, Germany); Mira Mezini (University of Darmstadt, Germany)

SA-H4: Health Session 4: Medical Technology

Room 1

Chairs: Miriam Cunningham (IIMC / IST-Africa, Ireland), Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

8:00 *Design research for medical devices in low resource environments*

Emma J Rose (University of Washington Tacoma, USA); Beth Kolko (University of Washington, USA); Claire Storck (Shift Labs, USA); Gowrishanka Wuppuluru (Padmaseetha Technologies, USA)

8:20 *Development of a control system for a prosthetic hand assisted by electromyographic signals*

John Calle-Siguencia, Edison S. Tenesaca and Ronny N. Tituana (Universidad Politécnica Salesiana, Ecuador); Fernando Urgiles (Universidad Politecnica Salesiana, Ecuador)

8:40 *The OpenFlexure Project. The technical challenges of Co-Developing a microscope in the UK and Tanzania*

Julian Stirling (University of Bath, United Kingdom (Great Britain)); Valerian Sanga, Paul Nyakyi and Grace Mwakajinga (STICLab, Tanzania); Joel Collins, Kaspar Bumke, Joe Knapper and Qingxin Meng (University of Bath, United Kingdom (Great Britain)); Samuel McDermott (University of Cambridge, United Kingdom (Great Britain)); Richard Bowman (University of Bath, United Kingdom (Great Britain))

9:00 *Key Factors of Design: 3D Printed Occupational Therapy Products in Developing Communities*

Presentations Schedule

Lucy Spicher (Penn State University, USA); John Gershenson (The Pennsylvania State University, USA)

9:20 *Medical Device Spare Part Pricing Strategy Analysis for Developing Nations*

Rawan Abu-Zaineh (Penn State University, USA); John Gershenson (The Pennsylvania State University, USA)

9:40 *Development of smartband to monitor from home the vital signs for patients with sars cov 2 through a mobile application from the central military hospital (HOMIL) Bogota 2020*

Tito Alberto Nuncira Gacharna and Adriana Beltran Ostos (Hospital Militar Central, Colombia); Monica Andrea Lopez Gonzalez (Fundación Domynet, Colombia); Joaquin Jose Avila Pallares and Valentina Romero Zuluaga (Universidad ECCI, Colombia); Natalia Andrea Duran Castro (Universidad de los Andes, Colombia); Erick David Daleman Amaya, Yeison Javier Fonseca Rojas, Hernando Hernandez Silva and John Alvaro Rueda Forero (Universidad ECCI, Colombia); Joffre Alejandro Guzman Laguna (Hospital Militar Central, Colombia); Angel Jesus Estrada Anaya, Maria Eugenia Lambertinez Rivera and Holman David Vasquez Amado (Universidad ECCI, Colombia); Vanessa Hernandez Vasquez (Hospital Militar Central, Colombia)

Saturday, October 31 10:10 - 11:10 (PT), 13:10 - 14:10 (ET), 17:10 - 18:10 (GMT)

SA-PL1: PANEL: IEEE HAC COVID Response

Room: plenary

This panel will address how IEEE HAC & SIGHT responded to the COVID pandemic.

Chair: Karthik Kulkarni (IEEE, USA)

Panelists:

Kartik Kulkarni (HAC Chair),

Sampath Veeraraghavan (SIGHT Chair and 2021 HAC Chair),

John Funso (HAC Partnerships Chair, R8 Humanitarian Coordinator, and also a COVID project lead), and

Pia Torres (HAC Project Support and Oversight Ad Hoc Chair and HAC/SIGHT COVID CoP lead)

Topics:

How HAC/SIGHT responded to the COVID pandemic - vision and process improvements

Providing volunteer engagement opportunities despite the pandemic

Elements of a strong proposal

Support from Communities of Practice

Examples of some funded projects

Building collaboration opportunities, for example, with Societies

How this will lead to next year's program

Presentations Schedule

Saturday, October 31 11:10 - 12:00

SA-L: Lunch Break

Saturday, October 31 12:00 - 13:30 (PT), 15:00 - 16:30 (ET), 19:00 - 20:30 (GMT)

ANNV: GHTC 10th Anniversary Celebration

Room: plenary

Chairs: Michael Andrews (Andrews & Associates, USA), Paul Kostek (Individual, USA)

GHTC Evolution - Panel

IEEE GHTC has allowed members to showcase projects and be exposed to resources that were not commonly known within the IEEE family. GHTC created a community of volunteers who wanted to make a difference and become a facilitator for volunteers, university programs, NGO's, foundations, etc. to work together. The conference mission and goals have morphed over the years. The approaches to member and service related projects have changed. The addition of academic research presentations and university projects have all had an impact on the Conference.

Panelists

- * Paul Kostek
- * Keith Moore
- * Mike Andrews
- * Ed Perkins

IEEE's Role in Humanitarian Technology and Sustainable Development - Panel

Realizing IEEE's Vision for Aligning the "Advancing Technology for Humanity" from an Aspirational Statement to Promoting Member Engagement with Sustainable Development and Humanitarian Service Providers. Panelists will explore how IEEE operationalized the broader IEEE humanitarian interests into an event (or series of events). The approaches to member and service related projects have changed.

Panelists

- * Roberto de Marca, IEEE President & CEO, 2014
- * Russ Lefevre, IEEE-USA President, 2008
- * Lew Terman, IEEE President & CEO, 2008
- * John Vig, IEEE President & CEO, 2009

Presentations Schedule

Saturday, October 31 13:40 - 15:20 (PT), 16:40 - 17:20 (ET), 20:40 - 22:20 (GMT)

SA-AG2: Agriculture 2: Context Appropriate Technology

Room: room 2

Chairs: John Gershenson (The Pennsylvania State University, USA), Khanjan Mehta (Lehigh University, USA)

13:40 *Design and fabrication of a bicycle-powered maize sheller for rural Ghanaian farmers*
Oheneba Atta Aggrey and Heather Beem (Ashesi University College, Ghana)

14:00 *Mushroom Mycelium Regeneration in Tropical Environments*
Belle Sullivan, Marc Rubin, David Tauman, Asgar Ali and Khanjan Mehta (Lehigh University, USA)

14:20 *Effective Plantation Management with Crowd-sensing and Data-driven Insights: A Case Study on Tea*

Sanat Sarangi, Prachin Jain and Prakruti V. Bhatt (Tata Consultancy Services, India); Swagatam Bose Choudhury (Tata Consultancy Services Limited, India); Mitali Pal (Tata Consultancy Services, India); Sujal Kallamkuth (Tata Consultancy Services Limited, India); Srinivasu Pappula (Tata Consultancy Services, India); Kailyanjeet Borah (Amalgamated Plantations, India)

14:40 *Variable Surface Area Capacitive Sensors for Use in Beehives*

Sami Lama, Navid Shaghghi, Yuya Yabe, Tatiane Antonio, Jesse Mayer and Liyang Liang (Santa Clara University, USA)

15:00 *Investigating Cash Flow in the Agricultural Supply Chain Within Kenya*

Megan Ellery, Lakshmi Hirpara, Ebenezer Akande and Gregory Schweiker (Penn State University, USA); John Gershenson (The Pennsylvania State University, USA)

Saturday, October 31 13:40 - 15:00 (PT), 16:40 - 17:00 (ET), 20:40 - 22:00 (GMT)

SA-CC3: Connectivity and Communication 3: Image Enhancement Techniques

Room: room 3

Chairs: Michael Brisbois (IEEE & Self, USA), Adil Usman (Indian Institute of Technology Mandi, India)

13:40 *Low-Cost Implementation of Bilinear and Bicubic Image Interpolation for Real-Time Image Super-Resolution*

Donya Khaledyan, Abdolah Amirany, Kian Jafari and Mohammad Hossein Moaiyeri (Faculty of Electrical Engineering, Shahid Beheshti University, Tehran, Iran.); Abolfazl Zargari Khuzani (Department of Electrical and Computer Engineering, University of California, Santa Cruz, Santa Cruz, CA); Najmeh Mashhadi (Department of Computer Science and Engineering, University of California, Santa Cruz, USA)

14:00 *Image quality enhancement in wireless capsule endoscopy with Adaptive Fraction Gamma Transformation and Unsharp Masking filter*

Presentations Schedule

- Rezvan Ezatian, Donya Khaledyan and Kian Jafari (Faculty of Electrical Engineering, Shahid Beheshti University, Tehran, Iran); Morteza Heidari (School of Electrical & Computer Engineering, University of Oklahoma, Norman, USA); Abolfazl Zargari Khuzani (Department of Electrical and Computer Engineering, University of California, Santa Cruz, Santa Cruz, CA); Najmeh Mashhadi (Department of Computer Science and Engineering, University of California, Santa Cruz, Santa Cruz, CA)
- 14:20 *PIMOD: A Tool for Configuring Single-Board Computer Operating System Images*
Jonas Höchst (Philipps-Universität Marburg & Technische Universität Darmstadt, Germany); Alvar Penning (University of Marburg, Germany); Patrick Lampe (Philipps-Universität Marburg & Technische Universität Darmstadt, Germany); Bernd Freisleben (Philipps-Universität Marburg, Germany)
- 14:40 *LoRAgent: A DTN-based Location-aware Communication System using LoRa*
Lars Baumgärtner (Technische Universität Darmstadt, Germany); Patrick Lieser and Julian Zobel (Technical University of Darmstadt, Germany); Bastian Bloessl (TU Darmstadt, Germany); Ralf Steinmetz (Technische Universität Darmstadt, Germany); Mira Mezini (University of Darmstadt, Germany)

Saturday, October 31 13:40 - 15:20 (PT), 16:40 - 17:20 (ET), 20:40 - 22:20 (GMT)

SA-H5: Health Session 5: Assistive Solutions

Room 1

Chairs: Miriam Cunningham (IIMC / IST-Africa, Ireland), Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

- 13:40 *Developing a Deep Learning-enabled Guide for the Visually Impaired*
Allen Shelton and Tokunbo Ogunfunmi (Santa Clara University, USA)
- 14:00 *Camera-Based Indoor Navigation in Known Environments with ORB for People with Visual Impairment*
Fanghao Song, Zhongen Li, Brian Clark, Dustin Grooms and Chang Liu (Ohio University, USA)
- 14:20 *Designing a Single Speaker-based Ultra Low-Cost Otoacoustic Emission Hearing Screening Probe*
Nils Heitmann (Technische Universität München, Germany); Thomas Rosner (PATH Medical GmbH, Germany); Samarjit Chakraborty (University of North Carolina at Chapel Hill (UNC), USA)
- 14:40 *Use of response channels to augment and evaluate progress of speech and language therapy in children with hearing impairment*
Kavyashree Venkatesh, Sangeeth Jayan, Deval Karia and Rishank Nair (Indian Institute of Science, India); Littina Manalel and Ramesh A. (St. John's Medical College Hospital, India); Manish Arora (Indian Institute of Science, India)
- 15:00 *In-door Obstacle Detection and Avoidance System for Visually Impaired People*
Syed Sammak Hussain, Dua Durrani, Abdul Aziz, Resham Atta and Lubaid Ahmed (Usman Institute of Technology, Pakistan)

Presentations Schedule

Saturday, October 31 15:00 - 16:00 (PT), 18:00 - 19:00 (ET), 22:00 - 23:00 (GMT)

SA-CCN: Networking Sessions

Room: room 3

Chair: Adil Usman (Indian Institute of Technology Mandi, India)

Saturday, October 31 15:20 - 16:00 (PT), 18:20 - 19:00 (ET), 22:20 - 23:00 (GMT)

SA-AGN: Networking Sessions

Room: room 2

Chair: John Gershenson (The Pennsylvania State University, USA)

SA-HN: Networking Sessions

Room 1

Chair: Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

Saturday, October 31 15:30 - 16:30 (PT), 18:30 - 19:30 (ET), 22:30 - 23:30 (GMT)

SA-DV: Diversity and Inclusion in Engineering

Room: plenary

Chair: Thomas Coughlin (Coughlin Associates, USA)

This talk discusses the IEEE response to institutional racism and the issues with diversity and inclusion in the engineering professions. It also gives several examples of what IEEE members have done to help improve diversity and inclusions and ends with a discussion with the attendees on what they can do to improve diversity and inclusion in the technical professions.

Presentations Schedule

Sunday, November 1

Sunday, November 1 08:00 - 09:30 (PST), 11:00 - 12:30 (EST), 16:00 - 17:30 (GMT)

SU-AG3: Agriculture 3: Gender Equity and Nutrition

Room: room 2

Chair: Khanjan Mehta (Lehigh University, USA)

8:00 *Designing for Women: Radio-Based Seed Saving Education for Widowed Female Farmers in Indiaers In India*

Kearney T Newman (University of Colorado Boulder & ATLAS Institute, USA); Ricky Marton (ATLAS Institute, USA); Janice Higuera (University of Colorado Boulder, USA); Aarjav Chauhan (University of Colorado at Boulder, USA); Rona Sadan (University of Colorado Boulder, USA); Heather Underwood (ATLAS Institute, USA)

8:20 *The Dimensions of Food Insecurity in Sierra Leone: Cues for Technology Innovation*
Jennifer Volz and Phoebe Canagarajah (The Pennsylvania State University, USA);
Khanjan Mehta (Lehigh University, USA)

8:40 *An Evaluation of Micronutrient Losses in the Diets of Mothers and Children in Sierra Leone*

Dhruv Rao (The Pennsylvania State University & SGS Gulf Ltd, United Arab Emirates);
Taylor Lyle, Shannon McFalls, Connor Higgins and Hartini Margot (The Pennsylvania State University, USA); Eric Obeysekare (Pennsylvania State University, USA); Khanjan Mehta (Lehigh University, USA)

9:00 *Mainstreaming Gender Equity for Agriculture Ventures: A Case Study*

Atyia Collins (WROC TV, USA); Aya Bseiso (Student Partner, USA); William Whitney and Khanjan Mehta (Lehigh University, USA)

SU-DM1: Disaster Mitigation 1: Innovating Service Delivery in Crisis

Room: room 3

Chairs: Paul Gardner-Stephen (Flinders University, Australia), Srihari Yamanoor (Self, USA)

8:00 *Innovating Medical Devices in the Midst of a Crisis: Lessons from an Intravenous Electronic Drop Counter in the 2014-2016 Ebola Outbreak*

Beth Kolko (University of Washington, USA); Molly Blank and Chie Kawahara (Shift Labs, USA)

8:20 *Low Cost Design of Non-Contact Thermometry for Diagnosis and Monitoring*
Narasimha Sai Yamanoor, Srihari Yamanoor and Kriti Srivastava (Self, USA)

8:40 *A Methodology of Building Workflow for Search and Rescue Operation with UAV*

Go Urakawa (University of Hyogo, Japan); Shigeru Kashiara (Osaka Institute of Technology, Japan); Atsushi Yamamoto, Kenta Matsuzaki, Kosei Miyazaki, Masashi Wada and Tomoya Seki (Kochi City Fire Bureau, Japan); Chikara Ohta (Kobe University, Japan); Masahiro Fukumoto (Shikoku RC, National Institute of Information and Communication Technology, Japan)

Presentations Schedule

9:00 Remote Design of Spare Parts for Local Manufacturing in Rural Kenya
Magdalia Campobasso (Penn State University, USA); John Gershenson (The Pennsylvania State University, USA)

SU-UN1: Other UN SDGs 1: Decent Work and Economic Growth

Room 1

Chairs: Susan H Cheng (Lehigh University, USA), Laura E. Marsiglio (Lehigh University, USA)

8:00 The Entrepreneurship Intention Questionnaire Applied to Students in Perú
Alberto Un Jan and Gisella Figueroa (Universidad San Ignacio de Loyola, Peru)

8:20 Comparing the Properties of Polyethylene Terephthalate (PET) Plastic Bricks to Conventional Concrete Masonry Units
Laura E. Marsiglio, Susan H Cheng, Elizabeth Falk, Andrew Fugh, Kelly M Mulvaney, Brian C Slocum, Donald Morris, Ganesh Balasubramanian and Khanjan Mehta (Lehigh University, USA)

8:40 Client-Driven Project on Sustainability within First-Year Cornerstone Design
Sarah Ritter, Esther Obonyo, Andrew Lau and Sven Bilen (The Pennsylvania State University, USA)

9:00 Winning the Heart Model to Improve Life of Socially Deprived in Kano, Nigeria
Ravindra Joshi (IEEE Delhi Section & Tata Power Delhi Distribution Limited, India)

Sunday, November 1 09:40 - 11:00 (PST), 12:40 - 14:00 (EST), 17:40 - 19:00 (GMT)

SU-CC4: Connectivity and Communication 4: Technologies for Human Sciences

Room: room 2

Chairs: Michael Brisbois (IEEE & Self, USA), Javier Urquizo (Villanova University, USA)

9:40 Gamayun - language technology for humanitarian response
Alp Oktem (Translators Without Borders, Spain); Muhannad Albayk Jaam (University of Aleppo & Translators Without Borders, Syria); Eric DeLuca (Translators Without Borders, USA); Grace Tang (Translators without Borders, Canada)

10:00 Deep learning denoising for EOG artifacts removal from EEG signals
Najmeh Mashhadi (The Department of Computer Science and Engineering, University of California, Santa Cruz, USA); Abolfazl Zargari Khuzani (The Department of Electrical and Computer Engineering, University of California, Santa Cruz, USA); Morteza Heidari (School of Electrical & Computer Engineering, University of Oklahoma, Norman, USA); Donya Khaledyan (Faculty of Electrical Engineering, Shahid Beheshti University, Tehran, Iran)

10:20 Inclusion and Independence: The impact of Mobile Technology on the Lives of Persons with Disabilities in Kenya and Bangladesh
Nusrat Jahan (Global Disability Innovation Hub, United Kingdom (Great Britain));
Giulia Barbareschi (University College London Interaction Centre, United Kingdom)

Presentations Schedule

(Great Britain)); Clara B Aranda-Jan (GSMA, United Kingdom (Great Britain)); Charles Musungu Mutuku (Association for the Physically Disabled of Kenya, United Kingdom (Great Britain)); Naemur Rahman (PRITI Research & Consultancy Services, Bangladesh); Victoria Austin (Global Disability Innovation Hub, United Kingdom (Great Britain)); Catherine Holloway (University College London, United Kingdom (Great Britain))

SU-DM2: Disaster Mitigation 2: Communications and Remote Sensing

Room: room 3

Chairs: Paul Gardner-Stephen (Flinders University, Australia), Srihari Yamanoor (Self, USA)

9:40 *Flomosys: A Flood Monitoring System*

Tai Groot and Behnam Dezfouli (Santa Clara University, USA)

10:00 *Caching Strategies with Mobile Cloud Wireless Mesh: A Study in Disaster Risk and Resilience*

Neil Angelo M. Mercado and John Paul Mamaradlo (Ateneo de Manila University, Philippines); Jane Arleth L dela Cruz (Ateneo de Manila University & Ateneo Innovation Center, Philippines); Nathaniel Libatique and Paul Cabacungan (Ateneo de Manila University, Philippines); Gregory Tangonan (Ateneo Innovation Center, Philippines)

10:20 *LoRa-based Mesh Network for Off-grid Emergency Communications*

Khazmir Camille Valerie G. Macaraeg (University of the Philippines Diliman, Philippines); Calvin Artemies Hilario (Advanced Science and Technology Institute & University of the Philippines - Diliman, Philippines); Charleston Dale M. Ambatali (University of the Philippines, Philippines)

10:40 *Rubble-penetrating S-band Life Detector using a Software-Defined Radio*

Rodrigo Rafael Cruz and Charleston Dale M. Ambatali (University of the Philippines, Philippines)

SU-UN2: Other UN SDGs 2: Technology and Development

Room 1

Chairs: Susan H Cheng (Lehigh University, USA), Laura E. Marsiglio (Lehigh University, USA)

9:40 *The use of technology for the growth of the sustainability concept inside community*

Thiago Matheus Martins de Moraes, Henrique Amon de Lima Viveiros and Gabriela Maia Camargo (São Paulo State University (UNESP), Brazil); Felipe Fernandes Jacintho (State University of Campinas (Unicamp) & Albert Einstein Israelite Institute for Teaching and Research, Brazil); José Feliciano Adami (Univ Estadual Paulista (UNESP), Brazil); Rubens Alves Dias (UNESP/FEG, Brazil)

10:00 *Empowerment of Women Self Help Groups: Human Centered Design of a Participatory IoT solution*

Sreeraj S S, Unnikrishnan A, Vishnu K, Kennith Noah E and Sruthy Anand (Amrita Vishwa Vidyapeetham, India); Maneesha Vinodini Ramesh (Amrita Vishwa Vidyapeetham, Amrita University, India)

Presentations Schedule

10:20 Smart City Innovations to Improve Quality of Life in Urban Settings
Tommy Persaud, Ugochi Amadi, Allison Duane, Bishoy Youhana and Khanjan Mehta
(Lehigh University, USA)

10:40 What are the benefits of open data and data mining for indigenous communities in Colombia?
Sarah Osma Peralta (Universidad Externado de Colombia, Colombia)

Sunday, November 1 11:00 - 12:00 (PST), 14:00 - 15:00 (EST), 1900 - 20:00 (GMT)

SU-L: Lunch Break

Sunday, November 1 12:00 - 13:00 (PST), 15:00 - 16:00 (EST), 20:00 - 21:00 (GMT)

CLOS: Closing Session & Keynote

Room: plenary

Chair: Paul M Cunningham (IIMC / mHealth4Afrika / IST-Africa Institute, Ireland)

Closing Ceremony

Keynote: Melissa Sassi, IEEE Digital Intelligence Working Group

Sunday, November 1 13:10 - 14:30 (PST), 16:10 - 17:30 (EST), 21:10 - 22:30 (GMT)

SU-DM3: Disaster Mitigation 3: Data-Oriented Interventions

Room: room 3

Chairs: Paul Gardner-Stephen (Flinders University, Australia), Srihari Yamanoor (Self, USA)

13:10 Pin&Post - App-Based Reporting of Electrical Fire Hazards to Prevent Wildfires
Aditya Sharma (Cupertino High School, USA); Ishan Goyal (Lynbrook High School, USA); Silvia Figueira (Santa Clara University, USA)

13:30 Mapping Disasters & Tracking Recovery in Conflict Zones Using Nighttime Lights
Zeal Shah (University of Massachusetts Amherst, USA); Feng-Chi Hsu and Christopher D. Elvidge (Colorado School of Mines, USA); Jay Taneja (University of Massachusetts - Amherst, USA)

13:50 Machine Learning based Classification of Online News Data for Disaster Management
Lakshmi S Gopal, Rekha P and Divya Pullarkatt (Amrita Vishwa Vidyapeetham, India);
Maneesha Vinodini Ramesh (Amrita Vishwa Vidyapeetham, Amrita University, India)

14:10 A Privacy-Preserving and Overhead-Free Protocol for Direct Donations to People Impacted by COVID-19 Lockdowns
Chang Liu (Ohio University, USA); Lisa S Liu (Athens High School, USA)

Presentations Schedule

Sunday, November 1 13:10 - 14:30 (PST), 16:10 - 17:30 (EST), 21:10 - 22:30 (GMT)

SU-ED: Quality Education

Room: room 2

Chairs: Maria Guadalupe Lopez Molina (Universidad Iberoamericana Puebla, Mexico), Pritpal Singh (Villanova University, USA)

13:10 *Lessons Learned from Delivering Programing Courses Online for Retraining Serbian Workforce through UNDP Programs - A Joint Project between UCSDX and MISANU*

Svetislav Maric (UCSD, USA); Lazar Z Velimirovic, Jelena D. Velimirovic and Petar Vranic (Mathematical Institute of the Serbian Academy of Sciences and Arts, Serbia)

13:30 *Laying the Foundations for a Digital Literacy Program in the Galapagos Islands*

Javier Urquizo and Pritpal Singh (Villanova University, USA); David Lansdale (Beyond Chacay Foundation & USFQ, Ecuador); Nathaly Sanchez and Karen Bermudez (Escuela Superior Politécnica del Litoral, Ecuador); Tyler Easlick, Cameron Lawrence, Nolan Wacker, Kellimarie Cooper, Chang Hoon Choi, Marie Huhmann and Jack Sullivan (Villanova University, USA); Jimmy Cordova and Cesar Martin (Escuela Superior Politécnica del Litoral, Ecuador)

13:50 *STEM Outreach in Underrepresented Communities through the Lens of Play, Creativity, and Movement*

Ashley Boone, Jamie Vanderwall, Maya Klitsner and Irini Spyridakis (University of Washington, USA)

14:10 *Bridging the Academic Chasm Between Institutions: The Role of Professional Bodies Case Study - IEEE/HP Telecenter, University of Ibadan*

John FunsoAdebayo (Chair, IEEE Nigeria Section, Nigeria)

14:30 *Augmented Reality for Teaching Data Structures in Computer Science*

Husnu S Narman, Cameron Berry, Alex Canfield, Logan Carpenter, Jeremy Giese, Neil Loftus and Isabella Schrader (Marshall University, USA)

14:50 *Impact of high school curriculum on student performance at university*

Reshma Elizabeth Roy Kurian (United Arab Emirates); Yousef Al-Assaf (RIT Dubai University, United Arab Emirates)

15:10 *Promoting Sustainability through Virtual Reality: A Case Study of Climate Change Understanding with College Students*

Monica Posluszny (University of Washington, USA); Geon Soo Park (SK Holdings C&C, Korea (South)); Irini Spyridakis and Sarina Katznelson (University of Washington, USA); Sam OBrien (Attain LLC, USA)

Presentations Schedule

Sunday, November 1 13:10 - 14:50 (PST), 16:10 - 17:50 (EST), 21:10 - 22:50 (GMT)

SU-UN3: Other UN SDGs 3: Crisis Response

Room 1

Chair: Javier Urquizo (Villanova University, USA)

13:10 *Capacity Maintenance During Global Disruptions: Security, resilience and incentives matter*

Paul Gardner-Stephen (Flinders University, Australia); Kelsie Nabben (RMIT University, Australia)

13:30 *Identifying and Mitigating Humanitarian Challenges to COVID-19 Contact Tracing*

Kelsie Nabben (RMIT University, Australia); Paul Gardner-Stephen (Flinders University, Australia); Marta Poblet (RMIT University, Australia)

13:50 *Humanitarian Response Without Humans: How can we help, when we can't get there?*

Matthew Lloyd (New Zealand Red Cross, New Zealand); Hlekiwe Kachali (Hanken School of Economics, Finland); Paul Gardner-Stephen (Flinders University, Australia)

14:10 *S4: Simple, Secure, Survivable Systems Human-first crisis technology design principles*

Kelsie Nabben (RMIT University, Australia); Paul Gardner-Stephen (Flinders University, Australia)

14:30 *The Four Internets of COVID-19: the digital- political responses to COVID-19 and what this means for the post-crisis Internet*

Kelsie Nabben and Marta Poblet (RMIT University, Australia); Paul Gardner-Stephen (Flinders University, Australia)