# 2017 IEEE Global Humanitarian Technology Conference (GHTC 2017)

## San Jose, California, USA
## 19 – 22 October 2017

IEEE Catalog Number: CFP17GHT-POD
ISBN: 978-1-5090-6047-4

**Copyright © 2017 by the Institute of Electrical and Electronics Engineers, Inc.**
**All Rights Reserved**

*Copyright and Reprint Permissions*: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

| | |
|---|---|
| IEEE Catalog Number: | CFP17GHT-POD |
| ISBN (Print-On-Demand): | 978-1-5090-6047-4 |
| ISBN (Online): | 978-1-5090-6046-7 |
| ISSN: | 2377-6919 |

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings .com

# Table of Contents


**Welcome Message** ..... iv

**2017 IEEE Global Humanitarian Technology Conference Organizers** ..... v

**Sponsors** ..... vii

**Exhibitors** ..... viii

**Tutorials** ..... x

**Keynote Speakers** ..... xi

**Panels** ..... xiv

**Program At A Glance** ..... xvi

**Technical Sessions- Friday, October 20th** ..... xvii

**Technical Sessions- Saturday, October 21st** ..... xxviii

## Technical Sessions: Friday, October 20th

**10:00 – 11:30**
**A1: Maternal Health Issues**
**Room:** San Jose

**10:00**
**Video-based IoT Baby Monitor for SIDS Prevention.....1**
Xiaoting Liu, *Santa Clara University, USA*
Kyle Takeuchi, *Santa Clara University, USA*
Tokunbo Ogunfunmi, *Santa Clara University, USA*
Shivakaumar Mathapathi, *Santa Clara University, USA*

**10:15**
**Development of Smart Phone-based Child Health Screening Tools for Community Health Workers .....8**
Richard Fletcher, *MIT, USA*
Xavier Soriano Diaz, *MIT, USA*
Honey Bajaj, *MIT, USA*
Suparna Ghosh-Jerath, *PHFI, India*

**10:30**
**Tablet App for Child Cognitive Assessment in Low and Middle Income Countries .....17**
Patricia Francis-Lyon, *University of San Francisco, USA*
Amina Abubakar, *Wellcome Trust, Kenya*
Yasser Attiga, *University of San Francisco, USA*
Rashmi Manjunath, *University of San Francisco, USA*
Uma Ramasubramanian, *University of San Francisco, USA*
Vaishali Chaudhuri, *University of San Francisco, USA*
Tri Nguyen, *University of San Francisco, USA*
Xiangyi Xu, *University of San Francisco, USA*
Siyang Zeng, *University of San Francisco, USA*
Charles Newton, *KEMRI, Wellcome Trust, Kenya*

**10:45**
**Screening Donated Breast Milk in the Developing World: Market Evaluation and Needs Identification for Rapid and Sustainable Methods of Screening Donated Milk at Human Milk Banks .....22**
Karen Mac, *Santa Clara University, USA*
Nina Morrison, *Santa Clara University, USA*
Samantha O'Connor, *Santa Clara University, USA*
Taylor Tromburg, *Santa Clara University, USA*
Callie Weber, *Santa Clara University, USA*
Unyoung Kim, *Santa Clara University, USA*
Michele Parker, *Santa Clara University, USA*

**11:00**
**Exploring Female Infertility Using Predictive Analytic .....28**
Simi M S, *Adishankara Institute of Engineering and Technology, Eranakulam, India*
Sanakranayaki K, *Adishankara Institute of Engineering and Technology, Eranakulam, India*
Murali Parameswaran, *Adishankara Institute of Engineering and Technology, Eranakulam, India*
Sabine Sivadasan, *Sabine Hospital, India*

**10:00 – 11:30**
**A2: Micro-Grids**
**Room:** Santa Clara

**10:00**
**Optimizing Rural Village Micro Grids to Provide Affordable and Reliable Electricity in Developing Countries ..... 34**
Daniel Zimmerle, *Colorado State University, USA*
Dale Manning, *Colorado State University, USA*

**10:15**
**Socioeconomically Sustainable Rural Microgrid Engineering Design ..... 40**
William Harris, *Texas A&M University, USA*
Mehrdad Ehsani, *Texas A&M University, USA*

**10:30**
**Analyzing suboptimal rural microgrids and methods for improving the system capacity and demand factors – Flibab microgrid case study examined ..... 49**
Nirupama Prakash Kumar, *Smart Wires Inc., USA*
Mahekdeep Singh, *Seattle University, USA*
Peter Dauenhauer, *University of Strathclyde, United Kingdom, Great Britain*
Likonge Makai, *LICHI Community Solutions, USA*
Henrietta Cho, *Meds & Food for Kids, Haiti*
Joseph Mutale, *University of Manchester, United Kingdom, Great Britain*

**10:45**
**Optimization of Advanced Energy Storage for Solar-Diesel Hybrid Microgrids ..... 57**
Douglas Danley, *NRECA, USA*

**11:00**
**Optimization of Photovoltaic Penetration for a Hybrid Diesel and Photovoltaic Micro-Grid Via Means on a Cloud Forcasing system ..... 63**
Stacey Dufrane, *Colorado State University, USA*
Daniel Zimmerle, *Colorado State University, USA*
Gerald P Duggan, *Colorado State University, USA*

**10:00 – 11:30**
**A3: Agriculture**
**Room:** Carmel

**10:00**
**High Yield Groundnut Agronomy: An IoT Based Precision Farming Framework ..... 70**
Rekha P, *Amrita Vishwa Vidyapeetham, India*
Maneesha Ramesh, *Amrita University, India*
Venkat Rangan, *Amrita University, India*
Nibi K V, Amrita *Vishwavidyapeetham, India*

**10:15**
**Precision agriculture using remote monitoring systems in Brazil ..... 75**
Rodrigo Filev Maia, *Centro Universitario da FEI, Brazil*
Anh L.H. Tran, *Coventry University, United Kingdom, Great Britain*
Ibrahim Netto, *Centro Universitário FEI, Brazil*

**10:30**
**Comparison of CNN Models for Applications in Crop Health Assessment with Participatory Sensing** ..... **81**
Prakruti Bhatt, *Tata Consultancy Services, India*
Sanat Sarangi, *Tata Consultancy Services, India*
Srinivasu Pappula, *Tata Consultancy Services, India.*

**10:45**
**UAV Imaging with Low-cost Multrispectral Imaging System for Precision Agriculture Applications** ..... **88**
Jaime Luis E Honrado, *Ateneo de Manila University & Skyeye, Inc., Philippines*
Dominic B. Solpico, *Ateneo de Manila University & Skyeye, Inc., Philippines*
Chrisandro Favila, *Ateneo Innovation Center, Philippines*
Edgardo E Tongson, *World Wide Fund for Nature - Philippines, Philippines*
Gregory L Tangonan, *Ateneo de Manila University, Philipines*
Nathaniel Libatique, *Ateneo de Manila University, Philippines*

**11:00**
**Modelling a Smart Agriculture System for Multiple Cropping using Wireless Sensor Networks** ..... **95**
Durga P, *Amrita Center for Wireless Networks and Applications, India*
Gayathri Narayanan, *Amrita Vishwa Vidyapeetham-AMRITA University, India*
Gayathri B, *Amrita Vishwa Vidyapeetham, India*
Maneesha Ramesh, *Amrita University, India*
Divya Pullarkatt, *Amrita Vishwa Vidyapeetham, India*

---

**10:00 – 11:30**
**A4: Water**
**Room:** Monterey

---

**10:00**
**Effective and Affordable Water Purification: An Instrument for Chronic Kidney Disease Patients in Amuradhapure, Sri Lanka** ..... **102**
Dinesh Cozian, *IEEE Member*, *USA*
Pubudu Kumarage, *Self Employed, USA*
Pavan Bilgi, Caltech *Univeristy, USA*
Tigran Danielyan, *Self Employed, USA*

**10:15**
**Water Quality Monitoring and Waste Management using IoT** ..... **108**
Maneesha Vinodini Ramesh, *Amrita Vishwa Vidyapeetham, Amrita University, India*
Renjith Mohan, *Amrita Vishwa Vidyapeetham, India*
Anupama Kurup, *Amrita Vidyalayam, India*
Nibi K V, *Amrita Vishwavidyapeetham, India*
Aiswarya A, Arsha A, *AmritaVidyalayam, India*
Sarang P R, *AmritaVidyalayam, India*

**10:30**
**Demonstration of a Wave-Powered Desalination System in Cape Verde** ..... **N/A**
Bill Staby, *Resolute Marine Energy, USA*

**10:45**
**A Low-Cost Wireless Sensor Network for Water Quality Monitoring in Natural Water Bodies ..... 125**
Gayathri Menon, *Amrita University, Amritapuri, India*
Maneesha Ramesh, *Amrita University, India*
Divya Pullarkatt, *Amrita Vishwa Vidyapeetham, India*

**11:00**
**Off-Grid Solar Powered Water Purification and Community Development in Haiti's Artibonite Valley, the Heart of Haiti's Cholera Epidemic ..... 133**
Geoffrey Kain, *Embry-Riddle Aeronautical University, USA*
Rachel Hunt, *Embry-Riddle Aeronautical University, USA*
Joseph Noto, *Embry-Riddle Aeronautical University, USA*
Jonathan Prine, *Embry-Riddle Aeronautical University, USA*
Calli Brown, *Embry-Riddle Aeronautical University, USA*
Marc Compere, *Embry-Riddle Aeronautical University, USA*

**13:30 – 15:00**
**B1: Physicals and Neurological Health Issues**
**Room:** San Jose

**13:30**
**Design of a celluar-enabled data-logging system for wheelchair use characterization ..... 144**
Amit Gandhi, *Massachusetts Institute of Technology, USA*
Prithiviraj Sundararaman, *Massachusetts Institute of Technology, USA*
Matt McCambridge, *Massachusetts Institute of Technology, USA*
Julia Heyman, *Massachusetts Institute of Technology, USA*
Daniel Frey, *Massachusetts Institute of Technology, USA*

**13:45**
**Psuedo Fatigue Test of Passive Energy-Returning Prosthetic Foot ..... 148**
Gabriel I Lopez-Avina, *Tecnologico de Monterrey & Biomechatronics Laboratory, Mexico*
Eduardo Barocio, *Purdue University & School of Materials Engineering, Mexico*
Joel Huegel, *Tecnologico de Monterrey & Biomechatronics Lab, Mexico*

**14:00**
**Design, Development and Implementation of a Biomechnical Right-Hand Prosthesis: Second Stage ..... 155**
Luis Fernando Cajamarca, *Universidad Politecnica Salesiana, Ecuador*
Jorge Matute, *Universidad Politecnica Salesiana, Ecuador*
John Calle, *Universidad Politecnica Salesiana, Ecuador*
Fernando Yunga, *Universidad Politecnica Salesiana, Ecuador*
Jose Vargas, *Universidad Politécnica Salesiana, Ecuador*
Fernando Urgiles, *Universidad Politecnica Salesiana, Ecuador*

**14:15**
**Giving blind a smart eye: Designing and modeling of intelligent white came for blind people ..... 161**
Muhammad Hanan, *Mehran University of Engineering & Technology, Jamshoro, Pakistan*
Anwar Ali Sahito, *Mehran University of Engineering & Technology Jamshoro Pakistan, Pakistan*
Amir Mahmood Soomro, *Mehran University of Engineering & Technology, Jamshoro, Pakistan*
Faheem Shafeeque Channar, *Mehran University of Engineering & Technology, Pakistan*

**13:30 – 15:00**
**B2: Solar Energy**
**Room: Santa Clara**

**13:30**
**Using Power Management Control to Maximize Energy Utilization and Reliability within a Microgrid of Internconnected Solar Home Systems ..... 167**
Bartosz Soltowski, *University of Strathclyde, United Kingdom, Great Britain*
Michael Dolan, *Smarter Grid Solutions, Glasgjow, United Kingdom*

**13:45**
**Business Operations for a Solar Energy Kiosk in Chalokwa, Zambia ..... 172**
Matt Shields, *Seattle University, USA*
Lisa Zhao, *Seattle University, USA*
Matt Salmon, *KiloWatts for Humanity, USA*
Lucy Pieterse, *Green Trust, Zambia*

**14:00**
**Development of a Small- Scale Solar Thermochemical Energy Storage System ..... 178**
Griffin Drake, *Oregon State University, USA*
Kyle Harris, *Oregon State University, USA*
Monica Heng, *Oregon State University, USA*
Ben A. Appleby, *Oregon State University, USA*
Lucas Freiberg, *Oregon State University, USA*
Philip Harding, *Oregon State University, USA*
Nick AuYeung, *Oregon State University, USA*

**14:15**
**Energy harvesting controls for solar direct- drive medical cold chain equipment ..... 186**
Daniel Myers, *PATH, USA*
Steven P Diesburg, *PATH, USA*
Steve McCarney, *Solar Electric Light Fund, USA*
Pat Lennon, *PATH, USA*

**14:30**
**Solar Powered Observatory for Educational Activities ..... 195**
Sarah Awara, *University of Calgary, Canada*
Abdul Rafae, *University of Calgary, Canada*
David Christopher Garrett, *University of Calgary, Canada*
Anis Ben Arfi, *University of Calgary, Canada*

**13:30 – 15:00**
**B3: Agriculture and Food Security**
**Room: Carmel**

**13:30**
**Design of a Passive Irrigation Controlled for Efficient Water Usage in Low Income Countries ..... 199**
Anna Jiang, *University of Toronto, Canada*
Amy Bilton, *University of Toronto, Canada*

**13:45**
**Ethics Code for Genetically Modified Ornamental and Landscape Plants ..... 207**
Hussein Abaza, *Kennesaw State Univerisy, USA*

**14:00**
**An Internet of Things (IoT)- based Aquaponics Facility.....210**
Shiny Abraham, *Seattle University, USA*
Phillip Thompson, *Seattle University, USA*
Armand Shahbazian, *Seattle University, USA*
Kevin Dao, *Seattle University, USA*
Han Tran, *Seattle University, USA*

**14:10**
**Lessons learnt from post analysis study of Solar Tunnel Dyers in date palm cluster of District Khaipur, Sindh in Pakistan: A recommended structure on Capacity building model For date plam producers to preserve food security ..... Not Available at Time of Production**
Khalil Ahmed, *Mehran University of Engineering & Technology Jamshoro, Sindh, Pakistan*
Asif Ali Shah, *Mehran University of Engineering & Technology Jamshoro, Sindh, Pakistan*
Sarang Shaikh, *Mehran University of Engineering & Technology Jamshoro, Sindh, Pakistan*

**14:20**
**ShareSpare: Bulding Leftover Network with Self-Moderation and Incentives ..... Not Available at Time of Production**
Rakshit Agrawal, *University of California, Santa Cruz, USA*

**14:30**
**Development and Evaluation of Drone Mounter Sprayer for Pesticide Applications to Crops .....744**
Yallappa D., *College of Agricultural Engineering, University of Agricultural Science*
M. Veerangouda, *College of Agricultural Engineering, University of Agricultural Science*
Devanand Maski, *College of Agricultural Engineering, University of Agricultural Science*
Vijayakumar Palled, *College of Agricultural Engineering, University of Agricultural Science*
M. Bheemanna, *College of Agricultural Engineering, University of Agricultural Science*

---

**13:30 – 15:00**
**B4: Water and Sanitation**
**Room:** Monterey

---

**13:30**
**Aquasift: A Low-Cost, Hand-Held Potentiostat for Point-Of-Use Electrochemical Detection of Contaminants in Drinking Water .....211**
Philip Wu, *Santa Clara University, USA*
Gabriela Vazquez, *Santa Clara University, USA*
Nicholas Mikstas, *Santa Clara University, USA*
Shoba Krishnan, *Santa Clara University, USA*
Unyoung Kim, *Santa Clara University, USA*

**13:45**
**An Internet of Things (IoT) based Sustainable Water Management.....215**
Sreekanth Narendran, *Amrita School of Engineering & Amrita Vishwa Vidyapeetham, India*
Preeja Pradeep, *Amrita School of Engineering, Amritapuri, Amrita Vishwa Vidyapeetham, India*
Maneesha Vinodini Ramesh, *Amrita Vishwa Vidyapeetham, Amrita University, India*

**14:00**
**An Approach for Crack Detecting in Sewer Pipes Using Acoustic Signals .....221**
Muhammad Safeer Khan, *Arkansas Tech University, USA*

**14:15**
**Stabilized Hypochlorous Acid Disinfection for High Vulnerable Populations ..... 227**
Eric Rasmussen, Briotech, *Incorporated & Infinitum Humanitarian Systems, USA*
Jeffrey F Williams, *Briotech Inc & OxiScience LLC, USA*

**14:30**
**Transforming Urban Waste into Construction blocks for a Sanitation Infrastructure: A Step towards addressing Rural Open Defecation ..... 235**
Harish Mohan, Ammachi Labs, *Amrita Vishwa Vidyapeetham, Amritapuri, India*
Lauriane Masson, *Ecole Polytechnique Féderale De Lausanne (EPFL), India*
Sreevalsa Kolathayar, *Amrita University, Amrita Vishwa Vidyapeetham, India*
Renjith Mohan, *Amrita Vishwa Vidyapeetham, India*
Anil Kumar Sharma, *Amrita Vishwa Vidyapeetham, India*
Aswathy K, Thiviya Kamalasekar, *Amrita VishwaVidyapeetham, India*
Kalathuru M, *Amrita VishwaVidyapeetham, India*

**13:30 – 15:00**
**B5: Humanitarian Challenges and Opportunities**
**Room:** San Carlos

**13:30**
**From crisis management to humanitarian technology – a European Prospective ..... 244**
Stefan Voigt, *German Aerospace Centre (DLR), Germany*
Konstanze Lechner, *German Aerospace Center (DLR), Germany*
Elisabeth Schoepfer, *German Aerospace Center (DLR), Germany*
Günter Strunz, *German Aerospace Center (DLR), Germany*

**13:45**
**Sustainable development through the use of solar energy for productive processes: the Ayllu Solar Project ..... 249**
Paulina Ramírez Del Barrio, *University of Chile, Chile*
Patricio Mendoza-Araya, *University of Chile, Chile*
Felipe Valencia Arroyave, *Solar Energy Research Center, SERC-Chile & University of Chile, Chile*
Gonzalo León, *University of Chile, Chile*
Lorena Cornejo Ponce, *University of Tarapacá, Chile*
Marcia Montedónico, *University of Chile, Chile*
Guillermo Jiménez Estévez, *University of Chile, Chile*

**14:00**
**Biochar production and characterization – a field study ..... 257**
Mathu Indren, *The University of Adelaide, Australia*
Nishanth Cheruvu, *The University of Adelaide, Australia*
Cris Birzer, *The University of Adelaide, Australia*
Paul Medwell, *The University of Adelaide, Australia*

**14:15**
**3D Printing Braille Maps for Texas A&M University ..... 262**
Jim Wilson, *Texas A&M University-EIC & Texas A&M University-EIC, USA*
Tyler Wooten, *Texas A&M University, USA*

**14:30**

**SCAN – Automatizing Libraries in African Villages ..... 266**

Matthew Johnson, *Santa Clara University, USA*
Jose Santillan, *Santa Clara University, USA*
Michael Walsh, *Santa Clara University, USA*
Silvia Figueira, *Santa Clara University, USA*

---

**16:00 – 17:30**
**C1: mhealth**
**Room:** San Jose

---

**16:00**

**mHealth4Afrika Alpha Validation in Rural and Deep Rural in Ethiopia, Kenya, Malawi and South Africa ..... 268**

Miriam Cunningham, *IIMC / mHealth4Afrika / IST-Africa, Ireland*
Paul M Cunningham, *IIMC / mHealth4Afrika / IST-Africa, Ireland*
Darelle van Greunen, *Nelson Mandela University, South Africa*
Alida Veldsman, *Nelson Mandela University, South Africa*
Chipo Kanjo, *Chancellor College, University of Malawi*
Emmanuel Kweyu, *@iLabAfrica, Strathmore University, Kenya*
Binyam Tilahun, *University of Gondar, Ethiopia*

**16:15**

**A design of a mobile health (mHealth) intervention for the preventation and treatment of Cholera in South Kivu in the Democratic Republic of Congo ..... 277**

Itulelo Imaja, *University of KwaZulu-Natal, South Africa*
Patrick Ndayizigamiye, *University of KwaZulu-Natal, South Africa*
Manoj Maharaj, *University of KwaZulu-Natal, South Africa*

**16:30**

**A design of a mobile health (mHealth) intervention to enhance home careers' disposal of medical waste in South Africa ..... 282**

Patrick Ndayizigamiye, *University of KwaZulu-Natal, South Africa*
Lydia Hangulu, *University of KwaZulu-Natal, South Africa*
Olagoke Akintola, *University of KwaZulu-Natal, South Africa*

**16:45**

**QoS based Telemedicine Technologies for Rural Healthcare Emergencies ..... 288**

Adwitiya Mukhopadhyay, *Amrita Vishwa Vidyapeetham, Amrita University, India*
Maneesha Vinodini Ramesh, *Amrita Vishwa Vidyapeetham, Amrita University, India*

**17:00**

**Whole Person Integrated Care (WPIC): A Healthcare Trasnformation Strategy Supported by A Novel Spreadsheet Based Software Framework ..... 295**

Stephen E. Beller, *National Health Data Systems, USA*
Sabatini Monatesti, *ES Enterprises, Inc, USA*
Peter Bachman, *Cequs, Inc., USA*

**16:00 – 16:45**
**C2a: Panel: Social and Economic Development of Rural Women in Rwanda and Uganda through Solar Eenergy for Productive Use**
**Room:** Santa Clara

**16:00**
**Social and Economic Development of Rural Women in Rwanda and Uganda through Solar Energy for Productive Use ..... 305**
Monica Brown, *Africa Development Promise & Posner Center for International Development, USA*
Sherina Munyana, *Africa Development Promise - Uganda, Uganda*

**16:45 – 17:00**
**C2b: Panel: IEEE WIE and Humaniatrian Technologies**
**Room:** Santa Clara

**16:45**
**IEEE WIE and Humanitarian Technologies ..... Not Available at Time of Production**
Monica Brown, *Africa Development Promise & Posner Center for International Development, USA*
Sherina Munyana, *Africa Development Promise - Uganda, Uganda*

**16:00 – 17:30**
**C3: Agriculture**
**Room:** Carmel

**16:00**
**Contributions of Post-harvesting Technologies in alleviating poverty: A case study of date palm cluster in Kahirpur District, Sindh, Pakistan ..... 311**
Khalil Ahmed, *Mehran University of Engineering & Technology Jamshoro, Sindh, Pakistan*
Sarang Shaikh, *Mehran University of Engineering & Technology Jamshoro, Sindh, Pakistan*
Asif Ali Shah, *Mehran University of Engineering & Technology Jamshoro, Sindh, Pakistan*

**16:15**
**Muchroom Cultivation in the Developing World: A Comparison of Cultivation Technologies ..... 320**
Connor Higgins, *The Pennsylvania State University, USA*
Hartini Margot, *The Pennsylvania State University, USA*
Sara Warnquist, *The Pennsylvania State University, USA*
Eric Obeysekare, *Pennsylvania State University, USA*
Khanjan Mehta, *Lehigh University, USA*

**16:30**
**Small Scare Muchroom Production Systems in Rural Cambodia ..... Not Available at Time of Production**
Bryant Lindsay, *Lehigh University, USA*
Lauren Fosbenner, *Lehigh University, USA*
Samuel Evers, *Lehigh University, USA*
Timothy Predmore, *Lehigh University, USA*
Sanjana Shree Chintalapudi, *Lehigh University, USA*
Khanjan Mehta, *Lehigh University, USA*

**16:00 – 17:30**
**C4: The IEEE MOVE Disaster Relief Project "in a box" Workshop**
**Room:** Monterey

**16:00**

**The IEEE Modular MOVE Disaster Relief Project .....327**
James M. Conrad, *University of North Carolina at Charlotte, USA*
A'lishia Bowman, *University of North Carolina at Charlotte, USA*
Henrique Weh, *Central Piedmont Community College, USA*
Tomas Ortiz, *Central Piedmont Community College, USA*
Mary Ellen Randall, *Ascot Technologies, USA*
Grayson W. Randall, *Ascot Technologies, USA*
Gregg Vaughn, *University of Alabama Birmingham, USA*

**16:45**

**The IEEE MOVE Disaster Relief Vehicle: Lessons Learned from One Year of Operation .....333**
James M. Conrad, *University of North Carolina at Charlotte, USA*
Mary Ellen Randall, *Ascot Technologies, USA*
Grayson W. Randall, *Ascot Technologies, USA*
Gregg Vaughn, *University of Alabama Birmingham, USA*
Percy F. Shadwell, Jr., *Shadwell Technical Services, USA*

---

**16:00 – 17:30**
**C5: Humanitarian Challenges and Opportunities**
**Room:** San Carlos

---

**16:00**

**Education in an Extreme Environment: A Univerrsity in a Refuge Camp .....341**
Suzana Brown, *SUNY Korea, State University of New York & Stony Brook University, NY, Korea*
Martin Saint, *Carnegie Mellon University & University of Colorado Boulder, USA*
Chrystina Russell, *Southern New Hampshire University, USA*

**16:15**

**Development of a Block Level Geovisualization Tool of Zaatari Refuge Camp Community Asset Data .....351**
Daniel Mooney, *Rochester Institute of Technology, USA*
Brian Tomaszewski, *Rochester Institute of Technology, USA*
Bryan French, *Rochester Institute of Technology, USA*

**16:30**

**Spatial Data in the Global South: A case study of alternative land management tools for cities with limited resources.....359**
Leticia Palazzi Perez, *UFABC & FCTH USP, Brazil*
Raphael Bischof Santos, *UFABC, Brazil*
Guilherme Carpintero Carvalho, *UFABC, Brazil*
Guadalupe Almeida, *UFABC, Brazil*

**16:45**

**Dynamic Traffic Light System for Unhindered Passing of High Priority Vehicles .....369**
Athul Krishna A, *KeralaTechnological University & College of Engineering Trivandrum, India*
Bharath Kartha *KeralaTechnological University, India*
Vishnu S Nair, *KeralaTechnological University, India*

**17:00**
**FREIDA (Framework of Resources for modeling Energy/Environmental/Ecnomic Impacts Of Development and Advancements) in Ports .....374**
Rubenka Bandyopadhyay, *Oak Ridge Associated Universities & ORISE Participant, USA*
Ozge Kaplan, *US Environmental Protection Agency, USA*
Rochelle Araujo, *US Environmental Protection Agency, USA*
Rebecca Dodder, *US Environmental Protection Agency, USA*
Elizabeth Smith, *US Environmental Protection Agency, USA*

## Technical Sessions: Saturday, October 21st

**10:00 - 11:30**
**D1: Diagnosis and Screening**
**Room:** San Jose

**10:00**
**Vital Sensor Kit for Use with Telemedicine in Developing Countries ..... 383**
Alejandra Pacheco, *Santa Clara University, USA*
Antonio Maldonado-Liu, *Santa Clara University, USA*
Jose Hernandez, *Santa Clara University, USA*
Natalie Arrizon, *Santa Clara University, USA*
Tokunbo Ogunfunmi, *Santa Clara University, USA*
Unyoung Kim, *Santa Clara University, USA*

**10:15**
**Stetho-phone: Low-cost Digital Stethoscope for Remote Personalized Healthcare ..... 388**
Shaikh Anowarul Fattah, *BUET, Bangladesh*
Sayeed Shafayet Chowdhury, *Bangladesh University of Engineering and Technology, Bangladesh*
Celia Shahnaz, *BUET, Bangladesh*
Rakibul Islam Chowdhury, *BUET, Bangladesh*
Ahmed Maksud, *Bangladesh University of Engineering and Technology, Bangladesh*
Md Shariful Islam, *BUET, Bangladesh*
Nael Mizanur Rahman, *Bangladesh University of Engineering and Technology, Bangladesh*

**10:30**
**Use of Cough Sounds for Diagnosis and Screening of Pulmonary DIsease ..... 395**
Christian Infante, *MIT, USA*
Daniel Chamberlain, *Massachusetts Institute of Technology, USA*
Yogesh Thorat, *Chest Research Foundatiob, India*
Rahul Kodgule, *Chest Research Foundatiob, India*
Richard Fletcher, *MIT, USA*

**10:45**
**Wrist-Card: PPG Senso Based Wrist Wearable Unit for Low Cost Personalized Cardio Healthcare Systems ..... 405**
Shaikh Anowarul Fattah, *BUET, Bangladesh*
Mohammad Rahman, *Bangladesh University of Engineering and Technology, Bangladesh*
Nafis Mustakin, *Bangladesh University of Engineering and Technology, Bangladesh*
Mohammad Tariqul Islam, *Bangladesh University of Engineering and Technology, Bangladesh*
Asir Intisar Khan, *Bangladesh University of Engineering and Technology, Bangladesh*
Celia Shahnaz, *BUET, Bangladesh*

**11:00**
**Urinary Tract Infections (UTIs) in Rural Kenya: Screening Challenges, Treatment Pathways And Technological Solutions ..... 412**
Grace Warkulwiz, *Penn State University, USA*
Kaylyn Hannon, *Penn State University, USA*
Dom Cabano, *Penn State University, USA*
Khanjan Mehta, Lehigh University, USA

**10:00 – 11:30**
**D2: Energy Management**
**Room:** Santa Clara

**10:00**
**Rural Indian Microgrid Design Optimization- Intelligent Battery Sizing .....418**
Gandhi Rajan Ramachandran, *Solarillion Foundation, India*
Meghana Kavakuntala, *SRM University, India*
Vetrivel Subramaniam Rajkumar, *Anna University, India*
Sivaroophini Gnanavel, *Anna University, India*
Vineeth Vijayaraghavan, *Solarillion Foundation, India*

**10:15**
**The Design, Installation and Testing of a Prototype Photovoltaic For Remote Villages along The Amazon River in Nauta, Peru .....423**
Michael Boller, *George Fox University, USA*
Chad Stillinger, *George Fox University, USA*
Joel McGee, *JungleMaster Ministries, USA*
Ben Giudice, *George Fox University, USA*

**10:30**
**Asessing Village Power Grid Problems for Development of Quality and Stable Supplemental Sutainable Energy .....430**
Vivek Mohan, *Amrita Vishwa Vidyapeetham, Amrita University, India*
Vidal Conejo-García, *Polytechnic University of Catalonia, Spain*
Renjith Mohan, *Amrita Vishwa Vidyapeetham, India*
Malini LM Frey, *Amrita University, India*
Manoj Pokkiyarath, *Amrita Vishwa Vidyapeetham & Amrita University, India*
Sai Shibu N B, *Amrita Vishwa Vidyapeetham, India*
Maneesha Vinodini Ramesh, *Amrita Vishwa Vidyapeetham, Amrita University, India*
Aryadevi Remanidevi Devidas, A*mrita Vishwa Vidyapeetham & Amrita University, India*

**10:45**
**Technical Standards for PV/Storage/Generator Microgrids .....440**
Douglas Danley, *NRECA, USA*

**11:00**
**Green Energy Distribution in Haiti .....445**
Rick Wallace Kenyon, *University of Colorado at Boulder, USA*
Alan Mickelson, *University of Colorado at Boulder, USA*

**10:00 – 11:30**
**D3: Communication Networks**
**Room:** Carmel

**10:00**
**University of Colorado at Boulder WiLDNet Testbed .....454**
Rick Wallace Kenyon, *University of Colorado at Boulder, USA*
Alan Mickelson, *University of Colorado at Boulder, USA*
Nicholas Bollen, *University of Colorado at Boulder, USA*
Chris Dizon, *University of Colorado at Boulder, USA*
Bennett Miller, *University of Colorado at Boulder, USA*
Heinz Boehmer Fiehn, *University of Colorado at Boulder, USA*
Mark Hinkle, *University of Colorado at Boulder, USA*
Kaitlin Y Mazotti, *University of Colorado at Boulder, USA*
Stefano Costa, *University of Colorado at Boulder, USA*

**10:15**

**Communication Networking in the Highlands of Papua New Guinea.....463**
Alan Mickelson, *University of Colorado at Boulder, USA*
Rick Wallace Kenyon, *University of Colorado at Boulder, USA*
Alexander Anderson, *Odin Energy Works LLC, USA*
Daniel Wessner, *Regis University, USA*
Bennett Miller, *University of Colorado at Boulder, USA*

**10:30**

**Self-Configuring Heterogeneous HF/UHF/Wi-Fi Disaster Communication Networks .....473**
Kimberley Hawtin, *Flinders University, Australia*
Paul Gardner-Stephen, *Flinders University, Australia*

**10:45**

**Eliminating the high stand-by energy consumption of ad-hoc Wi-Fi .....483**
Watcharachai Kongsiriwattana, *Flinders University, Australia*
Paul Gardner-Stephen, *Flinders University, Australia*

**11:00**

**Scalable Telecommunications over Ultra-Low- Bandwidth Radio Backbones.....490**
Ghassan Al-Nuaimi, *Serval Project Inc., Australia*
Romana Challans, *Serval Project Inc., Australia*
Matthew Lloyd, *Serval Project Inc., Australia*
Jeremy Lakeman, *Flinders University of South Australia, Australia*
Paul Gardner-Stephen, *Flinders University, Australia*
Anugs Wallace, *Flinders University, Australia*

---

**10:00 – 11:30**
**D4: Disaster Management**
**Room:** Monterey

---

**10:00**

**Demonstration of Post-Disaster Resilient Communications and Decision-Support Platform with UAV's, Ground Teams and Vehicles using Delay-Tolerant Information Networks on Sub-GHz Frequencies.....498**
Gemalyn Abrajano, *Ateneo de Manila University & Ateneo Innovation Center, Philippines*
Chrisandro Favila, *Ateneo Innovation Center, Philippines*
Chiang-Yi Luo, *Toyota Infotech Center, Japan*
Edgar Marko Trono, *Nara Institute of Science and Technology, Japan*
Daniel Lagazo, *Ateneo, Philippines*
Benjz Sevilla, *DICT, Philippines*
Jaime Luis E Honrado, *Ateneo de Manila University & Skyeye, Inc., Philippines*
Dominic B. Solpico, *Ateneo de Manila University & Skyeye, Inc., Philippines*
Joshua Yu, *Ateneo de Manila University, Philippines*
Kyle Chua, *Ateneo de Manila University, Philippines*
John Paul Mamaradlo, *Ateneo de Manila University, Philippines*
Carlex Jose II, *Ateneo de Manila University, Philippines*
Jherrielloyd Yao, *Ateneo de Manila University, Philippines*
Jane Arleth L dela Cruz, *Ateneo de Manila University & Ateneo Innovation Center, Philippines*
Ellice Ancheta, *Ateneo de Manila University, Philippines*
April Domingo, *Ateneo de Manila University, Philippines*
Matthew Ong, *Ateneo de Manila University, Philippines*
Jynariz Datuin, *Ateneo de Manila University, Philippines*
Keiichi Yasumoto, *Nara Institute of Science and Technology, Japan*
Nathaniel Libatique, *Ateneo de Manila University, Philippines*
Gregory Tangonan, *Ateneo Innovation Center, Philippines*

**10:15**
**Historical Distribution of Duration of Unplanned Power Outages in Queensland: Insights For sustaining telecommunications during disasters ..... 506**
Watcharachai Kongsiriwattana, *Flinders University, Australia*
Paul Gardner-Stephen, *Flinders University, Australia*
Matthew Lloyd, *Serval Project Inc., Austrailia*

**10:30**
**Design and development of the water supply system for the Red Cross Field Hospital ..... 514**
Yasuhiro Soshino, *Japanese Red Cross Kumamoto Hospital, Japan*
Akira Miyata, *Japanese Red Cross Kumamoto Hospital, Japan*

**10:45**
**Malasakit 1.0: A Participatory Online Platform Crowdsourcing Disaster Risk Reduction Strategies in the Phillipines ..... 522**
Brandie Nonnecke, UC Berkeley, USA
Shrestha Mohanty, *University of California, Berkeley, USA*
Andrew Lee, *University of California, Berkeley, USA*
Jonathan Lee, *University of California, Berkeley, USA*
Sequoia Beckman, *University of California, Berkeley, USA*
Justin Mi, *University of California, Berkeley, USA*
Sanjay Krishnan, *UC Berkeley, USA*
Rachel Edita Roxas, *National University, Philippines*
Nathaniel Oco, *De La Salle University, Philippines*
Camille Crittenden, *UC Berkeley CITRIS, USA*
Ken Goldberg, *UC Berkeley, USA*

**11:00**
**Social Media for Diaster Situations Methods, Opportunities and Challenges ..... 528**
Alivelu Mukkamala, *IT University of Copenhagen, Denmark*
Roman Beck, *IT University of Copenhagen, Denmark*

**11:15**
**Top-down and buttom-up – A global approach to strengthen local disaster resilience ..... 537**
Markus Enenkel, *SOS Children's Villages International & Columbia University, Int. Research Institute for Climate and Society, Austria*
Andreas Papp, *SOS Children's Villages International, Austria*
Elisabeth Veith, *SOS Children's Villages International, Austria*
Stefan Voigt, *German Aerospace Centre (DLR), Germany*

---

**13:30 – 15:00**
**E1: Surgical and other Healthcare Issues**
**Room:** San Jose

---

**13:30**
**Prototype telepathology solutions that use the Raspberry Pi and mobile devices ..... 544**
Donald Ekong, *Mercer University, USA*
Paul Fontelo, *National Library of Medicine, National Institutes of Health, USA*

**13:45**
**SurgiBox: An Ultraportable System to Improve Surgical Safety for Patients and Providers in Austere Settings ..... 548**
Debbie Teodorescu, *MIT D-Lab & Project SurgiBox, USA*
Sally Miller, *MIT, USA*
Sashidhar Jonnalagedda, *EssentialTech, USA*
Robert Smalley, *Harvard Medical School, USA*

**14:00**
**Real Time Injecting Device With Automated Robust Vein Detection Using Near Infared Camera And Live Video ..... 553**
Tamim Ahmed, *Bangladesh University of Engineering and Technology, Bangladesh*
Khandker Sadia Rahman, *Bangladesh University of Engineering and Technology, Bangladesh*
SK Subrina Shawlin, *Bangladesh University of Engineering and Technology, Bangladesh*
Mohammad Hasan, *Bangladesh University of Engineering and Technology, Bangladesh*
Arnab Bhattacharjee, *Bangladesh University of Engineering and Technology, Bangladesh*
Shaikh Anowarul Fattah, *BUET, Bangladesh*
Celia Shahnaz, *BUET, Bangladesh*

**14:15**
**ISiez: A Low-Cost Real-Time Seizure Detection System Utilizing Cloud Computing ..... 561**
Farid Farahmand, *Sonoma State University, USA*
Aaron Marquez, *Sonoma State University, USA*
Michael Dunn, *Sonoma State University, USA*
Jaime Ciriaco, *Sonoma State University, USA*

**14:30**
**Design and Calibration of a Wearable Research Grade Air Quality Monitoring System For Real-Time Data Collection ..... 568**
Hannaneh Hojaiji, *University of California, Los Angeles, USA*
Orpaz Goldstein, *UCLA, USA*
Christine King, *UCLA, USA*
Majid Sarrafzadeh, *UCLA, USA*
Michael Jerrett, *UCLA, USA*

---

**13:30 – 15:00**
**E2: Off-Grid and Electrification Planning**
**Room:** Santa Clara

---

**13:30**
**A Low-Power Thermoelectric Generator for Off-Grid Power in the aftermath of Natural Disasters ..... 578**
Jamison Olsten, *Colorado School of Mines, USA*
Salman Mohagheghi, *Colorado School of Mines, USA*

**13:45**
**Statistical Failure Estimation Method to Size Off-Grid Electrical System for Villages in Developing Countries ..... 584**
Sri Harika Kuppa, *Colorado State University, USA*
Daniel Zimmerle, *Colorado State University, USA*

**14:00**
**A Geospatial framework for electrification planning in developing countries ..... 590**
Jason Adkins, *Columbia University School of Engineering and Applied Sciences (SEAS), USA*
Vijay Modi, *Columbia University School of Engineering and Applied Sciences (SEAS), USA*
Ayse Selin Kocaman, *Bilkent University, Turkey*
Roy Han, *Independent, USA*
Shaky Sherpa, *Columbia University School of Engineering and Applied Sciences (SEAS), USA*
Naichen Zhao, *Columbia University School of Engineering and Applied Sciences (SEAS), USA*
Jonathan Carbajal, *Columbia University School of Engineering and Applied Sciences (SEAS), USA*
Chris Natali, Columbia University School of Engineering and Applied Sciences (SEAS), USA

**14:15**
**From Electrification to Empowerment: Re-Defining Energy Access in Fronteir Markets ..... Not Available at Time of Production**
Frank Bergh, *Sigora International & Engineers Without Borders USA, USA*

**14:30**

**Design and Simunation of an Integrated PV Solar Electric System.....600**
Pritpal Singh, *Villanova University, USA*
Rita Atallah, *Villanova University, USA*

---

**13:30 – 15:00**
**E3: Communications**
**Room:** Carmel

---

**13:30**

**Remote Environmental Monitoring using Internet of Things (IoT).....607**
Shiny Abraham, *Seattle University, USA*
Joshua Beard, *Seattle University, USA*
Renjith Manijacob, *F5 Networks, USA*

**13:45**

**Towards Energy conservation in Campus using Wireless Sensor Network .....613**
Dhivvya J Parasuraman, *Amrita Center for Wireless Networks & Applications (AmritaWNA) & Amrita Vishwa Vidyapeetham, India*
Maneesha Ramesh, *Amrita University, India*
Divya P, *Amrita School of Engineering, India*
Jayakrishnan V M, *Amrita Viswha Vidyapeetham, India*

**14:00**

**Zero Recurrent – Cost Two-Way Satellite Communications for Humanitarian Applications .....619**
Matthew Lloyd, *Flinders University*
Angus Wallace, , *Flinders University, Australia*
Paul Gardner-Stephen, *Flinders University, Australia*

**14:15**

**Piloting the Serval Mesh and Serval Mesh Extender 2.0 in Vanuatu: Preliminary Results .....625**
Paul Gardner-Stephen, *Flinders University, Australia*
Salma Farouque, *Flinders University, Australia*
Andrew Bate, *New Zealand Red Cross, New Zealand*
Matthew Lloyd, *New Zealand Red Cross, New Zealand*
Alexis Cullen, *Flinders University*

**14:30**

**Study and Analysis of OceanNet – Marine Internet Service for Fishermen .....635**
A Karthik, *Center for Wireless Networks and Applications, Amrita University, India*
Lakshmi Rajagopal, *Center for Wireless Networks and Applications, Amrita University, India*
Deepu Koshy, *Center for Wireless Networks and Applications, Amrita University, India*
Anjana Luke, *Center for Wireless Networks and Applications, Amrita University, India*
Meera S, *Center for Wireless Networks and Applications, Amrita University, India*
Sai Shibu N B, *Center for Wireless Networks and Applications, Amrita University, India*

**13:30 – 15:00**
**E4: Disaster Management**
**Room:** Monterey

**13:30**
**HydroMet: Deployment of a Large-Scale Nationwide Hydrometerological Sensor Network For Flood Warning and Monitoring.....643**
Alvin Retamar *Advanced Science and Technology Institute, Philippines*
Glenn Vincent Lopez, *Advanced Science and Technology Institute, Philippines*
Felan Carlo Garcia, *Ateneo de Manila University, Philippines*
Jeanette Badong-Carlos, *Advanced Science and Technology Institute, Philippines*
Marjon De Paz, *Advanced Science and Technology Institute, Philippines*
Ian Mosquera, *Advanced Science and Technology Institute, Philippines*
Jasmine Jane Yabut, *Advanced Science and Technology Institute, Philippines*
Jericho Capito, *Advanced Science and Technology Institute, Philippines*
Joven Javier, *Advanced Science and Technology Institute, Philippines*
Harold Bryan Paler, *Advanced Science and Technology Institute, Philippines*
Gerwin Guba, *Advanced Science and Technology Institute, Philippines*

**13:45**
**Damage Indentification and Assessment using Image Processing on Post-Disaster Satellite Imagery .....653**
Aparna R. Joshi, *National Institute of Technology Karnataka, Surathkal, India*
Isha Tarte, *National Institute of Technology Karnataka, Surathkal, India*
Sreeja Suresh, *National Institute of Technology Karnataka, Surathkal, India*
Shashidhar G. Koolagudi, *National Institute of Technology Karnataka, India*

**14:00**
**Intelligent Seeker Robot to Locate Dead Bodies and Survivors under Debris .....660**
Md Tahmid Rashid, *Northern University Bangladesh*
Syed Ayaz Mahmud, *Bangla Trac Communication Ltd., Bangladesh*

**14:15**
**Robot Ropes for Disaster Response Operations .....666**
Michael Wooten, *Clemson University, USA*
Ian D Walker, *Clemson University, USA*

**14:30**
**Integrated Disaster Risk Management in Indian Environmental-Prediction, Prevention And Preparedness ..... 751**
Adil Usman, *Indian Institute of Technology Mandi, India*

**16:00 – 17:30**
**F1: Health**
**Room:** San Jose

**16:00**
**Managing Child Malnutrition via Digital Enablement: Insights from a Field Trial .....667**
Anutosh Maitra, *Accenture Services Pvt. Ltd., INDIA, India*
Nataraj Kuntagod, *Accenture, India*
Rambhau Rote, *Accenture, India*

**16:15**
**Selecting analytical biomarkers for developing diagnostic technologies for global Health applications.....674**
Samantha Byrnes, *Intellectual Ventures Laboratory, USA*
Bernhard Weigl, *Intellectual Ventures Laboratory, USA*

**16:25**
**Situated Big Data and Big Data Analytics for Healthcare .....675**
Mark Sterling, *Nazarbayev University, Kazakhstan*

**16:35**
**Multiplatform application for postural analysis ..... Not Available at Time of Production**
Adjamilton Mederios de Almeida Junior, *Instituto Federal de Educacao, Ciencia e Tecnologia da Paraiba, Brazil*
Rychard Nunes Guedes, *Instituto Federal de Educacao, Ciencia e Tecnologia da Paraiba, Brazil*
Weslley de Cunha Santos, *Instituto Federal de Educacao, Ciencia e Tecnologia da Paraiba, Brazil*
Ana Regis, *Sunare, Brazil*
Carlos Danilo Regis, *IFPB & Iecom Brazil*

---

**16:00 – 17:30**
**F2: Energy Sources**
**Room:** Santa Clara

---

**16:00**
**Performance Testing and Techno-Economic Analysis to Improve an Affordable Charocal Cookstove .....676**
Daniel Sweeney, *Massachusetts Institute of Technology, USA*
Lauren Bustamante, *Massachusetts Institute of Technology, USA*
Betty Ikalany, *TEWDI Uganda, Uganda*
Helen Acuku, *TEWDI Uganda & Approrpiate Energy Saving Technologies (AEST) LTD, Uganda*

**16:15**
**Extrusion Auger Improvement Project.....685**
Aaron Wagner, *Santa Clara University, USA*
Maureen O'Neill, *Santa Clara University, USA*
Panthea Sepehrband, *Santa Clara University, USA*

**16:30**
**A Global Market Assessment Methodology for Small Wind in the Developing World.....690**
Alfred Alsop, *University of Strathclyde, United Kingdom, Great Britain*
Aran Eales, *University of Strathclyde, United Kingdom, Great Britain*
Scott Strachan, *University of Strathclyde, USA*
Jon Leary, *Wind Empowerment Association, United Kingdom, Great Britain*
Jon Persson, *Wind Empowerment Association, Sweden*
Isabel Ruiz Almeyda, *Wind Empowerment Association, The Netherlands*

**16:45**
**Optimal Power Flow for Micro-grids.....696**
Blair Hanna, *Georgia Southern University, USA*
Adel El Shahat, *Georgia Sothern University, USA*

**17:00**
**Electricity Tecnology Needs for Energy Access..... N/A**
Bruce Nordman, *Lawrence Berkeley National Laboratory, USA*
Aditya Khandekar, *Lawrence Berkeley National Laboratory, USA*

**16:00 – 17:30**
**F3: Communication**
**Room:** Carmel

**16:00**
**Architecture for Responsive Emergency Communication Networks .....704**
Patrick Lieser, *Technische Universität Darmstadt, Germany*
Flor Alvarez, *Technische Universität Darmstadt & Secure Mobile Networking Lab, Germany*
Paul Gardner-Stephen, *Flinders University, Australia*
Matthias Hollick, *Technische Universität Darmstadt & Secure Mobile Networking Lab, Germany*
Doreen Böhnstedt, *Technische Universität Darmstadt, Germany*

**16:15**
**Emergency Communication in Challenged Environments via Unmanned Ground And Aerial Vehicles .....713**
Lars Baumgärtner, *University of Marburg, Germany*
Stefan Kohlbrecher, *TU-Darmstadt, Germany*
Juliane Euler, *Technische Universität Darmstadt & Simulation, Systems Optimization, and Robotics Group, Germany*
Tobias Ritter, *Technische Universität Darmstadt, Germany*
Milan Schmittner, *Technische Universität Darmstadt, Germany*
Christian Meurisch, *TU Darmstadt, Germany*
Max Muehlhaeuser, *Technical University Darmstadt, Germany*
Matthias Hollick, *Technische Universität Darmstadt & Secure Mobile Networking Lab, Germany*
Oskar von Stryk, *Technische Universität Darmstadt, Germany*
Bernd Freisleben, *Philipps-Universität Marburg, Germany*

**16:30**
**Design and Implementation of Stand-Alone Photovoltaic-Powered Phone Booth .....722**
Javier Urquizo, *, Villanova University, USA*
Pritpal Singh*, Villanova University, USA*
Ruben Hidalgo*, Escuela Superior Politécnica del Litoral, Ecuador*
Pablo Jácome*, Universidad de Chile, Chile*
Guillermo Soriano, *Escuela Superior Politécnica del Litoral, Ecuador*

**16:45**
**Exploring Mobile Device Literacy in Senegal .....728**
Christelle Scharff, *Pace University, USA*
Vanessa Rene, *Pace University, USA*
Jan Gerhard Schoepp, *Pace University, USA*
Nishit Shah, *Pace University, USA*
Andrew Greenberg, *Pace University, USA*

**17:00**
**A Practical and Secure Social Media Facility for Internet-Deprived Populations.....735**
Jeremy Lakeman, *Flinders University, Australia*
Matthew Lloyd, *New Zealand Red Cross, New Zealand*
Romana Challans, *Flinders University of South Australia, Australia*
Milan Schmittner, *Technische Universität Darmstadt, Germany*
Matthias Hollick, *Technische Universität Darmstadt & Secure Mobile Networking Lab, Germany*
Paul Gardner-Stephen, *Flinders University, Australia*

# Additional Papers

**Productizing Humanitarian Telecommunications Research: A Case Study of the Serval Mesh Extender** ..... 757
*Paul Gardner-Stephen, Romana Challans, Jeremy Lakeman, Andrew Bettison, Patrick Lieser, Ralf Steinmetz, Flor Alvarez, Matthew Lloyd*

**Optimising the Question Box for Cost and Local-Manufacturability** ..... 767
*Rose Shuman, Jooyoung Kim, Paul Gardner-Stephen*

**Panel: An Initial Assessment of the Peugeot Center's Completed Projects and a Look Forward to the Future** ..... 776
*Kirsten H. Dodson, Kris Hatchell, Kerry Patterson, Kevin Colvett*

**Defining Success in a Developing Country's Innovation Ecosystem: the case of Rwanda** ..... 777
*Eric Obeysekare, Khanjan Mehta, Carleen Maitland*

**Adoption of Quality Culture - A case study of Mehran University of Engineering & Technology, Jamshoro, Sindh, Pakistan.** ..... 784
*Asif Ali Shah, Muhammad Aslam Uqaili, Abdul Sami Qureshi*

**Implementation of a Global Humanitarian Outreach Experience by Partnering Engineering, Business, and High-Tech Nursing Education with a Non-Governmental Organization** ..... 789
*Victoria Carlson-Oehlers, Patrick J. Jung, Bernard A. Cohen*

**High Quality, Low Cost Education with the Raspberry Pi** ..... 795
*Narasimha Saii Yamanoor, Srihari Yamanoor*

**Using Geographic Information Systems (GIS) in Za'atari Refugee Camp, Jordan for Refugee Community Information Management and Mobilization: The RefuGIS Project** ..... 800
*Brian Tomaszewski, Jean-Laurent Martin, Irene Omondi, Nijad Al-Najdawi, Sara Tedmori, Yusef Hamad*

**From First- to Third-Order Social Change in Development Engineering: A Case Study** ..... 810
*Brandon Reynante, Mandy Bratton, Lin Hein*

**DC Micro - Grid Pricing and Market Model** ..... 816
*Zacakry Minshew, Adel El-Shahat*

**When Non-Engineering Students work on an International Service-Learning Engineering Project –A Case Study** ..... 818
*Kenneth W.K. Lo, C.K. Lau, Stephen C.F. Chan, Grace Ngai*

**Opportunities and Challenges of Distributed Manufacturing for Humanitarian Response** ..... 825
*Laura James*

**Elevating Education of India's Rural Village Girls through Distance Learning Technology Supported by Sustainable Electricity** ..... 834
*Malini Frey, Manoj Pokkiyarath, Renjith Mohan, N. B. Sai Shibu, Vidal Conejo Gracia, Vivek Mohan, Siddhan*

**Battery-Degradation Model Based On The ANN Regression Function for EV Applications** ..... 841
*Gabrielle May, Adel El-Shahat*

**Design and Evaluation of a Low-cost Mechatronic System to Study Upper and Lower Limbs Biomechanics** ..... 844
*Hernan Lara-Padilla, Xavier S. Sánchez, T. A. Paucar*

**Case Study: Providing Computer Education at Malawi Children's Village** ..... 849
*Sherwyn Hunte, Hermona Tamrat, Adrienne White*

**Free Learning for Humanity** ..... 855
*James R. Schoening, Edilson Arenas, Tyde Richards, Ian E. Gibson*