

# SYSCON 2020

The 14<sup>th</sup> Annual IEEE International Systems Conference

August 24-27, 2020  
Virtual Conference



## 2020 CONFERENCE PROGRAM

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## **Important Announcement**

After studying and evaluating the announcements, guidance, and news released by relevant national departments, we are sorry to announce that the in-person gathering of IEEE SYSCON 2020, scheduled to be held April 20-23, 2020 in Montreal, Canada has been moved virtual. IEEE SYSCON 2020 will now be held as a virtual conference, to be held August 24 – September 20, 2020. Attendees will receive access to all of the presentations for the duration of the conference!

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Armin Zimmermann, Ilmenau University of Technology, Germany

## **Conference Management**

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## Technical Program

**A 5G NR based System Architecture for Real-Time Control with Batteryless RFID Sensors**  
Peng Hu (National Research Council of Canada, Canada)

**A Baseline Accuracy Classification Method to Over-come the Over-fitting Problem for Class-Imbalanced Defect-Prone Datasets Model**  
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Chris J. Macnab (University of Calgary, Canada)

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**A Mathematical Model for Combined Workforce and Vehicle-Route Planning within a Time Window**  
Amin Taheri (School of Industrial Engineering, Islamic Azad University & South Tehran Branch, Iran); Pooya Taheri (SFU & Langara College, Canada)

**A Mutation Testing Applied to Validate Networks Protocols**  
Izzat Alsmadi (Texas A&M San Antonio, USA); Anis Zarrad (University of Ottawa, Canada)

**A Novel Data Analytics Framework for the History Matching Problem for Reservoir Simulation in Up-Stream Petrochemical Industry**  
Sumit Kumar Bose (International Business Machines (IBM) & IBM Singapore Pte Ltd, Singapore); Ben Amaba PE (IBM & Chief Technology Officer, USA); Stephen Lord (IBM United Kingdom, United Kingdom (Great Britain))

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Robert G Mazzolin, BGen(Ret'd) P. Eng. (RHEA Group, Canada)  
Dr. Asad Madni (University of California Los Angeles)

**A SysML profile for mechanical assembly**  
Moncef Hammadi (SUPMECA & Laboratoire Quartz EA 7393, France); Rihab Brahmi (SUPMECA & ENIM, France); Jean-Yves Choley (SUPMECA, France); Moez Trigui and Nizar Aifaoui (LGM - ENIM, Tunisia)

**A Virtual Journey into the Emerging Edge-to-Edge Heterogeneous Networks identifying Cybersecurity Characteristics of Deployed Profiles**  
Bassam S Farroha (US DoD, USA); Deborah Farroha (DoD, USA); Joseph S Farroha (Johns Hopkins University & OnCall Cyber Alliance, USA)

**Achieving Efficient Computation Tasks for 5G-enabled Industrial IoT Applications**  
Peng Hu (National Research Council of Canada, Canada)

### **Adaptive Control of a Ball and Beam System**

Josie M Versloot, Edward Parrott and Rickey Dubay (University of New Brunswick, Canada)

### **Adaptive Impedance Control Based on Neural Network for Electrically-Driven Robotic Systems**

Jinzhu Peng and Shuai Ding (Zhengzhou University, China); Rickey Dubay (University of New Brunswick, Canada)

### **Adaptive Sliding Mode Fuzzy PID Control: Supervisory Control**

Mobin Saeedi and Jafar Zarei (Shiraz University of Technology, Iran); Roozbeh Razavi-Far (University of Windsor, Canada); Mehrdad Saif (University of Windsor & Faculty of Engineering, Canada)

### **Agent-Based Modeling of Regulatory Impacts on AI Marketplaces**

Prachi Pravin Dhamange, Cherukuri Sai Vivek and Varadharajan Sridhar (International Institute of Information Technology Bangalore, India); Shrisha Rao (International Institute of Information Technology, Bangalore, India)

### **Aggressive Motion Planning for a Quadrotor System with Slung Load Based on RRT**

Jefferson de Lima Silveira, Jr. (Universidade Federal de Sergipe, Brazil); Sidney Givigi (Queen's University, Canada); Eduardo O. Freire, Lucas Molina and Elyson A N Carvalho (Federal University of Sergipe, Brazil)

### **An Architecture for the Management of Virtual Machine Migrations**

Alexandre V Matos (Universidade do Estado de Santa Catarina & Universidade Federal do Paraná, Brazil); Carlos A Maziero (Federal University of Parana State - UFPR, Brazil)

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Mohammed N Alharbi and Shihong Huang (Florida Atlantic University, USA)

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Pravir Malik (Zappos); Hollie Delaney (Zappos, USA)

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Peng Liu, Boyuan Xia and Jichao Li (National University of Defense Technology, China); Danling Zhao (National University of Defense Technology & College of Information System and Management, China); Hechuan Wei and Mengjun Li (National University of Defense Technology, China)

### **Applying Model-Based Systems Engineering to the Development of a Test and Evaluation Tool for Unmanned Autonomous Systems**

Solomon Gebreyohannes (NC A&T University, USA); Ali Karimodini (NC A&T State University, USA); Abdollah Homaifar (North Carolina A&T State University, USA)

### **Architectural Guidance in Automotive for Privacy and Security: Survey and Classification**

Bram van der Sanden and Alexandr Vasenev (ESI (TNO), The Netherlands)

### **Assessment Requirement-Oriented Description Methodology for Technology System of Systems**

Hanlin You and Zhenyu Lian (Academy of Military Science, China); Bingfeng Ge (National University of Defense Technology, China)

### **Autonomous assembly of structures using pinning control and formation algorithms**

Kleber Cabral (Royal Military College of Canada, Canada); Sidney Givigi (Royal Military College of Canada, Canada); Peter Travis Jardine (Royal Military College of Canada, Canada)

### **AUV Cruising Auto Pilot for a Long Straight Confined Underwater Tunnel**

Pedro Daniel de Cerqueira Gava (Instituto Tecnológico de Aeronáutica - ITA, Brazil); Vítor A. M. Jorge (Instituto Tecnológico de Aeronáutica & FCMC, Brazil); Cairo L. Nascimento, Jr. (Instituto Tecnológico de Aeronáutica, Brazil); Geraldo Jose Adabo (ITA,



### **Aviation Systems Intelligent Computational Models**

Antonio Marcio Ferreira Crespo (DreamerGate Inc. & Concordia University, Canada); Li Weigang (University of Brasília & UnB, Brazil); Alexandre B Barreto (George Mason University, Brazil)

### **BC Tree Fruit System-of-Systems Information Architecture (Initial Design and Review)**

Youry Khmelevsky (Okanagan College, Canada); Donovan Bach (Okanagan College, Canada); Svan Lembke and Lee Cartier (Okanagan College, Canada)

### **Beyond SOTIF: Black Swans and Formal Methods**

Arash Khabbaz Saberi (TNO Automotive & Eindhoven University of Technology, The Netherlands); Jos Hegge (Verum Software Tools BV, The Netherlands); Terry L Fruehling (Encore Semi Inc. & Journal of Connected and Automated Vehicles, USA); Jan F. Grootte (Tech

### **Blockchain-Based Transparent Disaster Relief Delivery Assurance**

Mehmet Demir, Ozgur Turetken and Alex Ferworn (Ryerson University, Canada)

### **Can the effectiveness of International Collaborations in Major Defence Projects be improved by taking a System of Systems Perspective?**

Joseph Carson (Cranfield University & BAE Systems, United Kingdom (Great Britain)); Richard Adcock (Cranfield University & BKCASE, United Kingdom (Great Britain))

### **Combining STPA with SysML Modeling**

Fellipe Guilherme Rey de Souza (ITA, Brazil); Juliana Bezerra and Celso Hirata (Instituto Tecnológico de Aeronáutica - ITA, Brazil); Pierre de Saqui - Sannes (ISAE, France); Ludovic Aprville (Télécom Paris, France)

### **Comparative Investigation of MPPT Controller For Grid Connected Photovoltaic System**

Amr Sarhan (Military Technical College, Egypt); Mohamed A. Kamel (Military Technical College, Egypt & Concordia University, Canada); Ahmed Taimour Hafez (Military Technical College, Egypt); Sidney Givigi (Royal Military College of Canada, Canada)

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Manki Min (Louisiana Tech University, USA); Sunho Lim (Texas Tech University, USA)

### **Constructing Leading-Indicator Sustainability Metrics for a Corporate Complex Adaptive System Using Graph Algorithms**

Pravir Malik (Deep Order Technologies & Zappos, USA); Dylan Jorgensen (Zappos, USA)

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Justin A Gamble and Jingwei Huang (Old Dominion University, USA)

### **Decision Tree-based Adaptive Approximate Accelerators for Enhanced Quality**

Mahmoud Saleh Masadeh and Alain Aoun (Concordia University, Canada); Osman Hasan (National University of Sciences and Technology, Pakistan); Sofiene Tahar (Concordia University, Canada)

### **Deep Learning in Economic Load Dispatch with Short-Term Wind Power**

Xian Liu (University of Arkansas at Little Rock, USA)

### **Design and Fabrication of a Low-cost Human Body Lower Limb Exoskeleton**

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### **Designing Collective Behavior for Construction of Containment Structures using Actuated Blocks**

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**Development of a low-cost avionics platform for small-scale model airplanes**

Matheus Dias Maciel (ITA - Technological Institute of Aeronautics, Brazil)

**Development of New Systems Engineering Instrument using Text Mining Technique**

Niamat Ullah Ibne Hossain, Raed Jaradat, Morteza Nagahi and Kesava Dadi (Mississippi State University, USA); Christina Rinaudo (Engineer Research Development Center, USA)

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Emre Salmanoglu and Anna Bley (Mutualitics GmbH, Germany); Kenan Ahiska (Cranfield University, United Kingdom (Great Britain))

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Alexander Teske, Rami Abielmona and Moufid Harb (Larus Technologies Corporation, Canada); Jean Berger (Defence R&D Canada, Canada)

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**Dynamic Modeling of Complex Healthcare Systems Using Big Data to Describe and Visualize Healthcare Utilization**

Inas S. Khayal (Geisel School of Medicine at Dartmouth, USA)

**Dynamic Tactile Exploration for Texture Classification using a Miniaturized Multi-modal Tactile Sensor and Machine Learning**

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Xian Liu (University of Arkansas at Little Rock, USA)

**Effects of Road Path Profiles on Autonomous Vehicles' Handling Behaviour**

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Simon Diemert and Jeffrey Joyce (Critical Systems Labs Inc., Canada)

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**Engineering or not Engineering? That is still the question**

Fabiana Flores (Universidade Federal de Pernambuco (UFPE), Brazil); Silvio Meira (Universidade Federal de Pernambuco, Brazil); Evandro Hora (Tempest Security Intelligence, Brazil)

**Engineer-To-Order Plant Design: Assessing System Complexity and Hour Use Based on Directed Network Graphs**

Christian Alexander Bertram, Georg Otto Mueller and Niels Henrik Mortensen (The Technical University of Denmark, Denmark)

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Chunchao Lane and Chang Liu (Eastern New Mexico University, USA); Ying Li (Colby College, USA); Zhengchuan Liang (Nanjing University, USA)

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Mohamed Abdelghany, Waqar Ahmad, Sofiene Tahar and Sowmith Nethula (Concordia University, Canada)

**Evaluation of Classification Techniques for Identifying Cognitive Load Levels using EEG Signals**

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**Evaluation of the Robot Operating System 2 in Lossy Unmanned Networks**

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**Evolutionary Algorithms to Generate Test Cases for Safety and IT-Security in Automotive Systems**

Andreas Lauber, Martin Sommer, Kevin Fuchs and Eric Sax (Karlsruhe Institute of Technology, Germany)

**FASiM: A Framework for Automatic Formal Analysis of Simulink Models of Linear Analog Circuits**

Adnan Rashid, Ayesha Gauhar and Osman Hasan (National University of Sciences and Technology, Pakistan)

**Formal Compositional Reasoning of Autonomous Aerial Systems with Complex Algorithms**

Milton Stafford and Siddhartha Bhattacharyya (Florida Institute of Technology, USA); Matthew Clark (Galois, USA); Natasha Neogi (NASA LaRC, USA)

**Formal Methods and RTCA DO 178C (TUTORIAL)**

Jeffrey Joyce, Laure Millet, Simon Diemert and Jose Serna (Critical Systems Labs Inc., Canada)

**Formal Validation of Emergent Behavior in a Machine Learning Based Collision Avoidance System**

Ramakrishnan Raman (Honeywell Technology Solutions Lab, India); Yogananda Jeppu (Honeywell Technology Solutions, India)

**Gait Recovery System for Parkinson's Disease using Machine Learning on Embedded Platforms**

Gokul H (Solarillion Foundation); Prithvi Suresh (SRM Institute of Science and Technology); Hari Vignesh B and Pravin Kumar R (SRM Institute of Science and Technology, India); Vineeth Vijayaraghavan (Solarillion Foundation, India)

**Geospatially Distributed Safety and Performance Benefits for Projects of a Transportation System**

Cody Pennetti, Daniel J. Andrews, Thomas Polmateer and James H. Lambert (University of Virginia, USA)

**Grasp Selection for In-Hand Robotic Manipulation of Non-Rigid Objects with Shape Control**

Félix Nadon and Pierre Payeur (University of Ottawa, Canada)

**Highly Energy Efficient Animal Mobility Driven BLE Beacon Advertising Control for Wildlife Monitoring**

Eyuel Debebe Ayele (University of Twente, The Netherlands & University of Dresden, Germany); Fatjon Seraj (University of Twente, The Netherlands)

**HOS based System of Power Quality Disturbance Detection and Classification**

Mariana Moreira (Universidade Federal de São João Del Rei, Brazil); Adriano Vale-Cardoso (UFSJ, Brazil); Michel Leles (Universidade Federal de São João Del-Rei, Brazil); Carlos Duque (UFJF, Brazil); Danton D. Ferreira (Universidade Federal de Lavras, Braz

**How can OPM-based modeling disambiguate system concepts in ISO/IEC/IEEE 15288?**

Dov Dori (Technion, Israel Institute of Technology, Israel & Massachusetts Institute of Technology,

USA)

**HTL: A tensor-centered DSL for deep learning**

Gaétan J. D. R. Hains (Huawei Technologies Co. Ltd., France); Thibaut Tachon (Huawei Technologies & University of Orléans, France); Chong Li (Université Paris-Est & Lab. d'Algorithmique, Complexité et Logique, France); Zhen Zhang (Huawei Technologies, Fra

**Human System Integration Approach to Raise Motivation and Maintain Workmanship in Middle-scale Manufacturing Company of Japan**

Yoshiaki Ohkami (Keio University, Japan)

**Immersive Virtual Reality based Training and Assessment of an Orthopedic Surgical Process**

Avinash Gupta (Oklahoma State University, USA); J. Cecil (Oklahoma State University & Cyber Tech LLC, USA); Miguel Pirela-Cruz (Texas Tech Health Sciences Center, USA)

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Hanan Kohen (Technion - Israel Institute of Technology, Israel); Dov Dori (Technion, Israel Institute of Technology, Israel & Massachusetts Institute of Technology, USA)

**Indicators of Engineering Students' Academic Performance: A Gender-Based Study**

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Uri Shani (Technion, Israel Institute of Technology, Israel); Niva Wengrowicz (Technion, Israel); Hanan Kohen (Technion - Israel Institute of Technology, Israel); Daniel Gluskin (Technion, Israel Institute of Technology, Israel); Rea Lavi (Massachusetts I

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Jordi Cucurull (Scytl Secure Electronic Voting S.A., Spain); Christos Tselios (University of Patras & Citrix Inc., Greece); Carolina Rueda (Scytl Secure Electronic Voting S.A., Spain); Pablo Barrientos Lobato (Atos IT Solutions and Services Iberia, Spain)

**Integration of Traditional Therapy (SBRT) and Systems Approach for Pain Alleviation of Musculoskeletal System**

Yoshiaki Ohkami (Keio University, Japan)

**Investigating the Effectiveness of a Cable-driven Pinch-Grasp Haptic Interface**

Zoran Najdovski, Sameer Deshpande, Lei Wei and Syed Moshfeq Salaken (Deakin University, Australia); Navid Mohajer (Deakin University & Institute for Intelligent Systems Research and Innovation (IISRI), Australia); Saeid Nahavandi (Deakin University, Austr

**ISO 26262 Functional Safety for ADAS and Autonomous Vehicles (TUTORIAL)**

Jeffrey Joyce and Simon Diemert (Critical Systems Labs Inc., Canada)

**Iterative Feedback Tuning of Two-Degree-of-Freedom Controllers for Lighting Process Control**

Radu-Emil Precup and Alexandra-Bianca Borlea (Politehnica University of Timisoara, Romania); Emil M. Petriu (University of Ottawa, Canada); Florin Dragan (Politehnica University of Timisoara, Romania)

**Leveraging Iterative Design of Experiments to Innovate in a High-Risk Production Environment**

Clay D Woody and Dereck N Kennedy (United States Military Academy, USA); John J Case (United States Military Academy & Operations Research Center, USA); John Caddell (United States Military Academy & US Army, USA)

**Lifecycle Governance for Effective Digital Twins: A Joint Systems Engineering and IT Perspective**

Paolo P Pileggi (TNO, The Netherlands); Jacques Verriet (ESI (TNO), The Netherlands); Michael Borth (ESI, The Netherlands); Elena Lazovik and Jeroen Broekhuijsen (TNO, The Netherlands)

### **Linear Stability and Robustness Analysis of Droop-Controlled Islanded Microgrids**

Mohsen Azizi (New Jersey Institute of Technology, USA)

### **Linking Intrusion Detection System Information and System Model to Redesign Security Architecture**

Victor Pazmino Betancourt and Thomas Glock (FZI Research Center for Information Technology, Germany); Aleksei Kharitonov (Hochschule Aalen, Germany); Matthias Kern, Bo Liu and Eric Sax (FZI Research Center for Information Technology, Germany); Juergen Bec

### **LTE-R Service Enhancement Using OVSF codes**

Vipin Balyan, Mario Ligwa and Ben Groenewald (Cape Peninsula University of Technology, South Africa)

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Mahmoud Saleh Masadeh (Concordia University, Canada); Osman Hasan (National University of Sciences and Technology, Pakistan); Sofiene Tahar (Concordia University, Canada)

### **Managing Organisational System Evolution through Model-Based Systems Engineering Approaches**

Grace A.L. Kennedy and Farid Shirvani (University of Wollongong, Australia); William Scott (SMART Infrastructure Facility, University of Wollongong, Australia); Allan P Campbell (SMART Infrastructure Facility, University of Wollongong & UniSA, Australia)

### **Measuring the concretization level of Systems of Objectives in the early phase of product development to derive the product maturity**

Thilo O. Richter (Karlsruhe Institute of Technology (KIT) & IPEK - Institute of Product Engineering, Germany); Peter M. Tröster, André Felber and Albert Albers (Karlsruhe Institute of Technology (KIT), Germany); Kamran Behdinin (University of Toronto, Can

### **Medium Displacement Unmanned Surface Vehicle and Over-the-Horizon Targeting**

Eugene Paulo and Paul Beery (Naval Postgraduate School, USA); Grant Honecker (Naval Surface Warfare Center, USA); Michael Minneman and Dylan Parrot (Lieutenant, United States Navy, USA); David Saalwaechter (Program Executive Office Missiles and Space, USA)

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Marc Priggemeyer (RWTH Aachen University, Germany); Juergen Rossmann (Technical University of Aachen, Germany)

### **Method for Non-Linear Scaling of Multi-Criteria Decision Making Attribute Values**

Chad S Kerr (Mississippi State University & Georgia Tech Research Institute, USA); Niamat Ullah Ibne Hossain and Raed Jaradat (Mississippi State University, USA)

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Constantin Mandel and Tobias Stuermlinger (Karlsruhe Institute of Technology (KIT), Germany); Chuo Yue (Karlsruhe Institute of Technology, Germany); Matthias Behrendt (IPEK - Institute of Product Development, Germany); Albert Albers (Karlsruhe Institute

### **Model-Based Systems Engineering methods to support the reuse of knowledge within the development of validation environments**

Constantin Mandel, Kai Wolter and Katharina Bause (Karlsruhe Institute of Technology (KIT), Germany); Matthias Behrendt (IPEK - Institute of Product Development, Germany); Maximilian Hanf and Albert Albers (Karlsruhe Institute of Technology (KIT), Germany)

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Niamat Ullah Ibne Hossain, Safae El Amrani, Morteza Nagahi and Raed Jaradat (Mississippi State University, USA); Randy Buchanan (ERDC, USA)

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Leonardo Santiago Benitez Pereira (Federal Institute of Santa Catarina, Brazil); Rafael Rodrigues (Instituto Federal de Santa Catarina, Brazil); Edison A. C. Aranha, Neto (Federal Institute of Santa Catarina, Brazil)

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Zhongyuan Yu, Hoong Yan See Tao, Yao Xiao, Pamela Burke, Nicole Hutchison and Deep Makwana (Stevens Institute of Technology, USA)

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Eero Immonen and Mika Lauren (Turku University of Applied Sciences, Finland); Lassi Roininen (Lappeenranta-Lahti University of Technology, Finland); Simo Särkkä (Aalto University, Finland)

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Hasan Tariq (Qatar University, Qatar); Abderrazek Abdaoui (Qatar University & College of Engineering, Qatar); Farid Touati and Mohammad Al-Hitmi (Qatar University, Qatar); Damiano Crescini (University of Brescia-Italy, Italy); Adel Ben Mnaouer (Canadian U

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Shuai Ding, Jinzhu Peng, Yixin Hou and Xiaodong Lei (Zhengzhou University, China)

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Ricardo Bautista-Quintero (University of New Brunswick & Eigen Innovation, Canada); Rickey Dubay (University of New Brunswick, Canada)

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Paul C. Hershey (Raytheon, Inc., USA); Mu-Cheng Wang (Raytheon SAS, USA); Michael Carroll (Raytheon, USA)

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Kathleen Krahn (National Renewable Energy Laboratory, USA)

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Xian Liu (University of Arkansas at Little Rock, USA)

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Qingsong Zhao, Weitao Hu, Boyuan Xia, Junyi Ding and Mengjun Li (National University of Defense Technology, China)

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Maaz Rasheed Malik (Guilin University of Electronic Technology & Guilin China, China)

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James Nelson (The University of Texas at San Antonio, USA); Jonathan Lwowski, Patrick J Benavidez and John J Prevost (University of Texas at San Antonio, USA); Mo Jamshidi (University of Texas San Antonio & University of Texas @ San Antonio, USA)

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