

# **2021 17th IEEE International Conference on Factory Communication Systems**



<b>Tuesday, 8 June 2021</b>	
13:00-13:30	<p><b>Room 1</b></p> <p><b>Welcome, Introduction and Workshop Objectives</b>  13:00 Welcome and introduction of participants – Mr. Kang Lee, NIST</p> <p>13:10 Workshop Objectives, Ongoing Work, and Expected Output – Dr. Richard Candell, NIST  Chairs: Kang Lee, NIST, Richard Candell, NIST</p>
13:30-14:15	<p><b>Room 1</b></p> <p><b>Key note by Afif Oserian, Ericsson: 5G and Beyond for Industrial Automation - Performance Metrics</b></p>
14:15-14:45	<p><b>Room 1</b></p> <p><b>5G (URLLC and TSN) for Industrial Automation: Raheeb Muzzafar, Silicon Austria Labs</b></p>
14:50-15:30	<p><b>Room 1</b></p> <p><b>Group discussion with attendee's participation</b>  * Key definitions and Ontologies  * Informational Technology Metrics  * Operational Technology Metrics  * What metrics we should address specifically for industrial wireless - where produced and measured, how collected, units (SI), etc.  Chairs: Richard Candell, Kang Lee</p>
15:30-15:45	<p><b>Room 1</b></p> <p><b>Demonstration of before and after the implementation of TSN-based robotics operation and machine tending – Dr. Richard Candell, NIST</b></p>
15:45-16:00	<p><b>Room 1</b></p> <p><b>Demonstration of a new architecture for WLAN-based TSN: Perspective on requirements and performance evaluation – Dr. Iñaki Val, IKERLAN</b></p>
16:00-16:30	<p><b>Room 1</b></p> <p><b>Model-based Cosimulation and Design Space Exploration of Industrial Wireless Networks – Dr. Shuvra Bhattacharyya, University of Maryland</b></p>
16:30-17:25	<p><b>Room 1</b></p> <p><b>Group discussion with attendee's participation</b>  * Measurement, Evaluation, and Assessment Methods  * What method we should address for industrial wireless - procedures for measurements, results expected, units (SI), etc.  Chairs: Richard Candell, Kang Lee</p>
17:30-18:00	<p><b>Room 1</b></p> <p><b>Group discussion continued</b></p>

## Tuesday, 8 June 2021

	<p>* IEEE-SA standards process - an example of why IEEE 1451 would be good for this effort. – Kang Lee, NIST</p> <p>* Proposed target standards body and standards project with objective, purpose, scope, working group operations, and timelines. – Dr. Richard Candell, NIST</p> <p>Chairs: Richard Candell, Kang Lee</p>
18:00-18:15	<p><b>Room 1</b></p> <p><b>Conclusion with Summary and Action Items</b></p> <p>Chairs: Richard Candell, Kang Lee</p>

## Wednesday, 9 June 2021

08:30-09:00	<p><b>Room 1</b></p> <p><b>Welcome and Opening</b></p> <p>Chairs: Hans-Peter Bernhard, Zhibo Pang</p>
09:00-10:00	<p><b>Room 1</b></p> <p><b>Keynote by Andreas Müller: Industrial 5G: From Theory to Practice</b></p> <p>Chairs: Hans-Peter Bernhard</p>
10:00-10:15	<p><b>Room 1</b></p> <p><b>Coffee Break Group Picture</b></p>
10:15-11:55	<p><b>Room 1</b></p> <p><b>Wireless Sensor Networks</b></p> <p>Chairs: Stefano Scanzio, Tullio Facchinetti</p> <p><b>An Exact Scheduling Algorithm for Convergecast and Broadcast in Tree Topology WSNs -An Application to DSME-IEEE 802.15.4e-</b> <i>Aasem Ahmad, Ricardo Severino, Zdenek Hanzalek</i></p> <p><b>Investigating redundancy of LoRaWAN for emergency notifications in industrial plants</b> <i>Emiliano Sisinni, Paolo Bellagente, Alessandro Depari, Dhiego Fernandes Carvalho, Alessandra Flammini, Marco Pasetti, Stefano Rinaldi, Paolo Ferrari</i></p> <p><b>Enabling Listening Suspension in the Time Slotted Channel Hopping Protocol</b> <i>Gianluca Cena, Stefano Scanzio, Adriano Valenzano</i></p> <p><b>RSSI-Based Location Classification Using a Particle Filter to Fuse Sensor Estimates</b> <i>Thomas Blazek, Julian Karoliny, Fjolla Ademaj, Hans-Peter Bernhard</i></p>
13:00-13:50	<p><b>Room 1</b></p> <p><b>Work In Progress Session 1</b></p> <p>Chairs: Marcel Baunach, Raheeb Muzaffar</p> <p><b>Introducing resilience in industrial 5G systems using a digital twin approach</b> <i>Gustavo Cainelli, Lutz Rauchhaupt</i></p> <p><b>Towards a Threat Modeling Approach Addressing Security and Safety in OT Environments</b> <i>Siegfried Hollerer, Wolfgang Kastner, Thilo Sauter</i></p> <p><b>Towards Adding Safety and Security Properties to the Industry 4.0 Asset Administration Shell</b> <i>Ali Mohammad Hosseini, Thilo Sauter, Wolfgang Kastner</i></p> <p><b>Communication of energy data in automation systems</b> <i>Leif-Thore</i></p>

## Wednesday, 9 June 2021

	<p><i>Reiche, Maxim Runge, Alexander Fay, Karl-Heinz Niemann</i>  <b>AUTOSAR-compliant Clock Synchronization over CAN using Software Timestamping</b> <i>Florian Luckinger, Thilo Sauter</i></p>
14:00-15:30	<p><b>Room 1</b>  <b>Industry Forum: Deterministic Industrial Communication</b>  14:00 Dr. René Hummen, Hirschmann, Automation and Control GmbH, Germany  /  14:20 Dr. Dietmar Bruckner, B&amp;R Industrial Automation GmbH, Austria  /  14:40 Kenneth Lee, Schneider Electric, USA  Chairs: Thomas Strasser</p>

## Thursday, 10 June 2021

08:30-09:00	<p><b>Room 1</b>  <b>Opening</b>  Chairs: Hans-Peter Bernhard, Zhibo Pang</p>
09:00-10:00	<p><b>Room 1</b>  <b>Keynote by Wilfried Steiner: The TSN Configuration Challenge</b>  Chairs: Hans-Peter Bernhard</p>
10:05-12:30	<p><b>Room 1</b>  <b>Time Sensitive Networks and Applications</b>  Chairs: Iñaki Val, Mahin Atiq  <b>A Mechanism for Seamless Cryptographic Rekeying in Real-Time Communication Systems</b> <i>Heiko Buehler, Andreas Walz, Axel Sikora</i>  <b>Impact of Packet Filtering on Time-Sensitive Networking Traffic</b> <i>Lukas Wuesteney, Michael Menth, René Hummen, Tobias Heer</i>  <b>Heterogeneous Synchronization in Converged Wired and Wireless Time-Sensitive Networks</b> <i>Maximilian Schuengel, Steven Dietrich, David Ginthr, Shun-Ping Chen, Michael Kuhn</i>  <b>Out-of-sync Schedule Robustness for Time-sensitive Networks</b> <i>Silviu Craciunas, Ramon Serna Oliver</i>  <b>How to Quantify Packet Importance for Real-Time Control: A Feature-Oriented Perspective</b> <i>Xin Tong, Zhen Meng, Guodong Zhao, Liying Li, Zhi Chen</i></p>
13:30-15:10	<p><b>Room 1</b>  <b>Special Session: Reliable Wireless Mechatronics for the Factory Floor</b>  Chairs: Rick Candell, Mohamed Hany Kashef</p>

## Thursday, 10 June 2021

	<p><b>Wireless Time Sensitive Networking for Industrial Collaborative Robotic Workcells</b> <i>Susruth Sudhakaran, Karl Montgomery, Mohamed Kashef, Dave Cavalcanti, Richard Candell</i></p> <p><b>SHARP: Implementation of a Hybrid Wired-Wireless TSN Network to Enable Flexible Smart Factories</b> <i>Óscar Seijo, Xabi Iturbe, Inaki Val</i></p> <p><b>Delay and Jitter Analysis in Industrial Control Systems: A Paper Mill Case Study</b> <i>Rahul Nandkumar Gore, Elena Lisova, Johan Akerberg, Mats Bjorkman</i></p> <p><b>Feature Extraction and Classification for Communication Channels in Wireless Mechatronic Systems</b> <i>Jing Geng, Mohamed Kashef, Richard Candell, Yongkang Liu, Karl Montgomery, Shuvra Bhattacharyya</i></p>
15:15-16:45	<p><b>Room 1</b></p> <p><b>Industry Forum Part 2</b></p> <p>15:00 Dr. Kim Fung Tsang, President, Honorary Advisors Committee, Greater Bay Area 5G Industry Alliance, Hong Kong, Recommended Wireless Interfaces to IEEE 1451 standards</p> <p>/</p> <p>15:20 Richard Candell, NIST, USA, Industrial Wireless</p> <p>/</p> <p>15:40 Francois Le, iotabeam, USA, Sensors Security in wireless? Chairs: Victor Huang</p>

## Friday, 11 June 2021

08:30-09:00	<p><b>Room 1</b></p> <p><b>Opening</b></p> <p>Chairs: Hans-Peter Bernhard, Zhibo Pang</p>
09:00-10:15	<p><b>Room 1</b></p> <p><b>Wireless Communications</b></p> <p>Chairs: Michele Luvisotto, Patrik Denzler</p> <p><b>Interleaver in Coded Short Packets Transmission: A Preliminary Result</b> <i>Zhan Ming, Zhibo Pang, Kan Yu, Dacfe Dzong</i></p> <p><b>Robust End-to-end Schedules for Wireless Time-sensitive Networks under Correlated Large-scale Fading</b> <i>David Ginthoer, Rene Guillaume, Maximilian Schuengel, Hans-Dieter Schotten</i></p> <p><b>Safety Related Systems Design Methodology for Wireless Time-Varying Channels</b> <i>Pablo Sanz, Pablo Angueira, Jon Montalban, Inaki Val</i></p>
10:30-11:20	<p><b>Room 1</b></p> <p><b>Work In Progress Session 2</b></p> <p>Chairs: Marcel Baunach, Raheeb Muzaffar</p> <p><b>End-to-end QoS Management in Self-Configuring TSN Networks</b> <i>Andrea Garbugli, Armir Bujari, Paolo Bellavista</i></p> <p><b>Towards a Distributed Testbed for Wireless Embedded Devices for Industrial Applications</b> <i>Leander B. Hoermann, Albert Pötsch, Christian Kastl, Peter Priller, Andreas Springer</i></p>

<b>Friday, 11 June 2021</b>	
	<p><b>Impact of network centrality on the gateway designation of real-time TSCH networks</b> <i>Miguel Gutierrez Gaitan, Luis Almeida, Alejandro Figueroa, Diego Dujovne</i></p> <p><b>A Computational Model for 6LoWPAN Multicast Routing</b> <i>Philipp Raich, Wolfgang Kastner</i></p> <p><b>Assessing Open Interfaces and Protocols of PLCs for Computation Offloading at Field Level</b> <i>Michael Gundall, Hans D. Schotten</i></p>
11:30-13:10	<p><b>Room 1</b></p> <p><b>Communication Technologies for Industry</b> Chairs: Lukasz Wisniewski, Frank Golatowski</p> <p><b>Coexistence Management Methods and Tools for IO-Link Wireless</b> <i>Dmytro Krush, Christoph Cammin, Thomas Doebbert, Ralf Heynicke, Gerd Scholl</i></p> <p><b>Integration of ISO/IEC/IEEE 21450 Transducer Electronic Datasheets into OPC UA Information Model</b> <i>Muddasir Shakil, Alois Zoitl, Hans Peter Bernhard, Mahin K. Atiq</i></p> <p><b>Static Timing Analysis of OPC UA PubSub</b> <i>Patrick Denzler, Thomas Frühwirth, Andreas Kirchberger, Martin Schoeberl, Wolfgang Kastner</i></p> <p><b>CSI-Free Enhanced PHY Security against Eavesdropping Attack based on Intelligent Surface for Industrial Wireless</b> <i>Tengyue Zhang, Hong Wen, Zhibo Pang, Huanhuan Song</i></p>
13:15-13:45	<p><b>Room 1</b></p> <p><b>Closing Session</b> Chairs: Hans-Peter Bernhard, Zhibo Pang</p>