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3rd IEEE International Conference on Industrial Cyber-Physical Systems (ICPS)

Special Session on

"Medical CPS – Medical Device Interoperability for the Care of Acuity Patients"

organized by

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Call for Papers

Scope of the Special Session

This session intends to provide a platform for all research dealing with interoperability of medical devices to create a medical device system for the care of a potentially high acuity patients in the clinic. Medical interventions and diagnosis in the operating room (OR), the intensive care unit (ICU), and whole clinic become more and more complex. The number of medical devices increases continuously as well as the complexity of these devices. Today's manufacturer-dependent solutions for integration are not able to handle this complexity. They can only form isolated solutions. Interoperability between medical devices and a cross-manufacturer exchange of information and remote control operations is not available. High costs result from the lack of manufacturer-independent interoperability. Isolated ecosystems introduce a high barrier for market access of new and innovative devices, especially for small and medium-sized enterprises (SMEs). Consequently, the best treatment for the patient and best working conditions for the caregivers cannot be guaranteed.

In recent years, promising research and development projects have taken place in different consortiums all over the world to enable medical device interoperability. The most influential examples are the German OR.NET consortium, the MD PnP initiative in the USA, or the SCOT consortium in Japan. Plenty of use cases have been shown and new standards have been developed. The ASTM F2761 standard defines the Integrated Clinical Environment (ICE) and the arising requirements for networked medical devices. As a technical specification realizing the manufacturer-independent medical device interoperability, the IEEE 11073 Service-oriented Device Connectivity (SDC) family of standards has been developed. While the core standards are still published, work goes on the area of process and device specific standards. In parallel to the device-to-device communication, the emerging HL7 FHIR (Fast Healthcare Interoperability Resources) is developed. It provides a promising approach for the interconnection of medical devices and hospital information systems. With the introduction of open medical device connectivity, applications along the entire medical care structure are conceivable. Interoperability between medical devices and IT systems is also

conceivable and useful in emergency care, in mobile field hospitals, and medical care centers. In addition to new medical applications, open networking also poses new challenges for operators of clinical networks. For example, new safety aspects have to be considered and medical personnel have to be trained in the use of the new technology. The control of medical devices from different manufacturers via a central control unit places many demands on risk management and the design of human-machine interfaces.

However, there is still plenty of work to do in research and development to reach the goals of interoperability, smart medical device systems, support of caregivers, and optimal care for the patients. This reaches from technical challenges, standardization efforts, over regulatory and risk management issues up to new and innovative use cases and assistive systems.
In summary, this session focuses on medical cyber-physical systems from a technological point of view.

Topics of interest for this special session include

- Manufacturer-independent interoperability technology
- Medical device-to-device interconnection
- Medical device-to-infrastructure interconnection
- Openly integrated operating room and medical robotics
- Security and privacy for standardized medical device networks
- Risk management, approval strategies and processes for manufacturer-independently interconnected medical devices
- Interoperability-based medical use case and innovations, e.g., assistive systems, decision support systems, silent ICU, workflow recognition and support
- Human-Machine-Interface challenges for networked medical device systems
- Reliable and real-time-capable networks for medical devices
- Standardization, process support for standards development and maintenance

Submissions Procedure: All the instructions for paper submission are included in the conference website https://events.tuni.fi/icps2020/authors/

Deadlines: The same as the general conference deadlines

CVs of the proposers

Martin Kasparick studied Computer Science at the University of Rostock. He has been a Ph.D. student at the Institute of Applied Microelectronics and Computer Engineering since 2013. He has been working in the medical engineering projects OR.NET, MoVE, and PoCSpec. His main focus of research is on safe manufacturer-independent interoperability and applications build up on such technology. Martin participates in the development of the new IEEE 11073 standards, is a member of the IEEE 11073 Point-of-Care Devices Working Group (PoCD WG), and is co-author of the new IEEE 11073 Service-oriented Device Connectivity (SDC) family of standard proposals.

Armin Janß. Armin studied Electrical Engineering at the RWTH Aachen University and has specialized in Information and Communication Technologies. In 2015 he finished his Ph.D. at the Chair of Medical Engineering. Since 2011 he is leading the working group “Medical Device Integration, Risk Management and Usability Engineering”. Regarding the development of manufacturer-independent connection of medical devices on the basis of the IEEE 11073 SDC communication standard, he has accompanied several research projects (orthoMIT, smartOR, OR.NET, ZiMT, MoVE, PriMed). Another research focus is furthermore on the development of innovative Human-Machine-Interfaces and workflow support for the OR personnel in the framework of surgical interventions. For this purpose a central surgical SDC workstation demonstrator has been developed at the Chair of Medical Engineering. https://www.meditec.hia.rwth-aachen.de/en/home