

# Medical Cyber Physical Systems and Internet of Things Workshop 2021

Hosted in conjunction with CPS-IOT Week 2021

<https://uva-mcps-lab.github.io/mcps-workshop-2021/>

May 18th, 2021, Virtually

## Call for Papers

Medical Cyber-Physical Systems (CPS) encompass a new generation of smart medical systems that integrate human, cyber, and physical elements in closed-loop control. They aim to improve patient care by enabling the delivery of advanced therapies and complex surgeries. An example is the artificial pancreas that allows people with diabetes to better manage their condition. Another example is medical robotic systems, which allow doctors to perform minimally-invasive surgeries that were not possible before. Such systems may be integrated into the Internet of Medical Things (IoMT) which consist of connected infrastructures of medical devices, mobile and web applications, and other health services. Designing safe and effective Medical CPS and IoMT involves the work of a multi-disciplinary team of engineers, medical domain experts, and human factors specialists. This work needs to be supported by rigorous development processes and tools, as substantial evidence needs to be documented and integrated to justify design choices and ease the review process mandated by regulation.

The objectives of the Medical Cyber-Physical Systems (MCPS) and Internet of Medical Things workshop 2021 are to provide opportunities for researchers, industrial practitioners, caregivers, and government agencies to demonstrate innovative development methods and tools, present experience reports, discuss open challenges, and explore ideas for future development of Medical CPS and the Internet of Medical Things. Contributions are welcome on all aspects of system development, including specification, design, analysis, implementation, documentation, and certification of Medical CPS. Demonstrations of existing tools for design and analysis of Medical CPS are also encouraged.

The 11th MCPS workshop will be a one-day virtual event co-located with CPS-IOT Week 2021. Topics of interest include, but are not limited to, the following:

- ***Foundations for Integration of Medical Device Systems/Models:*** Component-based technologies for accelerated design and verifiable system integration, Systems of systems, Medical devices plug-and-play to support interoperability of heterogeneous systems
- ***Enabling Technologies for Future Medical Devices:*** Implantable regulatory devices, networked biosensors, tele-surgery, robotic surgery, physiologic signal QoS (Quality of Service), Medical CPS in developing countries
- ***Distributed Control & Sensing of Networked Medical Device Systems:*** Robust, verifiable, fault-tolerant control of uncertain, multi-modal systems
- ***Medical Device Plug-and-Play Ecosystem:*** Requirements and emerging standards for supporting interoperability in the clinical environment, including "black box" data recording, device authorization, and data security
- ***Human-Machine Interfaces:*** Identification of use-related safety requirements, model-based analysis of medical user interface design, user studies involving medical devices, modelling and analysis of use-errors with medical devices
- ***Patient Modeling & Simulation:*** Large scale, high fidelity organ/patient models for design & testing

- **Embedded, Real-Time, Networked System Infrastructures for High Confidence Medical Devices:** Architecture, platform, middleware, resource management, QoS (Quality of Service), Dynamic interoperation, including plug-and-play operation
- **High Confidence Medical Device Software Development & Assurance:** Care-giver requirements solicitation and capture, design and implementation, V&V (Verification and Validation), Heterogeneity in environment, architecture, platforms in medical devices
- **Internet of Medical Things:** Mobile medical apps, data management, security, logging, forensics, and privacy
- **Machine Learning and Data Science:** big data, predictive models, decision support, data analytics and data mining for medical applications and systems
- **Medical Practice-Driven Models and Requirements:** User-centric design, risk understanding, and use/misuse modeling in medical practice, management of failures in a clinical environment, modeling of operational scenarios, including medical devices, care-givers, patients
- **Certification of Medical Devices:** Quantifiable incremental certification of medical devices and interoperable medical systems, role of design tools and COTS (Commercial Off-The-Shelf) components, challenges with self-adaptive medical systems

## Paper Submission

Submissions are due March 1st, 2021. We are accepting the following types of submissions:

- **Short Papers** (4-6 pages, including references) Position papers, work in progress and novel but not necessarily thoroughly worked out ideas are encouraged.
- **Full Papers** (8-19 pages, including references) Novel ideas not published previously.
- **Posters / Demos** (1 page abstract)

Please use Easy Chair for Submissions: <https://easychair.org/conferences/?conf=mcps2021>

Authors should prepare their papers using LaTeX and the ACM style file (SIGCONF). Submissions must be original and should not have been published previously or be under consideration for publication while being evaluated for this workshop. Reviews will be single blind.

Accepted papers will be included in the CPS week proceedings. By submitting to the workshop the authors are granting permission for ACM to publish in print and digital formats for the ACM archive. Note that the copyright remains with authors.

## Important Dates

Short Papers, Full Papers and Posters/Demos	March 12th, 2021
Author notification	March 22nd, 2021
Papers and abstracts camera ready due (hard deadline)	March 29th, 2021

## Organizing Committee

### Workshop Co-Chairs

- Philip Asare, University of Toronto, CA
- Lu Feng, University of Virginia, USA
- Josephine Lamp, University of Virginia, USA

- Miroslav Pajic, Duke University, USA
- James Weimer, University of Pennsylvania, USA

***Steering Committee***

- Julian M. Goldman, Massachusetts General Hospital/Harvard Medical School
- Paul Jones, US Food and Drug Administration (FDA)
- Insup Lee, University of Pennsylvania
- Sandy Weininger, US Food and Drug Administration (FDA)

***Program Committee***

- Houssam Abbas, Oregon State University, USA
- Ezio Bartocci, TU Wien, Vienna University of Technology, Austria
- Flavio H. Fenton, Georgia Institute of Technology, USA
- Shan Lin, Stony Brook University, USA
- Oleg Sokolsky, University of Pennsylvania, USA
- Eugene Y. Vasserman, Kansas State University, USA
- Yi Zhang, Massachusetts General Hospital, MDPnP Lab, USA