

Control, Mechatronics, and Imaging for Medical Devices and Systems in Medicine

Overview: This OIT is one of two sponsored by IFAC TC 8.2 “Biological and Medical Systems”. It focuses on the **modeling and control of hardware/software medical devices, including imaging**, with a particular emphasis, where possible on clinical application and applicability.

Our overall goal in having two large OITs is to have a strong symposium within the overall IFAC 2020 conference meeting. In Toulouse in 2017 we had over 100 papers for these two OITs and a strong attendance across the breadth of work presented.

Session Theme and Rationale: There is growing convergence of technology and demographics as they impact our ability to provide healthcare. Aging populations have increased stress on medical resources with demand starting to exceed availability – a problem in need of the right technologies to improve care and productivity.

As computational, control and sensor technologies advance the potential in application to medical and biological systems has increased exponentially. As a result, there has been an increasingly tight inter-relation between engineering and clinical medicine.

Paper Topics: No topic is off limits, where possibilities could thus include:

- Mechatronics, hardware/firmware/software, and design
- Rehabilitation systems: Functional Electrical Stimulation (FES), Robotics and Sensors
- Medical Imaging for diagnosis or treatment, including algorithms to extract novel diagnostics or results
- Modeling and control of novel medical devices or novel modeling/control of existing medical devices for (new) clinical application
- Control of ECMO or circulatory assist devices
- Artificial organ systems
- Novel imaging methods and modalities, such as electro-tomographic imaging
- Inverse problems for medical imaging
- Biomechanics systems, such as for gait analysis or modeling.

Overall, this session focuses, broadly, on model-based applications of dynamic systems modeling, control and system identification to clinical medicine, emphasising the novelty in the hardware/software of medical devices. The application areas are broad to provide a robust overview of the field as a whole, but include current and emerging applications, as well as a broad array of potential application spaces.