Advanced Medical ICT Research at the University of Oulu, Oulu, Finland

Pentti Leppänen¹, Matti Hämäläinen¹, Pekka Pirinen¹, Jari Iinatti¹, Timo Jämsä²,
Tapio Seppänen³

¹Centre for Wireless Communications, P.O. Box 4500, FI-90014 University of Oulu, Finland
²Department of Medical Technology, P.O. Box 5000, FI-90014 University of Oulu, Finland
³Computer Engineering Laboratory, P.O. Box 4500, FI-90014 University of Oulu, Finland

The Department of Electrical and Information Engineering through its units of Centre for Wireless Communications, Intelligent Systems Group and Optoelectronics and Measurement Technology has started multidiscipline research projects focusing on wireless hospital concept in conjunction with local hospitals and industry. The key idea is to define, improve and develop existing working procedures by adopting wireless technologies in several daily operations. The novel features include both wireless data transmission and positioning approaches. All the savings in nursing staff’s time in supporting work task increases their possibilities to be present with patients. Ubiquitous access to real-time medical data extends the quality of care. Patient’s vital data is possible to measure using wireless sensors and body area networks which connects to backbone network and finally to hospital’s electronic medical records. Wireless hospital concept also improves patient’s self progress inside a hospital by giving automatic guidance. Applications developed for hospital can be utilized in welfare sector but also in more general.

WellTech Oulu is a recently established research institute for health and wellbeing, which coordinates and promotes related activities in the University of Oulu. The main research themes are measurement of human anatomy and physiology and medical ICT technologies.

The Department of Medical Technology studies technologies for the prevention of bone fractures. The first ever Bone Exercise Monitor has been introduced and developed in a clinical exercise study applying accelerometer-based technology. In addition, a fall detector with high (97%) detection sensitivity has been developed. Methods for the assessment of an individual risk of fracture are being developed, using clinical data, medical image analysis and finite element modelling. In addition, multidisciplinary approaches are used to find needs and ubiquitous solutions for physical, social and psychological environments of elderly citizens. FinnTelemedicum is an expert organization, focusing to the effects of ICT in the functional processes and concepts in the health care system, assessment of eHealth applications, and in self care and home care applications.