Expert Systems for Wireless Applications of Bio-Signals

Wireless technology has the potential to reduce cost and prolong bio-signal measurements, as well as enhance patient experience. These properties are especially important to advance early disease detection which is likely to improve outcomes for patients. As a particular disease develops, treatment methods require more resources and they become more invasive which increases the risk for patients. Early disease detection should be based on measurements which are triggered when a suspicion is raised. The cost of current measurement methods dictates that the trigger threshold is rather high. Cost efficient wireless applications for bio-signals might be a way to bring down the trigger level such that more measurements are carried out. In early stage disease detectable symptoms might not be present all the time. When the measurement duration is smaller than a potential asymptomatic period, then there is a probability that the signal analysis leads to a false negative diagnosis. Hence, extending the measurement duration might lead to more and earlier disease detection. More and longer bio-signal measurements might reveal meta structures, including, but not limited to disease dependencies and the efficacy of least invasive treatment such as lifestyle choices. Good patient experience is a prerequisite for more and longer measurements. Wireless technology has the potential to offer the convenience of unobtrusive devices and real time compliance monitoring. Having outlined the potential benefits of wireless applications for bio-signals, there are technological, design, and ethical challenges. Technological challenges range from practical hardware considerations, such as energy efficiency, to data handling, and medical decision support. Integrating the different aspects to create wireless applications for bio-signals requires design thinking. For example, it might be possible to exploit cross application technology by creating a service platform. Wireless technology offers great freedom for the patient, however wireless signals are easy to intercept sometimes even without being in the vicinity of the signal source. That raises ethical issues about patient safety and the integrity of medical infrastructure. Furthermore, current artificial intelligence methods are used for medical decision support where a human expert must decide on a diagnosis. Repeated interaction with such medical decision support systems might lead to unfounded trust and thereby result in biased diagnosis. That ethical problem might become more pressing in the future when the human expert moves into a supervisory role with less influence on the diagnosis.

For this special issue on wireless applications for bio-signals we invite papers which address the challenges outlined above. To be specific, we seek papers which document: significant hardware improvements, such as deeply embedded decision systems, novel system designs which incorporate wireless technology to create practical problem solutions, theoretical and practical big data problem solutions, including deep learning algorithms for medical decision support. With such solutions, we might even see applications that move from early disease detection to disease prediction.

Topics of interest include, but are not limited to, the following scope:

Expert Deep learning network for early disease detection using bio-signals

Machine learning models for wireless applications of bio-signals

Transfer learning for the preliminary deployment of expert systems in wireless body sensor network

New AI-based expert systems and networking test bed and trials

Analysis of bio-signal data using the Hadoop ecosystem.

Sensing and data gathering techniques of bio-signals via WSN.

E-health monitoring using bio-signals in real-time using SPARK, GraWirphX, etc.

Design architecture for Wireless IoT- enabled health activity monitoring devices

Hardware for wireless applications of bio-signals

Expert Systems design for advanced telemedicine techniques

New protocols for wireless transmission of bio-signals

New deep learning models for the wireless applications of ECG, EEG, EOG

New expert AI systems for virtual reality medical applications using wireless system

Deep learning models for robotics surgery applications

Schedule

Submission of manuscript: Sep 30, 2021

First notification: Nov 15, 2021

Submission of revised manuscript: Dec 15, 2021

Final notification: Jan, 2022

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Short Bio

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Enas Abdulhay completed her B.Sc in Biomedical engineering in University of Science and Technology, Jordan in 2003. She did her M.S in Biomedical engineering in Joseph Fourier University, France in 2005. She completed her PhD in Biomedical engineering in Joseph Fourier University, France in 2009. She was a lecturer at biomedical engineering department, University of Grenoble, France from 2006 to 2010. Later she joined Biomedical engineering department, Jordan University of Science and Technology, Jordan as lecturer in 2010 and presently she is an associate professor in the same

department. Her research interests are mainly in the area of biomedical engineering, Internet of Medical Things, Expert Medical System design. She has published several research papers in all these areas of research in various reputed journals. She has a rich editorial experience and have handled various special issues in a number of impact factor journals during the last 6 years. She is also an associate editor for the Journal of Medical Systems, Springer and Journal of Medical Imaging and Health Informatics, American Scientific Publishers, USA.

Dr. Oliver Faust

Dr Oliver Faust completed his M.S in communication from FH Dieburg, Germany in 2001. He completed his PhD in Electronics from the University of Aberdeen, Scotland in 2006. He did his second doctorate, DEng in Medical systems Engineering, Chiba University, Japan in 2015. He had an industrial experience at Altreonic NV, Belgium during 2008 to 2009. He was a visiting lecturer in Ngee Polytechnic, Singapore from 2009 to 2012. Then he joined the school of science and engineering, Habib University, Karachi, Pakistan. He has been with the department of biomedical engineering, Sheffield Hallam University, United Kingdom as a Senior Lecturer since 2015. His area of research is primarily in biomedical engineering. He has published more than 100 research papers in highly reputed journals and his papers are highly cited with his h index above 30. He also has a number of research projects and a rich experience in handling various special issues across a number of journals, including Artificial Intelligence in Medicine, Pattern Recognition Letters, etc.