Ambient Intelligence (AmI) applications in healthcare domain

Ambient Intelligence (AmI) is an emerging discipline that brings intelligence to our everyday environments and makes those environments sensitive to us. The basic idea behind AmI is that by enriching an environment with technology (mainly sensors and devices interconnected through a network), a system can be built to take decisions to benefit the users of that environment based on real-time information gathered and historical data accumulated. AmI is a fast-growing multi-disciplinary area which builds upon the advances in multiple areas in computer science, such as: artificial intelligence, sensors, networks, pervasive/ubiquitous computing, and human computer interfaces. In this talk, four applications of AmI in healthcare domain will be presented, including:

- **Human Activity Recognition**. A system that recognizes the activities of a person that is wearing accelerometer(s) will be presented. The system recognizes the activities of the user by applying machine learning techniques to analyze the sensors data. Comparison of several algorithms on several sensor body locations will be presented (chest, thighs, ankles, wrists, etc.).
- **Human Fall Detection.** This application is about detecting when a person falls. This is achieved by analyzing data provided by wearable sensors, mainly accelerometers. Various algorithms and sensor locations will be discussed and experimental results will be presented. This application is especially useful for elderly people, which have tendency to fall, and sometimes are hurt and cannot call for a help. Having such system, an automatic call can be stablished once a fall is detected.
- **Human Energy Expenditure Estimation.** This application is about automatically estimating the energy expenditure of a person. A system will be presented that analyzes data from several wearable sensors (accelerometer, heart rate, galvanic skin response, etc.) and by using machine learning techniques it estimates the energy expenditure.
- **Human Stress Detection.** A system that continuously detects the stress level of a person will be presented. The system uses machine learning methods to analyze data from a wristband device and to detect the stress level.

Hristijan Gjoreski received Bachelor degree in Computer Science and Electrical Engineering in 2010 from the Faculty of Electrical Engineering and Information Technology in Skopje, Macedonia. He received a Master's degree in 2011 and PhD in 2015 both from the Jožef Stefan International Postgraduate School in Ljubljana, Slovenia. Since 2010, he is a research assistant at the Department of Intelligent Systems at the Jožef Stefan Institute. His main research field is artificial intelligence with focus on data mining and machine learning techniques and their application in fields such as intelligent systems, ambient intelligence and wearable sensors computing. Applications on which he has focused in the last several years are: human activity recognition, fall detection, energy expenditure estimation, and stress detection. The majority of his research experience is mainly from three European research projects: Confidence, Chiron and Commodity12. Currently, he is a technical leader of the European Horizon 2020 IN LIFE project.