

ACCOMPANYING WORKSHOPS

free admission, but registration recommended
Monday, September 16, 2019

Hotel Witek 32-085 Modniczka, Kraków



15:00-16:30 Anton Popov, PhD, SM IEEE

Medical IoT paradigm and biomedical systems

Abstract

The complex infrastructure of interconnected medical devices and systems had evolved over the last several decades to provide accurate, continuous, and reliable support of human health and wellbeing. The healthcare IoT monitors, consults, and delivers the service to people at different scales, from wristbands counting the steps and calories, to multimodal visualization for cancer therapy. In this tutorial, the general approach to medical IoT network will be presented, and the main toolboxes will be described. A brief overview of biosignals will be given to demonstrate the variety of the input data from medical systems. The classification of biomedical systems will be provided with examples of recent developments in biosystems for diagnosis, monitoring, visualization, and others. Machine learning approach to the diagnosis will be discussed in the second part of the tutorial, and the signal analysis methods for feature engineering will be briefly summarized

About the Lecturer

Anton Popov is an associate professor of Electronic Engineering Department of Igor Sikorsky Kyiv Polytechnic Institute (Ukraine). He is a lecturer for the courses “Theory of signals”, “Biomedical Electronic Systems”, “Digital processing and analysis of biomedical signals and images”. He is also the head of the Biomedical Electronics and Signal Analysis Group of Kyiv Polytechnic Institute, AI/Deep Learning technical lead in the Ciklum company (UK), and IEEE Senior Member.

Anton Popov authored 150 publications in peer-reviewed journals and conference proceedings and was a supervisor for more than 60 bachelor, master, and PhD students.

His research interests include applications of signal processing methods to the analysis and interpretation of biomedical signals and images. Currently, his group is working on epileptic seizure prediction based on electroencephalograms and cardiorthmograms, techniques for quantification of cognitive workload and emotions, recognition of imaginary movements, muscle synergies detection, stabilography, as well as other biosignals and medical images for the diagnosis of diseases and evaluating the person’s physical conditions.

16:45-18:15 Eryk J. Lipinski (M.Sc, Eng., CEO) and **Krzysztof Nowak**

Recording and Analysis of Human Motion with Inertial Suit

Abstract

Inertial Suit contains biomechanical model of human body that is fed real-time data from live actor from 17 Inertial Measuring Units (IMUs) located on actor’s body. It’s main purpose is to do Motion Capture of human body.

It is a robust research and training tool with multiple applications: from simple movement recording through analyzing biomechanical aspects like angles and accelerations of specific body segments, detecting defined events, searching for problems in gait of sportsmen – to sophisticated group training systems immersed in Virtual Reality.

In our workshop session we want to show full body recording and potential measurements and analysis. We will show how system can warn about certain defined thresholds being crossed (function called bio-feedback). Discussion may cover potential applications in participant’s field.

About the Lecturers

Eryk J. Lipinski has 20 years of experience with GNSS satellite-based positioning and inertial stabilization and 3D-orientation. He runs solution center company GPS.PL and delivers Motion Capture solutions to customers in fields of soldier training and simulation, computer game manufacturing and sports. He is Certified Running Gait Analyst and Trimble Certified Mapping Trainer.

Krzysztof Nowak is a technician at GPS.PL with experience in testing and configuration of MoCap systems.

18:30-20:00 Ievgen Gorovyi (PhD, CEO @ It-Jim) and **Pavlo Vyplavin** (CTO @ It-Jim)

Classical Computer Vision vs Deep Learning for Visual Perception Tasks: What to Choose?

Abstract

Information extraction from images is a rapidly growing research field. Nowadays, deep learning (DL) methods are demonstrating remarkable results in many computer vision (CV) problems like object detection, face and text recognition, action recognition, object recognition and object tracking. However, such methods require high amount of training data and a lot of computational resources like GPUs or even clusters of hardware units. Moreover, another drawback is lack of scene geometry information utilized in DL models, which may degrade the expected results. In contrast, classical methods are based on feature crafting and a batch of user defined parameters, which often leads to unstable results. In this tutorial, we will discuss several typical CV problems and their classical and DL solutions. Comparative analysis will allow to give a clear picture of what group of methods should be applied and when. In particular, we are going to cover problems of object detection, multi-view matching, object tracking and simultaneous localization and mapping (SLAM)..

About the Lecturers

Ievgen Gorovyi received his PhD in 2014. His thesis was devoted to image correction and autofocusing methods for SAR systems. After receiving his PhD, he established It-Jim company, which delivers technical solutions in computer vision and pattern recognition, signal and image processing fields for clients over the globe. Ievgen is co-author of more than 40 publications, winner of numerous international awards and speaker at both academic and industrial conferences.

Pavlo Vyplavin received his PhD in 2011 with a thesis devoted to ground based noise waveform SAR. He worked at IRE NASU, Ukraine and at University of Campinas, Brazil. In 2018 he joined It-Jim focusing his work on computer vision, signal processing and artificial intelligence. Pavlo is a co-author of more than 60 published works.