Breakout Session I: Mobile Technologies and Sensors

Title: Cooperation Opportunities within the Area of Information and Communication Technology

Authors: ***Jose J. Gonzalez*** *is a professor at the Dept. of ICT, UiA. His current areas of interest are management of emergencies and critical infrastructure protection.*

Ole-Christoffer Granmo *is a professor at the Dept. of ICT, UiA. His research interests include mobile devices, decentralized/distributed computing, human-centered sensing, data fusion, pattern recognition, planning & resource allocation, GIS (for crisis mapping), and decision support.*

Tina Comes *is an associate professor at the Dept. of ICT, UiA. Her research interests include decision support in crisis and emergency management; risk management for critical infrastructure disruptions: vulnerability, interdependencies and cascading effects; risk management and collaboration in complex supply networks.*

Frank Y. Li *is a professor at the Dept. of ICT, UiA. His main research interests are within the topics of MAC mechanisms and routing protocols in mobile and wireless networks, including 4G and beyond, ad hoc networks, WSNs, WMNs, CRNs etc. He is also interested in QoS and performance evaluation of wired and wireless networks, especially IP-based networks.*

All the above UiA participants are faculty members at the Dept. of ICT, with different research focus. The overall objective of this breakout session is to present the research expertise from both UNO and UiA, identify the areas of common interest, and further explore possibilities for joint research projects within the frameworks of EU Horizon 2020, Norwegian Research Council and National Science Foundation etc.

The participating UiA faculty members are also associated with the Centre for Integrated Emergency Management (CIEM) which is one of the research priority areas at UiA. The primary objective of CIEM is to facilitate the paradigm shift in Emergency Preparedness & Management (EP&M) to deal with natural and man-made crises by providing ICT-based as well as inter-disciplinary solutions. One example of such paradigm shift is to develop solutions based on mobile communication and wireless sensor network technologies to detect, respond and help decision-making in crises situations.

The following contents are expected to be covered by this breakout session:

- Presentation of each individual participant, focusing on his/her research interests.
- Presentation of each individual participant, focusing on a specific study based on a recently published paper.
- Identification and exploration of common research interests.
- Identification of use cases which fit the identified common research interests.
- Discuss research project opportunities which involve both sides as project partners.
- Discuss researcher exchange plans considering the mobility of faculty members and PhD students as well as Master students.
- Explore the possibility of joint publications.

Breakout Session I: Mobile Technologies and Sensors

Title: Wireless Infrastructure of Networks of Distributed Sensor (WINDS)

Author: Hesham Ali, *Ph.D. UNO;* ***Kiran Bastola,*** *Ph.D. UNO;* ***Jong-Hoon Youn****, Ph.D. UNO*

The future of healthcare promises to include a major focus on preventive care. Collecting personal data using seamless non-invasive approach and predict potential health hazards will play a significant role in the projected predictive and personal model for future healthcare. At UNO's College of information Science and Technology, the Wireless Infrastructure of Networks of Distributed Sensors (WINDS) research group has been working on a number of projects associated with integrating wireless technology into the medical domain. Previously, the group has developed software solutions to track and monitor medical assets and detect medical error in a hospital setting. The group has been working closely with the Bioinformatics research group to research innovative ways for employing small wireless sensors to collect health-related data and continuously analyze it to predict potential health hazards with the goal of addressing such issues before they surface. The collaborative efforts have recently resulted in the development of an innovative mobility monitoring system with the capability of accurately classifying daily activities, providing a personal mobility profile and predicting potential health problems associated with observing limited mobility. The developed system paves the way for a comprehensive personal monitoring system with a focus on preventive healthcare.

Breakout Session I: Mobile Technologies and Sensors

Title: Multi-robot Coordination for Performing Complex Tasks

Author: ***Raj Dasgupta, Ph.D., Computer Science Department, UNO***

My research focuses on developing artificial intelligence and agent-based techniques for controlling and coordinating teams of autonomous robots to perform complex tasks. Towards solving this problem, the main contribution of my research has been to combine low-overhead techniques from swarm robotics with more computationally intensive techniques like game theory for robot motion and task planning. We have proposed several novel techniques for multi-robot coverage planning, multi-robot task allocation, modular robot reconfiguration planning and market-based distributed information aggregation in application domains such as Unmanned Aerial Vehicle swarms, robot-assisted landmine detection, robotic extra-terrestrial exploration, etc. In my discussion, I will give a brief overview of our major research results and solutions.

Breakout Session I: Mobile Technologies and Sensors

Title: On-board Processing of Acceleration Data for Real-time Activity Classification

Author: *Jong-Hoon Youn, Ph.D., Computer Science Department, UNO*

The assessment of a person's ability to consistently perform the fundamental activities of daily living is essential in monitoring the patient's progress and measuring the success of treatment. Therefore, many researchers have been interested in this issue and have proposed various monitoring systems based on accelerometer sensors. However, few systems focus on energy consumption of sensor devices. We have developed an energy-efficient physical activity monitoring system using a wearable wireless sensor. The system is capable of monitoring most daily activities of the human body: standing, sitting, walking, lying, running, and so on. To reduce energy consumption and prolong the lifetime of the system, we have focused on minimizing the total energy spent for wireless data exchange by manipulating real-time acceleration data on the sensor platform. One of our key contributions in the research field is that all functionalities including data processing, activity classification, wireless communication, and storing classified activities were achieved in a single sensor node without compromising the accuracy of activity classification.