

BHI & BSN 2018

4-7, March 2018

Treasure Island Hotel & Casino, Las Vegas, Nevada – USA

Workshop/Tutorial title:

The First International Workshop on Challenges and Opportunities in the Next Generation Body Sensors & Systems, Analytics, Applications, and Interventions

Organizers

Lee/Sunghoon Ivan, UMass Amherst
Ghiasi/Soheil UC Davis

Short description

This workshop will bring together leaders in Body Sensors and Mobile Health to discuss emerging trends and technological advances in sensors, systems, analytics, and interventions; and to brainstorm on challenges and opportunities in technology-enabled solutions to health problems.

Contents

The workshop will include four invited talks by prominent scholars (20 minutes) in the areas of 1) Body Sensors & Systems, 2) Analytics, 3) Applications & Interventions, followed by break-out sessions pertaining to each topic.

CVs of the organizers

Lee

- 2016-Now, Assistant Professor, UMass Amherst
- 2014-16, Postdoc Fellow, Harvard Medical School
- 2010-14, PhD, UCLA

Ghiasi

- 2004-present, Professor, UC-Davis
- 2000-04, PhD, UCLA



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Invited Speaker for the Sensors & Systems Track Prof. Edwin Chihchuan Kan, Cornell University



Title: Non-contact multiplexed RF monitoring of vital signs and internal body movement.

Abstract: Near-field coupling of an antenna transmitting a multiplexed signal can also carry the information of the motion on and inside the human body up to the RF penetration depth, which can be about 3 - 30cm in the UHF band. We experimentally demonstrate simultaneous monitoring of the vital signs of multiple observation points and occupants within the radio range, named as the near-field coherent sensing (NCS). NCS can be implemented either by active transmitting antennas as antenna reflection measurements, or by passive backscattering antennas as far-field antenna characteristics. A name card-like tag with passive implementation can be placed in a front pocket, necklace or wrist band without direct skin contact or motion restriction to maximize wearer comfort. This novel integrated sensing of heart rate,

ballistocardiogram (BCG), blood pressure, breath rate, respiration efforts and other internal body movement can open up new applications for long-term health monitoring, sleep scoring, stress/emotion evaluation and animal studies.

Invited Speaker for the Data Analytics Track Prof. David Clifton, Oxford University



Title: AI-Driven Healthcare Systems

Abstract: Intelligent healthcare systems based on AI are now feasible, with Oxford contributions to the field including the world's first FDA-approved physiological monitoring systems based on machine learning, and research outputs that are now used to care for over 20,000 patients every month in the NHS. This talk focuses on AI-based methods that are being translated into healthcare practice, and highlights systems under development between UK and China in this increasingly active area - including interventions based on wearable sensors, electronic hospital systems, and biomarkers.

Invited Speaker for the Applications & Interventions Track Prof. Bjoern Eskofier, Friedrich-Alexander University



Title: Smart shoes reach the clinic: Wearable sensor-based instrumented gait analysis for movement disorders

Abstract: The fast-growing costs of acute care are pushing the healthcare systems worldwide to a limit. A fast-growing interest exists for wearable and pervasive computing systems and ambient assistive technology that aim at ubiquitous health support for individuals in the home and community settings.

The talk will focus on such an assistive technology: the eGaIT (embedded gait analysis using information technology) project. Here, we implemented smart sensors in shoes and employed machine learning algorithms to provide accurate information to patients and

caregivers in movement disorders. As a model disease, Parkinson's disease (PD) will be presented. Routinely assessed by observation, the disease's symptoms are rated as part of semiquantitative clinical scores. Using eGaIT, we demonstrated the feasibility and applicability of more objective sensor-based gait measurement in PD for clinical studies and individual patient care.

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Workshop Schedule:
Date: 3/4/2018 (Sunday)

8:30 – 8:45	Opening Remarks: Prof. Sunghoon Ivan Lee, UMass Amherst Prof. Soheil Ghiasi, UC Davis
8:45 – 9:10	Invited Talk for Opportunities and Challenges in Sensor & Systems Speaker: Prof. Edwin Chihchuan Kan, Cornell University Title: Non-contact multiplexed RF monitoring of vital signs and internal body movement
9:10 – 9:35	Invited Talk for Opportunities and Challenges in Data Analytics Speaker: Prof. David Clifton, Oxford University Title: AI-Driven Healthcare Systems
9:35 – 10:00	Invited Talk for Opportunities and Challenges in Applications & Interventions Speaker: Bjoern Eskofier, Friedrich-Alexander University Erlangen-Nuernberg Title: Smart shoes reach the clinic: Wearable sensor-based instrumented gait analysis for movement disorders
10:00 – 10:30	Break
10:30 – 12:00	Breakout sessions for 1) Sensor & Systems, 2) Data Analytics, and 3) Applications & Interventions tracks, which would attempt to identify and discuss some of the most challenging research problems in the field. Each breakout session will be lead by workshop organizers.