## Tuesday, February 22

### 9:00 AM - 10:40 AM  Biosensors and Arrays I

**Chair: John Schmalzel**

#### Single Chip Solution to Capacitive Liquid Crystal Chemical and Biological Sensor

Alireza Hassanzadeh (University of Alabama in Huntsville, USA)
Robert G. Lindquist (University of Alabama in Huntsville, USA)

#### The Xsense Project: The Application of an Intelligent Sensor Array for High Sensitivity Handheld Explosives Detectors

Natalie Kostesha (Technical University of Denmark, Denmark)
Michael Stenbæk Schmidt (Technical University of Denmark, Denmark)
Filippo Bosco (Technical University of Denmark, Denmark)
Jesper Kenneth Olsen (Technical University of Denmark, Denmark)
Carsten Johnsen (University of Southern Denmark, Denmark)
Kent Nielsen (University of Southern Denmark, Denmark)
Jan Jeppesen (University of Southern Denmark, Denmark)
Tommy Sonne Alstrøm (Technical University of Denmark, Denmark)
Jan Larsen (Technical University of Denmark, Denmark)
Thomas Thundat (University of Alberta, Canada)
Mogens Jakobsen (Technical University of Denmark, Denmark)
Anja Boisen (Technical University of Denmark, Denmark)

#### Sensing Cellular Adhesion with a CMOS Integrated Impedance-to-Frequency Converter

Andreas Mucha (Siemens AG, Germany)
Meinrad Schienle (Siemens AG, Germany)
Doris Schmitt-Landsiedel (Technische Universität München, Germany)

#### On Accuracy of Simple FDTD Models for the Simulation of Human Body Path Loss

Sergey N. Makarov (Worcester Polytechnic Institute, USA)
Umair I. Khan (Worcester Polytechnic Institute, USA)
Md. Monirul Islam (Worcester Polytechnic Institute, USA)
Reinhold Ludwig (Worcester Polytechnic Institute, USA)
Kaveh Pahlavan (Worcester Polytechnic Institute, USA)
Gold Electrode Sensors for Electrical Impedance Tomography (EIT) Studies
Tushar Kanti Bera (Indian Institute of Science Bangalore, India)
J. Nagaraju (Indian Institute of Science Bangalore, India)

1:00 PM - 2:40 PM
Sensor Networking I
Chair: Steven Griffin

Gregory Willden (Southwest Research Institute, USA)
Donald R. Poole (Southwest Research Institute, USA)
Ben A. Abbott (Southwest Research Institute, USA)
Ronald T. Green (Southwest Research Institute, USA)

A Signal-to-Noise Ratio Enhancer
Ning H. Lu (ITT Electronic Systems, USA)

Reconfiguration and Management in Wireless Sensor Networks
Reed Tompkins (Gonzaga University, USA)
Thomas B. Jones (Gonzaga University, USA)
Robert E. Nertney (Gonzaga University, USA)
Christopher E. Smith (Gonzaga University, USA)
Patricia Gilfeather-Crowley (Gonzaga University, USA)

3:00 PM - 4:40 PM
Nondestructive Evaluation & Remote Sensing I
Chair: Shreekanth Mandayam

A Fast Circuit Model For Interaction Of Open-Ended Rectangular Waveguide Probes With Surface Long Cracks In Metals
I. Ahanian (Amirkabir University of Technology, Iran)
S. H. H. Sadeghi (Amirkabir University of Technology, Iran)
R. Moini (Amirkabir University of Technology, Iran)
Output Signal Prediction of an Open-Ended Coaxial Probe When Scanning an Arbitrary Shape Surface Cracks in Metals ....................................................................................................................................60
H. Maftooli (Amirkabir University of Technology, Iran)
H. Karami (Amirkabir University of Technology, Iran)
S. H. H. Sadeghi (Amirkabir University of Technology, Iran)
R. Moini (Amirkabir University of Technology, Iran)

Performance Monitoring of Ultrasonic Transducers with Laser Vibrometers ..................................................64
Yan Ru (Telemark University College, Norway)
Saba Mylvaganam (Telemark technological R&D Institute, Norway)

Next Generation System for Real-Time Monitoring of Rainfall, Soil Moisture, and Soil Temperature........70
Hamid Fahim Rezaei (The University of Iowa, USA)
Nicholas Sitter (The University of Iowa, USA)
Anton Kruger (The University of Iowa, USA)

Monitoring Metal Fill Profile in Lost Foam Casting Process Using Capacitive Sensors and Metal Fill Time Estimation ....................................................................................................................................76
Michael Okaro (Tennessee Technological University, USA)
Mohamed Abdelrahman (Texas A&M University, USA)
Jeff Graves (Tennessee Technological University, USA)

Wednesday, February 23

9:00 AM - 10:40 AM  Sensor Networking II
Chair: Halit Eren

Optimizing Key Updates in Sensor Networks .................................................................82
Ender Yüksel (Technical University of Denmark, Denmark)
Hanne Riis Nielson (Technical University of Denmark, Denmark)
Flemming Nielsen (Technical University of Denmark, Denmark)
Matthias Fruth (Oxford University, United Kingdom)
Marta Kwiatkowska (Oxford University, United Kingdom)

Energy Conscious Application of ZigBee Wireless Networks in Machine Health Monitoring Systems ......88
Halit Eren (Curtin University, Australia)

Secure Routing Protocol for Mobile Wireless Sensor Network.........................................................93
Hiren Deva Sarma (Sikkim Manipal Institute of Technology, India)
Avijit Kar (Jadavpur University, India)
Rajib Mall (Indian Institute of Technology Kharagpur, India)

Physical Layer Architecture for 1-Wire Sensor Communication Bus: Binary Channel Code Division Multiple Access ..............................................................................................................100
Benjamin Peiffer (University of Iowa, USA)
Anton Kruger (University of Iowa, USA)
9:00 AM - 10:40 AM  Commercial Development

Chair: Brian Carter

The Game of Deployment: Defining a game for studying sensor deployment problems............................106
Brian Carter (Chippewa Software Technology, USA)
Rammohan Ragade (University of Louisville, USA)

Review of Sensors for Greenhouse Climate Monitoring ........................................................................112
Vu Minh Quan (Massey University, New Zealand)
Gourab Sen Gupta (Massey University, New Zealand)
Subhas Mukhopadhyay (Massey University, New Zealand)

A Study on Characteristics of Continuous Wave Ultrasonic Anemometer ................................................119
Dongwoo Han (Kyungpook National University, Korea)
Sekwang Park (Kyungpook National University, Korea)

Fibre Optic Based 3-D Accelerometer Design ..........................................................................................123
Vlastimil Masek (Memorial University, Canada)
Michael Cada (Dalhousie University, Canada)
Andrew Cook (Memorial University, Canada)
Wu (Jack) Nan (AMEC, Canada)
Dan Li (Memorial University, Canada)

Coincidence Measurement System of Concentricity and Horizontality Using a Polarizing Laser ..............127
Jongwoo Jun (Chosun University, Korea)
Youngmin Park (Chosun University, Korea)
Jinyi Lee (Chosun University, Korea)

1:00 PM - 2:40 PM  MEMs and Nanosensors

Chair: Robert Krchnavek

Comparative studies on electrical properties of Polypyrrole based gas sensor .......................................131
Chintan M. Bhatt (Indian Institute of Science, India)
Nagaraju Jampana (Indian Institute of Science, India)

Trace level detection of NO₂ gas using SnO₂ thin films .......................................................................136
Anjali Sharma (University of Delhi, India)
K. Sreenivas (University of Delhi, India)
Vinay Gupta (University of Delhi, India)
Monika Tomar (University of Delhi, India)

3-Axes MEMS Hall-Effect Sensor .............................................................................................................141
Wei Cai (University of Hawaii at Manoa, USA)
Jeremy Chan (University of Hawaii at Manoa, USA)
David Garmire (University of Hawaii at Manoa, USA)
Room temperature detection of trace level NO2 gas using SnO2 nanoclusters ..............................................................145
  Anjali Sharma (University of Delhi, India)
  Sreenivas K. (University of Delhi, India)
  Vinay Gupta (University of Delhi, India)
  Monika Tomar (University of Delhi, India)

Embedded Sensors for Indoor Positioning ..........................................................................................................................149
  Teresa A. Shanklin (Purdue University, USA)
  Benjamin Loulier (Purdue University, USA)
  Eric T. Matson (Purdue University, USA)

1:00 PM - 2:40 PM   Biosensors and Arrays II
Chair: John Schmalzel

Remote Respiration Monitoring Sensor Using Stepped-FM ..............................................................................................155
  Mitsugu Otsu (The University of Kitakyushu, Japan)
  Ryohei Nakamura (The University of Kitakyushu, Japan)
  Akihiro Kajiwara (The University of Kitakyushu, Japan)

Elderly-Care Motion Sensor Using UWB-IR .........................................................................................................................159
  Kyohei Ota (The University of Kitakyushu, Japan)
  Yuki Ota (The University of Kitakyushu, Japan)
  Mitsugu Otsu (The University of Kitakyushu, Japan)
  Akihiro Kajiwara (University of Kitakyushu, Japan)

Growth of Polypyrrole-Horse Radish Peroxidase Microstructures for H2O2 Biosensor ..................................................163
  Pavan Kumar Kathuroju (Indian Institute of Science Bangalore, India)
  Nagaraju Jampanna (Indian Institute of Science Bangalore, India)

Optical Sensor System for Continuous Non-Invasive Hemodynamic Monitoring in Real-Time .................................167
  U. Timm (University of Limerick, Ireland)
  S. Andruschenko (University of Rostock, Germany)
  M. Hinz (University of Rostock, Germany)
  S. Koball (University of Rostock, Germany)
  G. Leen (University of Limerick, Ireland)
  E. Lewis (University of Limerick, Ireland)
  J. Kraitl (University of Rostock, Germany)
  H. Ewald (University of Rostock, Germany)

Optimization of Immunochemistry for Sensing Techniques to Detect Pesticide Residues in Water ......................173
  Basil Uthuppu (Technical University of Denmark, Denmark)
  Natalie Kostesha (Technical University of Denmark, Denmark)
  Mogens Havsteen (Technical University of Denmark, Denmark)
  Spire M. Kiersgaard (GEUS, Denmark)
  Jens Aamand (GEUS, Denmark)
  Claus Jorgensen (DHI, Denmark)
3:00 PM - 4:40 PM  Smart Sensors and Standards
Chair: Darold Wobschall

High-resolution Imaging Using Virtual Sensors from 2-D Autoregressive Vector Extrapolation ......................177
Claudio S. Marino (University of California San Diego, USA)
Paul M. Chau (University of California San Diego, USA)

Biological Inspired CMOS Foveated Sensor: For Neural Network Training ....................................................183
Yongwoo Jeong (University at Buffalo, USA)
Albert H. Titus (The State University of New York, USA)

Miniaturized Multi-Channel Thermocouple Sensor System ............................................................................188
Darold Wobschall (Esensors Inc., USA)
Avarachan Cherian (Esensors Inc., USA)

Next Smart Sensors Generation ..........................................................................................................................193
Stéphane Gervais-Ducouret (Freescale Semiconductor, France)

A High Sensitivity Correlation Image Sensor ....................................................................................................197
Mehdi Habibi (University of Isfahan, Iran)

3:00 PM - 4:40 PM   Multisensor Data Fusion
Chair: Steven Griffin

A Multi-agent Model for Fault Diagnosis in Petrochemical Plants .................................................................203
Benito Mendoza (Exxon Mobil Research and Engineering Company, USA)
Peng Xu (ExxonMobil Research and Engineering Company, USA)
Limin Song (ExxonMobil Research and Engineering, USA)

Pedestrian Motion based Inertial Sensor Fusion by a Modified Complementary Separate-bias Kalman Filter ............................................................................................................................................209
Rui Zhang (University of Freiburg, Germany)
Leonhard M. Reindl (University of Freiburg, Germany)

Fabrication of Hybrid Wireless Smart Temperature Sensor ............................................................................214
BonJu Gu (Toyohashi University of Technology, Japan)
Wang-Hoon Lee (Toyohashi University of Technology, Japan)
Kazuaki Sawada (Toyohashi University of Technology, Japan)
Makoto Ishida (Toyohashi University of Technology, Japan)

Sand Monitoring in Pipelines Using Distributed Data Fusion Algorithm ....................................................217
A. Abdelgawad (University of Louisiana at Lafayette, USA)
M. Bayoumi (University of Louisiana at Lafayette, USA)

Interface Detection in Pipe Separators Using ECT : Performance with reduced number of sensing electrodes ..........................................................221
Chaminda Pradeep (Telemark University College, Norway)
Yan Ru (Telemark University College, Norway)
Saba Mylvaganam (Telemark University College, Norway)
Thursday, February 24

8:20 AM - 10:00 AM  Sensor Networking III
Chair: Alessandra Flammini

Practical Issues in Wireless Sensor Network Localization Systems using Received Signal Strength Indication ................................................................. 227
Paulo Motter (Federal University of Rio Grande do Sul, Brazil)
Rodrigo S. Allgayer (Federal University of Rio Grande do Sul, Brazil)
Ivan Müller (Federal University of Rio Grande do Sul (UFRGS), Brazil)
Carlos Eduardo Pereira (Federal University of RGS - UFRGS, Brazil)
Edison Pignaton de Freitas (Halmstad University, Sweden)

On the development of a wireless self localizing streetlight monitoring system ............................................................ 233
C.M. De Dominicis (University of Brescia, Italy)
A. Flammini (University of Brescia, Italy)
E. Sisinni (University of Brescia, Italy)
Luca Fasanotti (University of Bergamo, Italy)
Fabio Floreani (University of Bergamo, Italy)

Energy Efficient Routing Protocol for Wireless Sensor Networks with Node and Sink Mobility .......... 239
Hiren Kumar Dea Sarma (Sikkim Manipal Institute of Technology, India)
Avijit Kar (Jadavpur University, India)
Rajib Mall (Indian Institute of Technology Kharagpur, India)

Design and Deployment of a Robust Remote River Level Sensor Network ....................................................... 244
Zamshed Iqbal Chowdhury (University of Dhaka, Bangladesh)
Masudul Haider Imtiaz (University of Dhaka, Bangladesh)
Muhammad Moinal Azam (University of Dhaka, Bangladesh)
Mst. Rumana Aktar Sumi (University of Dhaka, Bangladesh)
Md. Rakibur Rahman (University of Dhaka, Bangladesh)
Farzana Alam (University of Dhaka, Bangladesh)
Ishtiaq Hussain (University of Dhaka, Bangladesh)
Naeemul Hassan (University of Texas at Arlington, USA)

Nios II Processor and uClinux to Development of Network Node Wireless Based on IEEE 1451.5 (ZigBee) .............................................................................................................. 250
Tércio A.S. Filho (UNESP, Brazil)
Alexandre C. R. da Silva (UNSEP, Brazil)
Ian Grout (University of Limerick, National Technological Park, Ireland)
Silvano R. Rossi (Universidad Nacional del Centro de la Provincia de Buenos Aires, Argentina)
André L. A.Nogueira (UNESP, Brazil)

Chair: Gourab Sen Gupta

High-Temperature Measurement System with Wireless Electronics for Harsh Environments .................... 256
E. Sardini (University of Brescia, Italy)
M. Serpelloni (University of Brescia, Italy)
Microwave measurement of wood anisotropy .............................................................. Mirjana Bogosanovic (Auckland University of Technology, New Zealand)
Adnan Al-Anbuky (Auckland University of Technology, New Zealand)
Grant Emms (The New Zealand Research Institute SCION, New Zealand)

Non-Destructive Testing of a Train Wheel using a Linearly Integrated Hall Sensor Array ............... Jinyi Lee (Chosun University, Korea)
Seokjin Kwon (Korea Rail Road Institute, Korea)

Empolying Magnetic Sensor Array for Inspecting Cracks in a Pipeline ........................................ Jungmin Kim (Chosun University, Korea)
Myoungki Choi (Chosun University, Korea)
Jinyi Lee (Chosun University, Korea)

Beam Divergence Calculation of an Electromagnetic Acoustic Transducer For The Non-Destructive Evaluation of Plate-Like Structures ................................................................. Siddharth Advani (FBS, Inc, USA)
Jason Van Velsor (FBS, Inc, USA)
Joseph L. Rose (Pennsylvania State University, USA)

1:00 PM - 2:40 PM Nondestructive Evaluation & Remote Sensing III
Chair: Ashok Vaseashta

Optimization of Fingernail Sensing Technique based on Optical Experimentation and Modeling .... Jumana M. Abu-Khalaf (University of Utah, USA)
Stephen A. Mascaro (University of Utah, USA)

Design and Simulation of a self-assembled Force Sensor for Minimally Invasive Surgery ............... H. Gutiérrez-Cándano (Tecnológico de Monterrey, Mexico)
S. Camacho-León (Tecnológico de Monterrey, Mexico)
G. Dieck-Assad (Tecnológico de Monterrey, Mexico)
S.O. Martinez-Chapa (Tecnológico de Monterrey, Mexico)

An Electronic System for the Thermal Management of MOX Sensors .............................................. A. Depari (University of Brescia, Italy)
A. Flammini (University of Brescia, Italy)
D. Mariol (University of Brescia, Italy)
E. Sisinni (University of Brescia, Italy)
E. Comini (University of Brescia, Italy)
A. Ponzoni (University of Brescia, Italy)

A Hand Held Magnetic Camera System for Real Time Crack Inspection ........................................... Jongwoo Jun (Chosun University, Korea)
Jungmin Kim (Chosun University, Korea)
Jinyi Lee (Chosun University, Korea)
Youngmin Park (Chosun University, Korea)

Sensors for Water Safety and Security .......................................................................................... Ashok Vaseashta (Institute For Advanced Sciences Convergence, USA)
Eric Braman (NUARI, USA)
Philip Susmann (NUARI, USA)
Yuri Dekhtyar (Riga Technical University, Latvia)
Kristine Perovicha (Riga Technical University, Latvia)
Sensor Networking and Applications

Chair: Peter Jansson

iOS Hardware as a Sensor Platform: DMM Case Study ................................................................. 308
Daniel Brateris (Atlanticus Innovations, USA)
Dwight Bedford (Rowan University, USA)
David Calhoun (Rowan University, USA)
Aaron Johnson (Rowan University, USA)
Nikolas Kowalski (Rowan University, USA)
Kelli Martino (Rowan University, USA)
Thomas Mukalian (Rowan University, USA)
Justin Reda (Rowan University, USA)
Anthony Samaritano (Rowan University, USA)
Robert Krchnavek (Rowan University, USA)

Temperature Sensor Tag for Passive UHF RFID Systems .......................................................... 312
Juha Virtanen (Tampere University of Technology, Finland)
Leena Ukkonen (Tampere University of Technology, Finland)
Toni Björninen (Tampere University of Technology, Finland)
Lauri Sydänheimo (Tampere University of Technology, Finland)
Atef Z. Elsherbeni (The University of Mississippi, USA)

Non-Contact Heart Rate Detection Using Periodic Variation in Doppler Frequency ................ 318
Masatoshi Sekine (Oki Electric Industry Co., Ltd., Japan)
Kurato Maeno (Oki Electric Industry Co., Ltd., Japan)

Photovoltaic Module Shading: Smart Grid Impacts ................................................................. 323
Peter Mark Jansson (Rowan University, USA)
Kevin Whitten (Rowan University, USA)
John L Schmalzel (NASA Stennis, USA)

AUTHOR INDEX .......................................................................................................................... 334