



# ISSNIP

Bimonthly Newsletter

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## Foreword

Dear fellow researchers,

ISSNIP '08 is drawing near. In this issue, we give a little preview of the conference. Immediately before the conference, we have a Collaboration Day that lets members of the research network to come together and present their research. We will also review some past events, especially those events co-organized by us with the European SENSEI consortium. We also have a couple of interesting announcements to make.

For those of you who are attending the conference, I look forward to seeing you there.

Best regards,  
Palaniswami

## ISSNIP 2008 Preview

The conference committee has organized an exciting technical program, which includes plenary sessions, technical presentations, and workshops. All accepted papers were peer reviewed based on full-length paper submissions. Submissions were received from thirty three countries comprising 391 authors: 240 (61.4%) from the Asia-Pacific Region, 121 (30.9%) from Europe, Middle East and Africa, 27 (6.9%) from North America (USA and Canada), and 3 (0.8%) from Latin America. Accepted papers came from 26 countries, with 292 authors: 196 (67.12%) authors from the Asia-Pacific Region, 69 (23.63%) from Europe, Middle East and Africa, 24 (8.22%) from North America, and 3 (1.03%) from Latin America. The conference program is organized around a number of symposiums, which focus on particular areas and application of sensor networks and information processing. The plenary talks have been chosen to complement the symposium themes.

ISSNIP 2008 offers 6 plenary talks (more info at [http://www.elec.uow.edu.au/issnip2008/plenary\\_sessions.htm](http://www.elec.uow.edu.au/issnip2008/plenary_sessions.htm))



**Prof. Zygmunt J. Haas** received his B.Sc. in 1979, his M.Sc. in 1985, and his Ph.D. in 1988, all in EE. After earning his Ph.D. from Stanford University, he joined the AT&T Bell Laboratories in the Network Research Area. There he pursued research in wireless comm., mobility management, fast protocols, optical networks, and optical switching. In August 1995, he joined the faculty of the School of Electrical and Computer Engineering at Cornell University, where he is now a Professor. He heads the Wireless Network Laboratory ([wnl.ece.cornell.edu](http://wnl.ece.cornell.edu)), which is an internationally recognized group with extensive research contributions in the area of Ad Hoc Networks and Sensor Networks.

### Title: Stochastic Routing for Sensor- and Ad Hoc-Networks

**Speaker:** Prof. Zygmunt J. Haas (Cornell University, U.S.A.)

**Abstract:** The past couple of decades have been an exciting time in networking research. We saw many new emerging technologies, on the physical-layer and on layers above it. In this talk, I will survey three such relatively new networking technologies: the Ad Hoc Networks, the Sensor Networks, and the Delay-Tolerant Networks. I will discuss how these technologies evolved, how they differ one from the other, and assess their

technology-transfer potential. Most of the talk will concentrate on a number of

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selected theoretical and practical challenges in making these technologies attractive for potential industrial exploitation.

## Title: Design of the Human-Symbiotic Robot: TWENDY-ONE

**Speaker:** Prof. Shigeki Sugano (Waseda University, Japan)

**Abstract:** The development of human friendly and intelligent robots is greatly expected for future aging societies. Such robots are distinctively called Human-Symbiotic Robots. They must have abilities coexisting in the behavioral space, working space, and communication space with human. In designing of the human-symbiotic robots, capabilities of ensuring safety while interacting with human must be given top priority.

## Title: Emerging Technologies for Indoor Wireless Sensor Networks

**Speaker:** Prof. Stuart Milner and Prof. Christopher Davis (University of Maryland, U.S.A.)

**Abstract:** This talk focuses on low cost wireless networking platforms (motes), which consume low power and operate in a network centric manner. Entire systems, including processors, software, protocols, power, sensors, and wireless media, are projected to cost less than \$100 and include optical wireless and RF media that can operate at data rates from b/s to Gb/s. Using processors and protocols that can interoperate with Ethernet backbones, the sensor systems can be ubiquitous and standards-based.

## Title: Intelligent Sensing Using Computation on Readout

**Speaker:** Prof. Ralph Etienne-Cummings (Johns Hopkins University, U.S.A.)

**Abstract:** Biology provides a number of examples of at or near sensor information processing. This particularly true in vision, where complex scene features are extracted right at the eyes of many insects and animals. These intelligent sensors, which are collective called neuromorphic vision systems when mimicked in engineered hardware, are ideal for mobile applications because they promise compact

computational sensing at lower power consumption compared to the traditional imager/ADC/CPU systems. These properties are particularly important for unmanned aerial vehicles and other mobile applications. We present current-mode low noise imaging, which is typically difficult to realize, and computation-on-readout imaging processing for stereopsis and motion estimation. We discuss how these processed images can be used for guiding and controlling autonomous mobile robots.

## Title: Neuroimage Informatics to Understand the Developing Brain

**Speaker:** Prof. Simon K. Warfield (Harvard Medical School, U.S.A.)

**Abstract:** In the last trimester before birth, the developing human brain undergoes tremendous changes as it grows. Premature birth during this period is associated with an increased risk of adverse outcomes, with up to 50% of very low birth weight infants going on to develop cognitive and motor deficits.

The analysis of magnetic resonance images has a crucial role to play in characterizing normal brain development, and in understanding the impact of early brain injury upon the path of later brain maturation. However, there are a number of unique challenges in quantitatively assessing early brain MRI due to the limited contrast between different types of tissue, the rapid progression of brain maturation, and the logistical challenges of imaging newborn infants. Particular challenges include overcoming the effects of image acquisition artifacts, imaging system noise, and patient-specific normal and pathological variability.

Advances in image acquisition and medical image computing algorithms now enable sophisticated characterization of early brain development. We will present recent work in developing and evaluating

image analysis algorithms to improve our capacity to characterize early brain maturation and early brain injury and to assess potential therapeutic interventions.

## Title: Applications of Wireless Sensor Network to Wildlife Research



**Prof. Shigeki Sugano** received the B.S., M.S., and Dr. of Engineering in Mechanical Engineering in 1981, 1983, and 1989, respectively, from Waseda University. From 1987 to 1991, he was a Research Associate in Waseda University. Since 1991, he has been a Faculty Member

in the Department of Mechanical Engineering, Waseda University, where he is currently a Professor. From 1993 to 1994, he was a Visiting Scholar in the Mechanical Engineering Department, Stanford University. Since 2001, he has been a Director of the Waseda WABOT-HOUSE laboratory. He is a member of the Humanoid Robotics Institute of Waseda University. His research interests include human-symbiotic anthropomorphic robot design, dexterous and safety manipulator, and human-robot communication.



**Speaker:** Prof. Prabhat Ranjan (Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar, India)

**Abstract:** Development of Wireless Sensor Network (WSN) is expected to change the way data was being gathered in many applications. However, the goal of deploying millions of WSN nodes requires more technological development to achieve the power consumption, size and cost requirements. So far, WSN deployments have been very few due to these constraints. However, by relaxing some of these constraints, we can start to deploy WSN to various fields to gain experience and at the same time make an impact in the way data is currently gathered in that field.

## Title: Miniaturized Ion-selective Electrodes: A Powerful Tool in Studies of Events in Single Cells

**Speaker:** Prof. Prof Roland De Marco (Nanochemistry Research Institute, Department of Applied Chemistry, Curtin University of Technology, Australia)

**Abstract:** Following a paradigm shift in ion-selective electrode (ISE) research arising from Ernő Pretsch's seminal paper in 1997, this research field has been re-invigorated, and it is now possible to conduct ISE analyses with an unprecedented selectivity and sensitivity (i.e., 10<sup>-10</sup> M and discrimination of ions by several orders of magnitude) compared to alternative analytical methodologies. Consequently, there are new technologies that deliver robust, reliable and miniaturized all solid-state ISEs, and these sensor devices have been used in the monitoring of intracellular fluid, as well as ion efflux events from ion channels. In this paper, the author will discuss the development and evaluation of a new microelectrode technology platform for miniaturized ISEs, and he will present an overview of research on ISEs in the monitoring of events involving ions in single cells.

## ISSNIP 2008 Collaboration Day

Immediately preceding this year's ISSNIP conference, the Research Network is holding a Collaboration Day. This follows on from last year's highly successful Chief Investigator's meeting. The meeting will be held at the

conference venue on Sunday December 14th. The program will commence at 10am (morning tea is being served at 9.30am) with a selection of presentations by key ISSNIP researchers through the morning. Once again a poster session will take place after lunch, followed by a discussion forum. The poster session is an opportunity for ISSNIP research groups to showcase their expertise and current project activities, as well as provide a forum for the generation of new collaborative links. A detailed program will be available on the Network website (<http://www.sensornetworks.net.au>).

## SENSEI-ISSNIP Workshop at ICT-Mobile-Summit'08



A joint SENSEI-ISSNIP workshop entitled "Wireless Sensor and Actuator Network Research on Opposite Sides of the Globe" took place in Stockholm on May 9th 2008, as a pre-conference event for the ICT-MobileSummit 2008, 10 - 12 June 2008, Stockholm, Sweden. A delegation of ISSNIP researchers from The University of Melbourne, Victoria University and the University of Queensland took part in the workshop, consisting of presentations from Australian and European researchers followed by a poster session. The highly successful meeting saw the progression of talks exploring collaborative opportunities between the respective research groups. The following papers have been presented:

*Ad-Hoc Wireless Sensor Network Localization using Support Vector Regression*

A. Shilton, B. Sundaram, M. Palaniswami

*System Level Optimisation and Design for ULP Radios: From an IEEE 802.15.4 Compliant SoC to a Multi-standard Reconfigurable Design*

C. Bernier, F. Dehmas, E. de Foucauld, F. Hameau, L. Lolis, E. Mercier, L. Ouvry, M. Pelissier and P. Vincent

*A Framework for the Management of Wireless Network Islands through Dynamic Network Reconfiguration*

N. Bui, G. Zanca, M. Rossi, M. Zorzi



### *System Concepts, Interactions and Technical Challenges in the SENSEI system*

A. Gluhak, M. Bauer, V. Stirbu, T. Bauge and M. Johansson

### *Towards Activity Recognition in Service-Oriented Body Area Networks*

R. Marin-Perianu, C. Lombriser, M. Marin-Perianu, P. Havinga and Gerhard Troester

### *Sensor Network Implementation Challenges in The Great Barrier Reef Marine Environment*

S. Rajasegarar, J. Gubbi, O. Bondarenko, S. Kininmonth, S. Marusic, S. Bainbridge, I. Atkinson, M. Palaniswami

### *Secure Code Distribution in Wireless Sensor Networks*

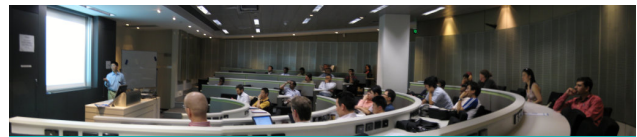
Y.W. Law, J. Sing, B. Kidd, S. Marusic

## Visit by Dr Wolfgang Schott of IBM Zurich

Dr Wolfgang Schott was on sabbatical leave at Deakin University and the University of Melbourne from September to October. Dr Schott was working on the attack/failure recovery problem of geographic routing with Robin Doss of Deakin University, and on secure routing with Yee Wei Law of the University of Melbourne.

## ISSNIP 2008 Summer School – Challenges and Directions for Sensor Networks

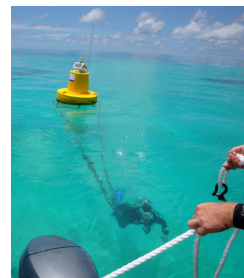
The ISSNIP-SENSEI Summer School was held at the University of Melbourne on the Wednesday November 12th and Thursday November 13th, 2008. The summer school encompassed a range of topics related to sensor networks technology, current work and ongoing challenges. Featuring leading speakers from European SENSEI project (specifically CEA-Leti, France; University of Oulu, Finland; Ericsson, Ireland; CFR, Italy) and Australia (University of Melbourne (CSSE and EEE), Deakin University, Daintree Networks). The event saw attendees from The University of Melbourne, RMIT, Deakin University, James Cook University, University of Adelaide and Victoria University. Concluding with a discussion forum on the critical and challenges and future directions for sensor networks research, the summer school provided valuable insights for research students, post-docs and academics alike into this interdisciplinary field.



## GBROOS Site Visit



November saw the first maintenance run on the IMOS-GBROOS sensor network deployment off the University of Queensland research station at Heron Island (the Great Barrier Reef) by AIMS researchers, led by Scott Bainbridge. A delegation of European and University of Melbourne researchers was on hand to inspect the deployment and obtain a first hand overview of ongoing challenges. Valuable discussions were held on the future needs and collaborative opportunities associated with the ongoing development of the sensor network deployments on the Great Barrier Reef.



## Announcements

### ISSNIP Research Collaboration Awards

The ISSNIP Research Collaboration Awards program was undertaken in the latter part of the year. These awards were available for ISSNIP members and their research teams, to support the undertaking of collaborative research activities with research partners from another institution or industry partner (Australian or International). This program is directed towards research activities and

meetings with a view to producing joint publications and defined outcomes. The award winners included:

Hong Suk Lee, Central Queensland University, "Knowledge-based Advanced Segmentation Technique for Off-Line Cursive Handwritten Text Recognition," working with Brijesh Verma (CQU) and Dr. John Zakos, MYCyberTwin, Australia

Dr. Siddhivinayak Kulkarni, University of Ballarat, "Biometric Systems based on Computational Intelligence Techniques," working with Brijesh Verma (CQU)

Dr. Md. Rafiul Hassan, University of Melbourne, "A robust and scalable process to select features for high dimensional gene expression data based on Receiver Operating Characteristics," working with Professor Mohammed Atiquzzaman, University of Oklahoma and Prof. Rao Kotagiri.

Peter Pong, University of Melbourne/ Jacobs Australia, "Heterogeneous Fusion" working with Subhash Challa (NICTA), Mark Morelande (UniMelb) and Bill Moran (UniMelb)

Peter Mc Leod, CQU, "Fusion of clustering and neural network for the classification of benign and malignant patterns in digital mammograms", working with Dr. Rinku Panchal, Thales Group, Sydney, Australia and Brijesh Verma (CQU)

Pubudu Pathirana, Deakin University, "SLAM for a Distributed Swarm" working with Gamini Dissanayake (UTS) and Kate Smith-Miles (Deakin)

Sutharshan Rajasegarar, University of Melbourne, "Robust Communications for GBR Sensor Network Deployment," working with M. Palaniswami (UniMelb), Scott Bainbridge (AIMS)

Dr A. Khandoker, University of Melbourne, "Automated assessment of diabetes disease progression", working with Dr Herbert F. Jelinek (Charles Sturt University), Dr R. Xu (Charles Sturt University); A/Prof I. Spence (University of Sydney); Prof J. Russell (Northside Clinic: Eating Disorders Program, Greenwich, Australia and University of Sydney); M. Palaniswami (UniMelb); Dr M. Prinz (Medical University of Vienna); Dr N. Melosevic (University of Belgrade, Serbia)

## ISSNIP Industry Affiliates Program

The Research Network is preparing to launch an Industry Affiliates Program. The program is designed to further facilitate the links between academia and industry through the ISSNIP framework. It is an opportunity for the numerous industry partners already involved in collaborative work with ISSNIP researchers to highlight aspects of their business of interest to the sensor networks research community. Similarly, it will provide a focal point for those seeking to form new collaborative links.

Joining the program will deliver opportunities to industry partners to raise the profile of their work amongst the vast international network of researchers that is ISSNIP. This will occur through feature articles in ISSNIP newsletters and website, sponsorship opportunities for ISSNIP events, notification of upcoming ISSNIP activities and industry focussed workshops and seminars.

To build on the already strong foundation of industry collaborations within ISSNIP, we ask that you send us details of your existing industry partners, so that they may be invited to join the program. Please endeavour to this by the end of January

## New Website

Our new ISSNIP website will be launched on the 14<sup>th</sup> December 2008: <http://www.issnip.unimelb.edu.au>

## Reminder

Please submit details of 2008 activities by your group so that these can showcased in the annual report and on the new website. This includes where applicable:

- new projects undertaken
- publications
- awards
- media exposure
- grants

## Editorial Board

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