



ARC Communications Research Network

Newsletter August 2006

Convenors Report

Welcome to the August ACoRN Newsletter, which features news from Monash University. We are grateful to the ACoRN local representative A/Prof. Jean Armstrong for organising an interesting collection of profiles and activities from Monash.

Big thanks are also extended to Aruna Jayasuriya and Steven Gordon, University of South Australia, Lavy Libman, NICTA and John Papandriopoulos, University of Melbourne for their joint efforts in making the inaugural *Early Career Researcher Workshop on Wireless Multihop Networking* a great success. The two-day event featured plenary talks by senior researchers, as well as technical sessions and poster sessions, presenting accepted papers from ACoRN students and ECRs. As an ACoRN-first, the workshop offered live webcast of the presentations, courtesy of NICTA.

Looking ahead, we are now getting close to the inaugural NEWCOM-ACoRN Joint Workshop in Vienna, Austria. The event opens on September 20th with two tutorials on "*Information Theory for Relaying and Cooperation*", presented by Dr. Gerhard Kramer, Bell Laboratories, USA, and "*Measurement and modeling of wireless propagation channels for MIMO and UWB*," presented by Prof. Andreas Molisch, Prof. Fredrik Tufvesson, Lund University of Technology, Sweden and Prof. Ernst Bonek, Vienna University of Technology, Austria, respectively. The tutorials are followed by the "*Wireless Technology Brokerage Event*," organised by the Innovation Relay Centres (IRC) Network, with the objective of bringing researchers from the two networks together with representatives from European research and ICT companies operating in the sector of wireless technology.

The following two days feature two plenary sessions, a panel session, several open NEWCOM department meetings, and 11 technical sessions with a total of 41 accepted paper presentations. The papers represent a good spread over the two networks with 11 papers from ACoRN, 28 papers from NEWCOM and two papers with joint authors from ACoRN and NEWCOM. The ACoRN papers come from Australian National University, Monash University, National ICT Australia, University of Adelaide, University of Newcastle, University of New South Wales, University of Queensland, and University of South Australia. A total of 20 ACoRN members will attend the workshop, supported by ACoRN central funds, with the hope that new collaborative links with our NEWCOM partners will be started and existing links will be strengthened.

Over the next six months, two school events will be organised and hosted by University of South Australia. Following the great success from last year, the second ACoRN Spring School is scheduled for November 13-16, offering three exciting tutorials over 3 ½ educational days. In addition, a week-long ACoRN Summer School will be held in connection with AusCTW 2007 in Adelaide, featuring the NEWCOM course "*Modern Channel Coding – Code Design and Iterative Decoding*," presented by two internationally renowned NEWCOM researchers.

As a final event for 2006, University of South Australia is attempting to organise an *ACoRN Workshop on Research Proposal Writing*, tentatively scheduled for December 4-8.

Lars K. Rasmussen
ACoRN Network Convenor

News from Monash University

Telecommunications Research and ACoRN at Monash

Monash University has a long history of research in the field of telecommunications. Staff from both the Faculty of Engineering and the Faculty of Information Technology are currently involved in a wide range of research projects spanning many aspects of telecommunications. ACoRN at Monash is based in the Department of Electrical and Computer Systems Engineering (ECSE) in the Faculty of Engineering but has members in both faculties.

In the past staff from ECSE were very involved in the MPEG standards and more recently in IP version 6 standards for mobile systems. ECSE is also very fortunate to have a 10x 16 Gb/s optically amplified long-haul transmission system has been donated by Siemens which can be used as a testbed for optical communication experiments <http://www.ctie.monash.edu.au/oc/#transxpress>.

In the last few years several staff have retired and a new generation of research active telecommunications staff have joined Monash. This has resulted in new and exciting research directions and collaborations within Monash, with other universities and with industry. The location of the Clayton campus, within easy reach of many telecommunications companies, and in some cases within walking distance, offers many opportunities for industry collaboration.

Recent successes of telecommunications researchers at Monash include a number of prizes for the work by Jean Armstrong and Arthur Lowery on optical OFDM. These included the prestigious \$100000 Peter Doherty prize for innovation and the ICT prize, for the best ICT commercialisation opportunity.

<http://www.monash.edu.au/news/newsline/story/913>. Armstrong and Lowery (both ACoRN members) by combining their expertise in OFDM and optical systems have shown how OFDM can be modified to suit optical communications. There have been a number of recent ARC successes including Discovery Project on Chipless RFID in collaboration with CSIRO Molecular Sciences to Dr. Nemaï Karmakar and Linkage grants in the most recent round to Dr Le Nguyen Binh and Dr Nemaï Karmakar for work in optical and wireless communications respectively.

Short profiles of Monash ACoRN staff members and the groups they lead.

Associate Professor Jean Armstrong

Jean Armstrong rejoined Monash in 2004, after ten years at La Trobe University. She had previously held academic positions at Monash University and the University of Melbourne. Her research is mainly in the area of digital communications and over the last decade most of her work has been on OFDM a field in which she has many highly cited papers and a number of patents at national or international stage. In 2005, in collaboration with Arthur Lowery she showed how OFDM could be effectively applied to optical communications. She supervises a number of postgraduates, mainly on OFDM topics. Current ACoRN members among her group include Khai-zuran Abdullah (Zuran), Shoba Akula, Himal Suraweera, Xia Li (Summer) and Shuang Tian (Tim).

Dr Tsun Yue Ho

Tsun Yue Ho received his B.E. degree in Electrical and Electronic Engineering (first class Hons) from the University of Canterbury, Christchurch, New Zealand, in 2001 and his Ph.D. degree from the Australian National University, Canberra, Australia, in 2004. He joined the Department of Electrical and Computer Systems Engineering, Monash University, Australia in 2004, as a Lecturer. His research interests include Signal Processing, Statistical Inference, Wireless Communications, Channel Modeling, MIMO Systems and Channel Theory. Some of his recent research focuses on velocity estimation based on time delays, Doppler frequency shifts and multipath scattering distributions. Some results from this research were presented at Globecom 2005 and conference attendance was sponsored by the ACoRN international conference attendance grant.

Dr Nemai Chandra Karmakar

Nemai Karmakar joined Monash in 2004. He had previously worked at Nanyang Technological University Singapore. His recent research includes work on electromagnetic bandgap structures, defected ground structures, planar phased array antennas and RFID. In 2005 he was a recipient of an ACoRN International Travel Fellowship to attend the 2005 IEEE International Antenna and Propagation Symposium in Washington DC, USA and the South Carolina State University in Columbia, USA

He supervises a number of postgraduate students including ACoRN members Shamim Shahriar Hossain and Sushim Roy.

Professor Arthur Lowery

Arthur Lowery was appointed to a *Chair of Electrical and Computer Systems Engineering*, at Monash in September 2004. Before that he had been a leader in the Photonic Design Automation (PDA) industry, having successfully commercialized his fundamental research in semiconductor laser modelling.

http://www.vpiphotonics.com/pda_design)

His research interests include Optical OFDM, Design Automation, Photonic Circuits and Systems and Laser instrumentation design. He supervises a number of postgraduate students including ACoRN member Shunjie Wang.

Dr Ahmet Sekercioglu

Ahmet Sekercioglu joined Monash in 2000. He was the program leader of the Applications Program of Australian Telecommunications Cooperative Research Centre (ATCRC - www.atcrc.com). The Applications Program team, in collaboration with Ericsson, Panasonic and Samsung researchers, have developed and worked towards standardization of fast handover protocols for delay-sensitive traffic in Mobile IPv6 networks. His current research interests include development of simulation tools for modeling very large communication networks, congestion control, dynamic routing and traffic modeling, and simulation and performance analysis of intelligent algorithms for communication network control. He supervises a number of postgraduate student including ACoRN members Ahmad Belhouli, Leon Ou Liang and Saied Mohammed.

Associate Professor Bin Qiu

Associate Professor Bin Qiu currently serves as the Chairman of Signal Processing and Communication Electronics (SPCE) committee in the IEEE Communications Society. He is a TPC co-chair for the Symposium on SPCOMM in IEEE Globecom 2006, which will be held in San Francisco, USA. He is also a senior member of the IEEE.

Bin leads the AVIPAC research group at the Faculty of IT, Monash University. The group consists of six full-time academic staff and several associates from industry as well as other universities in Australia and overseas. Their current research topics include advanced protocols for wireless communication systems, active queue management for the efficiency and security in communication networks, and intelligent signal processing for communication systems.

ACoRN supported activities at Monash University.

Monash researchers have benefited from many of the programs offered by ACoRN.

ACoRN directly supported a number of postgraduate and early career researchers to attend the ACoRN 2005 Spring School on Coding and Information Theory in Adelaide, the Australian Communications Workshop in Brisbane, and the CUBIN/ACoRN Information Theory Workshop in Melbourne. These stimulated many new research ideas and encouraged networking with many other Australian researchers and some joint publications have resulted

In 2005 Dr Nemai Karmakar was awarded an International Travel Fellowship to visit the University of South Carolina, Columbia to work with Dr M. Ali.

In 2006 Professor Steve McLaughlin of the University of Edinburgh visited Monash sponsored by ACoRN. As a result of this visit, Tian Shuang a Monash postgraduate will spend six weeks later this year at Edinburgh to continue the collaborative work on OFDM. This visit is also supported by ACoRN.



ACoRN Member Profile

Ahmad Belhouli



Ahmad Belhouli graduated from Etisalat University College of Engineering in Sharjah, at the United Arab Emirates (UAE) where he received his B.Eng. honours degree in Telecommunications Engineering. During his undergraduate studies he received the Rashid Award for academic excellence and the Al-Owais award for scientific research. Upon graduation in 2000, he worked as a Mobile Systems Engineer at Emirates Telecommunications Corporation (Etisalat) where he was responsible for frequency planning of new cell sites and optimisation of existing sites through cell trace analysis. In 2001 he received a postgraduate scholarship award from Etisalat to pursue his postgraduate studies in Australia. In 2003, he received his Master's degree in Telecommunications Engineering from the University of Melbourne.

Since 2003, he pursued his PhD degree in Telecommunications Engineering at the department of Electrical and Computer Systems Engineering in Monash University, Melbourne. He is working under the supervision of Dr. Ahmet Sekercioglu, Project Leader of the "Next

Generation Internet" ATcrc research program. He is co-supervised by Dr. Nallasamy Mani of Monash University, Melbourne. Apart from his postgraduate scholarship from Etisalat, his work is partly supported by ATcrc.

Ahmad's research revolves around End-to-End Quality of Service (QoS) Provisioning in Fourth Generation (4G) All-IP Wireless Networks. 4G wireless networks are expected to deliver real-time services such as Voice-over-IP (VoIP) and Video-over-IP (VIP) over an IP-backbone interconnecting various wireless access technologies such as the World Interoperability for Microwave Access, Wi-Max (802.16) and Mobile Broadband Wireless Access, MBWA (802.20). Resource Reservation Protocol (RSVP) is a network-control protocol used to guarantee necessary level of QoS for such real-time services. However, RSVP was initially designed with end-systems whose IP addresses do not change. Once mobility of the end-system is allowed, the dynamically changing IP addresses have significant impact on RSVP performance. Ahmad is working specifically on developing methods and protocols to minimize the interruption in QoS experienced when a Mobile Node handoffs from one access point to another. VoIP and VIP are used to test the network's capability to deliver rich multimedia content to the mobile users. Performance analysis is conducted using R-factor and Peak-Signal-to-Noise-Ratio (PSNR) calculations to derive the Mean Opinion Score (MOS) as perceived by the end user's terminal. The framework is designed and validated using parametric simulations developed using the network simulator 2 (ns-2).

Ahmad's research contributions have been well received at several international and national conferences including the two premier conferences of the field: IEEE International Conference on Communications 2006 (ICC'06 - Istanbul, Turkey) and the IEEE Global Telecommunications Conference (Globecom'06 - San Francisco, USA). He is currently preparing an article to be submitted to the IEEE Transactions on Mobile Computing and another to the Wireless Communications and Mobile Computing journal.

Ahmad is a reviewer for the IEEE Communications Letters, he is a student member of the IEEE, and is also a member of the ARC Communications Research Network (ACoRN) from which he received a grant to present his work internationally

ACoRN Events & News

ACoRN Spring School 2006 Coding, Multiple User Commu- nications and Random Matrix Theory

Adelaide - November 13-16 2006,

Taking advantage of recent efforts in textbook and course preparations by ACoRN researchers, ACoRN is proud to present the second ACoRN Spring School 2006. A broad mix of physical layer technologies and analysis techniques will be presented at a tutorial level intended for post-graduate students and researchers working in related areas. The highly relevant hot-topic research areas covered in the ACoRN Spring School 2006 are:

- Random matrix theory and its applications in MIMO systems;
- Low-density parity-check codes;
- Coordinated multiuser communications;

The tutorials will be presented by resident and international experts:

- Laura Cottatellucci, ITR, University of South Australia and Merouane Debbah, Institut Eurecom, France
- Sarah Johnson, University of Newcastle
- Alex Grant, ITR, University of South Australia,

ACoRN Workshop on Research Proposal Preparation

December 4-8 2006

This workshop is mainly intended for early-career researchers with little or no experience in preparing research proposals for competitive grant schemes. The focus of the workshop will be on preparing research proposals for the ARC Discovery Grant Scheme.

Delegates of the workshop will be required to submit a three-page research proposal draft prior to the workshop. The draft proposals will be the basis for exercises throughout the workshop. The intention is for each delegate to have a 10-page draft proposal completed by the end of the workshop.

ACoRN Summer School 2007

Modern Channel Coding – Code Design and Iterative Decoding

Adelaide - January 29 to February 2 2007

In connection with AusCTW 2007, ACoRN is bringing a NEWCOM school to Australia. ACoRN is inviting [Dr. Jossy Sayir](#), Telecommunications Research Centre, Vienna, Austria and [Dr. Ingmar Land](#), University of Aalborg, Denmark to Adelaide to present their course on modern channel coding.

This course will teach the principles of modern channel coding: code concatenation and iterative decoding. Soft-in soft-out decoding and decoding on factor graphs (the ingredients of iterative decoders) will be addressed. The encoding and decoding structures of parallel concatenated codes (called Turbo Codes), serially concatenated codes, low-density parity-check codes (already invented in 1964), and repeat-accumulate codes will be explained. Extrinsic information transfer (EXIT) charts will be introduced to characterize the decoding behavior and to design the codes. The course will be restricted to linear binary channel codes and memoryless communication channels. The principle of iterative decoding, however, is very general and can easily be transferred to other iterative receiver structures.

Local ACoRN Representatives

Queensland University

John Homer has accepted a research position with Defence/DSTO.

Vaughan Clarkson has taken over the role of Local ACoRN Representative at UQ

University SA

Steven Gordon has accepted a position as Assistant Professor at Thammasat University in Bangkok, Thailand.

Ian Holland has taken over the role of Local ACoRN Representative at UniSA

Both John and Steven have played vital roles in establishing the "ACoRN culture" at their respective universities.

Welcome to Vaughan and Ian.

WORKSHOP REPORT

Early Career Researcher Workshop on Wireless Multihop Networking

This workshop, the first ACoRN workshop aimed at ECRs in a specific research area, was a great success with 38 researchers and students meeting up at NICTA in Sydney. The interest well exceeded our initial expectations. Of the total of 38 delegates, 4 were from Victoria, 17 from New South Wales, 2 from Queensland, 14 from South Australia and 1 from New Zealand.

The goal of the workshop was to allow Early Career Researchers in Australia, including postgraduate students, to present and discuss their current research directions, identify peers working on similar topics, and facilitate the process of establishing successful collaborations. The workshop format enabled this with at least the 10 minutes set aside for questions and discussion of each presentation, as well as the breaks, fully utilised by attendees.

The feedback from workshop delegates has been very positive. The delegates found the workshop was a good opportunity to getting up to speed on multihop networking research activities in Australia, and for identifying opportunities for future collaboration across ACoRN organisations.

NICTA provided free wireless Internet access to the delegates and a live webcast of presentation slides and audio from the presenters. Also the venue and all local arrangements were provided by NICTA free of charge to the workshop.

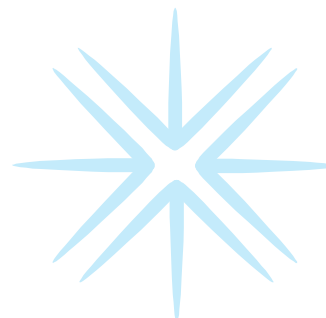
The event was organized by Aruna Jayasuriya & Steven Gordon, UniSA, Lavy Libman, NICTA and John Papandriopoulos, Uni of Melbourne



Lavy Libman, Mosche Zukerman and Aruna Jayasuriya



Xia(David) Li and Yi Chi Lin



Opportunities

Nanoradio - The power is yours

- R&D into Next Generation Wireless Technologies
- Cutting Edge Signal Processing Implementations
- Exciting Startup Company

Nanoradio AB (www.nanoradio.com) is a fabless semiconductor company with the mission to create value from its core competence in building components and systems for wireless applications by providing the best solutions and components in the market. Nanoradio AB was founded in March 2004 and has offices in Sweden, Korea, Japan, USA and Australia.

Nanoradio AB currently have the need for two Signal Processing Algorithm R&D Engineers to be involved in the re-research, design and development of PHY and/or MAC algorithms for implementation into ASIC solutions. The successful application will be located in Melbourne, Australia and report directly to the R&D manager.

To match these exciting opportunities to work on leading edge technologies, a very attractive salary package will be offered. To apply for this position please send an application letter (no more than one page) and a CV to jobs@nanoradio.com. Applications close on Friday 8th of September 2006.

Signal Processing Algorithm R&D Engineer

Required Skills

- Knowledge and understanding of MIMO/OFDM techniques and associated algorithms required to implement wireless modems.
- Knowledge of radio communication PHY or MAC protocols such as: 802.11n, WiMax, WCDMA or 3G evolution.
- Solid mathematical skills and the ability to apply these to solving of real world problems using DSP/FPGA/ASIC technologies.
- Excellent written and verbal communication skills
- Academic qualifications: PhD EE or Masters EE or >2 years of relevant Industry experience.

Highly Regarded Skills

- Software engineering principles including version control and object orientated programming methodologies.
- Algorithm implementation experience on embedded DSP, FPGA or ASIC.
- Well developed programming skills in Matlab and C programming languages
- Demonstrate the ability to work productively in a team environment when subject to defined project time schedules.

Senior Signal Processing Algorithm R&D Engineer

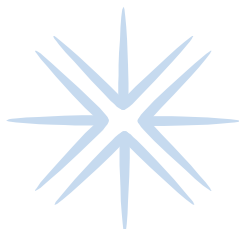
The senior nature of this position means that the candidate will also be required to provide technical leadership and guidance to other members of the team, and will take responsibility for parts of the design process including establishing and maintaining project schedules with the project manager.

Required Skills

- More than 5 years of Wireless Industry R&D experience with OFDM and/or MIMO and/or 802.11 MAC protocol.
- Academic qualifications: PhD EE or equivalent experience.
- Work productively in a team environment when subject to tight project time schedules.
- Solid mathematical skills and the ability to apply these to solving real world problems using DSP/FPGA/ASIC technologies.
- Highly developed programming skills in Matlab and C programming languages

Highly Regarded Skills

- Excellent written and verbal communication skills combined with experience in working on projects with team members located in different time zones.
- Algorithm implementation experience on embedded DSP, FPGA or ASIC.
- Knowledge of future radio communication protocols such as: 802.11n, WiMax, WCDMA or 3G evolution.
- Software engineering principles including version control and object orientated programming methodologies.
- Project management and experience with all phases of ASIC product development.





Win an Agere Internship! Valued at up to \$11,000

If you're an undergraduate student studying Electronic Engineering (or similar) then this could be your opportunity to gain valuable industry experience working with a cutting edge microelectronics design team. You could win a paid 12 week internship at Agere Systems Australia plus a \$2000 cash scholarship towards next year's study expenses. Eligible students will also receive an ACoRN travel grant.

To enter write a short project proposal exploring a current design challenge in the telecommunications or microelectronics field. Explain the design issues and why they are of interest. Discuss some strategies that could be used to address the problems and how you could contribute towards a solution. Your submission must include a reference from a member of academic staff. Each entry will be judged on merit.

Agere Systems is a global leader in semiconductors for storage, wireless data, and public and enterprise networks. The design team at North Ryde develops integrated circuits for 3G and personal broadband communications. The 3G Centre of Excellence is a major hub for wireless telecommunications R&D. For details on Agere Systems visit <http://www.agere.com>

CONDITIONS

1. Only undergraduate students currently studying Electronic Engineering (or equivalent) at a tertiary institution in Australia are eligible. Students must be continuing as an under- or post-graduate in 2007.
2. Entry will consist of a 1000 word project proposal, CV, academic transcript and a written reference from a University lecturer.
3. Prize consists of a 12 week paid internship at Agere Systems Australia, a certificate and a cash scholarship. The project you'll work on shall be defined by Agere Systems.
4. Prize winners may be eligible for a travel grant from ACoRN. See www.acorn.net.au. These grants (subject to ACoRN guidelines) can be used to offset travel and living expenses during the internship.
5. Applications should be sent to Alana Holmes at Agere by post or email to aholmes@agere.com. Applications close at 5pm 31 August 2006.
6. For more information contact Benjamin Widdup on (02) 8467 7715 or your local contact:

Call for Papers

Due Date	Event Name
15 Sept 2006	IEEE International Conference on Communications - Glasgow, Scotland, (ICC2007)
20 September 2006	IEEE Wireless Communications and Networking Conference (WCNC 2007) http://www.ieee-wcnc.org
5 November 2006	AusCTW 2007

Coming Events

Event Date	Event Name
31 August 2006	IEEE New Zealand Wireless Workshop 2006 mj.neve@auckland.ac.nz
11-14 September 2006	PIMRC 06 - Finland http://www.pimrc2006.org/
20-22 September 06	ACoRN NEWCOM Workshop – Vienna http://www.newcom-acorn.org/
9-12 October, 2006	ACE/NEWCOM Autumn School Space-Time Coding - Turin, Italy http://www.comelec.enst.fr/~ciblat/stbc_school/
13-17 November 2006	ACoRN Spring School http://www.acorn.net.au/event/springschool06/
4-8 December 2006	ACoRN Workshop on Research Proposal Preparation http://www.acorn.net.au/event/arcproposalworkshop/
11-13 December 2006	WITSP06 Hobart, Aust. http://www.dspscs-witsp.com/WITSP_06/WITSP2006.html
29 January-2 February 2007	ACoRN Summer School 2007 http://www.acorn.net.au/event/summerschool07/
5-7 February 2007	AusCTW2007
12-14 February 2007	Information, Decision and Control 2007 – Adelaide http://www.plevin.com.au/idc2007
11–15 March 2007	IEEE Wireless Communications and Networking Conference (WCNC 2007) -Hong Kong http://www.ieee-wcnc.org
24-28 June 2007	ICC2007 – Glasgow, Scotland http://www.icc2007.org/
26-30 November 2007	IEEE GLOBECOM http://www.comsoc.org/confs/globecom/2007/index.html

