



ARC Communications Research Network

Newsletter April 2006

Convenors Report

Welcome to the second ACoRN Newsletter of 2006. At the end of March, we submitted the first ACoRN Annual Report to the ARC. The report detailed and evaluated the activities in 2005, recognising success stories and identifying areas with room for improvements. Strategies, activities and new initiatives for 2006 were outlined, aiming at improving the performance of ACoRN. The report will be available from the ACoRN website soon.

The main success stories reported to the ARC were the ACoRN-NEWCOM joint collaboration agreement with joint exchange programs and the joint workshop in 2006, the two ACoRN school events attracting more than 100 students, and the priority of directing funding support towards students and ECRs with more than 80% of attendance grants being awarded to these groups. Within other areas a series of new initiatives are proposed for 2006.

The rate of expenditure by ACoRN Partner Organisations in 2005 did not reach expectations, leading to a significant roll-over of ARC funds and funds pledged by organisations. This was to some extent due to the slow start of ACoRN, getting streamlined application processes in place and getting the ACoRN Network Agreement signed. These issues have been resolved and we therefore do not expect any similar problems in 2006. The ACoRN central administration will monitor closely the rate of expenditure with an evaluation conducted mid-year. In case some partners are

still experiencing problems in terms of engaging with ACoRN, the central administration will work with particular partners in defining realistic budgets and action plans for reaching 2006 expectations.

Guidelines and templates with respect to 2006 local budgets will be distributed by the central administration, reflecting the priorities for this year. In return, ACoRN will expect to get an activity plan with corresponding budget from each Local ACoRN Representative. As many organisations did not reach the 2005 budget of pledged expenditure, ACoRN will further be requesting a detailed plan for additional funded activities from each relevant organisation. As decided last year, rollover pledged funds may not necessarily be subject to dollar-for-dollar matching, but must still be allocated to ACoRN activities. The rollover ARC funds created by under-spending, and thus no longer subject to matched funding, will be kept under central control and dedicated for rewarding active ACoRN partners.

The scale and focus of research on ACoRN Research Themes will be targeted in 2006, with the aim of creating research clusters within common research areas across the network. Specific workshop events in 2006 are targeted towards the research themes. Also, we will actively encourage smaller invited workshop events for bringing like-minded researchers together with the intention of forming smaller collaborative research groupings.

The level of Student and Researcher Mobility did not reach the expected level in 2005. As mobility in terms of longer-term research visits is a strong component in joint research collaboration, more focus will be directed towards these programs. It will be expected that at least one researcher, preferably an early career researcher, and one student from each partner organisation take on travel fellowships/scholarships in 2006. It will also be expected that ACoRN members attending international conferences with ACoRN support, will visit at least one international research group as part of the travel. In addition, ACoRN will introduce International and Domestic Linkage Prizes awarded twice a year, where students and ECRs are encouraged to submit papers accepted for presentation at domestic and international conference events. The best papers among submissions will be awarded a travel scholarship/fellowship to be taken in connection with the conference travel. In order to further facilitate the level of domestic mobility, ACoRN will compile and display on the ACoRN website a list of senior researchers willing to host researchers and research students from other organisations for visits of two weeks duration and above. Corresponding areas of research excellence and interest will also be included in the list.

In order for ACoRN and the ARC to be recognised for the funding support provided, ACoRN members awarded a conference attendance grant must acknowledge the ACoRN funding support in the published paper and display the ACoRN logo on their presentation slides. When subsequent journal papers are submitted and accepted for publication, the ACoRN support and the ACoRN membership should also be acknowledged.

In 2005, ACoRN only had one industry partner organisation, namely Agere Systems Australia. In 2006, we seek to expand on the number of industry partners in ACoRN. A portfolio of promotion material, specially targeting industry is being prepared. The target is to have at least three industry partners by the end of the year.

Public outreach has not been a high priority with ACoRN in 2005. In 2006 we plan to increase our activities in this direction. As a first initiative, ACoRN will sponsor the topic of Telecommunications on the NOVA website, published by the Australian Academy of Science.

All these new initiatives together with the existing program activities will be the basis for the 2006 ACoRN activity plans, which will hopefully allow ACoRN to provide even more benefits to our research community.

Lars K. Rasmussen
ACoRN Network Convenor

ACoRN-NEWCOM Workshop

ACoRN-NEWCOM Workshop 20-22 September 2006, Vienna, Austria

Remember our joint ACoRN-NEWCOM workshop in September. The paper submission deadline has been extended to 7th May. Make sure to get your papers submitted on time.

In order to ensure a strong ACoRN presence at the ACoRN-NEWCOM workshop, ACoRN will make additional central ARC funds available for supporting attendance at the event. This support will be based on 100% funding from the central ARC funds with no matching required by locally pledged funds. These funds are unfortunately only available for ARC-eligible organisations, ie, the university ACoRN partners.

ACoRN will allocate central funds to each eligible organisation for supporting up to three ACoRN members attending the event. The support will be in terms of reimbursement of actual expenses up to a maximum of \$4000 per attending member. At most one member will be eligible to receive central funding support without having a paper to present. In order to receive further central funding support, each additional member must be presenting a paper at the workshop. It is encouraged that at least one researcher and one research student are attending the event.

All ACoRN partner organisations are strongly encouraged to support (additional) members attending the event based on the existing dollar-for-dollar scheme. Many partner organisations did not spend the locally pledged funds for 2005, so this is a good opportunity to put the roll-over funds to good use.

For information about the workshop, go to the link: <http://www.newcom-acorn.org/>



Three Great Events in Melbourne in May

MIMO from Theory to Practice

4th & 5th May 2006

Victoria University will be hosting a workshop on "MIMO Antenna Systems - From Theory to Practice" in connection with the VTC 2006 in Melbourne. This workshop brings together some of the world experts in the field to present the latest developments in MIMO.

The workshop is suitable for researchers seeking new avenues of research endeavour in MIMO and its related fields. It is also suited to industry R&D personnel who are thinking of implementing or deploying MIMO like systems in the future, since many of the speakers have first hand practical experience. There will also be some introductory material to get engineers and early researchers, entering the field for the first time, quickly up to speed.

It is approximately 10 years since the trail blazing work of Teletar and Foschini, published in issues of the Bell Lab Technical Journal, unleashed the Multiple Input Multiple Output (MIMO) research explosion on the world. MIMO-like features are now being included in a number of key standards, e.g., UMTS has already standardised the Alamouti block coding system. This workshop brings together some of the world experts in the field to present the latest developments in MIMO. More information is available at <http://www.telecommunications.crc.org.au/MIMO-Workshop.html>

63rd IEEE Vehicular Technology Conference

The big event in May is the 63rd IEEE Vehicular Technology Conference (VTC). More than 600 technical papers will be presented at the event, which will also include 5 plenary speakers, 3 panel sessions and 4 tutorials. General Chair (and ACoRN member) A/Prof Fu-Chun Zheng has done an excellent job coordinating the event, while the TPC Chair Prof David Everitt put together an attractive program of 615 papers out of a total of 1364 submitted papers. ACoRN is a proud major sponsor of VTC in Melbourne.

ACoRN/NICTA Wireless winter school

11th & 12th May 2006

The 2nd Wireless Winter School (WWS) is for students and researchers, who are interested in Wireless Communications and Signal Processing. Its goal is to present leading-edge topics, which are at the core of modern communication systems.

The School comprises a combination of half and full day tutorials together with invited talks from leading experts. This intensive two day series of short courses and talks is designed to make maximum use of your time with us. It also provides our expert presenters with the opportunity to demonstrate leading research and to teach contemporary techniques that are in use across the spectrum of wireless signal processing.

This years school features a unique program of International experts lecturing on current hot topics in wireless communications. Exploring the "invasion" of International experts attending the VTC, the school is presenting research celebrities such as Prof. Fumiyuki Adachi, former head of research at DoCoMo Japan, and Prof. Lajos Hanzo, author of 10 books and more than 500 papers on wireless communications. No student should miss this event. For more information, visit the school website at <http://wws2006.cecs.anu.edu.au/>.

What's news!

RFID open to attack

Researchers at Edith Cowan University have shown the ease in which [RFID tags can be compromised using cheap radio transmitters](#). A denial-of-service attack on the tags can cause them to enter an error state then reset, allowing data such as price, location and destination to be changed. The tests were performed on the population Generation One tags, currently in use by the US Military and many RFID trials around Australia.

Telstra helps customers combat text message spam

Telstra is [introducing new measures to help customers who are targeted by unwanted premium text messages](#). Telstra consultants will contact Service Providers on behalf of customers to advise that services in dispute should be immediately stopped and help arrange refunds on services customers haven't intentionally requested. This will be backed by an education campaign to more than one million mobile customers offering advice on tackling and understanding unwanted premium text messaging services, after a tripling of complaints during the last 12 months.

Wireless sensors a CSIRO sensation

A [network of autonomous wireless sensors](#), known as flecks, have been trialed by the CSIRO over the last year. The flecks are battery and solar powered, and have been used to collect data such as temperature, soil moisture, water quality, humidity and solar energy levels. The flecks themselves form the network; data is transferred from fleck to fleck until it reaches a base station.

ACoRN Workshop

Early Career Researcher Workshop
on Wireless Multihop Networking

17-18 July 2006

Australian Technology Park,
Sydney

The aim of the ACoRN Wireless Multihop Networking workshop is to allow Early Career Researchers in Australia, including postgraduate students, to present and discuss their current research directions in the above areas, identify peers working on similar topics, and facilitate the process of establishing successful collaborations. The workshop will have a single track of 9-12 presentations, with significant time after each presentation for questions, discussions, and uncovering any similarities with other ongoing works. The workshop will also feature keynote talks by senior researchers, a presentation on career development, and a poster session.

All papers will be included in the Proceedings of the workshop, which will be published online on the [ACoRN website](#). A complementary copy of the proceedings on CD-ROM will also be available to the participants.

For more information, visit the workshop website at.

<http://www.acorn.net.au/event/acornecrworkshop>

Congratulations

Congratulations

Congratulations to Albert Guillen i Fabregas, Laura Cottatellucci and Alex Grant, who have successfully received funding from the DEST International Science Linkages Scheme for a French-Australian Science and Technology (FAST) project on advanced concepts for future broadband wireless networks..

ACoRN Member Profile

Himal Suraweera



Himal A. Suraweera received the B.Sc. degree in Electrical and Electronics Engineering (First Class Honours) from the Peradeniya University, Peradeniya, Sri Lanka in 2001. He worked as an instructor in the communication laboratory at the Department of Electrical and Electronics Engineering from Dec. 2001-Dec 2002.

Himal is completing his PhD candidature in the Department of Electrical and Computer Systems Engineering at Monash University. He is working under the supervision of A./Prof. Jean Armstrong and the title of the thesis is "Synchronization effects, peak-to-average power ratio (PAPR) reduction and impulse noise mitigation for OFDM systems". From Apr. 2003 to May 2004 he was with the Department of Electronic Engineering at La Trobe University before moving to Monash University in 2004 June with his supervisor A./Prof. Jean Armstrong. He is a recipient of the International Postgraduate Research Scholarship (IPRS) awarded by the commonwealth of Australia and a Monash University Departmental Scholarship. He was also the recipient of Mahapola Higher Education Scholarship awarded by the higher education ministry of Sri Lanka (1997-2001) and a La Trobe University

Postgraduate Research scholarship (2003-2004 May). During his undergraduate studies he spent four months as a trainee engineering apprentice at the local and international sections of Sri Lanka Telecom, Colombo Sri Lanka.

Since commencing PhD studies in April 2003, Himal's PhD research has focused on four aspects of OFDM and MIMO-OFDM communication systems. He has contributed to 20 journal/conference papers during his PhD candidature. His contributions concerning synchronization aspects of OFDM include accurately characterizing the error performance under the influence of carrier frequency offset and phase noise impairments. This work has been extended to encompass space-time/space-frequency block coded OFDM schemes. His PAPR research aim was to understand the clipping effects in Alamouti OFDM systems. A novel discrete Fourier transform based clip and nulling filter with spectral masking was also proposed and the peak re-growth versus error performance tradeoff of this technique has been studied. His joint work in the area of impulse noise mitigation with A./Prof. Jean Armstrong resulted in categorizing the error behaviour of OFDM in the presence of impulse noise by extending the "noise bucket" concept. Furthermore a novel impulse noise mitigation algorithm based on decision directed estimation was proposed. Finally his work has concerned the study of the capacity of spatial multiplexing based MIMO-OFDM. Based on these preliminary studies, a Gaussian approximation for the MIMO-OFDM capacity distribution has been proposed. Further theoretical work in this area is also planned with A./Prof. Peter J. Smith at The University of Canterbury, New Zealand and Matthew McKay at The University of Sydney.

Himal has served as a technical reviewer for some journals in the field including IEEE Transactions on Wireless Communications and conferences such as IEEE ICC, Globecom, WCNC, VTC, PIMRC and AusCTW. He is also a co-author of two recent research papers that address topics of theoretical error degradation in OFDM due to phase noise and capacity enhancements of a distributed MIMO-OFDM system. These publications are to be presented at the upcoming IEEE Vehicular Technology 2006 Spring conference in May to be held in Melbourne.

His current research interests are in the areas of OFDM communications and cooperative/relay networks emphasis on MIMO systems, distributed space-time processing, synchronization for OFDM systems.

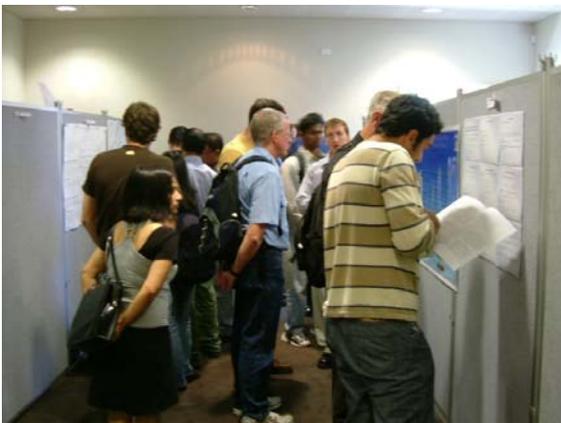
Workshop Reports

AusCTW 2006 Perth WA

AusCTW was another highly successful workshop. The poster sessions are the core of the conference, and provided a very good opportunity for networking between participants.

Congratulations to our student prize winners:

ITR Best paper award: Liang Chen for
Chen, Krongold, Evans, "An Adaptive Resource Allocation Algorithm for Multiuser OFDM"
WATRI Best poster award: Daniel Ryan for
Ryan, Collings, Clarkson, "Low Complexity ML Blind Reception for PAM and QAM"



The poster sessions were a good opportunity for networking.

Opportunities

SA Great - Premier's Science Awards

Nominations are now open for this year's Premier's Science Excellence Awards which aim to recognise and reward Excellence in Science and acknowledge commitment and skill in raising public awareness of science.

Awards will be presented in the following categories:

- Research leadership
- Excellence in Research for Commercial Outcomes
- Excellence in Research for Public Good Outcomes
- Science Education and Communication Excellence
- Science, Technology and Innovation Management Excellence

For more information on the awards program and to download a nomination form, please visit the [website](#) or [contact](#) SA Great on (08) 8211 8111. Nominations close at 5pm on **Monday 22 May 2006**.

Agere Internship Report

Agere Systems Australia Undergraduate Award for Excellence in Microelectronics Design and Telecommunications Engineering 2005-2006.



In 2005, ACoRN supported an ongoing internship program, initiated by Agere Systems Australia. ACoRN became a co-sponsor together with the Australian Electrical and Electronic Manufacturers' Association (AEEMA) for the Agere Systems Australia Undergraduate Award for Excellence in Microelectronics Design and Telecommunications Engineering.

The competitive internship programme is in its second year, but this is the first year that it has been promoted nationally. The standard of applicants was extremely high.

The winners were:

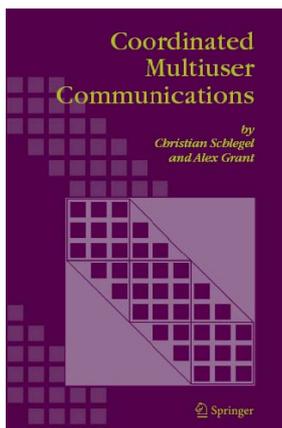
- [Natalia Galin](#), University of New South Wales
- [Jayant Baliga](#), University of Melbourne

Natalia and Jayant each have outstanding academic records, and submitted interesting and original project proposals, which demonstrated their aptitude for tackling challenging engineering problems.

They each undertook a 12 week salaried internship with the Agere's 3rd Generation (3G) Mobile Wireless R&D team, based in Sydney, and received cash scholarships from Agere Systems to support further studies. The travel grant for Jayant Baliga was funded primarily through Agere's annual pledge to ACoRN, with some additional funds from the University of Melbourne.

The programme enabled Natalia and Jayant to gain valuable industrial research experience. Natalia contributed towards the current activities of the product development team through an investigation of options for advanced receiver (RAKE replacement) algorithms for the High Speed Downlink Packet Access (HSDPA) mode of the 3G UMTS standard. Jayant undertook a theoretical study of a peak-to-average power ratio minimisation method with application to the long term evolution (LTE) of the current 3G standard. Both demonstrated very high aptitude for advanced development and research work. A direct outcome of this work was the draft of a patent application to be filed with the US patent office.

Agere intends to run the programme again nationally in 2006 with the continued support of ACoRN co-branding and assistance with the promotion of the programme to member organisations and provision of travel grants where required. The competition will be open to all senior undergraduate students intending to continue their studies in 2007. As in previous years, applicants will be required to write a short research proposal to demonstrate creativity and research aptitude. All applications must be supported by a referral letter from an academic. Further details for applicants will be publicised from June 2006.



Christian **Schlegel**, University of Alberta, Edmonton, Canada; Alex **Grant**, University of South Australia, Adelaide, Australia

Coordinated Multiuser Communications

Coordinated Multiuser Communications provides for the first time a unified treatment of multiuser detection and multiuser decoding in a single volume. Many communications systems, such as cellular mobile radio and wireless local area networks, are subject to multiple-access interference, caused by a multitude of users sharing a common transmission medium. The performance of receiver systems in such cases can be greatly improved by the application of joint detection and decoding methods. Multiuser detection and decoding not only improve system reliability and capacity, they also simplify the problem of resource allocation. **Coordinated Multiuser Communications** provides the reader with tools for the design and analysis of joint detection and joint decoding methods. These methods are developed within a unified framework of linear multiple-access channels, which includes code-division multiple-access, multiple antenna channels and orthogonal frequency division multiple access. Emphasis is placed on practical implementation aspects and modern iterative processing techniques for systems both with, and without integrated error control coding. Emphasizing the theory and practice of unifying accessing and transmission aspects of communications, this book is a valuable reference for students, researchers and practicing engineers.

Contents: **1. Introduction.** The Dawn of Digital Communications. Multiple Terminal Networks. Multiple-Access Channel. Degrees of Coordination. Network vs. Signal Processing Complexity. Future Directions. **2. Linear Multiple-Access.** Continuous Time Model. Discrete Time Model. Matrix-Algebraic Representation. Symbol Synchronous Model. Principles of Detection. Access Strategies. Sequence Design. **3. Multiuser Information Theory.** Introduction. The Multiple-Access Channel. Binary-Input Channels. Gaussian Multiple-Access Channels. Multiple-Access Codes. Superposition and Layering. Feedback. Asynchronous Channels. **4. Multiuser Detection.** Introduction. Optimal Detection. Sub-Exponential Complexity Signature Sequences. Signal Layering. Different Received Power Levels. **5. Implementation of Multiuser Detectors.** Iterative Filter Implementation. Approximate Maximum Likelihood. Approximate APP Computation. List Sphere Detector. **6. Joint Multiuser Decoding.** Introduction. Single-User Decoding. Iterative Decoding. Filters in the Loop. Asymmetric Operating Conditions. Proof of Lemma. **A. Estimation and Detection.** Bayesian Estimation and Detection. Sufficiency. Linear Cost. Quadratic Cost. Minimum Mean Squared Error. Cramér-Rao Inequality. Jointly Gaussian Model. Linear MMSE Estimation. Hamming Cost. Minimum probability of Error. Relation to the MMSE Estimator. Maximum Likelihood Estimation. References. Author Index. Subject Index.

2005, XX, 270 p., Hardcover ISBN 1-4020-4074-1 •€90.00 | £ 63.00 | \$119.00



Order Now!

Yes, please send me copies Schlegel, Co-ordinated Multiple User Communications
 ISBN 1-4020-4074-1 € 90.00 | £ 63.00 | \$119.00

Please bill me
 Please charge my credit card: Eurocard/Access/Mastercard Visa/Barclaycard/Bank/Americard AmericanExpress
 Number Valid until

Available from
Springer
 Distribution Center GmbH
 Haberstr. 7
 69126 Heidelberg
 Germany

Name	<input type="text"/>
Dept.	<input type="text"/>
Institution	<input type="text"/>
Street	<input type="text"/>
City / ZIP-Code	<input type="text"/>
Country	<input type="text"/>
Email	<input type="text"/>
Date	<input type="text"/> <input checked="" type="checkbox"/>
Signature	<input type="text"/> <input checked="" type="checkbox"/>

► Fax: +49 (0) 6221-345-4229 ► E-mail: SDC-bookorder@springer.com
All € and £ prices are net prices subject to local VAT, e.g. in Germany 7% VAT for books & journals and 16% VAT for electronic products. All prices exclusive of carriage charges. Prices and other details are subject to change without notice. All errors and omissions excepted.

TSA Innovation Encouragement Award

\$10,000 prize for innovation in the telecommunications industry

The grantee of the award must have played the leading, hands-on role in the invention and development of the innovation - though there will only be one prize, consideration will be given to Corporate Entrepreneurs as well as 'Start-ups'

Nomination forms can be applied for by email to tsa@tsa.org.au

Nominations close 3 May 2006

Criteria

The work that the Award recognises shall -

- a) be in the field of telecommunications or a closely related field
- b) demonstrate a high level of innovation and ingenuity
- c) be of clear market value
- d) be of significant immediate or potential impact for the industry in Australia
- e) be of a kind to support a continuing high global reputation of Australian Telecommunications.

In assessing the relative merits of short-listed nominations, the Panel shall assess-

- a) The novelty of the idea(s) associated with the innovation
- b) the values illustrated by the innovation
- c) how value was created
- d) how well value was created and will be sustained
- e) where the value was created (that is, in what market)



Conditions

1. The award shall be made to an individual not to a corporation or other legal entity
2. The individual must be a permanent resident of Australia or an Australian citizen
3. The individual shall not be disqualified because the work that is being recognised occurred in the course of employment for another

[Telecommunication Society of Australia Ltd](http://www.tsa.org.au)

ABN 85 050 134 622

[PO Box 4050 MM, Melbourne, Victoria,
3001tsa@tsa.org.au](mailto:3001tsa@tsa.org.au)

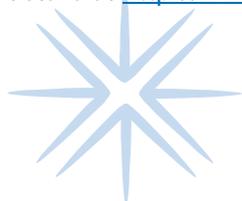
03 9639 0906 <http://www.tsa.org.au>

Call for Papers

Due Date	Event Name
7 May 06	ACoRN-NEWCOM Workshop http://www.newcom-acorn.org/
12 May 06	WiMesh Nets http://www.qshine.org/workshops.html
15 May 06	Workshop on Networking in Public transport http://www.qshine.org/workshops.html
24 May 06	Workshop in Recent Advances Peer-to Peer Streaming http://www.qshine.org/workshops.html
26 May 06	ACoRN ECR Workshop on Wireless Multihop Networking – http://www.acorn.net.au/event/acornecrworkshop/
1 June 06	A special issue of IEEE Journal on Selected Areas in Communications is being organized on: Optimization of MIMO Transceivers for Realistic Communication Networks: Challenges and Opportunities. http://www.argreenhouse.com/society/J-SAC/Calls/mimo_transceivers.html
1 June 06	IEEE Information Theory Workshop, Chengdu, China, Oct 22-26, 2006 http://www.ee.cityu.edu.hk/~itw06/

Contact Us

If you have any queries about anything in the newsletter or any other related ACoRN information please visit the ACoRN website for full contact details at <http://www.acorn.net.au/contact>



Coming Events

Event Date	Event Name
4-5 May 06	MIMO from Theory to Practice Melbourne
7-10 May 06	VTC2006-Spring Melbourne
11-12 May 06	Wireless NetWork Workshop Melbourne
10-11 May 06	17 th ITC Specialist Seminar Melbourne
14-19 May 06	ICASSP France
10-13 July 06	ACOFT Melbourne
17-18 July 06	ACoRN ECR Workshop on Wireless Multihop Networking Sydney
7-9 Aug 06	QShine 2006 Canada
20-22 Sept 06	ACoRN NEWCOM Workshop Vienna

For a complete list of coming events, or reports on past events, see the [event calendar](#).

Newsletter Items

If you have recently graduated, received an award, read an article that you have found useful, let us know so that we can share it with other ACoRN members. Please forward newsletter contributions directly to ACoRN Network Administrator christine.thursby@unisa.com.au

