Proceedings of the

22nd Annual Conference for the Australasian Association for Engineering Education

5–7 December 2011, Fremantle – Western Australia

Developing Engineers for Social Justice: Community Involvement, Ethics & Sustainability

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Review All papers in these AAEE Conference Proceedings were double-blind peer reviewed to ensure they contained: Clear objectives; Clearly defined methods; Reference to previous work and to theory/practice; Analysis of outcomes; and Discussed the application and/or implication of the work. Authors of papers nominated for acceptance were given the opportunity to revise their papers before inclusion into the Conference Proceedings. The AAEE annual conference appears on the Australian Research Council's ranked outlet list - ERAID #42271.

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AAEE 2011 Preface

Welcome to the Proceedings of the 22nd Annual Conference for the Australasian Association for Engineering Education (AAEE).

The theme for this year's conference, ***Developing Engineers for Social Justice: Community Involvement, Ethics & Sustainability,*** has been especially chosen to coincide with Engineers Australia's adoption of 2011as the Year of Humanitarian Engineering. To reinforce this conference theme, the Organising Committee welcomed contributions drawn from four diverse but interrelated sub-themes. The four subthemes for this year's conference are:

- ***Humanitarian Engineering***: The scope, challenges and achievements of engineering with regard to improving the lives and opportunities for marginalised communities (in Australia and world-wide);
- ***Inclusivity***: Equity and diversity among engineering students, engineering academics, practicing engineers, clients and people who use engineering systems or whose lives are influenced by engineering;
- ***Ongoing Graduate Professional Development***: Effective strategies and opportunities for graduate development in engineering careers; and
- ***Pathways into Engineering***: Articulation pathways into engineering careers and innovations within engineering degree programs and their assessment.

These Conference Proceedings contain 101 full-papers addressing the above sub-themes. Each paper was double-blind peer-reviewed to ensure quality in outcomes. The review process involved authors first submitting their (anonymously) authored papers for peer-review. After this process of review, all authors received feedback on their initial submissions. Authors whose papers were nominated for inclusion into the Conference proceedings were then given the opportunity to revise their initial submissions in accordance with reviewer feedback and then resubmit full-papers into the Conference Proceedings. Full-papers featuring in these Conference Proceedings were additionally included into the presentations program at the conference venue, the Esplanade Hotel Fremantle. All full-papers had to be authored to a manuscript template and a 7page limit, excluding invited papers which differed in that they did not have to adhere to the 7page limit but still underwent the same double-blind peer review process.

On behalf of the Organising Committee, we wish all participants at AAEE 2011 an exciting and fulfilling attendance as they experience and participate in the range of conference activities available. We also invite you to explore these Conference Proceedings and trust you will find they articulate a rich blend of topics aimed at progressing engineering education theory and practice as well as promoting professional, ethical and global responsibilities for our upcoming generations who choose engineering careers.

Best wishes

Dr Yasir M. Al-Abdeli
Technical Chair

A/Prof Euan Lindsay
Conference Chair

AAEE 2011 Acknowledgements

Holding an engineering education conference is first and foremost only made possible by attracting relevant high quality submissions from colleagues.

Over a period spanning more than a year, the Organising Committee for the 22nd Annual Conference for the Australasian Association for Engineering Education has undertaken a range of planning and coordination activities which have facilitated the timely and relatively smooth execution of this event. Members of the Organising Committee are:

A/Prof Euan Lindsay (Conference Chair)	Curtin University
Dr Yasir Al-Abdeli (Technical Chair)	Edith Cowan University
Prof Caroline Baillie	The University of Western Australia
Dr Wahidul Biswas	Curtin University
Dr Octavian Bass	Edith Cowan University
Dr Greg Crebbin	Murdoch University
Tim Davies	Engineers Australia, WA Division
Dr Ganesh Kothapalli	Edith Cowan University
Daniel Loden (Workshops Coordinator)	Engineers without Borders
Dr Sally Male	The University of Western Australia
Clive Maynard	Curtin University
Dr Nicoleta Maynard	Curtin University
Dr Alex Rassau	Edith Cowan University
A/Prof Michele Rosano	Curtin University
Shi Siong Tang	The University of Western Australia
Prof James Trevelyan (Sponsorships Coordinator)	The University of Western Australia

The success of the full-paper (double-blind) peer-review process is ultimately dependant on the dedication and commitment of our reviewers whose valued comments allow authors to further improve their full-papers before inclusion into the Conference Proceedings. The full-paper peer-reviewers for this year's conference are:
Syed Mahfuzul Aziz, Caroline Baillie, Octavian Bass, Sarah Bell, Mohammed Bennamoun, Wahidul Biswas, Kim Blackmore, Aaron Blicblau, Lyn Brodie, John Buckeridge, Frank Bullen, Duncan Campbell, Rosemary Chang, Ashfaque Chowdhury, Steven Collins, Greg Crebbin, Les Dawes, Jo Devine, David Dowling, Robin Ford, Anne Gardner, Peter Gibbings, Elizabeth Godfrey, Steven Goh, Thomas Goldfinch, Steven Grainger, Hong Guan, Roger Hadgraft, Douglas Hargreaves, Simon Housego, Prue Howard, Rob Jarman, Margaret Jollands, Lesley Jolly, Friederika Kaider, Lydia Kavanagh, Colin Kestell, Elaine Khoo, Robin King, Alexander Kist, Thorsten Kostulski, Ganesh Kothapalli, Euan Lindsay, David Lowe, Sally Male, Llewellyn Mann, Clive Maynard, Nicoleta Maynard, Timorthy McCarthy, Robert Mclaughlan, Lisa Mcloughlin, Julie Mills, Tom Molyneaux, Graham Moore, Karel Mulder, Steve Murray, Kali Nepal, Liza O'Moore, Juliana Kaya Prpic, Gangadhara B. Prusty, Alexander Rassau, Carl Reidsema, Michele Rosano, Gerard Rowe, Geoffrey Roy, Nicholas Sakellariou, Carroll Seron, Martin Shepherd, Nigel Shepstone, William Sher, Chris Short, Iain Skinner, Chris Smaill, Jolanta Szymakowski, Emily Tan, Shi Siong Tang, James Trevelyan, Andrew Wandel, Ronald Ward, Robert Webb, Keith Willey, P John Williams and Yixia Zhang

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