

**Proceedings of the
Fourteenth Electronics New Zealand
Conference**

ENZCon 2007



12 – 13 November

**Victoria University of Wellington
Wellington
New Zealand**

**Proceedings
of the
Fourteenth Electronics New Zealand
Conference**

ENZCon 2007

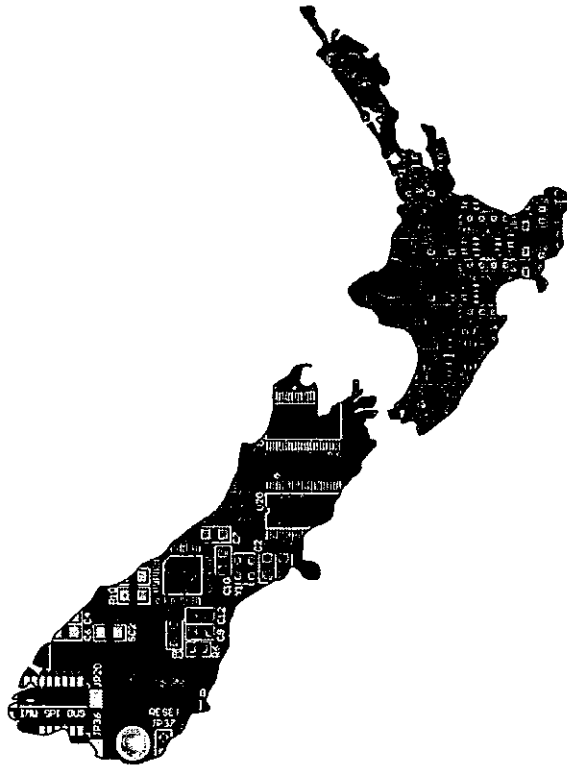
School of Chemical and Physical Sciences AND
Faculty of Engineering
Victoria University of Wellington
Wellington, New Zealand

12 – 13 November 2007

**Edited by
D.A. Carnegie and P. Teal**

ISBN 978-0-473-12951-4

ISBN 978-0-473-12952-1 (CDROM)



Copyright © 2007, Electronics New Zealand Incorporated (ENZCon Inc.)
All rights reserved

This book is copyright. Apart from any use for private study, research, criticism or review as permitted under the Copyright Act, no part may be reproduced by any process without the written permission of the editor or the chairperson of ENZCon Inc. Responsibility for the contents of these articles rests upon the authors and not the editor nor ENZCon Inc.

ISBN 978-0-473-12951-4 (print)
ISBN 978-0-473-12952-1 (CDROM)

▯ Welcome

Welcome to the fourteenth Electronics New Zealand Conference. This is the first time that Victoria University of Wellington has hosted this conference series and we are delighted to welcome academics, researchers, developers, industry and students in the general area of electronics to Wellington, and particularly to our campus.

ENZCon continues to grow in size and popularity, and this year is no different, with another record number of paper submissions, and a registration list that will be close to 100. We received a total of 74 paper submissions to this year's conference. A team of 23 national electronics experts diligently reviewed these documents and in the end we have accepted 80% or 59 papers for presentation. Many of the rejected submissions would have been included in previous year's ENZCon offerings, and although we empathise with the disappointment of the unsuccessful authors, the positives are that the quality of papers presented this year is higher than ever. It is so encouraging to see electronics research and development thriving in our country.

All of this is a far-cry from the embryonic ENZCon created at the University of Waikato in 1994. For that inaugural event, a total of 21 papers were presented over the two days, with approximately the same number of attendees. Whilst small and intimate, it was essential that ENZCon grow in order to survive, and the trend over the last few years indicates that this is exactly what is happening.

This year ENZCon is privileged to honour three of New Zealand's stalwarts of tertiary electronics education. Gary Bold of Auckland University, Bob O'Driscoll of Massey University and John Bähr of Otago University are all retiring. All three have dedicated themselves to offering their students the highest possible quality electronics education. We will sorely miss such amazing people, but I can't imagine these dedicated educators not being called back in to their institutions to "fill in some gaps". I am sure we have not seen the last of them. I would like to personally thank Gary, Bob and John for all their help over the period of my university career, and especially for helping me create the first ENZCon 13 years ago. Certainly without their active support and encouragement, ENZCon would not have existed. I greatly appreciate them agreeing to present at the final session of ENZCon this year – it will be a session not to be missed.

I wish to thank the support of Victoria University of Wellington's newly created Faculty of Engineering, the MacDiarmid Institute and our host School of Chemical and Physical Sciences. Celia Falchi has worked tirelessly assisting with sponsorship, trade displays, registration, web sites, and general administration. Paul Teal and Rob Murray have significantly helped collate the submitted papers and prepare these Proceedings. Gideon Gouws has liaised with industry to increase the profile of our sponsors without whom attendance at our conference would be considerably more expensive. I would also like to thank our national panel of paper reviewers, IET and RFTest Solutions for prize sponsorship and all those who have helped with the local support issues, and every attendee for making this conference possible.

Dale Carnegie
Convenor, ENZCon 2007

Organising Committee

Convenors

Dale Carnegie
Celia Falchi

Sponsorship Co-ordinator

Celia Falchi

Registration and Local Support

Celia Falchi
Shaynie Jones
Liza Wilson
Rob Murray

Proceedings Co-ordinators

Dale Carnegie
Paul Teal

Industry Liaison

Gideon Gouws

Local Assistance

Jason Edwards
Scott Forbes
Johnny McClymont
Debra Tanfield

Technical Programme Committee

Peter Andrae (Victoria)
John Bähr (Otago)
Donald Bailey (Massey)
Gary Bold (Auckland)
Dale Carnegie (Victoria)
Michael Cree (Waikato)
Adrian Dorrington (Waikato)
Paul Gaynor (Canterbury)
Gideon Gouws (Victoria)
Sen Gupta (Massey)
Mike Hayes (Canterbury)
Len Jennings (Manukau)
Peter Komisarczuk (Victoria)
David Krofcheck (Auckland)
Bruce MacDonald (Auckland)
Ken Mercer (Massey)
Chris Messom (Massey)
Tim Molteno (Otago)
Subhas Mukhopadhyay (Massey)
Bob O'Driscoll (Massey)
Howell Round (Waikato)
Paul Teal (Victoria)
Gurvinder Virk (Massey)

Sponsors

Victoria University of Wellington
– Faculty of Engineering
– School of Chemical & Physical
Sciences
MacDiarmid Institute
The Institution of Engineering and
Technology

Hoare Research Software
RFTest Solutions
Farnell
Electrotest
NicheCom