

Creating the **future**



contents

01 Energy	02
Centre for Energy Research and Policy Analysis	03
Carbon Capture and Storage	04
Solar Photovoltaics	05
Energy and Environmental Markets	06
Life Cycle Engineering	07
Oil and Gas Field Assessment	08
Biofuels and Combustion Optimisation	09
02 Health	10
Nanomedicine	11
Bionic Vision	12
Supercritical Fluids for Drug Delivery	13
Biomedical Materials and Tissue Engineering	14
Microfluidics and Next-Generation Bioreactors	15
Intelligent Healthcare Networks	16
Navigation for the Blind	17
03 Water	18
Online Water Quality Monitoring	19
Crop Irrigation with Salty Water	20
Dangerous Coastal Wave Prediction	21
Irrigation Optimisation in Cracking Soils	22
Fouling Prevention in Membrane Bioreactors	23
04 Digital World	24
Machine Learning	25
Autonomous Vehicles	26
Quantum Computing	27
Voice Identification Software	28
Satellite Navigation and Imaging	29
Artificial Intelligence	30
Computational Fluid Dynamics in Firefighting	31
05 Future Materials	32
Composite Airframe Integrity	33
Self-supporting Concrete Domes	34
Photonics and Flexible Displays	35
Polymers for Health and Industry	36



Dean's Message

The 21st century presents global problems that are more complex than ever. Issues such as climate change, depleted energy and water supplies, food shortages, obesity and healthcare demands pose new or increasingly urgent interdisciplinary challenges. All of these concerns have a solution in engineering – not only in the traditional disciplines such as civil, electrical, mechanical and mining engineering, but also through emerging fields such as tissue, food and environmental engineering. This publication showcases the powerful research capabilities that the UNSW Faculty of Engineering brings to these challenges: real-world innovation aimed at developing solutions to the problems of today, together with the vision to deliver on the opportunities that lie ahead.

A handwritten signature in black ink that reads "Graham Davies".

Professor Graham Davies
Dean, Faculty of Engineering

introduction

Constant change is the world's one great certainty. The challenges for today's engineers are to meet the changes that arise unexpectedly, and make the changes that will protect and enhance our individual lives, our communities and our planet.

The UNSW Faculty of Engineering is meeting those challenges with innovative applied and theoretical research, high-level cross-disciplinary cooperation and close work with industry to develop practical solutions to real-world issues.

Our researchers are creating new materials and structures, new and cleaner ways of powering our world, and providing essential fuel, food and water. They are making life safer and healthier, and making work faster and more efficient. There are some technologies which amaze and others which quietly go about the business of sustaining life as we know it with very little public acclaim.

UNSW Engineering is Australia's largest engineering faculty and is consistently ranked as Australia's best. UNSW Engineering was ranked first in the country and among the world's best in the 2008 *Times Higher Education* rankings.

Our research is focused on key areas of energy, health, water, digital information and communications, and materials for the future. The Faculty has state-of-the-art research facilities, is associated with 22 national, Cooperative and University research centres and has Australia's highest number of research student enrolments.



02 health

From nanotech weapons to combat disease to a bionic eye to restore sight to the blind, our health research is creating possibilities in treatment that offer new hope and better quality of life.



networked navigation

A new concept in personal navigation could deliver unprecedented independence for people with vision impairment.

Photo: (above right) a computer-rendered image of the navigation device concept; (below) Associate Professor Andrew Dempster (top) and Dr Binghao Li

Further information:
www.gmat.unsw.edu.au/snap



Emerging navigational technologies offer enormous opportunities for blind and visually impaired people to move about with greater confidence and independence.

A team of researchers from UNSW's School of Surveying and Spatial Information Systems (SSIS) and School of Computer Science and Engineering (CSE) is developing a hand-held navigation system which will work seamlessly indoors and outdoors, providing the vision-impaired user with a rich suite of information about their environment.

Dr Binghao Li and Associate Professor Andrew Dempster, spatial systems engineers with SSIS, say GPS systems alone cannot meet the needs of the vision-impaired in their current form.

"Blind or low-vision people need a special navigation system. Outdoor GPS is good but normally it's not good enough and it won't work indoors," says Dr Li.

"Blind people really need indoor positioning systems and that is what we propose to create, using a combination of Assisted GPS, WiFi, RFID (Radio Frequency Identification) tags and possibly INS (Inertial Navigation System).

"This could create a system which is accurate to within one or two metres and effective in indoor and outdoor environments. A blind person would still need a cane but this system would provide

additional navigational information via an aural interface, all in a hand-held device."

The research team, which also includes Professor Chris Rizos, Head of SSIS, and Dr Daniel Woo, a specialist in human-computer interaction from CSE, has secured a four-year ARC Linkage Grant to develop the navigation aid. The inspiration for the development came from Euan Ramsey-Stewart, a UNSW industrial design graduate who is himself vision-impaired. His company, Ramsey-Stewart Industrial Design, and national blindness and low-vision agency Vision Australia are the collaborating partners in the Linkage Grant.

Because the hand-held unit will be based on a modified, off-the-shelf unit, such as an iPhone or similar smartphone, Dr Li expects the system will be relatively low in cost.

The greatest challenge in the project, he says, is creating the software to achieve seamless integration of the different technologies, so that a user can, for example, move without interruption from using GPS outside a building to the other technologies deployed inside to give the locations of doors, stairways and other features.

A comprehensive navigation and position information system has the potential to give vision-impaired people greater confidence and autonomy, providing social equity benefits. The system could also deliver significant savings in public health and welfare costs.

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