

New South Wales

University of Wollongong

DP0772251 Prof RJ Barry

Approved Project Title **The role of preferred brain states in perceptual and cognitive processing: New insights into brain dynamics**

2007 : \$57,000

2008 : \$64,000

2009 : \$70,000

2010 : \$76,000

Primary RFGD 3801 PSYCHOLOGY

Administering Organisation University of Wollongong

Project Summary

New insights into brain dynamics will improve our understanding of both normal and atypical functioning. Extending previous work on normals will confirm how innovative Australian approaches can lead the research agenda in basic neuroscience, at the psychology-physiology interface. Testing in AD/HD and elderly populations will clarify dysfunctional brain mechanisms underlying AD/HD, and the cognitive losses in elderly populations (exacerbated by dementia). These results may lead to better diagnosis, treatment, and community understanding of these groups. Also, publications on these target groups will demonstrate internationally the widespread utility of this approach, encouraging further novel applications of basic neuroscience in health.

DP0773879 Prof A Bouzerdour; Prof M Amin; Dr S Phung

Approved Project Title **Advanced Processing for Through-the-Wall Radar Imaging**

2007 : \$137,236

2008 : \$121,197

2009 : \$115,920

2010 : \$105,542

2011 : \$105,542

Primary RFGD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Organisation University of Wollongong

Project Summary

There is currently considerable interest around the world in imaging systems that can 'see' through-the-walls. This project is at the cutting edge of through-the-wall radar imaging research and technology. It will benefit both the defence and security industries, and position Australia among the leading countries in this technology, as only a handful of research teams around the world have the necessary background and expertise in this area. The research outcomes will enhance the capability of the military, law enforcement, counter-terrorism, and search and rescue personnel. It will play a vital role in protecting and safeguarding Australia from terrorism and crime.

DP0773710 Prof HR Brown; Prof GP Simon

Approved Project Title **New Types of Biomimetic Nanostructured Adhesives**

2007 : \$165,000

2008 : \$160,000

2009 : \$150,000

Primary RFGD 2914 MATERIALS ENGINEERING

Administering Organisation University of Wollongong

Project Summary

Adhesives are one of the main ways in which we join materials, and have many advantages over other methods of joining. In this work we will make a new class of adhesive using nanotechnology that attempts to copy the very fine-haired feet of animals such as geckos who can stick to almost any surface, under most conditions. We will make these adhesives over large surface areas, and thus they will have commercial possibilities in a range of high technology industries, as well as in harsh environments. Because we will be able to manipulate the structure and observe property changes, it should also give us a greater insight into the adhesion mechanisms used by many small animals and bugs.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0770205 Prof SX Dou; Dr C Jiang; Dr J Driscoll; Prof RL Flukiger; Dr H Kumakura; Dr MD Sumption

Approved Project Title **Current limiting mechanisms in magnesium diboride superconductors**

2007 : \$320,000
2008 : \$330,000
2009 : \$390,000
2010 : \$180,000
2011 : \$210,000

Primary RFCD 2914 MATERIALS ENGINEERING

APD Dr C Jiang

APF Prof SX Dou

Administering Organisation University of Wollongong

Project Summary

Numerous important applications have already been identified for MgB₂ wire: power transmission cables, fault current limiters, transformers and magnets for motors and generators, as well as MRI. The significant increase in current carrying capacity of one order of magnitude expected to result from the proposed program will enable MgB₂ to replace presently existing low-temperature superconductors (LTS) and expensive high-temperature superconductors (HTS) in numerous important applications. MgB₂ technology, coupled with renewable energy sources, has the potential to provide a long-term solution to the energy crisis and global warming threat.

DP0771193 Dr ZP Guo; Prof HK Liu; Prof Dr PH Notten; Prof Dr J Chen; Dr A Zuettel

Approved Project Title **New concepts with multidisciplinary approach: novel functionalised nanostructures for hydrogen storage**

2007 : \$100,000
2008 : \$100,000
2009 : \$100,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation University of Wollongong

Project Summary

This project addresses National Research Priorities in the areas of breakthrough science, frontier technologies and advanced materials. Developing new methodologies to fabricate novel functionalised nanostructured materials with tailored properties has great potential in areas including energy storage, novel catalysts, novel sensors, micro/nano-electronics, etc. This project will enhance the international reputation and impact of Australian research in the internationally focused fields of nanotechnology and hydrogen energy technology. Applying innovative nanotechnology to the area of hydrogen energy will add to Australia's export potential and reduce Australia's reliance on foreign fuel sources.

DP0774168 Dr M Hagenbuchner; Prof M Gori; Prof A Tsoi; Prof A Sperduti

Approved Project Title **Investigations into Distributed Information Processing of the World Wide Web: Addressing Major Bottlenecks in Search Engine Design**

2007 : \$130,841
2008 : \$95,348
2009 : \$85,294

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation University of Wollongong

Project Summary

The Internet is a global medium used increasingly for commercial purposes. Nationally provided commercial services and products, as well as general types of information are made available globally via the Internet. Web search engines are the only method by which a common user can find a relevant service or information on the Internet. The sheer size and the dynamics of the Internet pose a significant challenge to search engines. This project proposes to address some major bottlenecks in search engine design (viz. the page rank computation). This may help future search engines to maintain a good level of Web penetration and, consequently will help to ensure a suitable coverage of nationally available services and information to the world.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0771675 Dr P Harris; Dr BM Derewianka; Dr H Chen; Dr P Fitzsimmons; Dr LK Kervin; Dr JB Turbill; Dr KE Cruickshank; Ms B McKenzie; Dr DM Konza

Approved Project Title **Investigating the relationship between literacy teaching, research and policy**

2007 : \$72,000

2008 : \$80,000

2009 : \$83,000

Primary RFCD 3302 CURRICULUM STUDIES

Administering Organisation University of Wollongong

Project Summary

An expected outcome is contribution to the development of a national literacy research agenda that includes priority areas; conceptual frameworks for characterising literacy; research approaches that help illuminate key issues and practices in literacy teaching and policy; and means for dissemination amongst researchers, teachers and policy makers. Another outcome is establishment of an Australia-based journal that publishes substantial literacy studies, which is not currently done in Australia. With a view to internationalisation of the journal, and encouragement of submissions that explore nexus of research, policy and practice, this journal would fulfil a significant function in assisting interaction among the three fields.

DP0770649 Prof JM Hill; Dr N Thamwattana

Approved Project Title **Modelling applications of nanomaterials in biology and medicine**

2007 : \$175,000

2008 : \$150,000

2009 : \$190,000

2010 : \$140,000

2011 : \$140,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

APD Dr N Thamwattana

Administering Organisation University of Wollongong

Project Summary

This proposal will address fundamental issues related to nanomaterials and their applications in biology and medicine. Accurate mathematical models will be formulated, leading to new practical techniques in nanobiotechnology, safe and effective methods to diagnose and cure diseases including cancer via targeted drug and gene delivery, and detection methods for biological hazards, such as those arising from biological terrorism. The research facility proposed involves significant training of applied mathematicians at honours, PhD and postdoctoral levels and multidisciplinary collaboration, ensuring that Australia maintains and develops an expertise in nanobiotechnology well into the future.

DP0770977 Prof AJ Hulbert; A/Prof PL Else

Approved Project Title **Food supply, diet and membrane lipids and the determination of metabolic rate**

2007 : \$100,000

2008 : \$100,000

2009 : \$100,000

Primary RFCD 2706 PHYSIOLOGY

Administering Organisation University of Wollongong

Project Summary

There are two types of polyunsaturated fatty acids (omega-3 and omega-6), which are both essential in the diet. This project will examine whether our current diet has a good balance of these two classes of fatty acids. It will examine the hypothesis that we do not have enough omega-3 polyunsaturates in our modern diet and that this imbalance has important consequences for metabolism and health. It will give insight into a relatively unappreciated cause of the current obesity epidemic and likely result in new strategies to combat this problem. It will have implications for other important health issues (such as depression) as well as for the food supply of Australia.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0771117 Dr JT Martinez; Prof AH Vickers

Approved Project Title Indonesian labour migration to north Australia, 1880-1972.

2007 : \$64,973

2008 : \$31,448

2009 : \$23,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation University of Wollongong

Project Summary

This study of mobility between Indonesia and Australia provides a historical context for understanding Australia's relations with Indonesia and the complex history of our shared maritime border. Exploration of Indonesian immigration experiences will add to current political debate over temporary labour migration. This project demonstrates the importance of cross-border research as a means of enriching Australian history and enhancing our cultural capital in relation to our northern neighbours. This detailed study of our multi-ethnic northern communities from which came the first Indonesian-Australian citizens makes a significant contribution to our knowledge of Australia's Asian diaspora.

DP0770234 Prof MJ Morwood; Dr F Aziz; Mr D Kosasih

Approved Project Title Astride the Wallace Line 2: human evolution, dispersal, culture and environmental change in Southeast Asia

2007 : \$195,000

2008 : \$180,000

2009 : \$190,000

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

Administering Organisation University of Wollongong

Project Summary

Our previous project on the archaeology and fossil record of Southeast Asia yielded results of international significance, including the discovery of a new human species and dates for major changes in the Indonesian faunal sequence. It also involved collaboration between Australian, Indonesian and Canadian researchers from a range of institutions and disciplines, and provided topics for six PhD and two MA students. This level of significant research, international collaboration and training will continue with the current project.

DP0772398 Dr SA Palmisano; A/Prof R Allison

Approved Project Title Identification and Examination of Visual Cues for Aircraft Glideslope Control

2007 : \$79,000

2008 : \$28,000

2009 : \$28,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation University of Wollongong

Project Summary

While aviation safety has improved dramatically over the last 50 years, accidents are still more common during landing than any other stage of flight. This project aims to improve our understanding of the way pilots use visual information to land an aircraft. Once our findings have been incorporated into existing training programs, this much-needed information should result in: (i) reduced pilot training time and cost; (ii) increased trainee pilot safety and confidence; and (iii) reduced aircraft maintenance costs. A PhD student, who will be trained in visual perception and aviation, should contribute significantly to future aviation research in this country.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0773667 A/Prof GM Schiemer; Dr E Schubert; Adj/Prof GB Hair; Prof R Parncutt; Mr WA Burt

Approved Project Title Investigating listening and performance strategies for microtonal composition

2007 : \$104,650

2008 : \$91,044

2009 : \$94,190

Primary RFCD 4101 PERFORMING ARTS

APD Mr WA Burt

Administering Organisation University of Wollongong

Project Summary

This project is important because it offers a new theoretical framework for understanding music independent of contemporary cultural boundaries. It opens up a new musical enquiry that will apply across quite different performance traditions and builds on recent collaborative initiatives by Australian musicians and researchers, the most recent collaboration involving counterparts from India. In addition to a major publication and conference proceedings in both creative and scientific disciplines, research findings will result in new approaches to composition, performance as well as an innovative musical instrument design that is informed by a new empirically derived approach to tuning.

DP0772215 Dr D Stuart-Fox

Approved Project Title The evolution of female resistance to male reproductive traits in animals

2007 : \$90,000

2008 : \$90,000

2009 : \$90,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

APD Dr D Stuart-Fox

Administering Organisation University of Wollongong

Project Summary

Australia has an outstanding international reputation in the fields of Ecology and Evolution. This study will reinforce Australia's excellence in these fields. Sexual conflict is a topic of great scientific interest because it has important implications for evolutionary theory and our understanding of the diverse strategies that animals use to attract or repel potential mates. Consequently, articles on this topic feature regularly in top international scientific journals. In addition, research on the unique social behaviours of Australian animals holds general public interest and plays an important role in attracting young people to careers in science.

DP0773329 Prof KA Tieu; Dr H Zhu; Dr PB Kosasih; Dr DJ Nolan

Approved Project Title Tribological contact of work roll in hot rolling

2007 : \$130,000

2008 : \$120,000

2009 : \$110,000

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation University of Wollongong

Project Summary

Steel and aluminium manufacturers form their products by shaping a hot metal billet using, for example, presses and rollers which contact the rapidly cooling metal in the production line. The economic benefits of lubrication, reduced rolling force (up to 25%), reduced roll wear and extended roll life (up to 40%), reduced down time due to roll change, and better strip quality are very significant for these manufacturing processes. This comprehensive program will provide new knowledge on lubrication and roll wear to help Australian manufacturing industry (e.g. steel and aluminium) to better understand and optimise their processes to achieve maximum benefits.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0771350 Prof AH Vickers; A/Prof M Beresford; Dr V Crinis; Dr R Ganguly-Scrase; Dr K Hannan; Dr BC Prasad; A/Prof AN Tran

Approved Project Title **The Clothing Industry in the Asia Pacific: Managing Constant Change**

2007 : \$110,001

2008 : \$83,001

2009 : \$125,001

2010 : \$57,773

Primary RFCD 3703 ANTHROPOLOGY

APD Dr V Crinis

Administering Organisation University of Wollongong

Project Summary

The dynamics of the garment industry have been central to industrialisation. This study will be the first examination of the changing nature of clothing manufacture. By tracing regional and international networks, and connecting them to patterns of legal and illegal movements of businesses, goods, money and people, it will show how changes in transnational business affect daily working life. It will highlight the outcome of trade liberalisation on the Asia Pacific, and contribute to safe-guarding Australia by providing a better understanding of the insecurities created by this rapidly changing industry.

DP0772999 Dr G Wang; Prof C Zhang; Dr KK Konstantinov; Dr JZ Wang; Prof MS Islam; Prof R Liu; Dr P Novák; Prof Dr PH Notten

Approved Project Title **First principles for development of novel hybrid electrochemical energy storage and conversion systems**

2007 : \$210,000

2008 : \$210,000

2009 : \$220,000

2010 : \$130,000

2011 : \$130,000

Primary RFCD 2914 MATERIALS ENGINEERING

QEII Dr G Wang

Administering Organisation University of Wollongong

Project Summary

Electrochemical energy is regarded as an alternative green energy/power source. The breakthrough technologies to be developed will allow us to realise the great goal of widespread usage of electric vehicles and hybrid electric vehicles, inducing dramatic improvements to our environment. It will also help us to reduce our dependence on the current oil-driven economy, and increase national energy security and energy independence. The project will establish indigenous expertise and scientific know-how on electrochemical energy storage and conversion technology. The competitive results from this research will provide an incentive to the Australian automobile and energy industries.

DP0772571 Ms KE Westaway

Approved Project Title **Landscape evolution and palaeoclimates in Indonesia: environmental, faunal and archaeological implications.**

2007 : \$102,030

2008 : \$102,030

2009 : \$102,030

Primary RFCD 2601 GEOLOGY

APD Ms KE Westaway

Administering Organisation University of Wollongong

Project Summary

The influence of environmental and climatic changes on faunal (including human) populations is a pressing issue for Australian communities in environmentally sensitive areas. This project will address this issue by documenting how certain flora and fauna in Indonesia, our nearest northern neighbour, responded to environmental challenges. Revealing when humans first dispersed through the region and how they adapted to changing environmental conditions will also contribute to our understanding of the cultural heritage of Australia's indigenous settlers. This project will build on established collaborations with Indonesian researchers and pioneer new dating methodologies to further enhance Australia's place at the forefront of geochronology.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0773555 Prof MR Wilson; Dr JA Aquilina

Approved Project Title **Discovering Mechanisms for Quality Control of Extracellular Protein Folding**

2007 : \$90,000

2008 : \$88,000

2009 : \$85,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation University of Wollongong

Project Summary

The expected outcomes will provide important advances in understanding of how the mammalian body maintains the normal structure/function of extracellular proteins. This information may ultimately aid in the design of agents to be used to clear the body of pathological protein aggregates - potentially providing a direct economic benefit to Australia. The high novelty and broad significance of this work indicate that it will produce high-impact publications which will tangibly assist Australia being recognized as a major contributor to world research outcomes. This project will also provide a direct social benefit by training research students with the skills necessary to further the development of biological research in Australia.