New South Wales

University of Wollongong

DP1096429 A/Prof TR Coltman; Dr BW Keating

Approved Project Title **Modelling IT Alignment in Multi-Business Service Organisations**

2010 : $ 80,000
2011 : $ 90,000
2012 : $ 80,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation University of Wollongong

Project Summary

Information technology and communication is responsible for nearly 80% of all productivity growth in the Australian services sector. A critical strategic alignment decision is the trade-off between investments in shared corporate IT infrastructure and individual business unit IT applications. The current response is to establish elaborate IT governance, reporting controls aimed at balance and compromise across the organization. Our model will provide a deeper understanding of what should be built as shared corporate IT infrastructure and as IT applications within individual strategic business units. This research will enable Australian industry to get greater value from its existing levels their expenditure in IT.

DP1093708 Dr A Dosseto; Prof AR Chivas; Dr AM Heimsath

Approved Project Title **Soil erosion and river system response to climate change and early human activity in Australia**

2010 : $ 120,000
2011 : $ 90,000
2012 : $ 90,000

Primary RFCD 2603 GEOCHEMISTRY

Administering Organisation University of Wollongong

Project Summary

This project will provide a much needed quantitative understanding of how soils and rivers have responded and adapted to climate change and human activity in Australia. The outcomes will inform models to predict how our environment is likely to adapt to new conditions in the future as a result of indirect (global warming) and direct (intensive land use) human-related stresses. This project will contribute to the innovative character of Australian research through the development and implementation of new approaches to study soil and river processes.

DP1094261 Dr ZP Guo; Dr Z Chen; Prof J Dahn; Prof Dr J Chen

Approved Project Title **New directions to miniaturized power sources: Integrated all-solid-state rechargeable batteries**

2010 : $ 135,000
2011 : $ 145,000
2012 : $ 140,000
2013 : $ 160,000
2014 : $ 120,000

Primary RFCD 2914 MATERIALS ENGINEERING

QEII Dr ZP Guo

Administering Organisation University of Wollongong

Project Summary

This project will lead to the development of safe integrated all-solid-state miniaturized lithium ion batteries for small autonomous devices, such as implantable medical devices, hearing aids, small autonomous devices with sensing and actuation, and for communications and rapid chemical/biological analysis. This will make a significant contribution to the nation in the areas of science, technology, health, and the economy. The development of new scientific knowledge related to this project will place Australia at the forefront of an emerging domain of research. The project will also provide excellent training for postgraduate students and young researchers to develop their skills in chemistry, materials science, and battery technology.

DP1093826	A/Prof P Harris; Dr H Chen; Dr BM Derewianka; Dr LK Kervin; Dr B McKenzie; Dr JB Turbill; Dr P Fitzsimmons	
Approved Project Title	**The National English Curriculum: Understanding the development, interpretation and implementation of disciplinary knowledge**	
2010 :	$ 75,000	
2011 :	$ 75,000	
2012 :	$ 75,000	
2013 :	$ 21,000	
Primary RFCD	3302	CURRICULUM STUDIES
Administering Organisation	University of Wollongong	

Project Summary

The National English Curriculum, the focus of this project, represents a renewed national effort to improve every students' educational achievements to the betterment of their social and economic participation in society. Explicating how knowledge about the subject English is institutionalised and implemented, and the role of social structures amongst those involved in the curriculum in shaping this process, will be key outcomes. Examples of classroom implementation will document the intellectual challenges teachers present to students and give voice to teachers in terms of how policy works for them, the challenges they face, and the support they require.

DP1092483	Prof BN Indraratna; Dr C Rujikiatkamjorn; Dr MD Liu; Dr J Chu	
Approved Project Title	**Laboratory and Theoretical Investigation of Soft Clay Behaviour under Cyclic Loading Stabilised by Prefabricated Vertical Drains**	
2010 :	$ 120,000	
2011 :	$ 119,000	
2012 :	$ 127,000	
Primary RFCD	2908	CIVIL ENGINEERING
Administering Organisation	University of Wollongong	

Project Summary

Coastal Australia is under increasing pressure from rapid population growth that requires continual capital investment in civil infrastructure such as road and rail links, ports and buildings. Many regions have soft compressible clays that present challenges for infrastructure design and construction. The use of prefabricated vertical drains (PVDs) in stabilising soil can reduce construction and maintenance costs, and increased soil strength will enhance the performance of infrastructure. In this project, the soil behaviour under cyclic loads stabilised by PVDs will be thoroughly investigated. Extensive laboratory testing will result in more efficient design and construction on soft soils, including roads, railways and airport runways.

DP1094383	Prof BN Indraratna; Dr LD Nghiem; Dr W Glamore; Prof LN Reddi; Dr AN Golab	
Approved Project Title	**Investigation of chemical clogging in a permeable reactive barrier (PRB) installed for remediating groundwater from acid sulphate soils**	
2010 :	$ 105,000	
2011 :	$ 105,000	
2012 :	$ 100,000	
Primary RFCD	2908	CIVIL ENGINEERING
Administering Organisation	University of Wollongong	

Project Summary

Soil acidity is a major geo-environmental problem in coastal Australia, whereby acidified groundwater pollutes estuaries with catastrophic consequences on local aquaculture (e.g. fish, oyster and prawn farming) and agricultural industries. The project aims to optimise the design and performance of permeable reactive barriers (PRBs) utilising waste materials such as recycled concrete and oyster shells for neutralising groundwater acidity prior to discharge to waterways. The main research includes the study of potential clogging and fouling of these PRB materials due to chemical reactions and to develop a predictive tool for long-term PRB performance as a means of ground acidity alleviation.

DP1092843 Dr Z Jacobs; Prof HL Dibble; Prof J Hublin; Dr SP McPherron

Approved Project Title **A tale of two species: constructing chronologies for patterns of change in the behaviour of Neanderthals and early modern humans**

2010 : $ 200,000
2011 : $ 169,000
2012 : $ 171,000
2013 : $ 170,000
2014 : $ 133,000

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

QEII Dr Z Jacobs

Administering Organisation University of Wollongong

Project Summary

This project will address one of humanity's most fundamental philosophical and empirical questions: when did we become human? The resulting insights will put Australia centre stage in this scholarly debate and contribute to a greater appreciation of the time-depth and significance of Aboriginal cultural heritage. Modern dating methods underpin many archaeological and environmental projects, so the advances made in this project will benefit researchers worldwide, increase Australia's capacity for commercial services and enhance the nation's international standing in geochronology. We will also train a new generation of high-quality research students in an interdisciplinary environment and forge new international collaborative initiatives.

DP1093138 A/Prof ZY Jiang; Dr D Wei; Prof KI Manabe; Prof XH Liu

Approved Project Title **Mechanics of micro cross wedge manufacturing**

2010 : $ 115,000
2011 : $ 120,000
2012 : $ 130,000

Primary RFCD 2905 MECHANICAL AND INDUSTRIAL ENGINEERING

Administering Organisation University of Wollongong

Project Summary

This novel research concentrates on the development of state-of-the-art micro processing technology and advanced simulation skills, and will develop an effective method to produce micro products. The project will further enhance the existing collaboration between Tokyo Metropolitan University, Japan, Northeastern University, China, and the University of Wollongong, and will provide an opportunity for postgraduates and postdoctoral fellows to work with international experts in the metal manufacturing area. The work will enhance the research basis for microforming in Australia and significantly benefit micro manufacturing industries, which will improve Australia's reputation in, and knowledge of, micro manufacturing of products.

DP1096546 Dr J Kim; Dr Y Zhao; Dr X Zhu; Mr Z Sun; Prof Y Kang; Prof Dr G Ramanath

Approved Project Title **Directed assembly and photoelectric properties of core-shell nanowire networks of PbSe-TiO2 heterostructures for high efficiency low-cost solar cells**

2010 : $ 100,182
2011 : $ 95,000
2012 : $ 105,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

APD Mr Z Sun

Administering Organisation University of Wollongong

Project Summary

The proposed program is aimed at studying numerous fundamental properties and phenomena of photoelectrochemical cells that have an important impact on environmentally friendly solutions to energy problems. Specifically, solar cells have a significant role in energy markets and in lessening CO2 emissions and other environmental impacts. Solar cell technology, coupled with renewable energy sources, has the potential to provide a long-term solution to the energy crisis and the global warming threat. In addition, the strong team to be assembled will reach a leading position in this area of cutting edge technology. The outcomes will benefit Australian industries.

DP1093952 Dr KK Konstantinov; Prof HK Liu; A/Prof A Calka; Dr D Wexler

Approved Project Title **Advanced Nanostructured Ceramic Composites for Ultracapacitors**

2010 : $ 90,000
2011 : $ 90,000
2012 : $ 100,000
Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation University of Wollongong

Project Summary

The global climate changes and the related disastrous events such as heat flows, bushfires, and flooding will endanger the Australian population and our natural environment. The implementation of effective devices and technologies to reduce our carbon footprint is a priority task. The project addresses the issue by development of new ultracapacitor materials for next generation green energy storage devices through engineering and implementation of advanced nanoceramics and nanocomposites created by innovative nanotechnologies. The project will also contribute to other national research priorities such as materials and frontier technologies, reduction of atmospheric pollution, and decrease in the energy dependence of our country on oil.

DP1092945 Dr HV McGregor; Prof CD Woodroffe; Dr SJ Phipps; Dr A Timmermann; Dr AW Tudhope; Dr JN Brown; Dr D Fink; A/Prof A Fedorov

Approved Project Title **Untangling the links between El Nino and the changing global climate**

2010 : $ 130,000
2011 : $ 130,000
2012 : $ 90,000
Primary RFCD 2606 ATMOSPHERIC SCIENCES

Administering Organisation University of Wollongong

Project Summary

Australia is a country of 'drought and flooding rain', and a key factor governing these cycles is the El Niño-Southern Oscillation (ENSO). Our project will provide the following benefits to the nation (i) increased understanding of ENSO variability; (ii) increased knowledge of the extremes of ENSO; (iii) insights into what causes ENSO to vary; and (iv) improved ability to forecast ENSO. Understanding ENSO is essential for anticipating changes in drought and rain in the future. This understanding will help us to adapt Australia's valuable agricultural and farming industries to climate change, and to manage our precious water resources.

DP1096721 Prof L McNamara; A/Prof KP Gelber

Approved Project Title **The Impact of Hate Speech Laws on Public Discourse in Australia**

2010 : $ 76,000
2011 : $ 120,000
Primary RFCD 3903 JUSTICE AND LEGAL STUDIES

Administering Organisation University of Wollongong

Project Summary

2009 will mark the 20th anniversary of the enactment of the first Australian laws (NSW) directed at the regulation of hate speech. Although hate speech laws are now firmly embedded in Australia's legal landscape, and have been extended in some jurisdictions to vilification based on religious and sexual orientation, they remain a controversial instrument for supporting Australia's policies on multiculturalism, religious tolerance and respect for difference. An examination of the effects of hate speech laws on public discourse - both intended and unintended - will offer valuable insights about the capacity of law to deliver social cohesion in 21st century Australia.

DP1095109 Dr R Menary; Dr DI Simpson; Prof DD Hutto; Prof SA Gallagher; Prof C Winch

Approved Project Title **Embodied Virtues and Expertise**

2010 : $ 72,000
2011 : $ 115,000
2012 : $ 106,000

Primary RFCD 4401 PHILOSOPHY

Administering Organisation University of Wollongong

Project Summary

The Project will provide a theoretical framework for understanding expertise. Crucially, the framework will provide an account that explains the motivation of experts, and allows for the virtues of experts to be analysed and promoted. The framework will thus fill a perceived gap in professional pedagogical disciplines such as Education, Nursing Education, and Medicine, in which the concept of expertise is central, but for which an adequate theoretical framework of expertise is lacking. Academics and practitioners from these disciplines will participate in conferences and workshops run under the Project.

DP1093342 Prof MJ Morwood; Mr AR Brumm; Dr F Aziz; Dr MW Tocheri; Dr WL JUNGERS

Approved Project Title **In search of the first Asian hominins: excavations at Mata Menge, Flores, Indonesia**

2010 : $ 230,000
2011 : $ 240,000
2012 : $ 241,000
2013 : $ 210,000
2014 : $ 154,000

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

Administering Organisation University of Wollongong

Project Summary

Australian researchers will undertake a large, interdisciplinary project concerned with the most fundamental issues in hominin evolution and dispersal in collaboration with high profile Indonesian and American institutions. This project will strengthen international ties; will create other research, educational and exchange opportunities; and will provide a venue for training of local people, postgraduate students, technical staff and other participants in a range of skills (e.g. survey, mapping, excavation, data management).

DP1096911 Prof GC Nanson; A/Prof BG Jones; Prof CV Murray-Wallace; Dr TJ Cohen

Approved Project Title **How green were our deserts? Evidence for Late Quaternary climate change and the source of water in the Lake Eyre basin**

2010 : $ 120,000
2011 : $ 120,000
2012 : $ 110,000

Primary RFCD 2601 GEOLOGY

Administering Organisation University of Wollongong

Project Summary

This project addresses the National Research Priority of Environmentally Sustainable Australia by examining evidence for what has controlled climate change and variable runoff in the vast Lake Eyre basin. It will provide evidence for why Australia, presently the world's driest inhabited continent, has as recently as medieval times supported large lakes holding many cubic kilometres of fresh water adjacent to the now-barren Flinders Ranges. It will show if this water had a tropical or temperate source, fundamental information for understanding Australia's past climate, and allow predictions of future climate to be based on firm evidence.

DP1093493 Dr SA Palmisano; A/Prof R Allison

Approved Project Title **Viewpoint changes during locomotion: Their role in self-motion perception and motion sickness**

2010 : $ 60,000
2011 : $ 60,000
2012 : $ 80,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation University of Wollongong

Project Summary

An improved understanding of self-motion perception and motion sickness in situations of sensory conflict will contribute significantly to scientific knowledge and theory. The findings of our experiments will aid in the development of fall-prevention and rehabilitation programs for the elderly and people recovering from sensory loss or impairment. Given the increasing motion complexity of modern environments, this project also has important practical applications for simulation and virtual reality environments, civil and military transportation, and even space travel. During the project a PhD student will be trained in measurement of self-motion perception and motion sickness, as well as eye-movement and gait analysis.

DP1094518 Prof SG Pyne

Approved Project Title **Stereoselective Synthesis of Bioactive Alkaloids for Structure Elucidation and Drug Discovery**

2010 : $ 150,000
2011 : $ 120,000
2012 : $ 120,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Organisation University of Wollongong

Project Summary

It is proposed to develop innovative methods for preparing bioactive natural products and their analogues with potential applications as new and safer therapeutic drugs and agricultural chemicals. This project would make important scientific contributions to the advancement of the fundamentals of synthetic organic chemistry and contribute to Australia's development as a knowledge-based economy. The methodology and products developed are likely to have potential pharmaceutical and agricultural applications from which the country could benefit in the future. This project will train skilled people who may develop innovative outcomes in the future, especially in the developing pharmaceutical and biotechnology industries in Australia.

DP1096001 Prof I Raeburn; Dr ME Laca

Approved Project Title **Structure and states of operator-algebraic dynamical systems**

2010 : $ 139,000
2011 : $ 141,000
2012 : $ 140,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation University of Wollongong

Project Summary

This project is in the general area of functional analysis, and more specifically operator theory, an area in which the University of Wollongong has an active research group and a strong international reputation. The investigators will study dynamical systems arising in combinatorial and number-theoretic situations, where the analogue of the "dynamics" is provided by an action of the real line on an operator algebra. Thus the project will involve ideas and techniques from a wide range of mathematical disciplines, and will help to broaden Australia's expertise across these disciplines.

DP1094053 Dr CH Ritz; Prof IS Burnett

Approved Project Title **Encoding and Communicating Navigable Soundfields**

2010 : $ 80,000
2011 : $ 80,000
2012 : $ 50,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Organisation University of Wollongong

Project Summary

While sound recording is commonplace, it is not currently practical to completely record a sound space such that the experience can be reproduced at a chosen 'listening point'. This is a significant restriction for audio applications in the entertainment, surveillance and virtual/mixed reality areas. The project will research novel and practical solutions to this problem and offers a significant conceptual advance in the transmission of complex audio scenes. This project will build fundamental new technology and IP for Australia in the digital media and audio space, one of the fastest growing sectors of our economy.

DP1096600 Prof AB Rozenfeld; Prof AS Dzurak; Prof DN Jamieson; Dr ML Lerch; Dr S Guatelli; Dr Z Kuncic; Prof M Zaider; Dr MI Reinhard

Approved Project Title **Development of innovative radiation detectors and computational techniques for improving quality of life**

2010 : $ 100,000
2011 : $ 100,000
2012 : $ 110,000

Primary RFCD 2403 ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

Administering Organisation University of Wollongong

Project Summary

This project will produce improved radiation detectors and advanced computational techniques, addressing needs in the prediction and assessment of the effects of radiation in homeland security, medicine, aviation and space applications. The 'preventative healthcare' priority goal of the National Research priority 'Promoting and maintaining good health' will be addressed, serving to reduce the risk to people involved in such activities. This fundamental research will also enhance Australia's international reputation in this field, stimulate local expertise and create a critical mass of researchers working in this sector.

DP1094135 Dr AJ Trevitt

Approved Project Title **How does biodiesel fuel burn? Revealing the chemical processes of methyl ester decomposition and oxidation**

2010 : $ 80,000
2011 : $ 65,000
2012 : $ 65,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation University of Wollongong

Project Summary

It is increasingly likely that a major proportion of the next-generation transport fuels will be derived from biological sources. Biodiesel is already an attractive prospect due to measured reductions in carbon monoxide and fine-particle emission along with its potential as a carbon-neutral fuel source. Impeding the rapid deployment of biodiesel-based engines is our limited understanding of the combustion processes at the molecular level. The purpose of this study is to reveal the underlying chemical processes of biodiesel-droplet burning using laser techniques, synchrotron radiation and mass spectrometry. The ensuing results will flow into modelling studies of biodiesel combustion systems and find practical application by guiding engine design.

DP1095758 Prof SP Ville; Prof DT Merrett

Approved Project Title **Reassessing the role of industry associations through an examination of Australian and New Zealand wool marketing, 1890-1960**

2010 : $ 30,000
2011 : $ 40,000
2012 : $ 20,000

Primary RFCD 3403 ECONOMIC HISTORY AND HISTORY OF ECONOMIC THOUGHT

Administering Organisation University of Wollongong

Project Summary

This is a study of organisational innovation in an internationally-important industry. Wool industry associations built and maintained a marketing organization, regionally and then nationally, that sold more than a half of the world's wool. Our long-term study assesses whether associations along the supply chain could replenish their social capital and remain adaptive and flexible organisations in the face of marked changes in the environment. The nature of the web of connections between associations in the wool market deserves further study. If their cooperation made possible the institutions governing wool selling then government agencies may need to take a more nuanced approach to regulating inter-organizational collaboration.

DP1093855 A/Prof G Wang; Dr D Wexler; A/Prof A Calka; Prof F Liu; Dr H Zhou

Approved Project Title **Graphene - the new frontier electromaterial for rechargeable lithium batteries and supercapacitors**

2010 : $ 120,000
2011 : $ 125,000
2012 : $ 120,000

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation University of Wollongong

Project Summary

Global warming and climate change have triggered an intensive demand for clean energy sources to replace fossil fuels. Graphene, as an emerging novel material, can serve as a medium for highly efficient energy storage and conversion in electrochemical devices. This project will lead to the development of novel renewable energy storage and conversion technology for transportation and distributed energy supplies. The outcomes of this research will increase our national energy security, facilitate achievement of the Federal government's target of 20% renewable energy in 2020, and bring significant economic and environmental benefits for Australia.

DP1094073 Prof X Wang; Dr G Peleckis; Mr D Chen; Prof H Hosono; Prof X Chen; Dr KH Muller; Prof E Muromachi; Dr AJ Studer

Approved Project Title **Materials science and superconductivity in the new Fe-based high temperature superconductors**

2010 : $ 155,000
2011 : $ 150,000
2012 : $ 150,000
2013 : $ 100,000

Primary RFCD 2914 MATERIALS ENGINEERING

APD Dr G Peleckis

Administering Organisation University of Wollongong

Project Summary

Novel superconducting materials with high superconducting transition temperature and upper critical field are one of the most important research fields in the community of materials science and condensed matter physics. Any significant breakthrough in Fe-based superconductors will result in exotic physics and possible novel superconducting electronic devices, and will have the potential for ground-breaking research. The purpose of this project is to bring Australia to the forefront of this field and to work with world leading researchers within Australia and worldwide to make advancements in this field.

DP1093934 Dr RM Warner; Prof BM Tsamenyi

Approved Project Title **Harnessing the oceans to combat climate change: Developing law and policy frameworks for ocean energy and climate change mitigation**

2010 : $ 104,000
2011 : $ 108,000
2012 : $ 110,000

Primary RFCD 3901 LAW

APD Dr RM Warner

Administering Organisation University of Wollongong

Project Summary

A major policy objective of the Australian Government is to address the adverse effects of climate change on the Australian economy, natural resources and national security. This project will analyse the adequacy of the current international and Australian legal and policy frameworks to prescribe regulatory principles for ocean energy activities and ocean based climate change mitigation activities which both protect and preserve the marine environment and its resources from adverse impacts and equitably accommodate other uses of the ocean. Australian legislative approaches to regulating these activities will be analysed to identify regulatory gaps and options developed to enhance Australia's regulatory framework.

DP1094493 Prof A Worsley; Dr HR Yeatman; Ms W Wang

Approved Project Title **A taxonomy of Australian consumers' food and health knowledge**

2010 : $ 55,000
2011 : $ 55,000
2012 : $ 50,000

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation University of Wollongong

Project Summary

Identification and measurement of the basic dimensions of food knowledge of consumers will inform new education curricula and community communication programs. The findings will enable better targeting of community and industry education by policy planners, education authorities, and the food industry. They will also enable monitoring and evaluation of food communication programs. In the longer term, this research may also enable citizens to deal with the changes caused by climate change, metabolic disease and increasing longevity; help educate more literate food industry workers; enhance communications between citizens, industry and government; and generate greater demand for higher quality food products.