New South Wales

The University of New South Wales

DP0986398 Prof R Amal; Dr W Teoh

Approved Project Title **Designing integrated photocatalytic systems for simultaneous clean energy generation and water remediation**

2009 : $ 320,000
2010 : $ 210,000
2011 : $ 220,000
2012 : $ 320,000
2013 : $ 310,000

Primary RFCD 2906 CHEMICAL ENGINEERING

APD Dr W Teoh

APF Prof R Amal

Administering Organisation The University of New South Wales

Project Summary

The proposal addresses the core issues of energy and water, two highly critical resources in Australia as well as worldwide. Utilising our geographically-abundant solar energy and through designing novel photocatalytic systems, the proposed research provides an ultimately clean solution by efficiently harnessing and converting the solar energy to hydrogen while remediating wastewater. Given the high intensity and consistent solar output in Australia, such technology provides an almost ideal and sustainable outcome in terms of clean energy and water supply. Success in this area will place Australian researchers at the forefront of practical and functional photocatalytic technologies

DP0984360 Dr A an Huef; Dr AD Sims

Approved Project Title **Operator algebras associated to groupoids**

2009 : $ 95,000
2010 : $ 80,000
2011 : $ 80,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of New South Wales

Project Summary

Australian researchers have a strong reputation for excellence and innovation in the field of operator algebras. Operator algebras associated to groupoids have been immensely influential in recent decades, both within mathematics and via applications to theoretical physics. This project will develop an innovative approach to groupoid algebras, and will help to maintain the high standing of Australian researchers in this important field.

DP0987133 Dr E Arabzadeh; Prof ME Diamond

Approved Project Title **Sensory Coding Mechanisms in Rat Somatosensory System; A Combined Behavioural and Electrophysiological Approach**

2009 : $ 101,000
2010 : $ 97,000
2011 : $ 97,000
2012 : $ 97,000

Primary RFCD 3207 NEUROSCIENCES

APD Dr E Arabzadeh

Administering Organisation The University of New South Wales

Project Summary

This inter-disciplinary project spans behavioural sciences, neurophysiology and computational neuroscience. It investigates fundamental questions such as how different aspects of stimuli are presented in sensory areas of the brain and how the animal interprets the neuronal activity in such areas to generate the relevant behaviour. A major problem with making prosthetic sensory devices is the way by which these devices can communicate with the brain. Research into the coding of different features of simple stimuli will provide basic knowledge which can be implemented in prosthetic sensory devices.

DP0985602 Prof ML Banner; Dr WL Peirson; Prof F Dias

Approved Project Title **Forecasting wave breaking in directional seas**

2009 : $ 200,000
2010 : $ 90,000
2011 : $ 90,000
Primary RFCD 2604 OCEANOGRAPHY

Administering Organisation The University of New South Wales

Project Summary

Wave breaking in Australia's coastal and open ocean regions has significant consequences for weather forecasting, marine safety, defence and renewable energy, yet no conceptual or computing framework exists for this fundamental process. This innovative project extends our recent advances in predicting wave breaking onset and strength of unidirectional wave groups to forecast breaking in realistic directional wind seas. The results of this project will provide the scientific basis needed to include reliable breaking wave information in forecast models, and will improve their accuracy. It will also increase the international competitiveness of Australian commerce reliant on accurate marine environmental forecasts.

DP0988767 Prof B Benatallah; Prof Dr F Casati

Approved Project Title **From Business Processes to Process Spaces**

2009 : $ 130,000
2010 : $ 95,000
2011 : $ 90,000
Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation The University of New South Wales

Project Summary

A grand challenge facing the next generation service -oriented computing comes from the needs for bringing benefits of services composition to end-users. The project will deliver innovative, useful, and usable concepts and tools to make processes ever more adaptable and sophisticated while becoming simple to access and reuse. The project will provide an ideal opportunity to train research students in cutting edge technologies. It will make significant contributions to the e-Research and services science paradigms.

DP0985147 A/Prof LE Bilston; Prof C Rae; Dr RR Sinkus; A/Prof R Henry

Approved Project Title **Novel methods for detecting changes in soft tissue microstructure and biomechanical properties using multi-modality MR imaging**

2009 : $ 200,000
2010 : $ 195,000
2011 : $ 170,000
Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This project will lead to novel methods for studying the internal structure of the soft tissues of the body, such as muscles and brain tissue, and how this is affected by mechanical loading and disease states. The project will thoroughly validate these new methods. This will not only provide new techniques for research use, but lead to improved diagnostic techniques in the future.

DP0985948 Prof KA Bowrey; Mr MT Handler

Approved Project Title **Entertainment rights in the age of the franchise: a reappraisal of personality rights under Australian intellectual property laws**

2009 : $ 42,000
2010 : $ 60,000
2011 : $ 99,000

Primary RFCD 3901 LAW

Administering Organisation The University of New South Wales

Project Summary

Global entertainment industry practice is to assert broad rights in creative entertainment concepts and characters. There is huge global merchandising potential for cultural products, as demonstrated by The Wiggles, Harry Potter and Pokemon. In the US, the UK, Japan and Korea there have been developments to enhance the protection of character and personality rights. However there is no current study of the status of the entertainment franchise under Australian intellectual property law. With Australian imports of cultural products at an all-time high and with local productions increasingly geared towards worldwide audiences, this study critically evaluates how Australian law fits with the realities of the global entertainment marketplace.

DP0986493 Prof J Braithwaite; Prof JI Westbrook

Approved Project Title **Evaluating communities of practice and social-professional networks: the development, design, testing, refinement, simulation and application of an evaluation framework**

2009 : $ 380,000
2010 : $ 290,000
2011 : $ 300,000
2012 : $ 140,000
2013 : $ 470,000

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation The University of New South Wales

Project Summary

Multiple national benefits are realized by this research, including addressing National Research Priority number 3, Promoting and maintaining good health. We will understand more clearly than previously the types of behaviours and attitudes that lead to or inhibit communities and networks, which means we can do something to improve these. Team based workplaces can be more productive, socially satisfying and professionally rewarding. Educational programs will benefit from the results and organisations can improve the way they work and treat staff, customers and other stakeholders. We can transfer the results to other industries, Australia's trading partners and the international community.

DP0984240 A/Prof RC Brooks; Prof JW Ballard

Approved Project Title **Linking the evolutionary and bioenergetic causes of sex differences in lifespan and ageing.**

2009 : $ 200,000
2010 : $ 180,000
2011 : $ 180,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation The University of New South Wales

Project Summary

The biological study of longevity and ageing has two important fronts: understanding how evolution shapes lifespan and ageing, and the mechanistic study of how genes, hormones, tissues and cells interact during ageing. Interventions to prolong longevity and improve quality of life depend on a vigorous and innovative research effort in both spheres. This project addresses why males and females have different lifespans and age differently in a way that bridges evolutionary and mechanistic study, and will build Australia's research capacity to study ageing at both levels. Because of the human interest in diet, sex, reproduction and ageing, we expect this research will be a showcase for public interest in science.

DP0988002 Dr MV Brown; Prof JA Fuhrman

Approved Project Title **Towards a predictive model for coastal marine microbial assemblages**

2009 : $ 150,000
2010 : $ 145,000
2011 : $ 130,000
2012 : $ 135,000
2013 : $ 135,000

Primary RFCD 2604 OCEANOGRAPHY

QEII Dr MV Brown

Administering Organisation The University of New South Wales

Project Summary

Coastal regions are overwhelmingly the most intense point of interaction between human activity and oceanic provinces. At this interface, the marine biological ecosystem provides critical services that are required to maintain industrial, economic and social well-being. Our work will identify how these marine systems respond to anthropogenic and climatic variability, National Research Priority 1, and in turn, how this response affects ocean services. This knowledge will inform management efforts in resource and biodiversity conservation, and identify novel areas for future resource exploration.

DP0988410 Dr SB Colbran

Approved Project Title **Understanding biological nitrogen fixation: an investigation of multi-electron reduction catalysis at novel iron-sulfur clusters**

2009 : $ 130,000
2010 : $ 90,000
2011 : $ 100,000

Primary RFCD 2502 INORGANIC CHEMISTRY

Administering Organisation The University of New South Wales

Project Summary

A new class of iron-sulfur clusters held together by a central light atom will be prepared and their reactions thoroughly studied. These clusters are important because they will have the same structure as the iron-molybdenum cluster of the enzyme nitrogenase. This enzyme fixes atmospheric nitrogen as ammonia. It is the primary route of nitrogen entry into all living systems. Industrially ammonia is produced in an energy-demanding process on a vast scale. The studies will provide insights into how nitrogenase works and how to design new multi-electron reduction catalysts. The research may lead to new energy-efficient routes to ammonia and to other new alternative fuel sources. Such processes would transform Australian industry and how we live.

DP0987893 Dr C Danta

Approved Project Title **The scientific ape: the evolution of the animal fable after Darwin**

2009 : $ 83,443
2010 : $ 82,349
2011 : $ 79,091

Primary RFCD 4202 LITERATURE STUDIES

APD Dr C Danta

Administering Organisation The University of New South Wales

Project Summary

This project will contribute to national and international debates over the understanding of human nature, the human propensity for violence towards other beings and the possibility of mutually supportive relations with our natural environment. By demonstrating literature's capacity to intervene meaningfully into conceptual debates about the literary representation of animals, it will enhance Australia's international scholarly profile in the emerging field of animal studies. It will also contribute to the international renown of Australian scholarship in traditional literary studies by producing the first theoretically informed reassessment of the literary genre of the fable.

DP0987339 A/Prof MP Davenport; Prof SJ Kent; A/Prof J Mak

Approved Project Title **The dynamics of viral latency in chronic infection**

2009 : $ 170,000
2010 : $ 170,000
2011 : $ 170,000
Primary RFCD 3210 CLINICAL SCIENCES

Administering Organisation The University of New South Wales

Project Summary

Although many acute infections can now be controlled, we still suffer from a large number of chronic infections such as HIV or herpes that cannot be eradicated. Many of these infections persist because they can lie dormant in a 'latent' state. How this latent state is established, and how long it lasts are important to understand if we want to control these infections. We have assembled a team of mathematicians, immunologists and virologists in order to study latent infection at the cellular level, and within infected monkeys. This will provide the first insights into the dynamics of latency - how these cells are produced and die - and should lead to novel approaches to controlling chronic infection.

DP0985182 Dr TF Denson

Approved Project Title **Social psychological, personality, and neural processes underlying anger, aggression, and health**

2009 : $ 104,000
2010 : $ 83,000
2011 : $ 110,000
Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

The Australian Institute of Criminology estimates the cost of assault, sexual assault, and homicide in Australia at over $2.5 billion per annum. Despite these enormous costs, very little is known about the cognitive and neural mechanisms guiding these phenomena. This research will also provide cues regarding risk for domestic violence. Understanding domestic violence is especially significant because it is the leading cause of homicide among women in Australia. The insights gained from this research may lead to substantial social (e.g., stronger social fabric, reduced crime) and economic benefit (e.g., reduced spending on healthcare and crime).

DP0985413 Dr TF Denson; Dr JR Grisham; Dr ML Moulds

Approved Project Title **Regulating anger: Cognitive reappraisal, emotional suppression, and post-event rumination**

2009 : $ 90,000
2010 : $ 40,000
2011 : $ 40,000
Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

Australians bear the substantial psychological, social, and economic costs associated with unrestrained anger. Anger problems are associated with school and work difficulties, poor social relationship quality, alcohol and drug use, financial and legal difficulties, premature cardiovascular mortality, and clinically significant mental health problems. Anger and aggression also cause much harm to society through crime, domestic abuse, and workplace violence among others. The Australian Institute of Criminology estimates the cost of assault, sexual assault, and homicide in Australia at over $2.5 billion per year. The insights gained from this research may help ameliorate these negative consequences of anger.

DP0987545 Prof PR Eggert; Prof EA Webby; Dr PM Robinson

Approved Project Title **Brought to book: Textual-editorial studies and the methodology of book history with a scholarly edition of Charles Harpur's complete poetry**

2009 : $ 170,000
2010 : $ 90,000
2011 : $ 106,000
2012 : $ 124,000
2013 : $ 170,000

Primary RFCD 4202 LITERATURE STUDIES

APF Prof PR Eggert

Administering Organisation The University of New South Wales

Project Summary

Australia will possess reliable access for the first time to accurate versions of all of the verse of our most important colonial poet, Charles Harpur. Study of his manuscripts and publishing history will reveal the poet's place in society as a cross-section of Imperial-colonial relations. A Harpur website with collaborative interpretation will serve as a model for future projects. There will be benefits for students and the wider public through free electronic access to facsimiles and transcriptions of Harpur's manuscripts. Print-on-demand technology will ultimately allow coursebooks for student syllabuses to draw on the material.

DP0986600 Prof M Ferry

Approved Project Title **A 3D crystallographic framework for understanding the structure of deformed and annealed metals**

2009 : $ 100,000
2010 : $ 100,000
2011 : $ 100,000

Primary RFCD 2913 METALLURGY

Administering Organisation The University of New South Wales

Project Summary

A new 3D analysis technology will be developed into a powerful computational platform and used to explain several unresolved issues concerning the deformed and annealed state of metals. This technique is first of its kind in Australia and generates high resolution 3D images from most solid materials. There is enormous potential for its use in materials science and other research fields which is beneficial to Australia's standing in basic science. The project will provide an excellent research training environment for early career researchers who will develop an expertise that is expected to make a major contribution to future fundamental and applied research.

DP0984560 Dr JR Grisham

Approved Project Title **Cognitive control in obsessive-compulsive disorder**

2009 : $ 60,000
2010 : $ 40,000
2011 : $ 60,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

Obsessive-compulsive disorder is associated with significant social and economic burden. There is a pressing need to understand the cognitive mechanisms that drive and maintain this disorder. This research will permit exciting advances that will extend existing models of OCD by (1) elucidating the effects of different strategies for responding to obsessional thoughts,(2) integrating psychological, cognitive, and neuropsychological models of OCD, (3) developing innovative approaches to intrusive thoughts that will benefit the treatment of OCD and (4) shaping the research directions of future Australian researchers.

DP0988137 Dr J Guo

Approved Project Title **Driving Large Scale Live Internet Broadcasting of Streaming Video**

2009 : $ 80,000
2010 : $ 80,000
2011 : $ 80,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

APD Dr J Guo

Administering Organisation The University of New South Wales

Project Summary

Recent experience of Internet service providers has seen a booming market demand for live Internet broadcasting services. Live broadcasting of high-profile events, such as the Live Earth concerts in July 2007 by MSN, has drawn a global audience of the order of millions of viewers across the Internet. The technology developed in this project will drastically reduce Internet bandwidth consumption for provisioning such large-scale Internet broadcasting services while meeting user satisfaction with guaranteed Quality of Service. It is crucial for Australia to invest in this frontier technology since Australian service providers rely on expensive Internet infrastructure to communicate with major data hubs in other continents.

DP0987939 Dr EH Hamed; Prof MA Bradford

Approved Project Title **Long-term behaviour of thin-walled concrete curved members strengthened with externally bonded composite materials**

2009 : $ 60,000
2010 : $ 60,000
2011 : $ 60,000

Primary RFCD 2908 CIVIL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Concrete arches and domes are prone to catastrophic failures which involve loss of life and limb, and many global iconic structures are of this form. When subjected to creep, shrinkage and thermal effects, their behaviour is non-linear and complex. This proposal will keep Australian research at the forefront by developing a fundamental understanding of these structural forms over time, when strengthened with externally-bonded composite materials in an innovative retrofit procedure. It encompasses the priority goal of frontier technologies for building and transforming Australian industry, will lead to valuable guidance for engineers, and will contribute to the training of skilled PhD scholars.

DP0986730 A/Prof AR Hamilton; Dr M Governale; Prof DA Ritchie

Approved Project Title **Hole nanoelectronics - new concepts for spintronic devices**

2009 : $ 180,000
2010 : $ 135,000
2011 : $ 135,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Administering Organisation The University of New South Wales

Project Summary

This proposal will support a new basic research initiative in an area with enormous potential for the trillion dollar semiconductor industry - an industry that is well aware of the need to find a replacement for the conventional transistor beyond 2020. This research program will bring together Australian researchers and students to work with leading international universities in Germany and England, including the renowned Cavendish Laboratory at Cambridge University. This project will position Australia to play a leading role in developing future quantum and spin-based technologies that have the potential to be as powerful over the next 50 years as conventional transistors have been over the past 50 years.

DP0984695 Prof MM Harding

Approved Project Title **Targeting DNA with Dynamic Combinatorial Chemistry**

2009 : $ 125,000
2010 : $ 100,000
2011 : $ 100,000
Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Organisation The University of New South Wales

Project Summary

The interaction of molecules with DNA, the molecule that controls genetic information, is fundamental to drug design, diagnosis of disease and the environment. Chemists usually synthesise these molecules in the laboratory. We will use an innovative new approach to producing molecules that interact with DNA, that as fast and efficient and mirrors the processes used by Nature to make natural products. This research may lead to the design of new therapeutics, diagnostics and applications that will benefit the Australian community, and will provide excellent training of researchers in skills required for employment in the biotechnology and pharmaceutical fields.

DP0988507 Prof RP Harvey; Dr MA Wouters; Dr R Bouveret

Approved Project Title **Gene regulatory networks in heart development**

2009 : $ 160,000
2010 : $ 150,000
2011 : $ 150,000
Primary RFCD 2702 GENETICS
APD Dr R Bouveret

Administering Organisation The University of New South Wales

Project Summary

In humans, structural and functional malformations of the heart are very common and are associated with a high economic and emotional burden. In this project, we will study how genetic networks initiate and control heart development at a molecular level. We will establish and employ state-of-the-art technologies and bioinformatics tools to explore the function of cardiac regulatory genes in detail. Our work will contribute both to discover new cardiac pathways for a better understanding of heart formation and disease, and to develop advanced techniques that will contribute to strengthen Australian basic and strategic research.

DP0984844 Dr JD Henry; A/Prof PG Rendell; Dr LH Phillips; Prof M Kliegel

Approved Project Title **Everyday cognition in older adulthood: Mechanisms contributing to the age-prospective memory paradox.**

2009 : $ 110,000
2010 : $ 90,000
2011 : $ 130,000
Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

Australia is faced with an ageing population, and thus an increasingly important goal is ageing well and ageing productively. The proposed research will clarify why older adults perform extremely well on prospective memory (PM) tasks based in everyday environments, but very poorly on PM tasks that take place in the controlled situation of the laboratory. Advancing our understanding of why this 'paradoxical' pattern of age effects occurs will help clarify how other aspects of everyday cognition in older adulthood may be optimised, and consequently take an important step in improving the lives of older adults. The results will also inform development of rehabilitation strategies for clinical groups who present with PM difficulties.

DP0988745 A/Prof TD Hoang; Prof V Solo

Approved Project Title **Optimisation-based analysis and synthesis of sparse systems in signal processing and communication**

2009 : $ 112,000
2010 : $ 125,000
2011 : $ 125,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Organisation The University of New South Wales

Project Summary

This project will make onceptual advances in the areas of signal processing and communication. A major benefit of this project will be its direct applications to digital industry - perhaps the major electrical industry of our era. The project will also aim to build a world class research activity at the University of New South Wales to focus attention on low-cost signal processing and communication, increase capacity for contract research, enhance nternational collaboration with leading researchers in the area, and produce quality PhD graduates in the field of signal processing and communication.

DP0988182 Prof MJ Hoffman; Prof J Roedel; Dr JL Jones

Approved Project Title **Cyclic Fatigue Mechanisms in New Lead-Free Piezoelectric Ceramics**

2009 : $ 155,000
2010 : $ 125,000
2011 : $ 125,000

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Piezoceramics are an important component in many items in modern day Australian life. However, they present a growing environmental concern, particularly for disposal, because they contain lead oxide and must often be disposed of prematurely due to component failure. Furthermore, many key Australian industries manufacture and use piezoceramics in fields ranging from mineral exploration, to imaging to biomedical devices. This project will enable the development of lead-free alternatives to current materials and more reliable materials which will reduce the need for waste disposal.

DP0985891 Prof LM Khachigian

Approved Project Title **YrdC translational control: physical and functional interactions, identification and influence of amino acid phosphorylation**

2009 : $ 110,000
2010 : $ 110,000
2011 : $ 120,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

This project will expand our basic understanding of the mechanisms with which a newly identified and highly conserved protein, YrdC203 regulates the process of protein synthesis from mRNA. This work will lead to basic insights into how gene expression is regulated at the level of translation, and generate valuable research tools, such as YrdC203 knockdown tools, peptide mimetics and decoys, phospho-specific and phospho-non specific antibodies. Exploitation of this breakthrough science will open up new avenues for therapeutic intervention in the future, while commercial exploitation of such reagents that recognise or interfere with YrdC203 will generate economic returns to Australia.

DP0989027 Prof AS Killcross

Approved Project Title **The role of the prefrontal cortex in responding to a changing world**

2009 : $ 100,000
2010 : $ 90,000
2011 : $ 90,000
Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

This proposal will test a novel theory of frontal brain function that emphasises the contrasting role of two regions of the prefrontal cortex in dealing with the changing nature of the world. It will provide novel insights in the the psychology and neural underpinnings of the control of behaviour. This will add to our basic knowledge of brain function, feeding into our understanding of human mental disorders such as schizophrenia and dementia. It will also provide training in psychology and behavioural neuroscience for Honours and Doctoral students.

DP0988579 Prof RJ Kohn; Dr L Yang

Approved Project Title **Building flexible multivariate models and their application in Finance**

2009 : $ 170,000
2010 : $ 170,000
2011 : $ 180,000
Primary RFCD 3404 ECONOMETRICS

Administering Organisation The University of New South Wales

Project Summary

The project will develop methods for analyzing the properties of dependent measurements that may evolve through time. The new methods will significantly improve on current best statistical practice and will be applied to important problems in the financial sector such as asset allocation and risk management. The financial sector is a vital part of the Australian economy and it is important to understand the joint behavior of financial assets in order to understand and allow for risk. The methods will have immediate application in other disciplines such as medicine, engineering and the environmental sciences. The project will train a postdoctoral student and three PhD students in cutting edge financial econometrics.

DP0985765 Dr PA Kritzer

Approved Project Title **High dimensional problems of integration and approximation**

2009 : $ 85,000
2010 : $ 85,000
2011 : $ 85,000
Primary RFCD 2301 MATHEMATICS
APD Dr PA Kritzer

Administering Organisation The University of New South Wales

Project Summary

In many applications, notably financial mathematics, problems of integration and approximation of functions in very high dimensions are of great interest. By finding modern mathematical solutions to these problems, we will therefore contribute to Australia's future success in developing innovative technologies for industrial and economic applications. By researching at an internationally competitive level and by cooperating with international experts, we will have a share in further strengthening the excellent role of Australian research institutions within the international scientific community in mathematics and scientific computing.

DP0988687 Dr SS Li; Dr T Zhang; Dr M Avdeev; Dr D Yu

Approved Project Title **Development of High Performance Ceramic Based Thermoelectric Materials for Power Regeneration Applications**

2009 : $ 135,000
2010 : $ 105,000
2011 : $ 100,000
2012 : $ 150,000
2013 : $ 160,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

ARF Dr T Zhang

Administering Organisation The University of New South Wales

Project Summary

Thermoelectric materials offer an opportunity for economic recovery of the waste heat from exhaust gases to reduce operational costs and CO2 emissions. An increase in thermoelectric conversion efficiency of a few percent, in power production, would translate to significant cost saving on a national scale, which is about several billions of Australian dollars worth of products per year in this area alone. Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment and greater energy independence for Australia. Success of this program will facilitate the development of thermoelectric materials and renewable energy technologies, which have enormous national and international markets.

DP0987557 Prof X Lin; Prof X Zhou

Approved Project Title **Analyzing Uncertain Data: Probabilistic Approaches**

2009 : $ 112,000
2010 : $ 115,000
2011 : $ 115,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation The University of New South Wales

Project Summary

The expected research outcome includes siginificantly technical contributions to the uncertain data analysis technology development by supporting probablistic query procesing. The proposed systematic, algorithm and database centric approach to investigate the novel, ubiquitous problems will lead to a greater support, from the database community, to the advanced real applications, and creating new opportunities for the IT industry. The success of this project will not only further enhance us as an internationally leading research group in uncertain data analysis and provide training for high quality personnel in this important and growing area but also bring considerable economic and social benefits to Australia.

DP0986083 Dr AN Lynch; Prof G Craven; Prof NA Warren; Prof GJ Williams

Approved Project Title **Federalism for the 21st Century - A Framework for Achieving Reform and Change**

2009 : $ 85,000
2010 : $ 96,000
2011 : $ 92,000

Primary RFCD 3901 LAW

Administering Organisation The University of New South Wales

Project Summary

Improvements to Australia's federal consitutional system could return between $9 billion and $20 billion each year to taxpayers (up to 3% of GDP). The problem affects service delivery in areas like health and education and hampers our ability to meet new challenges like water scarcity and climate change. In developing clear criteria for improving Australia's federal constitutionalism this project offers significant long term financial and other benefits to the nation and will also produce more specific benefits as a result of its case studies of health and water management.

DP0984237 Prof MA Lyons

Approved Project Title **'Ordinary Writings': lower-class writing practices in the transition to mass literacy in Europe, 1800-1918**

2009 : $ 80,000
2010 : $ 60,000
2011 : $ 20,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation The University of New South Wales

Project Summary

This project contributes to public debate on literacy and literacy standards. Its historical perspective offers an antidote to conventional wisdom. It will show that there is no clear separation between literacy and illiteracy, that levels of literary competence vary according to specific occasions and specific tasks, and that schooling is not necessary for literacy acquisition. It will help put Australian research in the international forefront of cultural history. It will show that written heritage deserves full recognition in all its aspects, not just as the expression of educated elites. This aspect of our written patrimony needs re-evaluation, and we need to improve preservation of it and accessibility to it.

DP0985793 Dr J McAdam

Approved Project Title **Weathering Uncertainty: Climate Change 'Refugees' and International Law**

2009 : $ 69,500
2010 : $ 40,000
2011 : $ 50,000

Primary RFCD 3901 LAW

Administering Organisation The University of New South Wales

Project Summary

The creation of climate change 'refugees' is one of the most serious consequences of global warming. Climate-induced displacement is of particular relevance to Australia, given its geographical proximity to islands in the South Pacific where sea levels are rising. Islanders in some parts of the region have already had to abandon their homes, and more will do so in the future. Australia is an obvious destination country. This project examines Australia's international legal obligations to such people, to enable the development of informed, responsible and lawful responses to their plight. It contributes to NRP 4: Safeguarding Australia: Understanding Our Region and the World.

DP0987478 Dr MF McCabe

Approved Project Title **Characterizing the hydrological cycle using water isotopes, land-surface models and satellite observations**

2009 : $ 120,000
2010 : $ 100,000
2011 : $ 100,000

Primary RFCD 2605 HYDROLOGY

Administering Organisation The University of New South Wales

Project Summary

Water is our most precious natural resource. In Australia, it is also our most precarious. The hydrological cycle describes the movement of water between the ocean, atmosphere and land. Understanding the effect and impact that a changing climate might have on the hydrological cycle is critical to securing Australia's water resources. To address these challenges, we must improve our basic understanding of the water exchange processes within the Earth system. Our project will exploit new technology in ground and space based observation, combined with advanced modeling and measurement capabilities, to develop an improved understanding and characterization of Australian hydrological cycles and aid in assessing climate change related impacts.

DP0988689 Prof S McDonald

Approved Project Title **The role of emotion and social cognition in communication disorders**

2009 : $ 100,000
2010 : $ 40,000
2011 : $ 60,000
Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

Social neuroscience is a rapidly emerging field that has identified the frontal systems of the brain as critical to social cognition, i.e. the ability to process specifically social information. Communication disorders also arising from frontal lobe damage are directly relevant to this field but have been ignored to date. This project represents cutting edge research putting Australia at the forefront in this endeavour. Not only is this research theoretically important but it is directly relevant to clinical management and remediation of the thousands of people in Australia who suffer brain injury annually and who suffer psychosocial disorders as a result.

DP0984304 A/Prof AS McIntosh; Dr C Caponecchia; Prof JR Wilson

Approved Project Title **Taking risks with safety gear: Biomechanical and psychological perspectives on risk compensation**

2009 : $ 68,000
2010 : $ 28,000
Primary RFCD 3214 HUMAN MOVEMENT AND SPORTS SCIENCE

Administering Organisation The University of New South Wales

Project Summary

This project uniquely combines objective and subjective measures in investigating whether and how people take more risks in the face of safety interventions. Investigating changes in behaviour with safety gear in sport is of benefit because it (a) allows comprehensive measurement of risk-taking behaviour and (b) can result in significant health benefits. These health benefits include reducing sports injuries through improving the efficacy of safety gear, and applications to risk-taking in other health domains, such as patient safety, occupational safety, and transport safety. Through improved methodology, the project should advance international research practice on this controversial topic.

DP0985604 Dr EN McMahon

Approved Project Title **Our Island Home: The shifting map of Australian literature**

2009 : $ 46,000
2010 : $ 27,000
2011 : $ 70,000
Primary RFCD 4202 LITERATURE STUDIES

Administering Organisation The University of New South Wales

Project Summary

This project will provide the first full-length study of the ways Australia's unique status as an island continent has shaped its national literature. Understanding this relationship will re-define the borders of its literature in three ways: it will establish new connections within the national literature between the literature of the mainland and surrounding islands; it will identify why certain regions such as the continental interior and outlying islands capture the literary imagination at particular times; it will bring to light ways for Australian literature to position itself within the shifting geographies of globalised modernity.

DP0984222 Dr AT Moles; Prof R Frankham; A/Prof WB Sherwin

Approved Project Title **How are weeds adapting to life in Australia? Quantifying the rate and direction of evolution in introduced species.**

2009 : $ 180,000
2010 : $ 120,000
2011 : $ 130,000
2012 : $ 150,000
2013 : $ 150,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

QEII Dr AT Moles

Administering Organisation The University of New South Wales

Project Summary

Introduced plants are a major problem throughout Australia. Introduced species are listed as one of the most severe threats to biodiversity in Australia, and managing them costs Australia around $4 billion per annum. The information we gather in this project will tell us what sort of changes introduced plants undergo when they arrive in Australia; how quickly plants can adapt to a new environment, and what sort of species are best able to adapt to new conditions. We will also ask whether introduced species are still adapting to Australian conditions. If so, then we might expect even more naturalised species to become problem weeds in the future. This sort of knowledge is fundamental to our ability to develop appropriate control programs.

DP0986747 A/Prof H Morita

Approved Project Title **Partial equity ownership and knowledge transfer: An economic analysis of strategic alliances**

2009 : $ 80,000
2010 : $ 60,000
2011 : $ 60,000
2012 : $ 60,000
2013 : $ 65,000

Primary RFCD 3402 APPLIED ECONOMICS

ARF A/Prof H Morita

Administering Organisation The University of New South Wales

Project Summary

Since 1997, 5462 cases of equity strategic alliances have been identified within Australia. In 2003, the ACCC rejected a proposal by Qantas and Air New Zealand to enter into such an alliance on the grounds that it would be highly anti-competitive. Under what conditions should the Government allow or prevent the formation of equity strategic alliances? Under what circumstances can such alliances benefit consumers and society? This project addresses these questions by systematically exploring the link between equity ownership and knowledge transfer. It will contribute to the effective operation of the Australian economy by proposing comprehensive guidelines for antitrust agencies to analyse welfare consequences of equity strategic alliances.

DP0986280 Prof F Moshirian; Dr PK Pham; Dr EW Wu

Approved Project Title **An Investigation of Country- and Firm-Level Barriers to Australian Institutional Investments in Foreign Equity Markets**

2009 : $ 80,000
2010 : $ 50,000
2011 : $ 50,000

Primary RFCD 3503 BANKING, FINANCE AND INVESTMENT

Administering Organisation The University of New South Wales

Project Summary

Australia's investment assets pool is ranked fourth in the world and is the largest in the Asia-Pacific region, yet Australia is ranked the second worst among 16 developed countries in internationally diversifying its investment portfolio. This project will identify global growth/diversification opportunities for Australian funds and assess their portfolio allocation practices against their international peers. The findings will encourage Australian funds to expand their investments in global equity markets, including Asia. This will enhance investment performance and make it possible to grow Australia's investment assets pool to the second largest in the world after the US, thereby increasing our long-term national wealth.

DP0984791 Dr ML Moulds

Approved Project Title **Understanding and predicting the role of memory in depression recurrence**

2009 : $ 100,000
2010 : $ 70,000
2011 : $ 70,000
2012 : $ 50,000
2013 : $ 60,000

Primary RFCD 3801 PSYCHOLOGY

ARF Dr ML Moulds

Administering Organisation The University of New South Wales

Project Summary

Depression exerts an immense social and economic burden on the community. There is an urgent need to understand the factors that increase vulnerability to recurrence. This project will have 5 key benefits; it will: (i) extend theoretical models of depression, (ii) aid the identification of individuals at risk of relapse, (iii) guide the development of evidence-based relapse prevention programs (meeting National Research Priority 2), (iv) enhance Australia's reputation for conducting cutting-edge experimental clinical research, and (v) shape the research directions of upcoming Australian researchers. The findings will inform policymakers who determine mental health service provision to the Australian community.

DP0987788 A/Prof J Murmann; Mr B Oviatt

Approved Project Title **How can Small Economies Create Globally Competitive Firms in New High-Tech Industries?**

2009 : $ 97,000
2010 : $ 90,000

Primary RFCD 3502 BUSINESS AND MANAGEMENT

Administering Organisation The University of New South Wales

Project Summary

In today's competitive world, governments have to develop better policies to stimulate economic growth. This research will provide Australian policy makers systematic empirical evidence to develop a dedicated policy aimed at stimulating the internationalization of new ventures in biotechnology, which constitutes a frontier high-tech area. Our study and the policy recommendations that will emerge from it can have a big economic impact because the health sector in biotechnology is a growing hi-tech area and has much potential to create value for the society.

DP0985478 Prof JS Murphet

Approved Project Title **William Faulkner Between Cinema and Literature**

2009 : $ 74,175
2010 : $ 31,000
2011 : $ 60,212

Primary RFCD 4202 LITERATURE STUDIES

Administering Organisation The University of New South Wales

Project Summary

Literature continues to react and adapt to an ever-more complex media environment, but there is still little in the way of detailed critical study to specify the strategies and tactics of literary survival in an audio-visual era. By attending to the unique and indicative case of William Faulkner, who wrote simultaneously for the films and the serious literary market, this project will develop a new critical model for understanding literature's adaptation to a complex media environment. It will shed significant intellectual light on the present and future states of literary survival in advanced industrial nations like Australia.

DP0987369 A/Prof V Ougrinovski

Approved Project Title **Constructive control of interconnected systems**

2009 : $ 75,000
2010 : $ 70,000
2011 : $ 65,000
Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of New South Wales

Project Summary

Sustainability and competitiveness of the Australian industry critically depends on the progress in the technological area of distributed information processing and control. This project will contribute to the existing Australian research effort in this area by advancing the control systems theory which underpins many cutting edge technologies in areas of immediate national interest.

DP0986718 Dr V Panchenko

Approved Project Title **Estimating and evaluating the predictive accuracy of structural macroeconomic models**

2009 : $ 35,000
2010 : $ 35,000
2011 : $ 35,000
Primary RFCD 3404 ECONOMETRICS

Administering Organisation The University of New South Wales

Project Summary

This project will provide improved methods to inform Australia's macroeconomic policies and its strategies for economic development by suggesting the most adequate structural macroeconomic model for the Australian economy. Effective macroeconomic policies, in turn, assure stable economic development, smoothes effects of economic cycles and balances inflation, unemployment, the exchange rate and other macroeconomic indicators. All these indicators are closely linked to the welfare of the Australian people and prosperity of the Australian economy. The importance of an accurate macroeconomic analysis is increased in the current condition of inflationary pressures, fiscal challenges, climate change, and world market instabilities.

DP0986091 Prof S Parameswaran

Approved Project Title **Design Automation for Processor Pipelines**

2009 : $ 125,000
2010 : $ 95,000
2011 : $ 105,000
Primary RFCD 2916 COMPUTER HARDWARE

Administering Organisation The University of New South Wales

Project Summary

Embedded system processors comprise about eighty percent of the processor market. This project targets this particular segment, customising multi-processor system on chips for a particular class of embedded applications, resulting in superior performance, low power and reduced cost. Direct benefits will include clear understanding of architectures and algorithms, research training, better processors for the embedded market, and quality publications. Indirect benefits will be commercialisation and licensing of this technology for use in the embedded systems design industry. Companies which can benefit from this technology exist in Australia and overseas.

DP0988102 Dr RV Patulny

Approved Project Title **Poor Women and Lonely Men: Examining Gendered Social Inclusion and Connection in Australia**

2009 : $ 100,000
2010 : $ 80,000
2011 : $ 90,000

Primary RFCD 3701 SOCIOLOGY

APD Dr RV Patulny

Administering Organisation The University of New South Wales

Project Summary

This project directly supports the national research priority goal of 'strengthening Australia's social and economic fabric' (as part of Promoting and Maintaining Good Health). Inclusive societies reap many benefits (economic, education, crime, health etc), and information revealed about relevant gendered patterns will help build social inclusion and connection in Australia by informing inclusive strategies and policies. The project also supports the national research priority goal 'ageing well and productively', by informing policy-contexts of specific disadvantage, such as amongst those ageing alone. The project will also add to broader understandings about the links between social inclusion, connection and wellbeing.

DP0984701 Dr JE Pimanda

Approved Project Title **Tissue specific regulation of gene expression**

2009 : $ 98,000
2010 : $ 90,000
2011 : $ 90,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

Despite the polarized public debate concerning the use of stem cells for tissue regeneration, fundamental questions relating to the identity and hierarchy of these cells remain unanswered. The benefit to Australia will be scientific in terms of providing an understanding of how stem and progenitor cells integrate transcriptional control systems during differentiation and the networks that are involved. This is fundamental to the future isolation and manipulation of these stem cell types to benefit the community. The work will also provide postgraduate students with training in state of the art genomic techniques and in the interface between bioinformatics and experimental science.

DP0986447 A/Prof LA Poole-Warren; Dr PJ Martens; Prof BE Tuch; A/Prof K Anseth

Approved Project Title **Hydrogel systems for effective encapsulation of functional pancreatic islet cells**

2009 : $ 200,000
2010 : $ 155,000
2011 : $ 155,000

Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This proposal addresses the problem of maintaining viability and function of cells encapsulated within an immuno-isolation barrier material. The research will develop biosynthetic materials that are able to meet design criteria for an effective biomaterial for this application. The major benefits to Australia will be in improved health outcomes by providing safer, more efficacious materials, economic growth development of the Australian Medical Device industry and in high level training of researchers in this field.

DP0988255 Prof MF Rahman; Dr WL Soong; Dr N Ertugrul; Prof T Jahns; Ms RD Dutta

Approved Project Title **Optimum rotor and concentrated stator-winding structures for improving the torque, field-weakening and power-density characteristics of interior permanent-magnet machines**

2009 : $ 130,000
2010 : $ 100,000
2011 : $ 90,000

Primary RFCD 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

The successful completion of this project will deliver one of the most energy efficient and compact motor which will meet the expectations of future electric and hybrid electric vehicles. The current generation of surface Permanent Magnet (PM) and Interior Permanent Magnet (IPM) motors are not optimized in terms of compactness, energy-density and efficiency, and torque characteristics. Australia has the world's second largest reserve of the magnet material for IPM machines. It also has a significant niche industry for specialized machine design. These twin advantages should offer Australia huge potential benefits in the world market for electric and hybrid electric vehicles and for substantial reduction in our dependence on importing petrol and greenhouse gas emissions.

DP0986673 A/Prof R Ramer; Dr R Mansour

Approved Project Title **Radio Frequency Micro Electro Mechanical Systems Switch Applications for Reconfigurable Multifunctional Communication Systems**

2009 : $ 105,000
2010 : $ 90,000
2011 : $ 90,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of New South Wales

Project Summary

Recent advances in modern ultra wideband radar and wireless communications applications demanded high performance and reconfigurable Radio Frequency subsystems that simplify multiple complex functions using common hardware. These trends impose drastic requirements on passive and active devices. The reported performance of Radio Frequency Micro Electro Mechanical Systems (RF MEMS) switches, with extremely low loss and high isolation, microsopic, have lead to their applications in reconfigurable circuits. The proposal deals with the development of RF MEMS based reconfigurable devices that will enable flexible interconnections between various ports and channels and optimize the usage of bandwidth. The outcomes of this project will be of significant benefit to the Australian Telecommunication industry.

DP0986122 Prof WG Randolph; Prof R Freestone; Dr SM Pinnegar

Approved Project Title **The Drivers and Outcomes of Re-investment in Low Density Suburban Housing Markets**

2009 : $ 140,000
2010 : $ 133,000

Primary RFCD 3101 ARCHITECTURE AND URBAN ENVIRONMENT

Administering Organisation The University of New South Wales

Project Summary

This project will make a major contribution to our knowledge of contemporary Australian urban change and will inform wider debates on the future of Australian cities. The project will explore the social and economic processed leading to reinvestment and renewal of older low density suburban housing and will offer insights into community-level attitudes to housing built to higher environmental standards. This project will inform local and metropolitan planning processes related to sustainable suburban renewal and support policies that reduce community concerns and uncertainty over change, thereby contributing to the strengthening of the social fabric of our cities.

DP0984694 A/Prof N Rasmussen

Approved Project Title **Public and Proprietary Knowledge in Biotechnology: An Historical and Sociological Analysis of First Generation Recombinant DNA Pharmaceuticals Development**

2009 : $ 50,000
2010 : $ 49,000
2011 : $ 64,000

Primary RFCD 3706 HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE

Administering Organisation The University of New South Wales

Project Summary

The 'biotechnology revolution' of the 1980s was a formative period that set the present pattern of links between university life science and commerce. A clearer analysis of the shifting boundary between public and proprietary scientific knowledge in this key recent episode will thus provide valuable insight into the social role of university-based science today. In addition to matters of science policy and sociology, this more accurate account of the scientific initiatives, commercial strategies, and relationships with universities among the first biotechnology firms may also contribute to business scholarship aiming to foster success in the life science sector.

DP0985554 Prof R Richardson

Approved Project Title **Developmental analysis of extinction of learned fear in rats**

2009 : $ 75,000
2010 : $ 75,000
2011 : $ 75,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

This project aims to gain a better understanding of extinction (ie., loss) of learned fear in rats. Extinction is the process underlying exposure therapy, which is the most effective current treatment for anxiety disorders. Although most anxiety disorders are first diagnosed relatively early in life, we know very little about extinction of fear across development. However, recent findings have suggested that there are fundamental developmental differences in the extinction of fear, and the present project explores these differences in greater detail. By doing so, the project aims to increase our understanding of how fears can be inhibited, and may eventually lead to the development of age-appropriate treatments for anxiety disorders.

DP0987721 Dr D Sen

Approved Project Title **Parametric coding of acoustic fields using models of auditory sensitivity**

2009 : $ 120,000
2010 : $ 60,000
2011 : $ 30,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Organisation The University of New South Wales

Project Summary

The project represents cutting edge research in the field of soundfield recording, audio compression and reproduction. The introduction of explicit acoustic field theory to the field of audio compression is a substantive and innovative change that not only furthers the knowledge base in the field but also provides a framework for contributions in related fields such as auditory prosthetics and noise cancellation. The most obvious benefits will be international acclaim and the opportunity to patent, develop and ultimately export technology and systems. Outcomes from the project will benefit consumers and facilitate diverse industries within Australia ranging from health management to the consumer electronics and entertainment industry.

DP0987084 Dr LR Sheppard; Dr ED Wachsman

Approved Project Title **An Innovative Solid-State Approach to Enhanced Solar-Hydrogen Production**

2009 : $ 110,000
2010 : $ 110,000
2011 : $ 110,000
2012 : $ 115,000
2013 : $ 116,000

Primary RFCD 2502 INORGANIC CHEMISTRY

ARF Dr LR Sheppard

Administering Organisation The University of New South Wales

Project Summary

The project will make a major step towards the development of solar-hydrogen technology, which promises to deliver a clean and renewable fuel - hydrogen - from water (seawater or other) using sunlight and a suitable photo-catalytic material. Not only will solar-hydrogen assist Australia to reduce its dependence on imported energy, but will also reduce Australia's carbon emissions and overall contribution to climate change. When commercialized, solar-hydrogen technology may also enable Australia to become a global leader in the export of clean fuel, which will have very positive, far-reaching consequences for the economy.

DP0987803 Prof D Silove; Dr SJ Rees; Prof AB Zwi; Prof RM Thorpe

Approved Project Title **Understanding anger and its consequences amongst women in conflict-affected Timor Leste: Implications for enhancing sustainable development**

2009 : $ 139,000
2010 : $ 140,000
2011 : $ 118,000
2012 : $ 120,000
2013 : $ 117,220

Primary RFCD 3799 OTHER STUDIES IN HUMAN SOCIETY

QEII Dr SJ Rees

Administering Organisation The University of New South Wales

Project Summary

An Australian national priority goal is to understand our region...(its) societies, politics and cultures. AusAID highlights gender within its key theme Investing in People, emphasizing that 'gender equality is integral to growth, governance and stability'. Australia has made a massive investment in the stabilization of East Timor and other post-conflict countries including aid for women's organizations. Yet there is a notable gap in the empirical base for designing programs for women. The proposed study focusing on women's anger has the potential to ground psychosocial programming for women on a firm empirical base. The results may be transferable to other traumatized and disadvantaged communities.

DP0984531 Prof IH Sloan; Prof E Saff; Prof H Wendland

Approved Project Title **Innovations in spherical approximation - construction, analysis and applications**

2009 : $ 110,000
2010 : $ 110,000
2011 : $ 110,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of New South Wales

Project Summary

The motivating problems for this project come from geophysics, including climate, weather forecasting, planetary gravitation and magnetism, and from coding theory and molecular chemistry. National benefit is expected to arise both from an improved ability to handle problems of key economic importance, and from an enhanced position in the international scientific world, through public presentation in leading journals and international conferences, and from direct collaboration with internationally leading scientists from USA, UK and Germany. The project will also increase the pool of trained mathematicians with expertise in areas important for applications.

DP0986536 Prof V Solo

Approved Project Title **Joint System Identification for Point Processes and Time-series**

2009 : $ 105,000
2010 : $ 85,000
2011 : $ 85,000
Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of New South Wales

Project Summary

In various application areas such as neurophysiology, earthquake modeling, price spikes in electricity markets, the data of interest are point processes (aka sequences of events) or combinations of point processes and analog signals. To understand the underlying subject of interest we need to be able to extract the maximum information from these observation sequences. The current tools for doing this are very limited. This research program will develop the complex signal processing and system methodology needed to create a suitable tool set.

DP0986534 A/Prof C Song; Prof F Tin-Loi

Approved Project Title **Scaled boundary finite-element shakedown approach for the safety assessment of cracked elastoplastic structures under cyclic loading**

2009 : $ 100,000
2010 : $ 100,000
2011 : $ 100,000
Primary RFCD 2908 CIVIL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Many structures in Australia have passed or are approaching their design life. One of the most common happening in an ageing structure is the appearance of cracks. The safety of a cracked structure is a major concern to general public and government authority if no reliable safety evaluation can be performed. In this research project, an advanced numerical tool will be developed to predict the stability of cracks and thus the safety of a cracked structure. Such a tool, which does not yet exist, will help engineers and government authorities in deciding on the necessity and type of rehabilitation, retirement or replacement of a cracked structure.

DP0988365 Prof CC Sorrell

Approved Project Title **Increase in Photocatalytic Activity of TiO2 through Intervalence Charge Transfer**

2009 : $ 120,000
2010 : $ 90,000
Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Titanium dioxide (TiO2) has many proposed and realised applications in energy and the environment. The main problem that has hindered development and commercialisation of devices using TiO2 is its low photocatalytic activity, which results from its poor absorption of visible and infrared light. Most researchers modify the properties of TiO2 by conventional electrochemical methods to improve its performance but these attempts have been of limited success. The present research involves a completely new approach to the problem, which is based on the method used in the heat treatment of sapphire to improve its colour. This approach uses a phenomenon involving the modification of the optical properties to improve its absorption of light.

DP0988818 Prof IM Suthers; Dr PR Oke

Approved Project Title **Coastal cold core eddies of the East Australian Current and their fisheries potential**

2009 : $ 80,000
2010 : $ 80,000
2011 : $ 80,000

Primary RFCD 2604 OCEANOGRAPHY

Administering Organisation The University of New South Wales

Project Summary

Offshore eddies shed by the East Australian Current can draw in coastal water from the Stockton Bight on the NSW central coast. This area is anecdotally recognized as a fisheries nursery area. It is often enriched by upwelling of cold, nutrient-rich waters which can seed these eddies with larval fish and their food. We will test if such eddies nurture plankton communities and then transport them back to the coast, giving rise to a useful index for predicting future fisheries, as well as explaining biodiversity changes to marine park planners. We will provide a census of these eddies during El Nino-Southern Oscillation events and climate change of the past 15 years in unprecedented detail.

DP0987302 Dr MM Tanaka; A/Prof AR Francis; Dr R Lan

Approved Project Title **Mathematical models and bioinformatic analyses of bacterial genome evolution**

2009 : $ 118,000
2010 : $ 120,000
2011 : $ 118,000
2012 : $ 127,220
2013 : $ 131,650

Primary RFCD 2399 OTHER MATHEMATICAL SCIENCES

QEII Dr MM Tanaka

Administering Organisation The University of New South Wales

Project Summary

Bacteria are vital agents in earth's biosphere, breaking down and synthesising a wide variety of compounds. Some bacteria cause disease; others are exploited for a range of biotechnological applications. Bacteria have a remarkable ability to survive and thrive in changing conditions. For example, pathogenic bacteria confronted by antibiotics easily evolve resistance to them. With the reality of climate change, we expect more rapid shifts in the structure of bacterial communities, possibly leading to the emergence of new pathogens. The benefits of this project are to discover how the genetic structure of bacteria confer this flexibility, and to help keep Australia at the forefront of research in bioinformatics and mathematical biology.

DP0985059 Dr P Thordarson; A/Prof FC Braet

Approved Project Title **Smart bio-mimetic self-assembled gels for biomedical applications**

2009 : $ 100,000
2010 : $ 60,000
2011 : $ 60,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Organisation The University of New South Wales

Project Summary

Advanced materials that can be used to deliver drugs, repair scars and damaged tissue are the holy grail of regenerative medicine. Recently, a class of materials called self-assembled gels have shown enormous potential in this regard. Self-assembled gels have already demonstrated their use in drug delivery and are showing great promise in the treatment of spinal injuries. This project will create an even smarter version of these gels with biological activity, especially targeting cancer and suppressing tumour growth after surgery. Our approach will help to ensure that Australians can take a leading role in this highly exciting new area of biomedical research.

DP0986332 Prof F Tin-Loi; Dr Y Pi

Approved Project Title **Limit and shakedown analyses allowing for geometric effects and physical instability**

2009 : $ 120,000
2010 : $ 120,000
2011 : $ 120,000
Primary RFCD 2908 CIVIL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

The accurate safety assessment of structures is a fundamental requirement for their safe and cost effective design and management. In this respect, understanding the implications of geometric effects and physical instability on the failure behaviour of structures is a vital and challenging one. This project aims at achieving this by developing innovative approaches in which the classical, so-called, limit and shakedown, analyses are extended to incorporate these effects. The project will result in a significant advance in Australia's capability for enhanced diagnosis of its aging infrastructure and potentially also, through this newly developed computational ability, for the rapid transition of new materials to emerging technologies.

DP0986538 Prof I Tyrrell

Approved Project Title **The International Context of American Conservation Policy, c. 1900-1920**

2009 : $ 63,000
2010 : $ 40,000
2011 : $ 28,000
Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation The University of New South Wales

Project Summary

This project provides historical depth to current global concerns on resource depletion in fossil fuels, and to the clamour for international environmental cooperation that is of vital interest to Australia. It will explains why and how earlier concerns arose, and how these were allayed or deflected. It will highlight the importance of cultural rather than scientific issues in these controversies, showing how the American political system generated interest in international environmental problems, and yet made agreements difficult to achieve. It will deepen knowledge, enrich cultural understanding of the United States and contribute to Australia's international research profile in the field.

DP0987188 Prof TD Waite; Dr AL Rose

Approved Project Title **Resolving Critical Knowledge Gaps Relating to Light and Free-Radical Mediated Transformations of Iron and Copper in Oxic Natural Waters**

2009 : $ 95,000
2010 : $ 95,000
2011 : $ 95,000
Primary RFCD 2599 OTHER CHEMICAL SCIENCES

Administering Organisation The University of New South Wales

Project Summary

Understanding the transformation kinetics of iron and copper species is critical to maintaining Australia's water resources since i) iron transformations are key to generation and transport of acid in Australia's coastal environment; ii) growth of toxic algae are stimulated by dissolution of iron-rich sediments with subsequent release of nutrients phosphorus and iron, and iii) algal toxicity is related to iron and copper nutrition and interplay of these metals with oxygen. Additionally, global cycles of carbon, phosphorus and nitrogen are influenced by iron and copper interactions with light and oxygen. Improved understanding of these processes should lead to an awareness of how to prevent these problems and, if they occur, approaches to their mitigation.

DP0985886 Dr DI Warton; Dr NR Andrew; Dr H Gibb

Approved Project Title **Predicting the effect of climate change on community structure and function: an assessment using temperate grassland invertebrates**

2009 : $ 120,000
2010 : $ 90,000
2011 : $ 90,000

Primary RFCD 2799 OTHER BIOLOGICAL SCIENCES

Administering Organisation The University of New South Wales

Project Summary

This research will set the future agenda for assessing community responses to climate change worldwide. Our findings will be a robust template for future research to incorporate sophisticated multi-species assessments across all taxa and biomes. Results and conclusions from this research will aid graziers, agronomists, government agencies and conservation groups working in urban, rural and regional landscapes to prepare for changes in species relationships over the coming century. The team of early career researchers will also prepare the next generation of scientists for cutting edge ecological and statistical research within a dynamic and multidisciplinary context.

DP0987729 Dr DI Warton

Approved Project Title **Advances in statistical methods for analysing high dimensional count data**

2009 : $ 94,000
2010 : $ 94,000
2011 : $ 94,000

Primary RFCD 2302 STATISTICS

Administering Organisation The University of New South Wales

Project Summary

This project will lay the methodological foundations for future studies of ecological communities world-wide: whether studying biodiversity; monitoring and testing for an environmental impact of human activities (such as mining or pollution); studying drivers of ecosystem change such as land use, feral animals or climate change. This project will develop and make available new analysis methods that are more readily interpreted, more powerful and more flexible, and that enable the study of some research questions which are difficult or impossible to answer using current methods (e.g. understanding higher-order interactions at the community level). Future biostatisticians will be trained, partly addressing our critical national shortage.

DP0987584 Prof RE Wood; Dr N Beckmann; Dr A Minbashian

Approved Project Title **Integrating between-person and within-person approaches to personality in the workplace**

2009 : $ 110,000
2010 : $ 90,000
2011 : $ 90,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

Personality tests are used to predict well being and productivity at work and are often used for personnel decisions within organisations in developed countries, including Australia. The treatment of personality as a fixed set of traits that produce similar responses across situations ignores human variability across situations which is needed for design of interventions to make humans happier and more effective at work. The results of tests of the integrated model of personality will be used to design interventions for the development of responses that lead to greater well being and effectiveness of managers in work settings.

DP0987985 Dr SW Wroe; Dr DK Curnoe

Approved Project Title **The mechanics of being human**

2009 : $ 60,000
2010 : $ 50,000
2011 : $ 60,000
Primary RFCD 2601 GEOLOGY

Administering Organisation The University of New South Wales

Project Summary

This project will lead to far more detailed understanding of skull mechanics in our own lineage. Results will be of great interest to international scholars in both evolutionary and biomedical fields and help to establish a primary position for Australia in the rapidly expanding area of computer simulation of biological structure. Further development on our own established protocols for automated transfer of CT scan data into finite element models, which have already improved speed, accuracy and realism, will take finite element analysis to a point at which it can be more readily applied to evolutionary, biomedical and safety design questions.

DP0987236 Prof J Xue; A/Prof J Potter

Approved Project Title **A Programming Model of Object Validity for Secure and Efficient Concurrency**

2009 : $ 159,000
2010 : $ 112,000
2011 : $ 120,000
Primary RFCD 2803 COMPUTER SOFTWARE

Administering Organisation The University of New South Wales

Project Summary

To provide improved performance and security for software applications, Australia's ICT industry must adapt to the complex programming demands of modern multicore processors. The programming model developed in the project represents a breakthrough solution. A seamless integration of concurrency and object orientation leads to a simple yet powerful programming style that is compatible with today's premier approach to building large-scale software systems with significantly improved performance and security. The product will reduce development time for compute-intensive applications in many industry sectors, including health care (e.g. patient monitoring), finance, defence, environment, mining, manufacturing and computer games.

DP0984902 Dr HR Yang

Approved Project Title **Genome wide screening for gene products that regulate the celluar dynamics of lipid droplets**

2009 : $ 90,000
2010 : $ 40,000
2011 : $ 40,000
Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

Obesity is a pandemic that if not stopped, will lead to huge social and economic problems in Australia. In essence, the hallmark of human obesity is the accumulation of cellular lipid droplets. This research will benefit Australia by providing a fundamental understanding of how lipid droplets are formed. This will have immediate international impact at the scientific level and will also provide novel targets and strategies for treating obesity. The proposed study will also benefit Australian agriculture by providing strategies to improve oil production from plant seeds.

DP0988529 Dr RY Yang

Approved Project Title **Multi-scale modelling of particle breakage in grinding process**

2009 : $ 115,000
2010 : $ 85,000
2011 : $ 95,000
Primary RFCD 2907 RESOURCES ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

The minerals industry is the largest exporter in Australia, contributing approximately 40% of Australia's total exports. Grinding is one of basic operations in mineral processing to liberate valuables from the host rock. Grinding process, however, has very low efficiency and may account for 50% of the direct operating cost of a mineral processing plant. This project is to develop a novel, multi-scale model to investigate grinding at both process and individual particle levels and to provide a more accurate prediction of grinding performance. This will result in improved control and design of grinding process with reduced energy consumption and mineral waste, which will be of immense economic and environmental benefit to Australia.

DP0987142 Dr C YE

Approved Project Title **Controlled synthesis of well-aligned single crystalline one-dimensional semiconducting nanomaterials for energy application**

2009 : $ 130,000
2010 : $ 100,000
2011 : $ 100,000
Primary RFCD 2914 MATERIALS ENGINEERING

APD Dr C YE

Administering Organisation The University of New South Wales

Project Summary

This proposal is at the forefront of a number of important fields, and therefore the outcomes are expected to be of great interest to a broad spectrum of industry sectors, including advanced materials, nanotechnology, and sustainable energy. The novel synthetic methods and the targeting material system could lead to advanced materials for energy application. The outcomes of this project will place Australian researchers among the pioneering groups in this area and will benefit several major technology-related fields including materials manufacture technology and sustainable energy.

DP0987944 A/Prof J Yuan; Dr W Zhang

Approved Project Title **Spectrum Agile Radio Communication Techniques for Future Wireless Broadband Networks**

2009 : $ 135,000
2010 : $ 100,000
2011 : $ 100,000
Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of New South Wales

Project Summary

The project aims at developing novel cognitive spectrum access, transmission and receiving technologies, which allow unlicensed devices to use the unoccupied spectrum of licensed users in an intelligent way. The project outcomes will break the spectrum-availability bottleneck and significantly improve the spectrum utilisation in Australia. Potential applications of the project outcomes allow co-existence of various wireless communication systems working in the same spectrum band, which can lead to new services and open markets for new players. In addition, the Australian research community will benefit from the new theory and techniques while wireless users will benefit from improved high data rates and lower cost of services.