Summary of Linkage Projects Applications for Funding to Commence in 2006

New South Wales

The University of New South Wales

LP0668128 A/Prof E Ambikairajah

Approved Project Title **Classification of human movement patterns from a triaxial accelerometer for home telecare**

2006 : $53,000
2007 : $53,000
2008 : $52,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

APA(I) Award(s): 2

Partner Organisation(s)
MedCare Systems Pty Ltd

Administering Institution The University of New South Wales

Project Summary

The purpose of the proposed ambulatory monitoring system is to ensure that a community-dwelling elderly person receives automatic, timely aid in the event of an adverse situation while alone at home, such as a fall or stroke. This project is aimed at the priority area 'ageing well, ageing productively'. Providing rapid assistance after a fall will prevent much of the morbidity, distress and socio-economic cost that are associated with falls. Specifically, this project brings new advanced digital signal processing algorithms to bear on the difficult signal enhancement and classification problems associated with the information stream received from the triaxial accelerometer worn by the elderly client.

LP0667650 Dr TJ Barber; Prof E Leonardi

Approved Project Title **Development of a Compartment Fire Behaviour Training (CFBT) Database**

2006 : $32,950
2007 : $27,450
2008 : $29,450

Primary RFCD 3102 BUILDING

APA(I) Award(s): 1

Partner Organisation(s)
New South Wales Fire Brigade

Administering Institution The University of New South Wales

Project Summary

In recent years, incidents of fire flashover have caused considerable destruction to property and the loss of life. Fire prediction and understanding is an area of significance to both the Australian public and the firefighting profession. The NSW Fire Brigade has recently introduced Compartment Fire Behaviour Training (CFBT). To extend this scheme, a database of configurations will be developed using computational modelling, allowing firefighters the ability to experience virtually different situations. Detailed experimental studies will be conducted to validate the numerical model. This database will have use and significance beyond Australia and successful implementation promises reductions in the loss of life and property.

LP0667420 Dr L Barner; Prof TP Davis; Dr DA Lewis

Approved Project Title **Surface engineering of oriented nano-layers for performance control**

2006 : $75,000
2007 : $75,000
2008 : $75,000
Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Partner Organisation(s)
Sola International Holdings Ltd
Administering Institution The University of New South Wales

Project Summary

This research project will deliver knowledge on how to graft oriented, self assembled films from a surface, develop structure-property relationships at a nano-scale, develop a means to control these properties and develop characterization techniques at nano-scales. This research project, if successful, will deliver the ability to tailor the properties of a surface in a manner and over a range of properties that is not even contemplated today.

In addition to the scientific benefits, there are also immediate commercial applications in Australia and worldwide for ophthalmic products (e.g. anti-fog and easy to clean lenses), if the balance of properties can be obtained.

LP0667926 Prof TP Davis; Dr V Bulmus; Dr C Barner-Kowollik; Dr DJ Irvine; Ms L Ryan; Dr M Stenzel

Approved Project Title **Triblock Copolymeric Structures As Novel Dispersants**

2006 : $95,337
2007 : $90,050
2008 : $97,633
Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Partner Organisation(s)
Uniqema
Administering Institution The University of New South Wales

Project Summary

ICI are one of the largest producers of surface-active compounds in the world. ICI are represented in Australia by National Starch & Chemicals who have significant manufacturing and research/development sites in Sydney and Melbourne. As the fastest growing market for dispersants is SE Asia, it is our intention that if the research is successful that scale up and manufacture will occur at both the Bristish and Australian sites.

LP0667730 A/Prof AG Dempster; Prof C Rizos; Dr J Wang; Prof DA Grejner-Brzezinska

Approved Project Title **Sensor Integration for Low-Cost Robust Machine Automation**

2006 : $104,530
2007 : $107,565
2008 : $110,716
2009 : $89,337
Primary RFCD 2910 GEOMATIC ENGINEERING
APA(I) Award(s): 1

Partner Organisation(s)
Leica Geosystems
Administering Institution The University of New South Wales

Project Summary

Machine automation (MA) radically improves efficiency of mining and construction operataions. When used for farming, it makes Australia more competitive with subsidised competitors in Europe and USA. In one case, a 50% reduction in tractor fleet resulted when night plowing was made possible using MA techniques. The systems developed in this project will make MA far more attractive to Australian agriculture, mining and construction industries, by making it more robust and less susceptible to difficult conditions, such as under trees.

LP0667655 A/Prof KJ Fox; Dr J De Haan; Dr PH Van Mulligen; Dr M Silver

Approved Project Title **Scanner Data in the Consumer Price Index: How to expand and improve their use**

2006 : $74,000
2007 : $60,000
2008 : $108,000
Primary RFCD 3401 ECONOMIC THEORY
APA(I) Award(s): 2

Partner Organisation(s)
Australian Bureau of Statistics
Statistics Netherlands (CBS)
Administering Institution The University of New South Wales

Project Summary

The Consumer Price Index (CPI) is used in a variety of policy contexts, such as setting interest rates and determining the level of welfare payments, as well as by private industry for determining wages. The CPI is aggregate measure of price changes. It is typically constructed using survey data, which is a small sample of all the goods purchased. Electronic recording of sales, using scanned product bar codes, provides a huge amount of price and quantity information that potentially can be used to construct an improved CPI, and hence improved policies. The project includes the collaboration of the Australian Bureau of Statistics and the Central Bureau of Statistics (The Netherlands).

LP0667698 Prof CL Geczy; Prof IA Clark

Approved Project Title **Identification of novel markers of inflammation**

2006 : $90,000
2007 : $83,000
2008 : $76,000
Primary RFCD 3202 IMMUNOLOGY

Partner Organisation(s)
Vital Diagnostics
Administering Institution The University of New South Wales

Project Summary

This project will benefit Australia as it will increase basic understanding of inflammatory processes, result in a new generation of diagnostics for inflammatory diseases that could lead to earlier diagnosis and to monitor treatment, resulting in large economic and health benefit. It may lead to development of novel new therapies using monoclonal antibodies to regulate processes in immune, cardiovascular and infectious diseases. The work will generate significant economic spin-offs to the Australian biotechnology industry and will further relationships and training between research and development.

LP0667562 Dr SC Griffith; Dr SR Pryke; A/Prof WA Buttemer

Approved Project Title **Nutrition in the Gouldian finch - developing an optimal 'life-history diet'**

2006 : $90,000
2007 : $78,625
2008 : $71,625
Primary RFCD 3004 ANIMAL PRODUCTION

Partner Organisation(s)
Fidler Partners Pty Ltd
Demac Wildlife Nutrition
Finch Society of Australia Inc.
The Finch Society of Western Australia
Administering Institution The University of New South Wales

Project Summary

Native Australian birds such as the budgerigar, cockatiel, cockatoo, zebra finch and Gouldian finch dominate the pet trade with tens of millions kept across the world. Currently these birds are fed inadequate diets based on a few generic seeds (of European origin). Our study will investigate the nutritional needs of the Gouldian finch and the nutritional content of native Australian seeds, ultimately designing an optimal diet that will dramatically improve the health of these captive birds. We will develop a new product based on Australian plants, which are adapted to growing in even in the poorest soils and climates in Australia and which will form the basis of a new commercial crop for domestic and international markets.

LP0667544 Dr EL Johnston; Dr CJ Doyle

Approved Project Title **Contemporary ecological threats from historical pollution events and their modification by environmental conditions**

2006 : $60,000
2007 : $55,500
2008 : $48,500
Primary RFCD 2707 ECOLOGY AND EVOLUTION

Partner Organisation(s)
Port Kembla Port Corporation
Administering Institution The University of New South Wales

Project Summary

Many Australian ports have contaminated sediments that are a legacy of industrial pollution. The resuspension of these sediments through shipping or dredging activity represents an obvious, yet unsubstantiated, threat to the biodiversity and health of marine communities living well above the seafloor. This research proposal addresses a strategic knowledge gap with implications for appropriate management of port operations. Identifying the conditions under which contaminated sediments may cause an impact, and the environmental factors that modify these effects, will produce significant advances in scientific understanding and the results will be of strategic interest to all Australian Port Authorities.

LP0668235 Prof SL Kjelleberg; Prof PD Steinberg; Dr T Thomas; Dr SG Egan; Dr CG Holmström; Dr JC Venter; Dr KB Heidelberg; Dr G Sutton; Dr D Rusch; Dr A Halpern

Approved Project Title **Environmental genomics and novel bioactives from microbial communities on living marine surfaces**

2006 : $360,000
2007 : $325,000
2008 : $318,000
2009 : $318,000
2010 : $290,000
Primary RFCD 2703 MICROBIOLOGY
APA(I) Award(s): 1
APDI Dr T Thomas

Partner Organisation(s)
J. Craig Venter Institute
Administering Institution The University of New South Wales

Project Summary

This project has three linked benefits to Australia. One, it is the first study to use environmental genomics analysis in an Australian marine ecosystem, thus bringing into the Australian scientific community the cutting edge technology for studying diverse microbial communities. Two, by using this technology we will be able to investigate Australian marine biodiversity to an unprecedented extent. Three, this newly revealed diversity will then be mined for novel bioactives for use in pharmaceutical and other human health applications.

LP0667799 Dr AS McIntosh; A/Prof AM Williamson

Approved Project Title **Rail Safety And Reliability: A Human Factors/Ergonomics Approach**

2006 : $112,000
2007 : $125,000
2008 : $120,000
Primary RFCD 3504 TRANSPORTATION
APA(I) Award(s): 2

Partner Organisation(s)
Independent Safety Transport and Reliability Regulator
Department of Infrastructure
RailCorp
Administering Institution The University of New South Wales

Project Summary

Recent rail crashes have focussed rail operators and the public on issues of rail safety and reliabilty. The project is a major initiative that will assist the development of safer and more reliable rail operations through the application of human factors and ergonomics methods to the design of train control and management devices and systems.

LP0668313 A/Prof BA Neilan; Mr M Van Asten

Approved Project Title **A sustainable cellular factory for the production of antibiotics by photosynthetic bacteria**

2006 : $80,000
2007 : $74,000
2008 : $67,000
Primary RFCD 2708 BIOTECHNOLOGY

Partner Organisation(s)
Diagnostic Technology
Administering Institution The University of New South Wales

Project Summary

The range and rate of natural product discovery is the limiting factor in developing new pharmaceuticals. Traditional methods for the screening of these compounds or for their chemical synthesis are rapidly becoming inadequate as an increasing number of specific therapies, for cancers and infectious diseases for instance, are required. The research proposed will enable the design and production of "unnatural" products, including novel antibiotics, via combinatorial biosynthesis in photosynthetic microorgansims. The outcomes include graduate student training and Australian innovation in an enormous global market that is awaiting the next generation of medicines and associated pharmaceutical production technologies.

LP0667526 Prof O Ostrovski

Approved Project Title **Utilisation of manganese sludge in production of manganese alloys**

2006 : $66,350
2007 : $55,000
2008 : $50,000
Primary RFCD 2913 METALLURGY
APA(I) Award(s): 1

Partner Organisation(s)
Tasmanian Electrometallurgical Company
Administering Institution The University of New South Wales

Project Summary

Australia possesses one of the world's best deposits of manganese ore, and has the potential to increase production of manganese alloys. This depends strongly on the competitiveness of Australian manganese industry. Deposition of manganese sludge, which is formed in ferroalloy furnaces, in fume dams in Bell Bay is costly, occupies valuable land, and causes an environmental concern. Utilisation of manganese sludge back into ferroalloy furnace will make operation of Tasmanian Electro Metallurgical Company more efficient, sustainable and will stimulate further development of manganese industry in Australia.

LP0668205 Prof WG Randolph; Dr BH Judd; Dr R Samuels

Approved Project Title **Assessing the Effectiveness of Public Housing Estate Regeneration in NSW**

2006 : $128,750
2007 : $87,132
2008 : $110,900
Primary RFCD 3101 ARCHITECTURE AND URBAN ENVIRONMENT
APA(I) Award(s): 2

Partner Organisation(s)
NSW Department of Housing
Administering Institution The University of New South Wales

Project Summary

This project will assist in strengthening the social and economic fabric of disadvantaged public housing estates by developing an innovative framework for monitoring and evaluating the impacts of estate renewal programs in NSW. The framework will be capable of evaluating change not only in the estates themselves, but also in surrounding neighbourhoods. Special attention will be focused on issues of community wellbeing and safety. The development of more advanced techniques to assess the financial and non-financial benefits of renewal activity will make a significant contribution to the national body of knowledge about these complex and important renewal programs and their impacts in local communities.

LP0668326 Prof JH Roberts; A/Prof PD Morrison

Approved Project Title **Measuring Marketing Effectiveness: State of the Art, Current Practice and Areas of Leverage**

2006 : $98,000
2007 : $90,000
2008 : $77,000
Primary RFCD 3502 BUSINESS AND MANAGEMENT

Partner Organisation(s)
Australian Marketing Institute
Administering Institution The University of New South Wales

Project Summary

Marketing performs a useful role in society by identifying customer needs, focusing the resources of the firm towards meeting those needs, and communicating to customers how best to access the products available to fulfill their needs. Without good metrics marketing is fragmented and ineffective. By improving the measurement of marketing effort there will be less waste, resulting in higher profits and greater focus and improved customer satisfaction within Australian markets. In global markets, Australian firms will have access to the tools necessary to assist them to better meet the needs of overseas' customers, resulting in improved export performance.

LP0667740 Dr KB Rogers; Dr KP Hoekman

Approved Project Title **The Impact of Training in Self-Directed Learning Upon the Self-Regulation, Academic Resilience, and Achievement Motivation of Female Adolescents**

2006 : $25,982
Primary RFCD 3301 EDUCATION STUDIES

Partner Organisation(s)
Abbotsleigh Anglican School for Girls
Administering Institution The University of New South Wales

Project Summary

In adolescence, girls appear less willing to work independently or take academic risks. This innovative effort to provide systematic training in learning to work independently may perhaps circumvent conscious underachievement in school, as well as provide teachers with concrete methods for this circumvention. The innovation of the intervention itself will be its systematicity in incorporating self-direction skills within regular coursework in history rather than presenting it as a "stand alone" curriculum. Of import to researchers will be the assessment of "growth" in constructs heretofore theorized well, but not well measured: academic resilience, achievement motivation, and self-regulation.

LP0668265 Prof PG Saunders; Dr K Zhang

Approved Project Title **Growing Old in a Rapidly Changing World: Living Conditions and Inequalities Amongst the Aged in China**

2006 : $98,000
2007 : $92,000
2008 : $92,000
Primary RFCD 3701 SOCIOLOGY

Partner Organisation(s)
China Research Centre on Ageing
Administering Institution The University of New South Wales

Project Summary

China is set to dominate the world stage in the current millennium and ageing will present challenges to all nations. This research will benefit understanding of these issues by enriching our understanding of how older people in China cope with rapid change by documenting the factors that produce improved living conditions, including strong family and community relations. A component of the research will draw comparisons with Australia in order to increase the relevance of the study which will build ageing research capacity in both China and Australia.

LP0668397 Dr A Sharma; Dr I Cordery; Mr G Kibria

Approved Project Title **A Stochastic Downscaling Framework for Catchment Scale Climate Change Impact Assessment**

2006 : $88,526
2007 : $92,817
2008 : $97,575
Primary RFCD 2605 HYDROLOGY
APA(I) Award(s): 1

Partner Organisation(s)
Sydney Catchment Authority
Administering Institution The University of New South Wales

Project Summary

We propose a framework for climate change impact assessment at the catchment scale, that can both assess the change in catchment yield, as well as refine management policies to mitigate likely impacts. A key aim is to represent the full uncertainty in the simulated streamflow, thus enabling a risk-based comparison of current policies with those for climate change conditions. Given the importance of this research to the availability of water under a climate change scenario, this proposal has been listed under the ARC's Research Priority 1: 'An Environmentally Sustainable Australia', with the specific priority goals being 'Water - A Critical Resource', and 'Responding to climate change and variability'.

LP0667531 Dr V Sintchenko; Prof EW Coiera; Prof GL Gilbert; Mr DJ Muscatello; Ms HF Gidding; Dr D Dwyer; Mr MJ Bartlett

Approved Project Title **Informatics approaches to improving risk assessment and response to outbreaks of communicable diseases**

2006 : $120,000
2007 : $115,000
2008 : $30,000
Primary RFCD 2801 INFORMATION SYSTEMS
APA(I) Award(s): 1

Partner Organisation(s)
NSW Department of Health
Centre for Infectious Diseases and Microbiology
Australian Government Department of Health & Ageing
Administering Institution The University of New South Wales

Project Summary

The project will address the detection of infections caused by category A biological agents which pose a risk to national security. The project will contribute to Research priority 4 'Safeguarding Australia from invasive diseases and securing our critical infrastructure' by developing detection and alerting techniques for potential catastrophic threats. The Australian community will benefit from more efficient detection and management of potential biothreats to health and infrastructure. The application of the model to other industry sectors will enable better strategic planning and implementation of biosecurity initiatives. The potential national cost-benefit is impressive given limitations of currently used surveillance tools.

LP0668316 Prof TD Waite; Prof AG Fane; Dr G Genkin; Prof E Leonardi; Dr TJ Barber

Approved Project Title **Development of Vibratory Submerged Membrane Systems for Water and Wastewater Treatment**

2006 : $115,000
2007 : $115,000
2008 : $115,000
Primary RFCD 2906 CHEMICAL ENGINEERING
APA(I) Award(s): 2

Partner Organisation(s)
Hyflux Ltd
IMI TAMI Ltd
Sydney Water
Administering Institution The University of New South Wales

Project Summary

While there has been a dramatic increase in the use of submerged membrane systems in recent years, fouling of these membranes remains a major limitation to their more widespread use with the commonly used antifouling approach of bubbling with air exhibiting serious limitations. Low frequency vibration of submerged membranes appears to offer substantial benefits with regard to increased flexibility of operation (such as the ability for rapid turn up/turn down and the ability to minimise fouling in anaerobic systems)and is likely to further extend the use of membranes in water and wastewater treatment.

LP0667735 Dr J Wang; A/Prof P Mathew; Dr J Katupitiya; A/Prof RA Willgoss

Approved Project Title **Process models and control strategies for abrasive waterjet precision cutting of amorphous magnetic metal parts for energy efficient electrical machines**

2006 : $100,000
2007 : $95,000
2008 : $100,000
Primary RFCD 2903 MANUFACTURING ENGINEERING
APA(I) Award(s): 1

Partner Organisation(s)
Glassy Metal Technologies Ltd.
Administering Institution The University of New South Wales

Project Summary

Amorphous magnetic metal (AMM) is the most energy-efficient material for electrical machines and can save more than 36% of the energy wasted by an electrical motor using an ordinary core material. Since electrical motors consume about 70% of all the electricity generated, energy saving of approximately $900 million annually in electricity bills, and an annual reduction of 2.5 million tonnes of greenhouse gas emissions in Australia are expected. This project will develop a unique technology able to cut AMM to the required quality and productivity. It targets the national research priorities in Frontier Technologies and An Environmentally Sustainable Australia.

LP0668157 Prof AB Yu; Dr P Zulli

Approved Project Title **Model studies of transport and solidification phenomena in blast furnace hearth**

2006 : $124,000
2007 : $136,000
2008 : $132,000
2009 : $114,000

Primary RFCD 2913 METALLURGY

APA(I) Award(s): 1

Partner Organisation(s)
Bluescope Steel Research

Administering Institution The University of New South Wales

Project Summary

Blast furnace ironmaking is a key operation in the steel industry which, with annual turnover around $11 billion, is a largest manufacturing sector in Australia. This project will generate computer models that can reliably describe the complicated multiphase flow and thermochemical processes in blast furnace hearth. The implementation of reliable computer models and the development of new understanding through the conduct of this project should lead to long life campaigns, better operational control, decreased fuel consumption, improved productivity and reduced environmental impact. This, together with the proposed research training, is important to the development of Australia's competitive steel industry.