Victoria

The University of Melbourne

FT0991187 Dr PJ Anderson

Approved Project Title **Improving the quality of life of children born very premature.**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 3210 CLINICAL SCIENCES

Administering Organisation The University of Melbourne

Project Summary

This research program is in line with the national research priority to promote good health and well being, and more specifically to provide a healthy start to life for high-risk infants. This research program is attempting to improve the quality of life of infants born very preterm by improving our understanding of the nature of the problems faced by these high-risk children. This knowledge will inform future preventative care and early intervention strategies. More directly, this research program incorporates a series of randomised controlled trials which are all attempting to improve the health and well being of these vulnerable infants.

FT0991472 Dr N Barker

Approved Project Title **Molecular signals that regulate the regenerative properties of intestinal epithelial cells**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 3210 CLINICAL SCIENCES

Administering Organisation The University of Melbourne

Project Summary

Most cancer deaths are due to the cancer spreading to other organs. Cancer is much more difficult to treat once it has spread to other organs in the body where the cancer cells can exist in a dormant state. Dormant cancer cells evade conventional anticancer treatment and can remain dormant for a very long time before they change back to a 'tumour-growing' state. An understanding of how the cancer initiating (stem cell) property of tumour cells is maintained offers potential novel avenues to eliminate persistent cancer cells. This knowledge will ultimately lead to better management and treatment of cancer, and increase survival. An understanding of stem cell behaviour is also central to the control of degenerative conditions.

FT0991413 Prof K Bennell

Approved Project Title **Knee osteoarthritis: Getting moving with physiotherapy**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 3210 CLINICAL SCIENCES

Administering Organisation The University of Melbourne

Project Summary

Knee osteoarthritis (OA) is a prevalent chronic musculoskeletal condition causing pain, disability and reduced quality-of-life. Further rises in the prevalence of knee OA and associated patient and economic costs are expected due to an ageing population and increasing risk factors for OA such as obesity. This research will provide important information about the role of modified footwear and gait retraining in management of knee OA which can influence current clinical practice. This has the potential to reduce the burden of knee OA from both an individual and societal perspective. Furthermore, the research will result in a commercially available shoe suitable for people with knee OA.

FT0991117 Dr MJ Brear

Approved Project Title **Enabling low greenhouse gas emissions from road vehicles through the proper use of alternative fuels**

2009 : $ 85,800
2010 : $ 171,600
2011 : $ 171,600
2012 : $ 170,850
2013 : $ 85,050

Primary RFCD 2999 OTHER ENGINEERING AND TECHNOLOGY

Administering Organisation The University of Melbourne

Project Summary

A major increase in alternative transport fuel use appears necessary in our response to the challenges of climate change and energy security. This proposal will advance our fundamental understanding of key aspects of the combustion of particular alternative fuels, thus enabling proper engine design and so maximising greenhouse and energy security benefits. Further, the Australian automotive industry is a major employer and exporter, and needs to develop and/or maintain international leadership in low emission technologies to ensure its long term viability. This proposal builds a consortium of local organisations with common interests, thus helping local industry respond to several, significant challenges that they presently face.

FT0990583 Dr RA Caruso

Approved Project Title **Engineered materials for future energy technologies**

2009 : $ 98,600
2010 : $ 197,200
2011 : $ 197,200
2012 : $ 197,200
2013 : $ 98,600

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Melbourne

Project Summary

The development of new technologies to be applied in fuel generation, energy conversion and environmental remediation will have wide national and international impact. The cross-disciplinary and cross-institution research program proposed will draw on expertise within Australia and in Europe for the fabrication of materials for next generation energy devices. In the future, there is the potential that these materials could be fabricated within Australia and therefore lead to employment nationally, and income generated through the export of advanced catalysts, solar cells and sequestration materials.

FT0991404 Dr RR Dagastine

Approved Project Title **Fundamentals and applications of dynamic interfacial forces in soft matter**

2009 : $ 85,800
2010 : $ 171,600
2011 : $ 171,600
2012 : $ 171,600
2013 : $ 85,800

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of Melbourne

Project Summary

The proposed program will make an internationally significant contribution to the fundamental understanding of soft matter on the nanoscale. This has a direct impact upon processes that are key to a wide range of Australian industries ranging from the manufacture of functional foods to minerals recovery to pharmaceutical formulation, where innovative solutions can substantially improve productivity, increase export potential and reduce environmental impact. The outcomes of this work, in the form of high impact papers and conference presentations, will build and enhance Australia's reputation as a world leader in nanotechnology and colloid science.

FT0990531 Dr MR Duckham

Approved Project Title **Ambient spatial intelligence: Spatial analysis and event detection in environmental geosensor networks**

2009 :	$ 85,800
2010 :	$ 171,600
2011 :	$ 171,600
2012 :	$ 171,600
2013 :	$ 85,800

Primary RFCD 2910 GEOMATIC ENGINEERING

Administering Organisation The University of Melbourne

Project Summary

This project will design and test innovative new decentralised algorithms for responding to spatiotemporal queries in environmental monitoring networks. The research is essential for constructing larger, denser, and more reliable networks, helping to embed spatial intelligence within the environment itself (ambient spatial intelligence). The project builds on Australia's existing research excellence in geographic information science. By making smarter use of spatial information, the project will further strengthen Australia's world-leading spatial information industry, and support sustainable and economic environmental management through important applications like conservation contracts and carbon sequestration monitoring.

FT0991640 Dr RJ Elith

Approved Project Title **Improved methods for predicting species' distributions under environmental change**

2009 :	$ 78,900
2010 :	$ 152,950
2011 :	$ 148,100
2012 :	$ 148,100
2013 :	$ 74,050

Primary RFCD 3008 ENVIRONMENTAL SCIENCES

Administering Organisation The University of Melbourne

Project Summary

Understanding the impacts of climate change and invasive species on the distribution and persistence of species is an issue of global and national significance and concern. This project will provide tools essential for the effective management of Australia's ecosystems by delivering clear guidelines and practical methods that will substantially improve the modelling of future species distributions.

FT0991558 Dr JD Gehman

Approved Project Title **Maximizing solid state Nuclear Magnetic Resonance (NMR) with maximum entropy**

2009 :	$ 85,800
2010 :	$ 171,600
2011 :	$ 171,600
2012 :	$ 171,600
2013 :	$ 85,800

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Organisation The University of Melbourne

Project Summary

Nuclear magnetic resonance is an essential technology for the characterisation of important industrial and biomedical molecules, molecular chains and complexes. This project aims to considerably expand the fundamental capability of experimental techniques for the study of materials in the solid state, in particular for a new class of biological nanoparticle. These advances will have important global implications for research into life-saving therapeutic strategies aimed at many pharmaceutical targets embedded in cell membranes, protein misfolding disorders such as Alzheimer's disease and Huntington's disease, as well as development of the next generation of "green" plastics and other advanced polymers.

FT0990267 Dr EL Hartland

Approved Project Title **The biology, structure and function of bacterial virulence effectors**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 3204 MEDICAL MICROBIOLOGY

Administering Organisation The University of Melbourne

Project Summary

This project is closely aligned with the National Research Priority of Promoting and Maintaining Good Health and will establish a research framework to investigate novel virulence processes that allow bacterial pathogens to infect humans and cause disease. This fresh approach to the study of bacterial pathogenesis will sit outside classic genetic methods to investigate infection and immunity which rely heavily on genetic manipulation of the pathogen. Other than providing fundamental information on host-pathogen interactions, this work may lead to novel disease interventions by inhibition of bacterial virulence factor activity and/or enhancement of host inflammatory and immune responses.

FT0991395 A/Prof M Kelaher

Approved Project Title **Agreements as a mechanism for community participation in health policy: Understanding process and evaluating effectiveness**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation The University of Melbourne

Project Summary

Improving the health of Indigenous people requires health policy that is inclusive and proactive rather than crisis driven. Formal agreements outline responsibilities and accountabilities in a shared framework that respects the rights of the parties involved. This project will evaluate the quality and effectiveness of agreements in Indigenous health by assessing their ability to change the way governments and communities work together to improve health. The project will help ensure that future agreements reflect shared solutions for improving the health of Indigenous people in a respectful and effective way. It will also determine whether agreements work to bring community and government together to reduce inequalities in health.

FT0991470 Dr R Kippen

Approved Project Title **Epidemics, mortality and longevity in Tasmania, 1838-1930**

2009 :	$ 85,800
2010 :	$ 171,600
2011 :	$ 171,600
2012 :	$ 171,600
2013 :	$ 85,800

Primary RFCD 3705 DEMOGRAPHY

Administering Organisation The University of Melbourne

Project Summary

This project will investigate areas of contemporary importance that can only be explored using historic-demographic data. National benefits include (1) gaining a better understanding of how epidemics spread through families and communities, and possible mortality and case-fatality rates, to assist in preparation for future epidemics; (2) improved accuracy in projecting older-age mortality and population ageing in Australia and other countries; and (3) more precise estimates of women's capacity to naturally conceive and carry to term by characteristics such as her age, her partner's age, and her number of previous births. The project will also result in augmentation of a unique publicly available dataset.

FT0990892 Dr TP Lane

Approved Project Title **The dynamics of deep convective clouds and their role in the climate system**

2009 :	$ 85,800
2010 :	$ 171,600
2011 :	$ 171,600
2012 :	$ 171,600
2013 :	$ 85,800

Primary RFCD 2606 ATMOSPHERIC SCIENCES

Administering Organisation The University of Melbourne

Project Summary

Deep convective clouds are the source of some of the largest uncertainties in climate projection models. This research will better characterise turbulence, mixing and momentum transport processes around clouds and develop new methods to include these effects in climate models, leading to more robust estimates of future climate change. An additional benefit of this work is that it will develop new guidelines for cloud-induced turbulence avoidance for use by the aviation industry and lead to increased aviation safety.

FT0991110 A/Prof C Lim

Approved Project Title **Unified digital networking for wireless and optical access**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Melbourne

Project Summary

The provision of broadband services is a high priority for the Australian government as evidenced by the various initiatives around Australia. The merging of backbone infrastructures for access environment will overcome unnecessary cost of maintaining and upgrading two separate networks for wired and wireless applications. The merged infrastructure will potentially provide inexpensive and cost-effective solutions for truly broadband services with a choice of wired or wireless connectivity to customers and will remove the rural-urban broadband divide that has been challenging Australia. The outcomes of this project can lead to new business ventures and will further strengthen the telecommunication industry.

FT0990930 Dr A McKendrick

Approved Project Title **Resolving multi-sensory conflict as we age: audio-visual integration and the role of normal and abnormal sensory decline**

2009 :	$ 85,800
2010 :	$ 171,600
2011 :	$ 171,600
2012 :	$ 171,600
2013 :	$ 85,800

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Melbourne

Project Summary

Australia has an ageing population. Even the healthiest older individuals undergo some deterioration of vision and hearing, however, these senses are almost invariably studied in isolation. The real world is multisensory. This project will enhance our knowledge of how ageing impacts on the interpretation of visual and auditory information regarding the timing and location of objects; essential precursors to many real world tasks, for example: driving, interpreting speech, and hazard avoidance. This knowledge is essential for the optimisation of audio-visual environments for the elderly, and for the development of tools to improve performance in the presence of sensory decline due to age-related eye disease.

FT0991646 Dr J Moss

Approved Project Title **Climate Justice**

2009 :	$ 76,198
2010 :	$ 151,190
2011 :	$ 151,190
2012 :	$ 151,190
2013 :	$ 74,992

Primary RFCD 4401 PHILOSOPHY

Administering Organisation The University of Melbourne

Project Summary

The project will offer significant insights into the effects of climate change and adaptation policy on the key area of rural well being and energy use. The project will be able to gauge whether current and proposed carbon trading schemes are just and how in particular, Australia's climate policy interacts with the Pacific region. In addition, the project will also consider the important political issue of whether democratic participation in the formation of climate policy is required and in what ways.

FT0990727 Prof D Nesic

Approved Project Title **Networked control systems: harnessing an emerging technology**

2009 :	$ 111,400
2010 :	$ 222,800
2011 :	$ 222,800
2012 :	$ 222,800
2013 :	$ 111,400

Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of Melbourne

Project Summary

Drive-by-wire cars, fly-by-wire aircraft and sensor/actuator wireless networks in process and manufacturing industries are just a few examples of emerging networked control technologies that are currently reshaping our world. These technological advances have a vast potential to reduce the cost, weight and volume of engineered systems, simplify their maintenance and installation and their novel architectures and features may enable us to address significant environmental and socio-economic challenges, such as an increased demand for energy and other limited resources. This project will develop a systematic design methodology for networked control systems that will be essential in ensuring that its full potential is exploited.

FT0991245 Dr MA Perugini

Approved Project Title **Molecular evolution of a model oligomeric enzyme from bacterial extremophiles**

2009 :	$ 85,800
2010 :	$ 171,600
2011 :	$ 171,600
2012 :	$ 171,600
2013 :	$ 85,800

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Organisation The University of Melbourne

Project Summary

The national benefits of this research program include insight into the sustainability of marine microorganisms that play an important role in Australia's diverse ecosystem, the development and applications of frontier technologies including high-performance computing on the world's largest supercomputer facility for life science research, and knowledge impacting on the discovery of novel antibiotics that target pathogenic bacteria, like Golden Staph. This program will also train several young Australians in highly sought after skills, including bacteriology, biophysics, enzymology, molecular biology, molecular modelling, protein chemistry and structural biology.

FT0990350 Dr SA Ralph

Approved Project Title **Transfer ribonucleic acid (tRNA) synthetases as drug targets in Plasmodium falciparum**

2009 :	$ 85,800
2010 :	$ 171,600
2011 :	$ 171,600
2012 :	$ 171,600
2013 :	$ 85,800

Primary RFCD 3204 MEDICAL MICROBIOLOGY

Administering Organisation The University of Melbourne

Project Summary

Malaria is a major worldwide infectious disease. The disease kills around 2 million people every year, and current drugs are increasingly failing due to parasite drug resistance, creating an urgent demand for new drugs, that inhibit different targets. The Fellow will study a new class of parasite drug targets, the transfer ribonucleic acid (tRNA) synthetase enzymes to find novel inhibitors. Compounds blocking these enzymes may lead to new drugs to combat malaria.

FT0990628 Dr CA Reid

Approved Project Title **Understanding the neuronal mechanisms underlying inherited epilepsies**

2009 :	$ 82,300
2010 :	$ 164,600
2011 :	$ 164,600
2012 :	$ 164,600
2013 :	$ 82,300

Primary RFCD 3207 NEUROSCIENCES

Administering Organisation The University of Melbourne

Project Summary

Epilepsy is a serious disease that impacts severely on individuals and the community as a whole. Conservative estimates suggest a financial cost of more than $2 billion per annum. Drug treatment for this disease is often not adequate. Recent advances have allowed scientists to determine mutation in human genes that cause epilepsy. New models of epilepsy based on this knowledge will allow us to better understand what causes epilepsy enabling us to devise new and potent therapeutic strategies to treat the disease.

FT0990539 Dr TA Reuter

Approved Project Title **Religion and Spirituality in the Contemporary World: An Indonesian Case Study**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 3703 ANTHROPOLOGY

Administering Organisation The University of Melbourne

Project Summary

Religious extremism in Indonesia became a major security concern for Australia after the Bali bombing. Research thus focused on the networks of small and rather marginal Islamic radical groups such as Jemaah Islamiyah (JI), while the broader national and international trends that give rise to this and other, more moderate and popular new forms of religiosity remained unexplored. This emphasis on extremism contributed to a stereotyping of Islam as intransigent, and of multi-ethnic and multi-religious Indonesia as an Islamic nation. The current project will deliver a more balanced appraisal of the impact of resurging religiosity in our region by focusing on the pluralistic and relativistic religious attitudes more representative of Indonesian society today.

FT0991296 Prof A Scott

Approved Project Title **Incentives and performance in the health care system**

2009 :	$ 90,078
2010 :	$ 180,157
2011 :	$ 180,157
2012 :	$ 178,507
2013 :	$ 88,428

Primary RFCD 3402 APPLIED ECONOMICS

Administering Organisation The University of Melbourne

Project Summary

Changes in financial incentives for health care providers will have direct effects on their behaviour, which in turn influences patients' health outcomes, quality of care, and access to health care for the population. The research will provide a richer understanding of the effects of incentives, and will influence policy on the design of incentives for health care providers in Australia. Changes in incentives will ensure patients receive more appropriate, higher quality, and less costly health care, in the most appropriate settings, and delivered by the most appropriate health care providers. This will have direct effects on population health and well-being and the capacity of individuals to lead healthy and productive lives.

FT0991385 Dr Y Tan

Approved Project Title **Real time optimisation by extremum seeking control and learning control**

2009 :	$ 85,800
2010 :	$ 171,600
2011 :	$ 171,600
2012 :	$ 171,600
2013 :	$ 85,800

Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of Melbourne

Project Summary

Optimal control technology provides the systematic design of systems that exhibit optimal behaviour, such as maximal productivity, best efficiency, minimal cost and best quality. Real time optimisation finds the solution of the optimal control in real time, relaxing requirements on the system knowledge. The proposed research will build on Australia's well-established strength in control and optimisation, and aim to establish within Australia world-leading expertise in real time optimisation theories and applications. This will have direct benefits to the Australian economy through various engineering applications ranging from vehicle dynamics to emissions reduction to manufacturing process to efficiency improvement of power generation systems.

FT0991326 Dr A Turpin

Approved Project Title **Smart Algorithms Linking Medical Image Data and Measures of Dysfunction**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 2899 OTHER INFORMATION, COMPUTING AND COMMUNICATION SCIENCES

Administering Organisation The University of Melbourne

Project Summary

Losing sight has a profound affect on a person's quality of life. Advances in devices that monitor vision have not been matched by advances in computer software that analyses data from those devices. This project will combine computer science, visual neuroscience and clinical expertise to devise algorithms and build software that will vastly improve clinician's abilities to diagnose and monitor vision loss. In turn, this will dramatically improve the chances of those with diseases such as glaucoma to preserve their sight into old age. Furthermore, outcomes from this project will inform the development bionic eye technologies, which will assist those with eye diseases such as retinis pigmantosa and age-related macular degeneration to see.

FT0991854 A/Prof B Vo

Approved Project Title **Optimal Control of Multi-Object System**

2009 :	$ 98,600
2010 :	$ 197,200
2011 :	$ 197,200
2012 :	$ 197,200
2013 :	$ 98,600

Primary RFCD 2301 MATHEMATICS

Administering Organisation The University of Melbourne

Project Summary

Better understanding of multi-object systems developed from this research, in particular, optimal control algorithms for multi-object systems have several significant socio-economic benefits. Application areas that benefits from our research include aerospace applications such as radar, sonar, guidance, navigation, and air traffic control and non-aerospace areas such as image processing, oceanography autonomous vehicles and robotics, remote sensing, and biomedical research. The sensor network discipline also stand to benefit from the understanding of multi-object system and control framework.