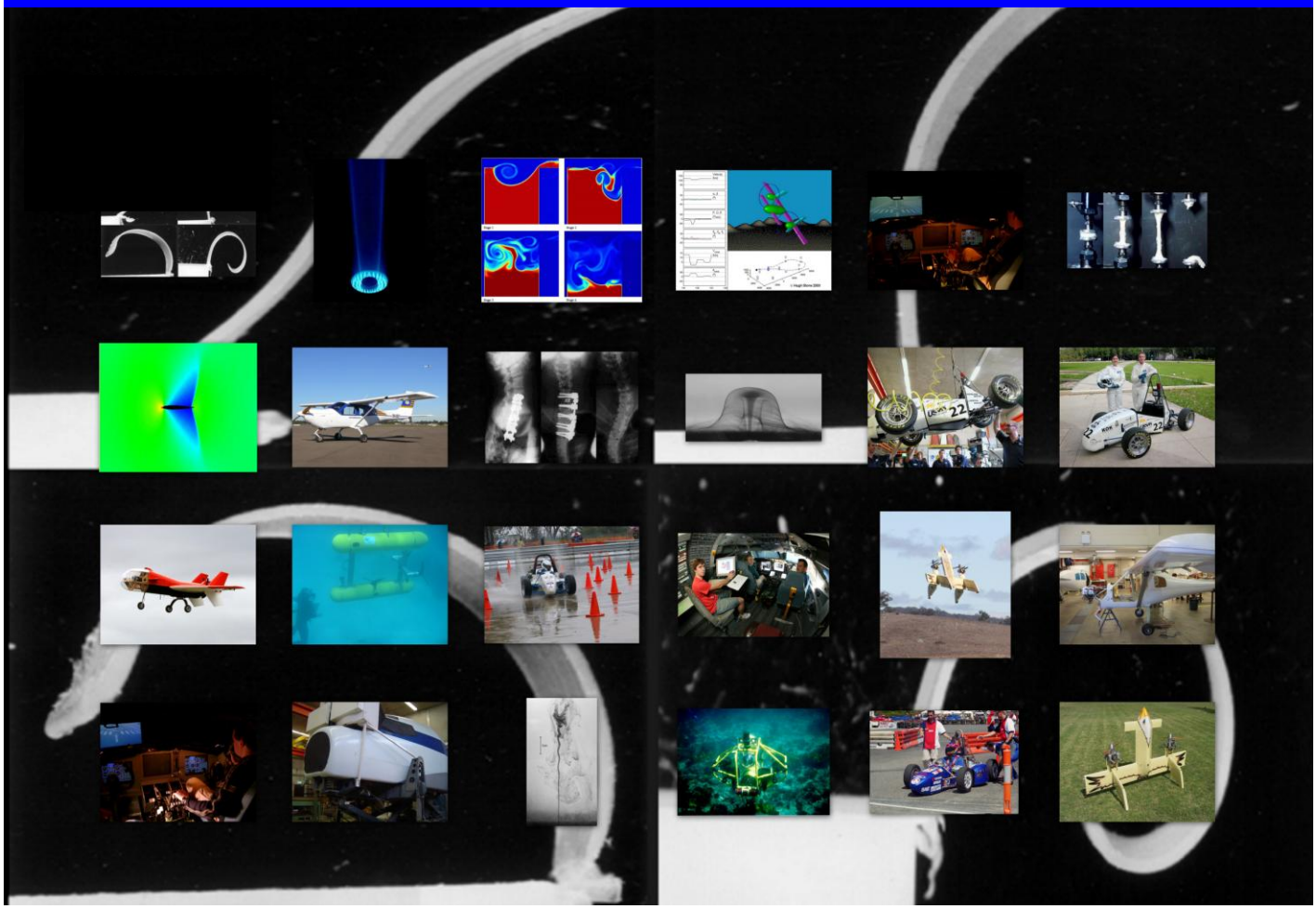
SCHOOL OF AEROSPACE, MECHANICAL & MECHATRONIC ENGINEERING

RESEARCH REPORT 2009



Faculty of Engineering and Information Technologies
The University of Sydney

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Designed and produced in-house by the School of Aerospace, Mechanical & Mechatronic Engineering, University of Sydney

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Foreword

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Professor Steve Armfield
Head of School

We are pleased to publish this report which reflects the research strengths and achievements in the School of Aerospace, Mechanical and Mechatronic Engineering (AMME) for 2009. The school has a number of world class research groups and has continued to maintain its position as the dominant research school in the faculty, and one of the leading engineering research schools in the country. During the year $4.6 million of new research funding was obtained, 241 research articles and books were published, 115 research students were under supervision and 24 research students completed. With 27 permanent academic staff members the performance per capita places us on a par with the top engineering schools in the world. I would like to thank all the staff whose hard work and dedication has produced this outstanding research profile.

Organisational Overview

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Academic Staff

Head of School

Prof Steve Armfield

Professors

Armfield, Steven
Behnia, Masud
Durrant-Whyte, Hugh
Mai, Yiu-Wing
Masri, Assaad
Nebot, Eduardo
Tanner, Roger
Tong, Liyong
Ye, Lin

Emeritus Professors

Bilger, Robert
Bird, Graeme
Steven, Grant

Honorary Professors

Brandwood, Arthur
Henderson, Le Roy
Kent, John
Zhang, Liangchi

Adjunct Professors

Chamitoff, Gregory
Rose, Francis

Associate Professors

Dunstan, Colin
Ruys, Andrew
Sukkarieh, Salah

Honorary Associate Professors

Diwan, Ashish
Wong, Shing-Chung
Youssef, Peter

Adjunct Associate Professors

Lowe, Allen
Roger, Greg
Zheng, Rong

Senior Lecturers

Auld, Douglass
Brooker, Graham
Gibbens, Peter
Karkenahalli, Srinivas
Jabbarzadeh, Ahmad
Kirkpatrick, Michael
Li, Qing
Liao, Xiaozhou
McHugh, Paul
Rye, David
Scheding, Steven
Williams, Stefan
Wong, Kee Choon
Zreiqat, Hala

Honorary Senior Lecturer

Bilston, Lynne

Adjunct Senior Lecturer

Uthayakumaran, Surjani

Lecturer

Wu, Xiaofeng

Honorary Lecturers

Boughton, Phillip
Stone, Hugh

Adjunct Lecturer

Bates, Peter

Associate Lecturers

Briozzo, Paul
Fiford, Rod

Adjunct Associate Lecturer

Gonzalez, Carlos

Honorary Associates

Binder, Waltraud (Trudie)
Fan, Xijun
Houghton, Ron
Liu, Zizhen
Lu, Chunsheng
Mitra, Ashish
Nahar, Kazi Kamrun
Pereira, Gerald
Qin, Qing Hua
Swain, Michael
Zhang, Xin-Ping

Research Staff

ARC Future Fellow

Liu, Hong Yuan

International Visiting Research Fellow

Shabana, Yasser

ARC APD

Chang, Li
Nguyen, Thai

Australian Postdoctoral Fellow

Lu, Ye

ARC Fellow APD

Du, Xusheng

ARC Research Associate

Tekyeh Marouf, Bahereh

University Postdoctoral Research Fellows

Mo, Maosong
Wu, Chengtie

University of Sydney Bridging Support Fellow

Li, Wei

Research Fellows

Bailey, Tim
Brooks, Alex
Bryson, Mitchell
Deng, Shiqiang
Elinas, Pantelis
Fitch, Robert
Kaupp, Tobias
Mahon, Ian
Makarenko, Alexei
Melkumyan, Arman
Melkumyan, Narek
Monteiro, Sildomar
Murphy, Richard
Mylvaganam, Kausala
Neito, Juan
Nettleton, Eric
Perera, Lochana
Peynot, Thierry
Pizarro, Oscar
Singh, Surya
Vasudevan, Shrihari
Velonaki, Mari

Post Doctoral Fellows

Ali, Yasser
Baji, Avinash
Chen, Yiqing Annie
Dai, Shao Cong
Dasari, Aravind
Jakuba, Mike
Luo, Quantian
Luo, Zhen
Nguyen, Van Ky Quan
Pramanik, Alokesh
Qi, Fuzhong
Ramos, Fabio
Starner, Sten
Uddin, Mohammad Sharif
Wang, Yanbo
Williamson, Nicholas
Yaroshchyk, Pavel
Zhou, Shiwei

Postdoctoral Research Associates

Lu, ZuFu
Wang, Guocheng

Organisational Overview

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Research Staff

Research Associates

Douillard, Bertrand
Dunn, Matthew
Gounder, James
Gu, Ying
Lee Wo, Duane
Lin, Daniel Chun-Fan
Ramaswamy, Yogambha
Wang, Dong

Senior Research Engineers (CRC-AS)

Qi, Ben
Beehag, Andrew

Research Assistant

James, Barbara

Administrative Staff

Project Officer

Merry, Lisa

Finance Managers

Connell, Robin
Wang, Christy

Finance Officers

Bismire, Doris
Du Toit, Lanita

Administrative Officers

Hunter-Smith, Lisa
Liang, Wendy (Undergraduate Studies)
Martin, Vinita (Head of School's Office)
Olip, Ruth
Santos, Tessie
Sawtell, Olga
Sexton, Bronwyn (Postgraduate Studies)
Tetradis, Natasha

Administrative Assistant

Gonzales, Susan

Computer Systems Officer

Fiford, Rod

Workshop Staff

Senior Technical Officers

Cumberland, Greg (Manager, AMME Workshop-On Leave)
Elder, Greg (Acting Manager, AMME Workshop)
Stenger, Duncan (Acting Manager, AMME Workshop)

Technical Officers

Attia, Muhammad Esa
Atzmon-Simon, Barak
Bandara, Dharmapriya
Beauport, Jean-Gerard
Brown, Stuart
Calleija, Mark
Chan, Pak Hung (Victor)
Connolly, Laura
Crundwell, Bruce
Fan, Xiuya
Geier, Matthew
Hale, Timothy
Head, Adrian
Karkada, Stanley
Keep, Steve
Kim, Yeop
Klemme, Stanley
Lal, Ritesh
Maclean, Andrew
Mercer, Duncan
Nichani, Vijay
Oliver, Bruce
O'Shannessy, Robert
Randle, Jeremy
Riviere, Greg
Rodgers, Craig
Sadrossadat, Amir
Scaysbrook, Brian
Shearing, Trevor
Todhunter, John

Technical Assistants

Mear, Paul
Potts, John

Organisational Overview

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Visiting Professors/ Scholars

Bao, Ronghao
Cazorla, Miguel
Chen, Chang-Rong
Chrigui, Mouldi
Cotterell, Brian
Gao, Cun-Fa
Horikiri, Fumimasa
Ila, Viorela
Kim, Chul-Ho
Letty, Camille
Ma, Haitao
Mastorakos, Epinondas
Pottie, Gregory
Qiu, Wan-Qi
Shi, Dean
Su, Liying
Tang, Youhong
Tanimoto, Toshio
Vidal-Calleja, Teresa
Viejo, Diego
Wang, Yongguang
Williams, Gordon
Wu, Cuilan
Xu, Shi-Ai
Yu, Zhong-Zhen
Zhang, Hongwu
Zhou, Xing-Ping

Occupational Trainees

Amiot, Marie
Bastos, Guilherme
Bernou, Mathieu
Cadena, Cesar
Cai, Guipeng
Canepa, Andrea
Cui, Wei
Guerrero, Pablo
Hobbs, Kevin
Koerner, Fabian
Li, Xiongkui
Malios, Aggelos
Miao, Xiaoting
Ndayra, Mario
Pang, Rui
Peng, Haikuo
Posch, Andre
Potthast, Christian
Roohaniesfahani, Seyediman
Schellekens, Michael
Speck, Raphael
Sun, Guangyong
Wang, Chao
Yang, Lin
Zuolei, Sun (Samuel)

Research Highlights

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Research and Teaching Grants Awarded in 2009

Australian Research Council (ARC) Discovery Grants

LI (Qing) $300,000
Topology optimisation of periodic structures for stent design

LI (Wei) and Swain (ARF) $600,000
Topography optimization of implants for enhancing osseointegration"

MASRI, BILGER and Mastorakos $654,000
Strongly transient processes in turbulent combustion

PIZZARO, WILLIAMS (QEII) (*et al*) $798,000
Cost-effective autonomous technologies for long term monitoring of marine protected areas

TANNER $410,000
Modelling soft viscoelastic solids

Australian Research Council (ARC) Linkage Grants

BEHNIA, ARMFIELD and NAGARATHINAM $288,000
AECOM

LIAO $301,000
Electron microscope project

Australian Research Council (ARC) Linkage Infrastructure, Equipment and Facilities Grants (LIEF)

CAIRNEY (*Electron Microscope*), Liao, Mai (*et al)* $1,200,000
Advanced focused ion beam (FIB) / scanning electron microscopes (SEM) for nanometre scale characterisation and fabrication

SHEN (*Civil Engineering*), Liao, Mai (*et al*) $260,000
Split Hopkinson bar facility for high strain rate testing of materials

Australian Research Council (ARC) Future Fellowship

LIU $624,300
Fatigue life prediction of nano-filler modified composites

National Health and Medical Research Council Grant (NHMRC)

ZREIQAT and DUNSTAN $539,500
Harnessing the physiological effects of strontium and zinc to produce novel biomaterials for orthopaedic applications

Rebecca L Cooper Medical Research Foundation Grant

ZREIQAT $20,000
Developing novel scaffolds for osteochondral defects and orthopaedic prosthetic coatings for bone tissue regeneration and implant osseointegration

University of Sydney Early Career Researcher Scheme (ECR)

WU $30,000
Design and implementation for satellites formation flying control using one-bit processing

University of Sydney Major Equipment Scheme (ME)

LIAO $37,000
Model 691 precision ion polishing system with a cold Stage

MASRI $32,000
A third harmonic generator & wavelength meter for the high speed imaging of CH_2O

WILLIAMS $40,000
Iver2 AUV, base vehicle with side scan SONAR

ZREIQAT $30,000
Cell culture system, UV spectrometer, digital imaging system

Research Highlights

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Appointments and Promotions

Dr Qing **Li** is promoted to Associate Professor.

Professor Liyong **Tong** is appointment Pro Dean in the Faculty.

Dr Hala **Zreiqat** is promoted to Associate Professor/ Principal Research Fellow.

Awards and Honours and Partnerships

ACFR signed a strategic partnership with BAE Systems to support research in autonomous systems (worth $1.5m/year for initial period of 5 years).

Professor Hugh **Durrant-Whyte** was elected as a Member of the Australian Academy of Science on 24th March, 2009

Professor Hugh **Durrant-Whyte** received the Clunies Ross Award for his critical role in raising the visibility of Australian Robotics in government industry, academia and the community.

Drs Peter **Gibbens** and Michael **Kirkpatrick** were jointly awarded the inaugural AMME teaching award.

Ms Yogambha **Ramaswamy** won the best oral presentation by a student at the 19th annual conference of the Australasian Society for Biomaterials and Tissue Engineering Held at the University of New South Wales, Sydney, Australia, 21-23rd Jan 2009. This Award was sponsored by the New South Wales office for Science and Medical Research.

Dr Stefan **Williams** was awarded an ARC Super Science Fellowship position.

Professor Lin **Ye** published a volume in the Springer Lecture Notes on Applied Computational Mechanics series.

Dr Hala **Zreiqat** was awarded a World Class Grant for the meeting "Tissue Engineering and Regenerative Medicine: The next 20 years" hosted and co-sponsored by the University of Sydney in November 2010.

Aerospace Research

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Research Group

Design Optimisation Research

Dr K Srinivas
P: + 61 2 9351 4289
k.srinivas@usyd.edu.au

(Also a member of the Biomedical, Fluid Dynamics Research Groups & Finite Element Analysis Research Center)

- Hierarchical Asynchronous Parallel Evolutionary Algorithms (HAPEAs)
- Robust evolutionary methods for multi-objective and Multidisciplinary Design Optimisation (MDO) in Aeronautics.
- Grid free flow-solvers and evolutionary algorithms.
- Adaptive aerofoils/wings design and optimisation using evolutionary algorithms.

Smart Structures Research

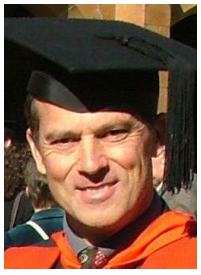
Professor Liyong Tong
P: +61 2 9351 6949
Liyong.tong@sydney.edu.au

(Also a member of Finite Element Analysis Research Center)

Research interests are mainly concerned with modeling behaviors of composite and smart structures. Current research areas and projects include:

- Failure analysis and damage tolerance of adhesive bonded composite joints
- Modeling behavior of 3D reinforced composite materials, including transverse stitching
- Behavior of composite plates and shells
- Smart structures using PZT sensors/actuators, including damage detection and performance control of thin-walled structures

Flight Simulation and Control



Dr Peter Gibbens
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peter.gibbens@sydney.edu.au

The Variable Stability Flight Simulator (VSFS) is an exclusive project to the University of Sydney, a national first. In addition to the application of the VSFS to AMME flight mechanics courses, the simulator offers significant potential in other areas. For instance, current post-graduate study is being performed with the aim of producing an avionics course based on the simulator systems. Other post-graduate projects involve guidance and control (landing and flight path) using visual systems - simulated with the VSFS.

Space Engineering Research

Associate Professor Salah Sukkarieh
P: +61 2 9351 8154
salah@acfr.usyd.edu.au

(Also a member of Australian Center for Field Robotics ACFR)

- Planetary Rover Systems
- Navigation in GPS denied environments
- Multi-robot systems for Space
- Multi-Satellite Navigation and Control

Aerospace Research

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Space Engineering Research (continued)

Dr Doug Auld
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doug.auld@sydney.edu.au

(Also a member of the Fluid Dynamics Research Group)

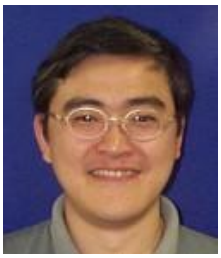
The DSMC (Direct Molecular Simulation - Monte Carlo Method) gas flow simulation technique was pioneered by Emeritus Professor Graeme Bird in this School. The method was originally used for simulation of rarefied gas flow around re-entry vehicles, but has now progressed to the stage of being a useful tool for solving a large range of aerodynamic and aerospace problems such as:

1. Simulation of flow separation in near continuum region
2. Rankine-Heugonot weak/strong shock reflection solutions
3. Nano-Fluid Simulations
4. Investigation of stability of low Reynolds number flows

Dr Xiaofeng Wu
P: +61 2 9036 7053
xiaofeng.wu@sydney.edu.au

- Small Satellite bus design
- Fault tolerance systems design
- Remote sensing

Unmanned Aerial Vehicle (UAV) Research



Dr KC Wong
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kc.wong@sydney.edu.au

Current UAV related research activities include the following:

- Autonomous remote sensing using UAVs;
- Decentralised navigation and control of autonomous flight vehicles;
- Simultaneous localisation and map building for autonomous flight vehicles;
- Design and development of rapid prototype UAVs;
- Wind-tunnel and flight based experimental research in aerodynamics and flight performance;
- Modelling of engine/propeller performance and aircraft stability characteristics;
- High fidelity aircraft model development for simulation based control system validation;
- Trajectory optimisation and autonomous guidance for unmanned aircraft;
- Sensor fusion strategies for state estimation using multiple redundant sensors, including Global Positioning Systems (GPS);
- Using GPS for aircraft attitude determination;
- System identification methods and neural networks for fault detection and reconfiguration;
- Robustness analysis of control laws in the presence of uncertain dynamics and wind gusts;
- Robust nonlinear high-performance manoeuvre tracking for autonomous aircraft;
- Autonomous safe recovery and landing of a UAV;
- Terrain following for autonomous flight vehicles;
- Integration of available technologies into operational UAV systems;
- Real-time fight control software synthesis for UAVs;
- Design and fabrication of airframe components using advanced composite materials.

Aerospace Research

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Emeritus Professors
Prof Bird, Graeme
Prof Steven, Grant

Honorary/ Adjunct Staff
Dr Bates, Peter
Prof Chamitoff, Gregory
Dr Houghton, Ron
Dr Stone, Hugh

Research Fellow
Dr Bryson, Mitchell

Research Associate
Dr Gu, Ying

Postdoctoral Fellows
Dr Luo, Quantian
Dr Luo, Zhen
Dr Nguyen, Van Ky Quan

Research Students
Brown, Sonya Ann
Dumble, Steven
Hemakumara, Madu Prasad
Jimenez Jaramillo, Juan Pablo
Kiang, Jademond
Lawrance, Nicholas Robert Jonathon
Lee, Chang-Joon
Lin, Jiangzi
Lupton, Todd William
Medagoda, Eran Dimantha Bandara
Moscoso Lavagna, Luis
Reid, Alistair Smyth
Tsai, Allen Chung-Yao
Vasista, Srinivas
Yang, Kwang Jin

Research Grants*

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Meat and Livestock Australia Ltd/Research Support	A/Prof Salah Sukkarieh	UAV surveillance systems for the management of woody weed infestations	May 2008-Nov 2010	**285,000**
Department of Agriculture, Fisheries and Forestry (Federal)/Research Support	A/Prof Salah Sukkarieh	Using UAVs and innovative classification algorithms in the detection of cacti	Mar 2009-Dec 2010	**108,577**
Australian Research Council/Discovery Projects (DP)	Prof Liyong Tong	Morphing flexible structures with PLZT based optical actuators	Jan 2007-Mar 2010	**351,942**
Asian Office of Aerospace Research and Development (USA)/Research Support	Prof Liyong Tong	Active pin reinforced sandwich panels	Jan 2007-Sep 2010	**79,738**

* Figures obtained from the Research Office, University of Sydney

Aerospace Research

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2009 Publications**

**Records obtained from the Integrated Research Management Application (IRMA), University of Sydney

Book Chapters

Lee, D S, Gonzalez, L, Periaux, J, Srinivas, K 2009, Evolutionary Optimisation Methods with Uncertainty for Modern Multidisciplinary Design in Aeronautical Engineering, 100 Volumes of "Notes on Numerical Fluid Mechanics": 40 Years of Numerical Fluid Mechanics and Aerodynamics in Retrospect, Springer, Berlin, 271-284

Lee, D S, Srinivas, K, Gonzalez, L, Periaux, J 2009, Uncertainty Based MDO of UAS Using HAPMOEA , Computational Fluid Dynamics 2008, Springer, Berlin Heidelberg, 649-654

Srinivas, K, Periaux, J, Lee, D S, Gonzalez, L 2009, New Aerospace Design Challenges: Robust Multidisciplinary Evolutionary Techniques, ECCOMAS Multidisciplinary Jubilee Symposium: New Computational Challenges in Materials, Structures, and Fluids, Springer Science + Business Media, Netherlands, 343-357

Conference Papers

Auld, D J 2009, Investigation of Boundary Slip Conditions for DSMC Simulation of Transonic Flow, 26th International Symposium on Rarefied Gas Dynamics 2008, American Institute of Physics, United States, 519-524

Garcia, O, Sanchez, A, Wong, K C, Lozano, R 2009, Modeling and Control of a Vectored-Thrust Coaxial UAV, European Control Conference ECC 2009, European Union Control Association (EUCA), Budapest, Hungary, 695-700

Gibbens, P W, Medagoda, E, Dumble, S 2009, Enhancement of Learning in Aircraft Handling Qualities Through Variable Stability Flight Simulation , 20th Annual Conference for the Australasian Association for Engineering Education AAEE 2009, The School of Mechanical Engineering, The University of Adelaide, Australia, 759-764

Guerrero, J, Lozano, R, Romero, G, Lara-Alabazares, D, Wong, K C 2009, Robust Control Design based on Sliding Mode Control for Hover Flight of a Mini Tail-Sitter Unmanned Aerial Vehicle, 35th Annual Conference of the IEEE Industrial Electronics Society IECON 2009, IEEE Industrial Electronics Society, Portugal, 2342-2347

Guerrero, J, Romero, G, Lara, D, Lozano, R, Wong, K C 2009, Robust Control Design for a Class of Unmanned Aerial Vehicle with Parametric Uncertainty, European Control Conference ECC 2009, European Union Control Association (EUCA), Budapest, Hungary, 689-694

Hall, A P, Wong, K C 2009, Coaxial Helicopter with Fully Controlled Flapping Feedback Rotors, 3rd Australasian Unmanned Air Vehicles Conference 2009, Defence Science and Technology Organisation, Australia

Luo, Q T, Tong, L 2009, Use of optically transparent lead lanthanum zirconate titanate as actuators and sensors, 2nd International Conference on Smart Materials and Nanotechnology in Engineering SMN 2009 , SPIE, United States, 749311-1-749311-8

Non- refereed Proceedings and Abstracts

Hall, A P, Wong, K C, Auld, D J 2009, Coaxial Rotor Interaction Modelling Using Blade Element Momentum Theory, 7th Australian Pacific Vertiflite Conference on Helicopter Technology 2009, American Helicopter Society International, Inc., Australia

Lee, C-J, Srinivas, K 2009, Grid considerations for computing cerebral aneurysm with stent, The 6th International Intracranial Stent Meeting 2009, GCOE Institute of Fluid Science, Tohoku University, Sendai, Japan, 60-60

Lee, D, Periaux, J, Gonzalez, L, Srinivas, K 2009, Coupling Hybrid-Game Strategies with Evolutionary Algorithms for Multi-Objective Design Problems in Aerospace, EUROGEN 2009 - Evolutionary and Deterministic Methods for Design, Optimization and Control with Applications to Industrial and Societal Problems, CIMNE - International Center for Numerical Methods in Engineering, Barcelona, Spain

Leslie, A E, Wong, K C, Auld, D J 2009, Broadband noise reduction on a mini-UAV propeller through boundary layer tripping, 3rd Australasian Unmanned Air Vehicles Conference 2009, Defence Science and Technology Organisation, Australia

Lin, J, Luo, Z, Tong, L 2009, An Evolutionary Method of Dynamic Level Sets for Shape and Topology Optimization Using X-Fem, International Conference on Extended Finite Element Methods XFEM 2009 - Recent Developments and Applications, RWTH Aachen University, Germany, 117-120

Journal Papers

Luo, Q T, Tong, L 2009, Analytical solutions for nonlinear analysis of composite single-lap adhesive joints , International Journal of Adhesion and Adhesives, 29

Luo, Q T, Tong, L 2009, Calculation of Energy Release Rates for Cohesive and Interlaminar Delamination Based on the Classical Beam-adhesive Model , Journal of Composite Materials, 43(4), 1-348

Luo, Q T, Tong, L 2009, Constitutive equations for 0-3 polarized PLZT actuators, International Journal of Solids and Structures, 46(25-26)

Luo, Q T, Tong, L 2009, Constitutive Modeling of Photostrictive Materials and Design Optimization of Microcantilevers, Journal of Intelligent Material Systems and Structures, 20(12), 1425-1437

Luo, Q T, Tong, L 2009, Energy release rates for interlaminar delamination in laminates considering transverse shear effects, Composite Structures, 89(2), 235-244

Luo, Q T, Tong, L 2009, Fracture Prediction of Adhesively Bonded Structures Using Energy Release Rates, Journal of Adhesion Science and Technology: the international journal of theoretical and basic aspects of adhesion science and its applications in all areas of technology, 23

Luo, Z, Tong, L, Kang, Z 2009, A level set method for structural shape and topology optimization using radial basis functions, Computers & Structures, 87(7-8), 425-434

Luo, Z, Tong, L, Luo, J, Wei, P, Wang, M 2009, Design of piezoelectric actuators using a multiphase level set method of piecewise constants , Journal of Computational Physics, 228(7), 2643-2659

Luo, Z, Tong, L, Ma, H 2009, Shape and topology optimization for electrothermomechanical microactuators using level set methods, Journal of Computational Physics, 228(9), 3173-3181

Nguyen, V K, Tong, L 2009, Coupled algorithms for piezoelectric actuator design optimization for shape control of smart structures, International Journal of Computational Methods, 6(4)

Peddie, K M P, Gonzalez, L F 2009, CFD Study on the Diffuser of a Formula 3 Racecar, Orbit: University of Sydney Undergraduate Research Journal, 1(1), 18-35

Periaux, J, Lee, D S, Gonzales, L, Srinivas, K 2009, Fast reconstruction of aerodynamic shapes using evolutionary algorithms and virtual nash strategies in a CFD design environment, Journal of Computational and Applied Mathematics, 232(1), 61-71

Plain, K P, Tong, L 2009, Traction law for inclined through-thickness reinforcement using a geometrical approach, Composite Structures, 88(4), 558-569

Wood, M D, Tong, L, Luo, Q T, Sun, X, Katzos, A, Rispler, A 2009, Failure of Stitched Composite L-Joints Under Tensile Loading - Experiment and Simulation, Journal of Reinforced Plastics and Composites, 28(6), 715-742

Biomedical Engineering Research

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Research Group

A/Professor Andrew Ruys
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(Also a member of Materials and Structures Research Group CAMT)

Biomaterial synthesis & testing

A/Professor Colin Dunstan
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Bone cell regulation; Biomaterials; Cancer metastasis to bone; Osteoporosis

Dr Hala Zreiqat
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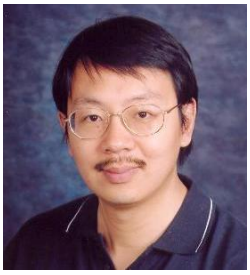
Skeletal tissue engineering; Biomaterials and scaffolds development; Arthritis and other musculoskeletal conditions; Bone; Cartilage; Orthopaedics and Dental biomaterials



Dr Qing Li
P: + 61 2 9351 8607
qing.li@sydney.edu.au

(Also a member of Materials and Structures Research Group CAMT & Finite Element Analysis Research Center)

Computational scaffold tissue engineering; Remodelling for orthopaedics; Dental biomechanics and biomaterials; Computational design for periodic microstructural materials- Optimisation of structural topology

Academics

Dr K Srinivas

Adjunct/ Honorary Academics

Prof Brandwood, Arthur
A/Prof Bilston, Lynne
Dr Boughton, Philip
A/Prof Diwan, Ashish
A/Prof Roger, Greg
A/Prof Youssef, Peter

Research Fellows

Dr Li, Wei
Dr Wu, Chengtie

Postdoctoral Fellows

Dr Lu, ZuFu
Dr Wang, Guocheng
Dr Zhou, Shiwei

Research Associates

Lin, Chun-Fan (Daniel)
Ramaswamy, Yogambha

Honorary Associates

Dr Binder, Waltraud (Trudie)
Dr Liu, Jane (Zizhen)
Dr Mitra, Ashish
Dr Nahar, Kazi Kamrun
Dr Swain, Michael

Research Assistant

James, Barbara

Project Officer

Merry, Lisa

Research Students

Boughton, Elizabeth Anne
Cadman, Joseph Edward
Chen, Yuhang
Field, Clarice Jasper
Lau, Howard
Lok, Peter Yin Cheung
Miles, Brad Peter
Nandakumar, Deepika
Rungsiyakull, Chaiy
Soh, Khian Leong Edwin
Yu, Nicole Y C
Zhang, Zhongpu

Biomedical Engineering Research

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Research Grants*

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
DVC Research/Bridging Support Grant	A/Prof Qing Li	CFD driven topological design for coronary stents	Jan 2009-May 2010	**50,000**
Australia Malaysia Institute/Research Support	A/Prof Qing Li	Enhancing dental education through computational modelling	Mar 2009-Mar 2011	**10,000**
Australian Research Council/Discovery Projects (DP)	A/Prof Qing Li [Dr Wei Li]	Computational scaffold optimisation for tissue engineering	Jan 2007-Jun 2010	**215,000**
DVC Research/Bridging Support Fellowship	Dr Wei Li	Multiscale bone remodelling and its application in implantable prosthetic device	Jan 2009-Dec 2009	**50,000**
Australian Research Council/Linkage Projects (LP)	A/Prof Andrew Ruys	Oxide bioceramics for drug delivery	Jan 2006-Nov 2010	**86,275**
Australian Research Council/Linkage Projects (LP)	A/Prof Andrew Ruys [A/Prof Qing Li; Dr Wei Li]	Cochlear implants: Identifying current paths through computational modelling of MRI data	Jan 2007-Dec 2010	**102,346**
DVC Research/Postdoctoral Research Fellowship Scheme	Dr Chengtie Wu	Biomaterials chemical and topographical modification for tissue engineering	Jan 2007-Dec 2009	**267,838**
National Health and Medical Research Council/Career Development Awards	A/Prof Hala Zreiqat	Molecular mechanisms controlling the maintenance and differentiation of skeletal tissue/device interface for biomedical engineering applications	Jan 2006-Dec 2010	**436,250**
Rebecca L Cooper Medical Research Foundation/Equipment Grant	A/Prof Hala Zreiqat	Developing novel scaffolds for osteochondral defects and orthopaedic prosthetic coatings for bone tissue regeneration and implant ossointegration	Jan 2009-Dec 2009	**20,000**
National Health and Medical Research Council/Project Grants	A/Prof Hala Zreiqat [A/Prof Colin Dunstan]	Novel coatings for orthopaedic implants	Jan 2009-Dec 2011	**430,125**
Australian Research Council/Linkage Projects (LP)	A/Prof Hala Zreiqat [Dr Chengtie Wu]	Scaffolds for bone tissue regeneration and use in orthopaedic applications	Jan 2009-Dec 2012	**504,000**

* Figures obtained from the Research Office, University of Sydney

Biomedical Engineering Research

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2009 Publications**

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Book Chapters

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Non-refereed Proceedings

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Chavara, D T, Wang, C, Ruys, A J 2009, Biomimetic Functionally Graded Materials: Synthesis by Impeller-Dry-Blending, Journal of Biomimetics, Biomaterials, and Tissue Engineering, 3, 37-49

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Centre for Advanced Materials Technology (CAMT)

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The Centre for Advanced Materials Technology (CAMT) was established in 1989 at the University of Sydney, Australia. The aims of CAMT are to conduct high quality fundamental research in materials science and technology and to promote collaboration with industry in the design, engineering, development and manufacturing technology of advanced materials, which can give a competitive edge to new products and processes. It has a widely recognised international and national reputation for high quality research, equipped with state-of-the-art facilities of processing, characterisation and mechanical testing.

CAMT carries out investigations and R&D projects for industry. Technology transfer to industry occurs through workshops, short courses and seminars. The Centre has an international exchange program and supports postgraduate students in advanced materials technology. CAMT is one of partners of CRC-ACS (Cooperative Research Centre for Advanced Composite Structures).

Research Group

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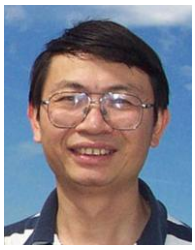
Materials science and engineering; advanced fibre composites; polymer blends; forming, joining and welding; biomimetics, biomaterials and biomechanics; failure analysis and diagnosis; mechanical behaviour of materials (metals, polymers, ceramics, composites, etc); fracture and fatigue mechanics; friction and wear; advanced thin films; eco-materials; smart materials and structures



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Materials characterization using advanced electronic microscopy techniques

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Materials science; property profile of composite materials (fatigue and fracture, residual strength, long-term properties, structure-property relationship and microscopic characterisation); interlaminar stresses and delamination in composite laminates; manufacturing techniques and processing models for high performance polymer composites; composites design; rehabilitation of infrastructure using fibre composites, polymer composite tribology and epoxy adhesive joints for engineering structures

Materials & Structures Research

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Academics
Dr Li, Qing
A/Prof Ruys, Andrew

Adjunct Academics
Prof Rose, Francis

Research Fellows
Dr Deng, Shiqiang
Dr Du, Xusheng
Dr Liu, Hong-Yuan
Dr Mo, Maosong
Dr Mylvaganam, Kausala
Dr Nguyen, Thai
Dr Sheng, Jun
Dr Tekyeh Marouf, Bahereh
Dr Yasser, Shabana

Postdoctoral Fellows
Dr Baji, Avinash
Dr Chang, Li
Dr Chen, Yiqing Annie
Dr Dasari, Aravind
Dr Lu, Ye
Dr Pramanik, Alokesh
Dr Uddin, Mohammad Sharif
Dr Wang, Yanbo

Honorary Associates
Dr Liu, Zizhen
Dr Lu, Chunsheng
Dr Qin, Qing Hua
Dr Wong, Shing-Chung
Prof Zhang, Liyangchi
Dr Zhang, Xin-Ping

Research Associates
Dr Beehag, Andrew
Dr Qi, Ben
Wang, Dong

Administrative Assistant
Santos, Tessie

Technical Staff
Karkada, Stanley
Oliver, Bruce
Shearing, Trevor

Research Students
Abtahi, Mojtaba
Fang, Yujiang
Huang, Nao
Mustapha, Samir Ahmad
Ni, Song
Wang, Gongtao
Zhu, Yiwei

Research Grants*

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Discovery Projects (DP)	Dr Xusheng Du	Novel nanostructured high energy cathode material	Jan 2007-Jun 2010	**260,000**
Australian Research Council/Discovery Projects (DP)	Dr Chang Li	Towards new generations of lubricants using nanoparticles	Jan 2008-Dec 2010	**290,000**
Australian Research Council/Discovery Projects (DP)	Dr Xiaozhou Liao	Transmission electron microscopy investigation of the deformation mechanisms of nanostructured materials	Jan 2007-Dec 2011	**980,000**
Australian Research Council/Discovery Projects (DP)	Dr Xiaozhou Liao [Dr Yanbo Wang]	Atomistic mechanisms of the mechanical behaviour of nanostructured silicon carbide films	Jan 2009-Dec 2011	**300,000**
Australian Research Council/Future Fellowships (FT)	Dr Hong-Yuan Liu	Fatigue life prediction of nano-filler modified composites	Nov 2009-Dec 2013	**624,300**
Australian Research Council/Discovery Projects (DP)	Dr Ye Lu	Fundamentals of damage identification in tubular structures using guided waves	Jan 2009-Dec 2011	**300,000**

* Figures obtained from the Research Office, University of Sydney

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Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Discovery Projects (DP)	Prof Yiu-Wing Mai	Some outstanding mechanics problems in layered ferroelectromagnetic composites with enhanced magnetoelectric effect	Jan 2006-Mar 2010	**490,000**
Australian Research Council/Discovery Projects (DP)	Prof Yiu-Wing Mai	Nanostructure design and toughening mechanisms of novel thermosets	Jan 2008-Dec2011	**630,000**
Australian Research Council/Discovery Projects (DP)	Dr Thai Nguyen	Developing a new technology: advanced surface hardening and grinding in a single operation	Apr 2008-Apr 2011	**305,000**
Cooperative Research Centre for Advanced Composite Structures/Research Support	Prof Lin Ye	CRC advance composite structures II - Program 1 aerospace composites	Jan 2005-Dec 2009	**360,734**
Australian Research Council/Discovery Projects (DP)	Prof Lin Ye	Fundamental roles of nano-particles in CF/EP composites	Jan 2008-Dec 2010	**303,000**
Australian Research Council/Discovery Projects (DP)	Prof Lin Ye	Fundamentals of active sensor network for damage identification in engineering structures	Jan 2008-Dec 2010	**375,000**
Australian Research Council/Linkage Projects (LP)	Prof Liangchi Zhang	Novel cutting picks for mining industry and an Australian standard	Jan 2006-Jul 2009	**300,000**
Australian Research Council/Discovery Projects (DP)	Prof Liangchi Zhang	Damage-free surfacing of large brittle wafers with on-machine flatness control	Feb 2007-Jan 2012	**1,202,882**
University of Queensland/Shared Research Support	Prof Liangchi Zhang	Effect of chemo-mechanical grinding on surface integrity of single crystal silicon substrates	Jan 2007-Dec 2009	**15,000**
Australian Research Council/Linkage Projects (LP)	Prof Liangchi Zhang	Mechanisms of mixed lubrication in rolling	Jan 2008-Jul 2009	**356,034**
Australian Research Council/Linkage Projects (LP)	Prof Liangchi Zhang	Non-destructive characterisation of residual stresses for the silicon-on-sapphire technology	Jan 2008-Jul 2009	**290,076**
Australian Research Council/Discovery Projects (DP)	Prof Liangchi Zhang	An innovative manufacturing technology enabling new generations of hip joint prosthesis	Jan 2008-Dec 2012	**1,860,000**

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2009 Publications**

**Records obtained from the Integrated Research Management Application (IRMA), University of Sydney

Books

Su, Z, Ye, L 2009, Identification of Damage Using Lamb Waves: From Fundamentals to Applications, Springer Verlag, Germany

Book Chapters

Liao, X, Huang, X 2009, Transmission electron microscopy of bulk nanostructured metals, Bulk Nanostructured Materials, Wiley - VCH Verlag, Germany, 327-342

Mo, M, Du, X S 2009, Building Nonmagnetic Metal Oxide and Bimetallic Nanostructures - Potential Applications in Life Sciences, Mixed Metal Nanomaterials, Wiley - VCH Verlag, Weinheim, 161-196

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Chang, L, Zhang, L 2009, Mechanical behaviour characterisation of silicon and effect of loading rate on pop-in: A nanoindentation study under ultra-low loads, Materials Science and Engineering A: Structural Materials: Properties, Microstructures and Processing, 506(1-2), 125-129

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Wang, Y, Sui, M 2009, Atomic-scale in situ observation of lattice dislocations passing through twin boundaries, Applied Physics Letters, 94(2), 021909-1-021909-3

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Xu, Z, Hameed, N, Guo, Q, Mai, Y 2009, Nanostructures and Thermomechanical Properties of Epoxy Thermosets Containing Reactive Diblock Copolymer, Journal of Applied Polymer Science, 115(4), 2110-2118

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Zhao, Y, Li, Y, Topping, T, Liao, X, Zhu, Y, Valiev, R, Lavernia, E 2009, Ductility of ultrafine-grained copper processed by equal-channel angular pressing, International Journal of Materials Research (formerly Zeitschrift fÃ¼r Metallkunde), 100(12), 1647-1652

Zheng, J, Zhou, X, Ying, J, Xie, X, Mai, Y 2009, Enhanced mechanical properties of polypropylene/silica nanocomposites with surface modification of nano-silica via in situ copolymerization of methyl methacrylate and butyl acrylate, Chinese Journal of Polymer Science (Gaofenzi Xuebao), 27(5), 685-694

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Zhou, C, Du, X S, Liu, Z, Ringer, S P, Mai, Y 2009, Solid phase mechanochemical synthesis of polyaniline branched nanofibers, Synthetic Metals, 159(13), 1302-1307

Zhu, Y, Narayan, J, Hirth, J, Mahajan, S, Wu, X, Liao, X 2009, Formation of single and multiple deformation twins in nanocrystalline fcc metals , Acta Materialia, 57(13), 3763-3770

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Biddut, A Q, Zhang, L, Ali, Y M, Liu, Z 2009, Achieving a damage-free polishing of mono-crystalline silicon, Key Engineering Materials, 389-390, 504-509

Zhang, L 2009, Cutting composites: A discussion on mechanics modelling, Journal of Materials Processing Technology, 209(9), 4548-4552

Zhang, L 2009, On the mechanics of single-walled carbon nanotubes, Journal of Materials Processing Technology, 209(9), 4223-4228

Materials & Structures Research

Finite Element Analysis Research Center

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The Finite Element Analysis Research Center was (FEARC) has been a part of the School of Aerospace, Mechanical and Mechatronic Engineering at The University of Sydney since July 1992. The center's primary aim is to serve as a national focus for research in Finite Element Analysis.

Research Group

The academic members of the center include:

Director

Prof Tong, Liyong	(Aerospace Research Group)

Emeritus Professor

Prof Steven, Grant

Research Fellows

Dr Qing Li	(Biomedical Research Group)
Dr Wei Li	(Biomedical Research Group)
Dr K Srinivas	(Aerospace Research Group)

The staff and associates of FEARC are very active in a large range of topics, samples of which are given below:

- FE analysis for the draping of cloth structures for aircraft or garment.
- Error estimation in dynamic and buckling FEA analysis.
- FE Modelling of Piezo-elastodynamics for the control of very flexible structures.
- Evolutionary structural optimisation.
- FE Modelling and design optimisation of dental structures.
- FE modelling of biomechanical processes such as spinal manipulation or hip implants or prosthesis.
- Crack tracking algorithms for fracture mechanics.
- FEA modelling of acoustics and fluid/structure interaction.

Rheology Research

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Research Group

Professor Roger Tanner
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- Rheology
- Polymer processing
- Computational mechanics

Dr Ahmad Jabbarzadeh
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- Nano-rheology and nano-tribology
- Boundary condition and wall slip at the fluid-solid interface
- Characterizing material properties by molecular level simulations
- Novel 3D nano-structures, the origin of high rigidity for ultra-thin liquid films
- Low friction states of films only a few nanometers thick
- Linking material properties and molecular architecture en route to design of customized purpose materials
- Using molecular simulations to study crystallization of polymers

Honorary/ Adjunct Staff

Prof Fan, Xijun
Dr Pereira, Gerald
Dr Uthayakumaran, Surjani
A/Prof Zheng, Rong

Postdoctoral Fellows

Dr Dai, Shao Cong
Dr Qi, Fuzhong

Research Associate

Lee Wo, Duane

Research Students

Bertevas, Erwan
Lee-Wo, Duane
Ramin, Leyla

Research Grants*

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
DVC Research/Bridging Support Grant	Dr Ahmad Jabbarzadeh	Lubrication at the atomic scale	Jan 2009-Dec 2009	**50,000**
Cooperative Research Centre for Polymers/Research Support	Professor Roger Tanner	Project 4.1 effect of additives on polymer properties	Jan 2006-Dec 2012	**234,009**
Australian Research Council/Discovery Projects (DP)	Professor Roger Tanner	Mullins-type effects in sofit filled viscoelastic solids	Jan 2007-Dec 2009	**280,985**

* Figures obtained from the Research Office, University of Sydney

Rheology Research

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2009 Publications**

**Records obtained from the Integrated Research Management Application (IRMA), University of Sydney

Journal Papers

Amirkaveei, S, Dai, S C, Newberry, M, Qi, F, Shahedi, M, Tanner, R I 2009, A comparison of the rheology of four wheat flour doughs via a damage function model , Applied Rheology (Fliessverhalten steuern), 19(3), 1705-34305-9

Housiadas, K, Tanner, R I 2009, On the rheology of a dilute suspension of rigid spheres in a weakly viscoelastic matrix fluid , Journal of Non-Newtonian Fluid Mechanics, 162(1-3), 88-92

Jabbarzadeh-Khoei, A, Tanner, R I 2009, Crystallization of alkanes under quiescent and shearing conditions , Journal of Non-Newtonian Fluid Mechanics, 160, 99-21

Lee Wo, D, Tanner, R I 2009, The impact of blue organic and inorganic pigments on the crystallization and rheological properties of isotactic polypropylene, Rheologica Acta, Online

Tanner, R I 2009, The changing face of rheology, Journal of Non-Newtonian Fluid Mechanics, 157(3), 141-144

Tanner, R I, Hadinata, C, Lee Wo, D 2009, Behaviour of a simple crystallisation model in tube and channel flow , Rheologica Acta, 48(5), 499-507

Tanner, R I, Qi, F 2009, Stretching, shearing and solidification, Chemical Engineering Science, 64(22), 4576-4579

Tanner, R I, Qi, F, Housiadas, K 2009, A differential model for the rheological properties of concentrated suspensions with weakly viscoelastic matrices, Rheologica Acta, Online(2), 46-

Non-refereed proceedings and abstracts

Tanner, R I, Dai, S C, Qi, F, Newberry, M, Bekes, F 2009, Basic dough rheology and the Kieffer Test , 5th International Symposium on Food Rheology and Structure, ETH Zurich, Zurich, Switzerland, 348-351

Xue, S, Barton, G W, Tanner, R I 2009, Heat Transfer within a Furnace for Drawing Microstructured Optical Fibres, 18th International Conference on Plastic Optical Fibers (POF 2009), University of Sydney, CD-rom, 4 pages-

Tanner, R I, Lee Wo, D, Zheng, R, Costa, F 2009, Impact of Colorants on Polypropylene Rheology, Advances in Polymer Science and Technology 1, Trauner Verlag, Linz, Austria, 143-143

Tanner, R I 2009, Yielding behaviour without an explicit yield stress for soft materials, XXII International Congress of Theoretical and Applied Mechanics, ICTAM, South Australia

Kittipoomwong, P, Jabbarzadeh-Khoei, A, See, H T 2009, Dissipative Particle Dynamics Simulation of Particulate Suspensions, 5th Australian-Korean Rheology Conference AKRC 2009 , The Korean Society of Rheology, Korea, Republic of

Robotics Research

Australian Centre for Field Robotics (ACFR)

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The Australian Centre for Field Robotics (ACFR) is based in the School of Aerospace, Mechanical and Mechatronic Engineering at The University of Sydney, and is dedicated to the research, development, application and dissemination of field robotics principles.

The group has substantial experimental facilities including three laboratories and a field test site, a range of experimental and production vehicles, industry-quality mechanical and electrical design and fabrication facilities, and employs the latest in embedded computing, sensing and control technologies.

The ACFR is now the largest robotics and automation research group in Australia and is also one of the largest of its kind in the world.

Research and Industry Partnerships

- ARC Centre of Excellence for Autonomous Systems (CAS)
- CRC Mining Australia
- Rio Tinto Centre for Mine Automation
- Centre of Expertise in Defence Autonomous & Uninhabited Vehicle Systems, DSTO, Australian Government
- Centre for Autonomous Aerospace Systems
- Centre for Social Robotics
- IMOS AUV Facility
- Academic Capability Partner - BAE Systems

Key Research Areas

The Fundamental Research Program focuses on enabling technologies in four key areas. These areas draw together common themes and research priorities from the applied research program with the goal of supporting long-term developments across the whole field robotics area.

- Perception, sensing, representations of information, the modelling and management of uncertainty, data fusion and perceptual interpretation.
- Control, of individual micro and macro machines, of heterogeneous groups of platforms and sensors, and of contact and interaction with the environment and each other.
- Learning, supervised and unsupervised learning in unstructured and dynamic environments, multi-agent learning, pattern recognition and concept formation.
- Systems, design and optimisation of “systems of systems”, modelling and management of complexity, large scale systems theory, and modelling of information flow.

These themes define the science of field robotics and represent the main focus of ACFR. The projects ensure that the many threads of the fundamental research programs are brought together and that a bridge exists to further commercial development of research results.

Robotics Research

Australian Centre for Field Robotics (ACFR)

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Research Group

Professor Hugh Durrant-Whyte
P: + 61 2 9351 5583
h.durrant-whyte@cas.edu.au

- Demonstration of non-Gaussian Decentralised Data Fusion (DDF) concepts on multiple heterogeneous autonomous systems
- To develop weed detection methodologies and weed destruction methods that can be implemented in an autonomous non-herbicidal weeding system
- High-speed on-road autonomous ground vehicle manoeuvres
- Unmanned agricultural operations

Professor Eduardo Nebot
P: + 61 2 9351 2343
eduardo.nebot@sydney.edu.au

Perception research

Associate Professor Salah Sukkarieh
P: +61 2 9351 8154
salah@acfr.usyd.edu.au

UAV systems for agriculture and ecosystem management

- Decentralised navigation and control of UAVs
- Simultaneous localisation and map building for UAVs

Dr Graham Brooker
P: + 61 2 9351 4023
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Sensor research

Dr David Rye
P: + 61 2 9351 2286
david.rye@sydney.edu.au

Systems Research (Perception and Control):

- Fish-Bird (an interactive kinetic artwork in which two robots in the form of wheelchairs communicate with their audience, and with each other, through movement and written text.);
- CAS outdoor research demonstrator (generic UGV platform for testing control, perception and learning algorithms)

Dr Steve Scheding
P: + 61 2 9351 8929
s.scheding@cas.edu.au

Perception research

- Fish-Bird
- CAS Outdoor Research Demonstrator
- Investigation and development of appropriate multi-sensor systems to monitor/estimate foodstuff temperature, mass and moisture content, and foodstuff chemical/protein changes)

Dr Stefan Williams
P: + 61 2 9351 8152
stefan.williams@sydney.edu.au

- Long-term operation of a robotic ground vehicle in an outdoor environment
- Undersea vehicles
- Fish-Bird

Robotics Research

Australian Centre for Field Robotics (ACFR)

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Research Fellows

Dr Makarenko, Alexei
Dr Nieto, Juan
Dr Singh, Surya
Dr Velonaki, Mari

Postdoctoral Fellows

Dr Ali, Yasser
Dr Bailey, Tim
Dr Melkumyan, Arman
Dr Pizarro, Oscar

Research Associates

Dr Brooks, Alex
Dr Bryson, Mitchell
Dr Douillard, Bertrand
Dr Elinas, Pantelis
Dr Fitch, Robert
Dr Jakuba, Michael
Dr Kaupp, Tobias
Dr Mahon, Ian
Dr Monteiro, Sildomar
Dr Murphy, Richard
Dr Nettleton, Eric
Dr Perera, Lochana
Dr Peynot, Thierry
Dr Ramos, Fabio
Dr Vasudevan, Shrihari

Administrative Staff

Hunter-Smith, Lisa
Olip, Ruth
Sawtell, Olga
Tetradis, Natasha
Wang, Christy (Finance)

Technical Staff

Attia, Muhammad Esa
Bandara, Dharmapriya
Beauport, Jean-Gerard
Calleija, Mark
Chan, Pak Hung (Victor)
Connolly, Laura
Fan, Xiuya
Geier, Matthew
Hale, Timothy
Head, Adrian
Keep, Steve
Kim, Yeop
Klemme, Stanley
Lal, Ritesh
Maclean, Andrew
Mercer, Duncan
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Miller, Timothy
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Research Students

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Allen, Thomas Luke
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Brown, Iain Duncan
Brunner, Christopher Joseph
Desai, Shital Harshad
Friedman, Ariell Lee
Gan, Seng Keat
Gomez Escobar, Jairo Alejandro
Guizilini, Victor
Hemakumara, Madu Prasad
Hernandez Gutierrez, Andres
Hill, Andrew John
Hung, Calvin Kai-Yuan
Innes, Christopher John
Johnson, David Graham
Karumanchi, Sisir Babu
Kuo, Victor Che-Jung
Lawrance, Nicholas Robert Jonathon
Lupton, Todd William
Mariam, Nazifa
Medagoda, Lashika Janith Bandara
O'Callaghan, Simon
Reid, Alistair Smyth
Robertson, Scott William Harman
Silvera Tawil, David
Steinberg, Daniel
Van De Ven, Joop Johannes Wilhelmus
Vial, John Francis Stephen
Wood, David Kenneth
Yang, Kwang Jin

Robotics Research

Australian Centre for Field Robotics (ACFR)

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Research Grants*

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Federation Fellowships (FF)	Prof Hugh Durrant-Whyte	Data fusion and perception in autonomous networks	Jan 2007-Dec 2011	**1,606,210**
Technological Resources Pty Ltd/Research Support	Prof Hugh Durrant-Whyte	Rio tinto centre for mine automation	Jan 2007-Dec 2011	**18,500,000**
University of California - Berkeley (USA)/Shared Research Support	Prof Hugh Durrant-Whyte	BRAIN tactical sensor networks	Jan 2008-Dec 2009	**268,800**
University of Pennsylvania (USA)/Shared Research Support	Prof Hugh Durrant-Whyte	MAST: Micro Autonomous Systems and Technology	May 2008-Nov 2013	**304,836**
Australian Research Council/Centres of Excellence (CE)	Prof Hugh Durrant-Whyte [Prof Eduardo Nebot]	Centre for autonomous systems	Jan 2003-Dec 2010	**15,200,000**
DVC Research/Postdoctoral Research Fellowship Scheme	Dr Michael Jakuba	Efficient multiple plume source search	Sep 2008-Sep 2011	**245,293**
DVC Research/Bridging Support Fellowship	Dr Oscar Pizarro	Automated marine habitat classification	Jan 2009-Dec 2009	**50,145**
Australian Research Council/Discovery Projects (DP)	Dr Fabio Ramos	Learning from uncertain and missing labelling in relational data	Jan 2008-Dec 2010	**235,944**
Meat and Livestock Australia Ltd/Research Support	A/Prof Salah Sukkarieh	UAV surveillance systems for the management of woody weed infestations	May 2008-Nov 2010	**285,000**
Department of Agriculture, Fisheries and Forestry (Federal)/Research Support	A/Prof Salah Sukkarieh	Using UAVs and innovative classification algorithms in the detection of cacti	Mar 2009-Dec 2010	**108,577**
Australian Research Council/Discovery Projects (DP)	Dr Mari Velonaki	Physicality, Tactility, Intimacy: Interaction between Humans and Robots	Jan 2009-Dec 2013	**753,757**
Australian Research Council/Discovery Projects (DP)	Dr Stefan Williams	Autonomous exploration and characterization of benthic habitats linked to oceanographic processes	Jan 2008-Dec 2010	**134,000**
Department of Innovation, Industry, Science and Research (Federal)/National Collaborative Research Infrastructure Strategy (NCRIS)	Dr Stefan Williams [Dr Michael Jakuba; Dr Oscar Pizarro]	Use of Autonomous Underwater Vehicle at the IMOS AUV facility	Jul 2008-Jun 2013	**1,582,499**
Australian Research Council/Linkage Projects (LP)	Dr Stefan Williams [Dr Michael Jakuba; Dr Oscar Pizarro]	Autonomous repeatable surveys for long term monitoring of marine habitats	Jan 2009-Dec 2011	**320,000**

* Figures obtained from the Research Office, University of Sydney

Robotics Research

Australian Centre for Field Robotics (ACFR)

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2009 Publications**

**Records obtained from the Integrated Research Management Application (IRMA), University of Sydney

Books

Brooks, A.M. Parametric POMDPs: Planning in Continuous Spaces for Mobile Robot Navigation. VDM, Saarbrücken, Germany

Kaupp, T. Human-Robot Collaboration: A Probabilistic Approach. VDM, Saarbrücken, Germany

Ramos, F.T. Recognising, Representing and Mapping in Field Robotics: A Statistical View to Perception in Unstructured Environments. VDM, Saarbrücken, Germany

Williams, S.B. Efficient Solutions to Autonomous Mapping and Navigation Problems. VDM, Saarbrücken, Germany

Edited Book

Ramos, F.T., Brock, O. & Trinkle, J. (Eds) Robotics Science and Systems IV MIT Press, Cambridge, USA

Book Chapters

Calvo, R., Brown, I. & Scheding, S.J. 'Effect of experimental factors on the recognition of affective mental states through physiological measures', In A. Nicholson & X. Li (Eds), AI 2009: Advances in Artificial Intelligence, pp. 62–70, Springer, Berlin, Germany.

Cole, D.T., Thompson, P.R., Göktoğan, A.H. & Sukkarieh, S. 'Demonstrating the benefits of cooperation for a UAV team performing vision based feature localisation' In O. Khatib, V. Kumar & G. Pappas (Eds), Experimental Robotics: The Eleventh International Symposium, pp. 105–115, Springer.

Gomez, J.A. & Brooker, G. 'Ultra-wideband radars for through-wall imaging in robotics' In S.C. Mukhopadhyay, G.S. Gupta & Y-M.R. Huang (Eds), Recent Advances in Sensing Technology, pp. 271–282, Springer.

Göktoğan, A.H. & Sukkarieh, S. 'Distributed simulation and middleware for networked UAS' In K.P. Valavanis, P. Y. Oh & L.A. Piegl (Eds), Unmanned Aircraft Systems: International Symposium on Unmanned Aerial Vehicles, pp. 331–357, Springer.

Ramos, F.T., Kadous, W. & Fox, D. 'Learning to associate image features with CRF-matching' In O. Khatib, V. Kumar & G. Pappas (Eds), Experimental Robotics: The Eleventh International Symposium, pp. 505–514, Springer.

Williams, S.B, Pizarro, O.R., Mahon, I.J. & Johnson-Roberson, M. 'Simultaneous localisation and mapping and dense stereoscopic seafloor reconstruction using an AUV' In O. Khatib, V. Kumar & G. Pappas (Eds), Experimental Robotics: The Eleventh International Symposium, pp. 407–416, Springer

Curated and Catalogued Works of Art

Velonaki, M., Rye, D. & Scheding, S. 'Circle D: Fragile Balances', interactive installation with two autonomous objects. In M. Rackham (curator), Super Human: Revolution of the Species, RMIT Gallery, Melbourne, Australia, 5 November–5 December.

Velonaki, M., Rye, D. & Scheding, S. 'Circle E: Fragile Balances', installation with kinetic object. In M. Rackham (curator), Super Human: Revolution of the Species, RMIT Gallery, Melbourne, Australia, 5 November–5 December.

Velonaki, M., Rye, D. & Scheding, S. 'Circle D: Fragile Balances', interactive installation with two autonomous objects. In V. Lynn (curator), Double Take: Anne Landa Award for Video and New Media Arts 2009, Art Gallery of New South Wales, Sydney, Australia, 7 May–19 July 2009.

Velonaki, M., Rye, D. & Scheding, S. ‘Circle E: Fragile Balances’, installation with kinetic object. In V. Lynn (curator), Double Take: Anne Landa Award for Video and New Media Arts 2009, Art Gallery of New South Wales, Sydney, Australia, 7 May–19 July 2009.

Velonaki, M., Rye, D., Scheding, S. & Williams, S. ‘Fish-Bird: Circle B—Movement C’, interactive installation with two robots and multi-sensor perception system. In P. Dinesen & S. Harving (curators), ENTER ACTION - Digital Art Now, ARoS Århus Kunstmuseum, Århus, Denmark, 7 February–26 April.

Conference Papers

Agamennoni, G., Nieto, J.I & Nebot, E.M. ‘Mining GPS data for extracting significant places’ Proc. 2009 IEEE Int. Conf. on Robotics and Automation, pp. 855–862, Kobe, Japan, 12–17 May.

Allen, T.L., Hill, A., Underwood, J.P. & Scheding, S.J. ‘Dynamic path planning with multi-agent data fusion - the parallel hierarchical replanner’ Proc. 2009 IEEE Int. Conf. on Robotics and Automation, pp. 3245–3250, Kobe, Japan, 12–17 May.

Barkby, S.A., Williams, S.B., Pizarro, O. & Jakuba, M. ‘An efficient approach to bathymetric SLAM’ Proc. IEEE/RSJ Int. Conf. on Intelligent Robots and Systems, 2009, pp. 219–224, St Louis, USA, 10–15 October.

Barkby, S.A., Williams, S.B., Pizarro, O. & Jakuba, M. ‘Incorporating prior bathymetric maps with distributed particle bathymetric SLAM for improved AUV navigation and mapping’ Proc. OCEANS 2009 MTS/IEEE, 7 pp., Biloxi, USA, 26–29 October

Brooks, A.M., Kaupp, T. & Makarenko, A.A. ‘Randomised MPC-based motion-planning for mobile robot obstacle avoidance’. Proc. 2009 IEEE Int. Conf. on Robotics and Automation, pp. 3962–3967, Kobe, Japan, 12–17 May.

Brooks, A.M., Makarenko, A.A., Kaupp, T., Durrant-Whyte, H.F. & Delleart, F. ‘Decentralised data fusion with dynamic topologies - a graphical model approach’. Proc. 1st IFAC Workshop on Estimation and Control of Networked Systems, Venice, Italy, 24–26 September

Brunner, C., Peynot, T. & Underwood, J. ‘Towards discrimination of challenging conditions for UGV’s with visual and infrared sensors’ Proc. 2009 Australasian Conf. on Robotics and Automation, 10 pp., Sydney, Australia, 2–4 December.

Bryson, M.T., Johnson-Roberson, M. & Sukkarieh, S. ‘Airborne smoothing and mapping using vision and inertial sensors’ Proc. 2009 IEEE Int. Conf. on Robotics and Automation, pp. 2037–2042, Kobe, Japan, 12–17 May.

Chapman, A.J. & Sukkarieh, S. ‘A protocol for decentralized multi-vehicle mapping with limited communication connectivity’. Proc. 2009 IEEE Int. Conf. on Robotics and Automation, pp. 357–362, Kobe, Japan, 12–17 May.

Douillard, B., Brooks, A. & Ramos, F. ‘A 3D laser and vision based classifier’. Proc. 2009 Fifth Int. Conf. on Intelligent Sensors, Sensor Networks and Information Processing, pp. 295–300, Melbourne, Australia, 7–10 December

Elinas, P. ‘Multigoal planning for an autonomous blasthole drill’. Proc. 9th Int. Conf. on Automated Planning and Scheduling, pp. 342–345, Thessaloniki, Greece, 19–23 September

Fan, X., Shen, J.Y., Beauport, J.-G., Hennessy, R. & Nettleton, E. ‘Taking the right step: determine the correct entity execution ordering in a time-stepped simulation’. Proc. Modelling, Simulation and Identification, 10 pp., Beijing, China, 12–14 October

Fitch, R.C. & Lal, R.R.. ‘Experiments with a ZigBee wireless communication system for self-reconfiguring modular robots’. Proc. 2009 IEEE Int. Conf. on Robotics and Automation, pp. 1947–1952, Kobe, Japan 12–17 May.

Freese, M., Singh, S.P.N., Singhose, W., Fukushima, E.F. & Hirose, S. ‘Terrain modeling and following using a compliant manipulator for humanitarian demining applications’ Proc. 7th Int. Conf. on Field and Service Robotics, 10 pp., Cambridge, USA, 14–16 July.

Gan, S.G., Yang, K. & Sukkarieh, S. ‘3D Path planning for a rotary wing UAV using a Gaussian process occupancy map’ Proc. 2009 Australasian Conf. on Robotics and Automation, 6 pp., Sydney, Australia, 2–4 December.

Göktoğan, A.H., Sukkarieh, S., Bryson, M., Randle, J., Lupton, T. & Hung, C. 'Using rotary-wing unmanned aerial vehicles for aquatic weed surveillance and management' Proc. Int. Symp on Unmanned Aerial Vehicles, 18 pp., Reno, USA, 8–10 June.

Granström, K., Callmer, J., Ramos, F.T. & Nieto, J.I. 'Learning to detect loop closure from range data' Proc. 2009 IEEE Int. Conf. on Robotics and Automation, pp. 15–22, Kobe, Japan 12–17 May.

Henderson T., Fan X., Alford A., Grant E. & Cohen, E. 'Innate theories as a basis for autonomous mental development'. IROS 2009 Workshop on Autonomous Mental Development for Intelligent Robots and Systems, 11 pp., St. Louis, USA, 11 October.

Hernandez-Gutierrez, A., Nieto, J., Vidal-Calleja, T. & Nebot, E. 'Large scale visual odometry using stereo vision' Proc. 2009 Australasian Conf. on Robotics and Automation, 7 pp., Sydney, Australia, 2–4 December.

Johnson, D.G. 'Complex scatterer reconstruction using multistatic spherical wave ISAR Fourier template matching' Proc. 2009 Int. Conf. on Electromagnetics in Advanced Applications, pp. 291–294, Torino, Italy, 14–18 September.

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Zhou, H., Monteiro, S.T., Hatherly, P., Ramos, F., Nettleton, E. & Opplozer, F. 'Spectral feature selection for automated rock recognition using Gaussian process classification' Proc. 2009 Australasian Conf. on Robotics and Automation, 7 pp., Sydney, Australia, 2–4 December

Journal Papers

Barton, M.J., Robinson, P.A., Sureshkumar, S., Galka, A., Durrant-Whyte, H. F., Guivant, J. & Ozaki, T. 'Evaluating the performance of Kalman-filter-based EEG source localization' IEEE Trans. Biomedical Engineering, vol. 56, no. 1, pp. 122–136.

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Melkumyan, A. & Mai, Y-W 'Electroelastic gap waves between dissimilar piezoelectric materials in different classes of symmetry' Int. J. Solids and Structures, vol. 46, no. 21, pp. 3760–3770.

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Thermodynamics and Fluids Research

Combustion

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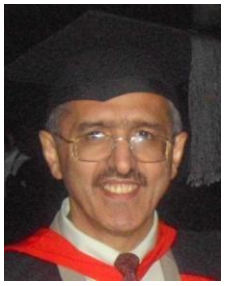
Research Group



Professor Assaad Masri
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Lifted flames;
Incineration of halons and CFC's;
Chemical inhibition of halons in flames;
Experimental investigations of methanol and ethanol flames;
PDF-Monte Carlo calculations of turbulent non-premixed flames

Honorary Associates

Prof Bilger, Robert
Prof Kent, John
A/Prof Lowe, Allen

Postdoctoral Fellows

Dr Starner, Sten
Dr Yaroshchyk, Pavel

Research Associates

Dr Dunn, Matthew
Dr Gounder, James

Research Students

Al-Harbi, Ahmed
Badra, Jihad
Juddoo, Mrinal
O'Loughlin, William

Research Grants*

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Fitch Engineering Pty Ltd/Research Support	Prof Assaad Masri	Optimisation of heat transfer in a furnace heating (or cooling) metal strips	Jan 2007-Dec 2009	**23,000**
Australian Research Council/Discovery Projects (DP)	Prof Assaad Masri	Investigations of surface-gas reactions and mixing in micro-combustion	Jan 2008-Dec 2010	**390,000**
Australian Research Council/Discovery Projects (DP)	Prof Assaad Masri [Prof Robert Bilger]	Finite rate chemistry effects in turbulent combustion	Jan 2007-Dec 2010	**500,000**

* Figures obtained from the Research Office, University of Sydney

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Combustion

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2009 Publications**

**Records obtained from the Integrated Research Management Application (IRMA), University of Sydney

Book Chapter

Kent, J H 2009, Prediction of particulates in turbulent diffusion flames by conditional moment closure, Combustion Generated Fine Carbonaceous Particles, KIT Scientific Publishing, Germany, 605-618

Conference Papers

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Badra, J A, Masri, A R, Behnia, M 2009, Numerical Simulations of Heat Transfer from Arrays of Jets Impinging on a Plate , The Fourth International Conference on Thermal Engineering: Theory and Applications, The Petroleum Institute, Abu Dhabi, UAE, 1-4

Dunn, M J, Barlow, R, Masri, A R, Bilger, R W 2009, The Spatial Structure of Turbulent Premixed Flames Issuing in a Hot Coflow, Australian Combustion Symposium 2009, University of Queensland, Australia, 67-70

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Journal Papers

Bilger, R W, Wu, Z 2009, Carbon Capture for Automobiles Using Internal Combustion Rankine Cycle Engines , Journal of Engineering for Gas Turbines and Power, 131, 034502-1-034502-4

Dunn, M J, Masri, A R, Bilger, R W, Barlow, R, Wang, G 2009, The compositional structure of highly turbulent piloted premixed flames issuing into a hot coflow, Proceedings of the Combustion Institute, 32(II), 1779-1786

Gordon, R L, Masri, A R, Mastorakos, E 2009, Heat release rate as represented by [OH] Ã— [CH2O] and its role in autoignition , Combustion Theory and Modelling, 13(4), 645-670

Gubba, S, Ibrahim, S, Malalasekera, W, Masri, A R 2009, An assessment of large eddy simulations of premixed flames propagating past repeated obstacles, Combustion Theory and Modelling, 13(3), 513-540

Hall, R D, Masri, A R, Yaroshchyk, P, Ibrahim, S 2009, Effects of position and frequency of obstacles on turbulent premixed propagating flames, Combustion and Flame, 156(2), 439-446

Ibrahim, S, Gubba, S, Masri, A R, Malalasekera, W 2009, Calculations of explosion deflagrating flames using a dynamic flame surface density model, Journal of Loss Prevention In the Process Industries, 22, 258-264

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Vogiatzaki, K, Cleary, M, Kronenburg, A, Kent, J H 2009, Modeling of scalar mixing in turbulent jet flames by multiple mapping conditioning , Physics of Fluids, 21(2, Article number 025105), 025105-1-025105-11

Vogiatzaki, K, Kronenburg, A, Cleary, M, Kent, J H 2009, Multiple mapping conditioning of turbulent jet diffusion flames, Proceedings of the Combustion Institute, 32II, 1679-1685

Thermodynamics and Fluids Research

Fluid Dynamics

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Research Group

Professor Steve Armfield
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Computational Fluid Dynamics (CFD);
Stratified flows;
Natural convection flows;
Turbulence

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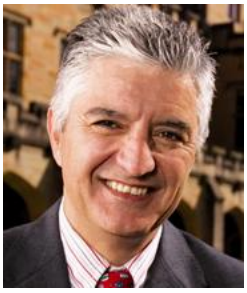
Computational Fluid Dynamics (CFD);
Stratified flows;
Atmospheric flows



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Heat and mass transfer;
Electronic cooling;
Ventilation

Academics

Dr Auld, Doug
Dr K Srinivas

Honorary Staff

Prof Henderson, Le Roy

Postdoctoral Fellow

Dr Williamson, Nicholas

Research Students

Aberra, Tilek
Bartos, Nick
Dittko, Karl Albert
Fakhim, Babak
Gillam, Natalie
Hattori, Tae
Ling, Jack
Luthfi,
Rollo, Jennifer Louise
Tang, Chi Yan

Research Grants*

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Discovery Projects (DP)	Prof Steven Armfield [Dr Michael Kirkpatrick]	Investigation and optimisation of displacement ventilation and cooling systems	Jan 2009-Dec 2012	**300,000**
Australian Research Council/Linkage Projects (LP)	Prof Steven Armfield [Dr Michael Kirkpatrick]	Freshing, mixing and purging of riverine saline ponds by freshwater overflow	Jan 2005-Dec 2010	**132,400**
Australian Research Council/Discovery Projects (DP)	Prof Steven Armfield [Dr Michael Kirkpatrick]	Stability, transition and heat transfer in thermally coupled natural convection boundary layers	Jan 2006-Dec 2009	**570,000**
James Cook University/Shared Research Support	Prof Steven Armfield [Dr Michael Kirkpatrick]	Transport by Natural Convection in Reservoir Sidearms	Jan 2008-Jul 2009	**90,000**

* Figures obtained from the Research Office, University of Sydney

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Fluid Dynamics

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2009 Publications**

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Conference Papers

Dittko, K A, Kirkpatrick, M P, Armfield, S W 2009, Representation of non-rectangular boundaries in numerical simulations of natural convection flows in reservoir sidearms, The 18th World IMACS Congress and MODSIM09 International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand and International Association for Mathematics and Computers in Simulation, Australia, 4149-4155

Jiracheewanun, S, Armfield, S W, Behnia, M 2009, Combined Natural Convection Cooling of a Drink Can, The Fourth International Conference on Thermal Engineering: Theory and Applications, The Petroleum Institute, Abu Dhabi, UAE, 1-6

Ranga Dinesh, K, Jenkins, K, Kirkpatrick, M P 2009, LES of turbulent swirling jets: Study of jet precession, recirculation and vortex breakdown. , ASME Turbo Expo 2009: Power for Land, Sea and Air - Gas Turbine Technical Congress and Exposition (GT2009), ASME, United States, 1-7

Ranga Dinesh, K, Jenkins, K, Kirkpatrick, M P 2009, Simulations of Unsteady Oscillations in Turbulent Non-Premixed Swirling Flames, ASME Turbo Expo 2009: Power for Land, Sea and Air - Gas Turbine Technical Congress and Exposition (GT2009) , ASME, United States, 1-7

Ranga Dinesh, K, Jenkins, K, Kirkpatrick, M P 2009, Study the Effect of Swirl on a Confined Coannular Jet using LES, 6th International Symposium on Turbulence, Heat and Mass Transfer THMT 2009, Begell House, Inc., United Kingdom, 12 pages-

Journal Papers

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Ginns, P W, Marsh, H, Behnia, M, Cheng, J, Scalas, L 2009, Using postgraduate students' evaluations of research experience to benchmark departments and faculties: Issues and challenges, British Journal of Educational Psychology, 79, 577-598

Kirkpatrick, M P, Armfield, S W 2009, Open boundary conditions in numerical simulations of unsteady incompressible flow , ANZIAM Journal , 50, 523-C773

Lin, W, Armfield, S W, Patterson, J, Lei, C 2009, Prandtl number scaling of unsteady natural convection boundary layers for Pr>1 fluids under isothermal heating, Physical Review E (Statistical, Nonlinear, and Soft Matter Physics), 79(6), 066313-1-066313-8

McBain, G D, Chubb, T, Armfield, S W 2009, Numerical solution of the Orr-Sommerfeld equation using the viscous Green function and split-Gaussian quadrature , Journal of Computational and Applied Mathematics, 224(1), 397-404

Odeh, S, Behnia, M 2009, Improving Photovoltaic Module Efficiency Using Water Cooling, Heat Transfer Engineering, 30(6), 499-505

Patterson, J, Lei, C, Armfield, S W, Lin, W 2009, Scaling of unsteady natural convection boundary layers with a non-instantaneous initiation , International Journal of Thermal Sciences, 48, 1843-1852

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Williamson, N J, Komiya, A, Maruyama, S, Behnia, M, Armfield, S W 2009, Nutrient Transport from an Artificial Upwelling of Deep Sea Water, Journal of Oceanography, 65(3), 349-359

Graduates 2009

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Doctor of Philosophy

Anderson, Peter Williams
Model Predictive Control for a Tail-Sitting UAV

Chan, Mingli Cynthia
Synthesis and Testing of Functionally Graded Carbon-Fibre-Reinforced Ceramic Matrix Composites

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Laser and Vision Based Classification in Urban Environments

Dunn, Matthew
Finite-Rate Chemistry Effects in Turbulent Premixed Combustion

Goktogan, Ali Haydar
A Software Framework for Seamless R&D of a Networked UAS

Jiracheewanun, Sujin
A Numerical Investigation of Side Heated Cavity and Cooling Flows

Lin, Chun-Fan
Computational Modeling, Analysis of Metallic and Functionally Graded Dental Implant Induced Bone Remodelling and Design Optimisation

Melkumyan, Narek
Surface-Based Mapping for Unstructured Environments

Ramaswamy, Yogambha
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Rigby, Paul
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Seltzer, Rocio
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Thompson, Paul Robert
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Wang, Xuyan Rosalind
Learning and Classification of Hyperspectral Images

Worrall, Stewart James
Providing Situation Awareness in Complex Multi-Vehicle Operations

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Chapman, Airlie Jane
Cooperative Multi-Vehicle Decision Making using a Landmark Position Based Communication Network

Liao, Xu Dong
CFD Analysis of Horizontal Axis Wind Turbine

Zhou, Mengjian
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Cao, Yang
Chung, Eunice Siaw Kiat
Hassan, Mohamed Ibrahim
Shan, Mao
Yu, Jia Ni

Merit
Araujo Navarro, Karina
Ayerakwa, Peter Kwame
Chen, Xi
Jia, Ying Jie
Liu, Jie
Ma, Laqin
Shi, Yuening
Upender, Vineet
Yu, Cheng Zhong
Zhong, Tiezheng
Zuo, Ning

Pass
Huang, Qing
Lin, Yufeng
Liu, Biye
Liu, Yichuan

Undergraduate Research- FSEA Racing Car

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USYD Formula SAE Competition December 2009, Werribee, Melbourne

Academic Staff
Dr Lozzi, Andrei

Senior Technical Officer
Elder, Greg

Formula SAE is a student engineering competition where teams design, construct and race a small open-wheeled racing car intended for use in weekend autocross competitions. All research, design and manufacture must be completed within a period of 12 months to prepare for the annual event held by the Society of Automotive Engineers Australasia. The three-day event scores teams on their design, costing and marketing skills as well as dynamic events of skid pad, acceleration, autocross and endurance.

Dr Andrei Lozzi on this year's FSEA Competition

It is my pleasure and pride to be able to say that the 09 team have provided us with a spectacularly capable and attractive little car. As Ettore Bugatti more or less said, a design is not perfect unless it is also aesthetically perfect. This little gem has rewarded the somewhat daring switch by the 08 team to a sophisticated 2 cylinder Aprilia engine from the previous robust but pedestrian 4 cylinder engines. In 08 the team worked long and hard to make, from stem to stern, a revolutionary new car, at the end the result was a promising but an unreliable package. Anyway, it would be hard to overstate the contribution of the ingenuity and dedication of the 08 team and of our technicians that guide them.

This year the team upgraded much of the car and solved a string of problems, one at the time. The problem solving and upgrading went on till the final event of the program, when the 'Great Aprilia Car' finally demonstrated that it in the hands of our best, it could get around with the best.

Overall we came 8th out of 24 entries, of which a few did not even show. We began poorly but the car got better and better. At the final and most important events we ran about sixth. This is very satisfying because it revealed the potential of the basic design. The top cars are quite amazing and were driven by what looked to me to be professional level race car drivers. Next year we plan to intensely develop this car. We will have about 10 students upgrading and developing the car and about the same number researching and prototyping new and improved components for 2011. Many of the top cars do not seem to be designed and made just by the students. This may not seem fair but the world is never fair and by actually designing, by analyzing and manufacturing their own cars our graduates will be better engineers.
The work that our students carry out towards the design and construction of our cars should impress the most demanding prospective employer.

Undergraduate Research- FSEA Racing Car

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The fearless team is shown next, I will mention just the thesis members:

Car development team:

Jared Holmes	Crush zone & team leader
Geoff Goh	Brakes
Sean O'Connor	Exhaust & cooling
Donald Maloney	Intake
Dai Bang Nguyen	Electronics
Faeez Fadhlillah	Suspension
Mitchell Smart	Frame
Robert Muir	Finance
Stephanie Fulton	Human resources
Michael Martin	Drive train
James Curl	Body shell

Research & development team:

Cole Fitzpatrick	Carbon fiber wheels
Tim Roffey	Drive train
Edward McMillan	Hydraulic gear shifter
Carlo Chiavarola	Al honeycomb tests
Blake Mair	Al honeycomb chassis
Vinh Dang	Torsion rig
Perry Nock	Moment of inertia rig

Student Research Showcase

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Engineering Sydney hosted its annual Research Conversazione on Friday 30 October 2009. The annual Research Conversazione is the Faculty of Engineering and Information Technologies' major annual event to showcase the research undertaken by students over the past year. It is an ideal opportunity for industry representatives and alumni to network and make contact with the engineers of the future.

There were 37 posters presented from the School of Aeronautical, Mechanical & Mechatronic Engineering, which were judged by the relevant industry representatives and academics from the Faculty for the following prizes generously sponsored by Shelston IP and Watermark Patent Attorneys.

Shelston IP Best Poster Awards - Undergraduates

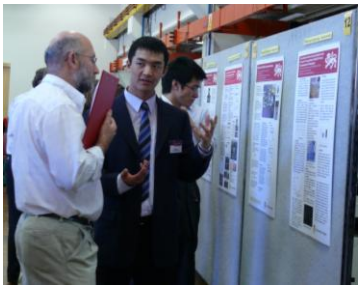
Abel-John Buchner (Aeronautical)
Susan Graham (Biomedical)
Nejteh Demirian (Mechanical)
Dushyant Rao (Mechatronics)
Daniel Wilson (Space)

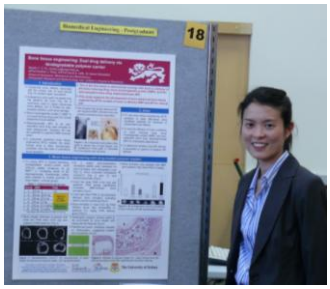
Shelston IP Best Poster Awards - Postgraduates

Derrick Ho (Aeronautical)
Peter Lok (Biomedical)
Mojtaba Abtahi (Mechanical)
Iain Brown (Mechatronics)

Watermark Best Poster Awards in Biomedical Engineering

Winner: Nicole Yu
Runner-up: Boon-Zhi Quah





Performance Overview

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Research Income Awarded in 2009 for Projects Commencing in 2010*

ARC Grants	$3,975,300
NHMRC Grants	$539,500
Industry/ Private Funds	$72,000
Total	**$4,587,350**

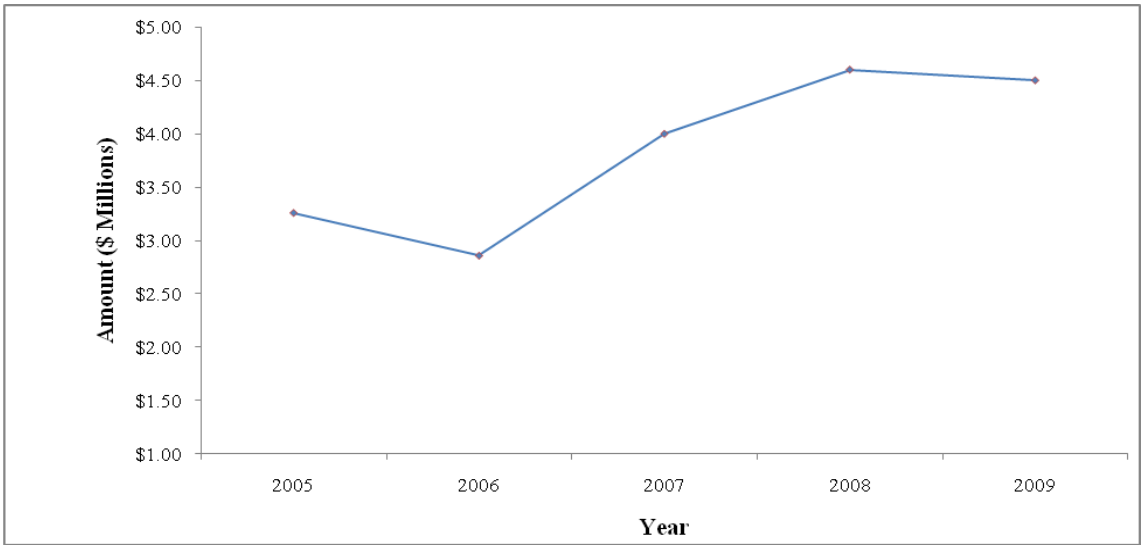

Figure 1: Successful Research (ARC and NHMRC) Funding / Year (2005 – 2009)

* Figures obtained from the Research Office, University of Sydney

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Research Output†

The publications reported and approved for the University's **Higher Education Research Data Collection** (HERDC) are reported below.

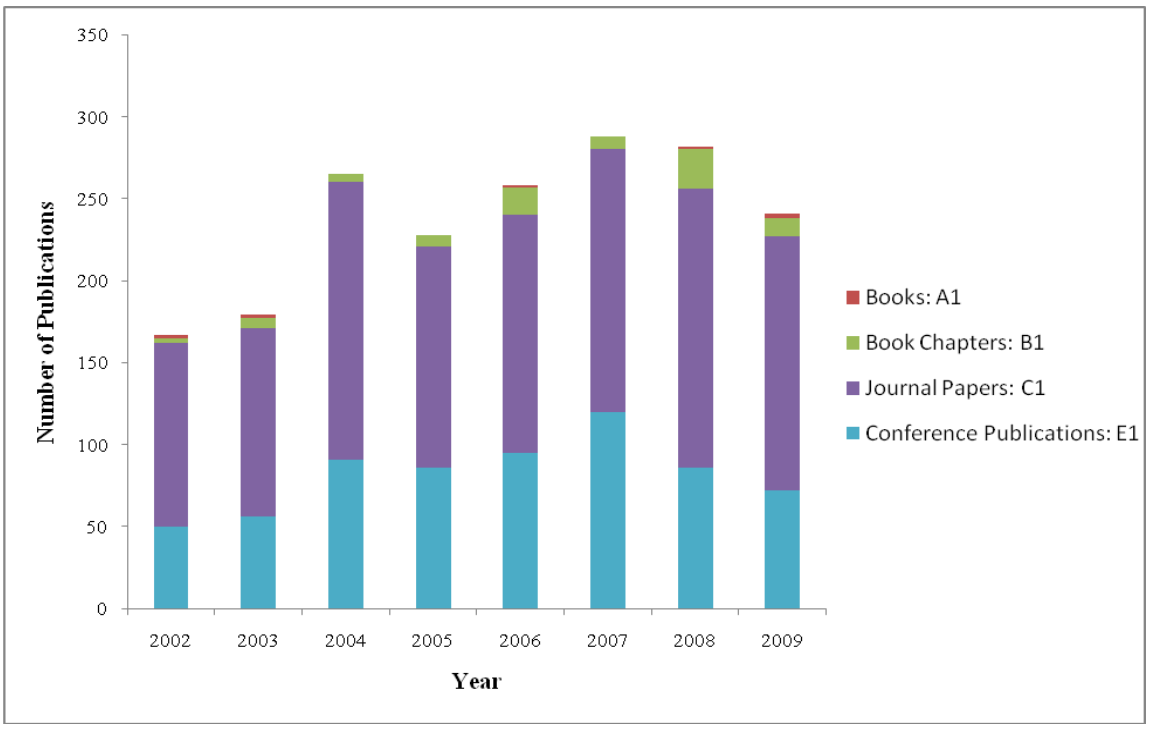

Figure 2: Research Publications 2002- 2009
A1: Authored research books published by commercial publisher (3)
B1: Authored research chapters in commercially published books (11)
C1: Refereed articles in scholarly journals (155)
E1: Full written papers that are published and peer reviewed (72)

† Figures obtained from the Integrated Research Management Application (IRMA), University of Sydney

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Postgraduate Supervision and Completions

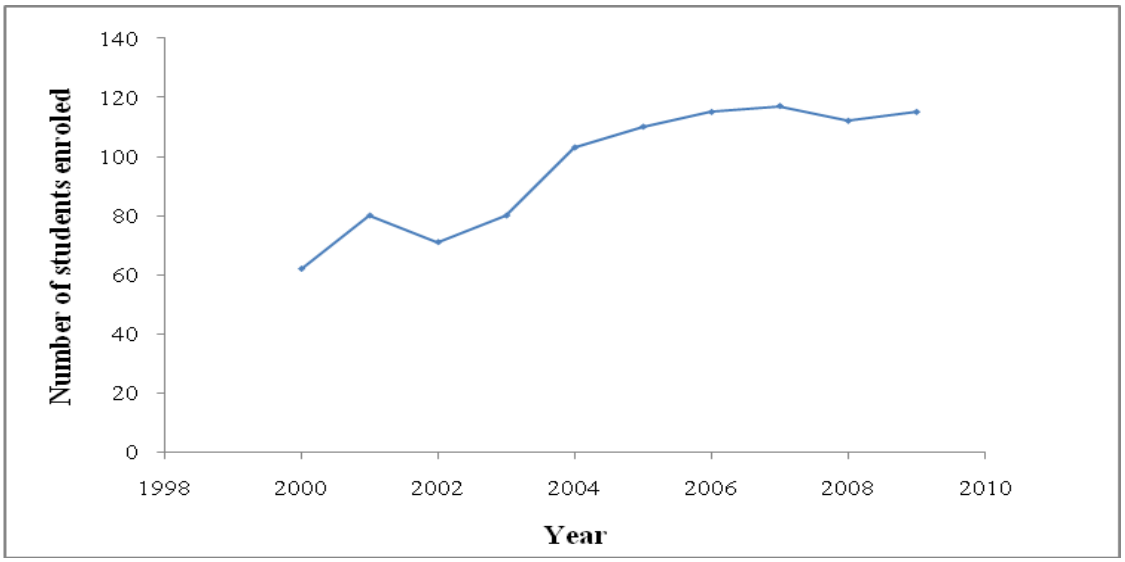

Figure 3: Total number of enroled Master of Philosophy and PhD students (2000- 2009)

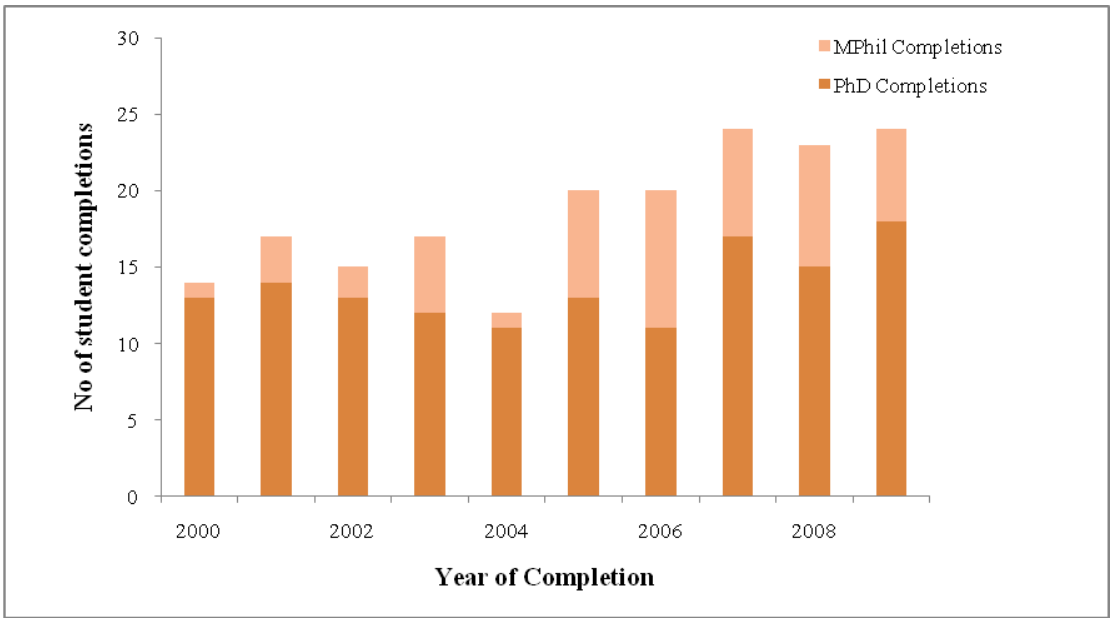

Figure 4: PhD and MPhil completions. (2000 – 2009)