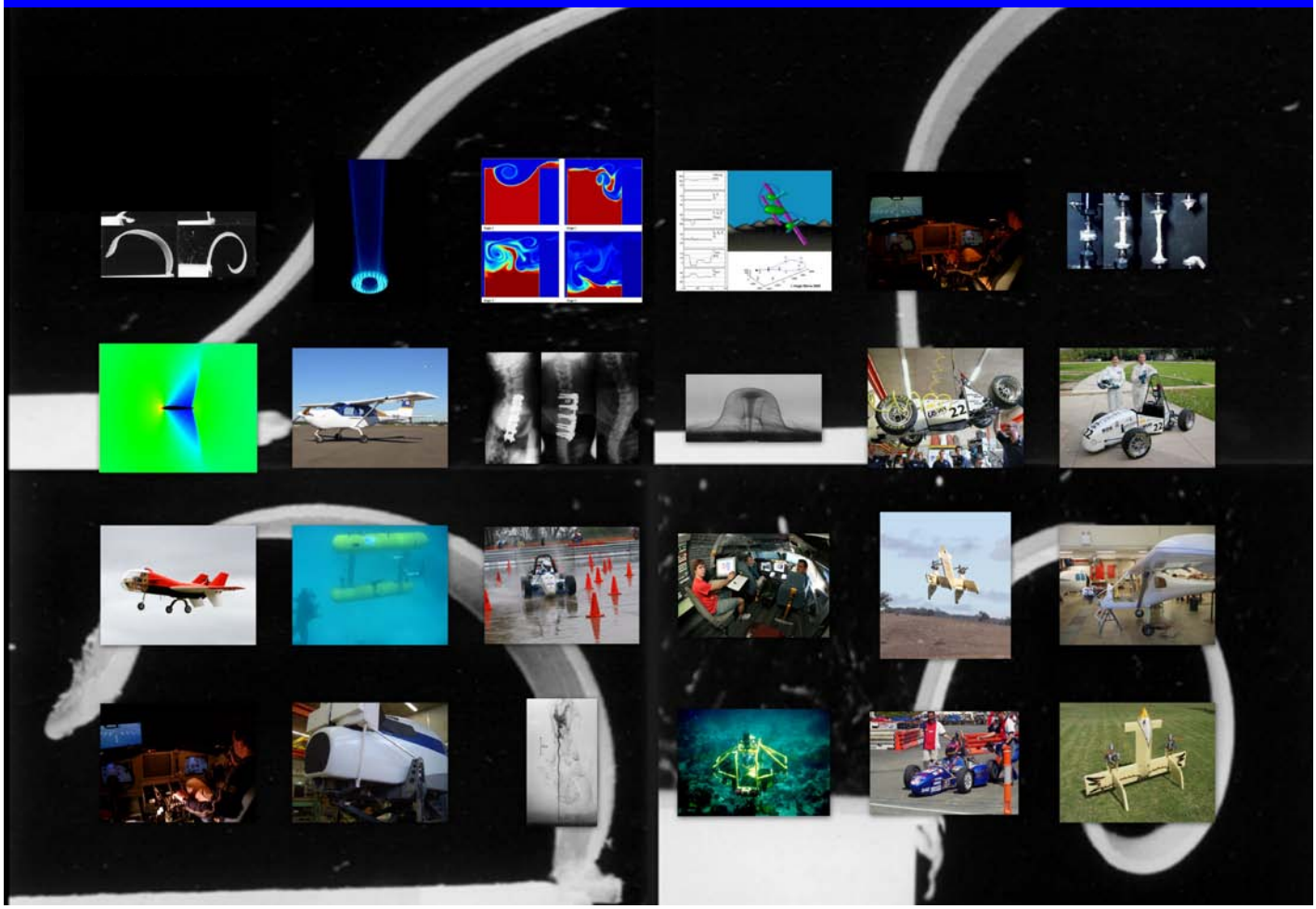
SCHOOL OF AEROSPACE, MECHANICAL & MECHATRONIC ENGINEERING

RESEARCH REPORT 2008



Faculty of Engineering and Information Technologies
The 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 2008. 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 $4.5 million of new research funding was obtained, 282 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, and in particular to congratulate Prof. Yiu-Wing Mai on his election as a Fellow of the Royal Society and Prof. Hugh Durrant-Whyte on his election to the Australian Academy of Science.

Organisational Overview

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Academic Staff

Head of School

Prof Steve Armfield

Professors

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

Emeritus Professors

Bilger, Robert
Bird, Graeme
Steven, Grant

Honorary Professors

Brandwood, Arthur
Kent, John

Adjunct Professors

Cox, Brian
Rose, Francis

Associate Professors

Dunstan, Colin
Ruys, Andrew
Sukkarieh, Salah

Adjunct Associate Professors

Lowe, Allen
Roger, Greg

Senior Lecturers

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

Honorary Senior Lecturers

Bilston, Lynne

Lecturers

Liao, Xiaozhou
Wu, Xiaofeng

Honorary Lecturers

Stone, Hugh

Adjunct Lecturers

Bates, Peter

Adjunct Associate Lecturers

Gonzalez, Carlos

Honorary Associates

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

Research Staff

ARC Australian Research / ARC Australian Postdoctoral Fellows

Chang, Li
Du, Xusheng
Makarenko, Alexei
Nguyen, Thai
Pizarro, Oscar

ARC Postdoctoral Research Fellows

Li, Wei
Velonaki, Mari

Senior Research Fellows

Xue, Shicheng

Research Fellows

Deng, Shiqiang
Goktogan, Ali
Halim, Dunant
Liu, Hong-Yuan
Mylvaganam, Kausala
Nieto, Juan
Singh, Surya

University of Sydney Bridging Fellows

Gu, Bin
Wang, Baolin

University Postdoctoral Research Fellows

Mo, Maosong
Wu, Chengtie

Postdoctoral Fellows

Ali, Yasser
Baji, Avinash
Bailey, Tim
Chen, Yiqing Annie
Dai, Shao Cong
Dasari, Aravind
Lu, Ye
Luo, Quantian
Luo, Zhen
Masson, Favio
Melkumyan, Arman
Nguyen, Van Ky Quan
Pramanik, Alokesh
Qi, Fuzhong
Starner, Sten
Wang, Yanbo
Williamson, Nicholas
Yaroshchyk, Pavel
Zhou, Shiwei

Senior Research Associates

Brooks, Alex
Ramos, Fabio

Research Associates

Bryson, Mitchell
Elinas, Pantelis
Fitch, Robert
Gu, Ying
Jakuba, Mike
Jones, Katie
Kaupp, Tobias
Mahon, Ian
Monteiro, Sildomar
Murphy, Richard
Nettleton, Eric
Ong, Sharon
Perera, Lochana
Peynot, Thierry
Vasudevan, Shrihari

Research Assistants

James, Barbara
Nagarathinam, Srinarayana
Tenne, Joel

Senior Research Engineers (CRC-AS)

Beehag, Andrew
Qi, Ben

Organisational Overview

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Administrative Staff

General

Gonzales, Susan
Hunter-Smith, Lisa
Liang, Wendy
Martin, Vinita
Merry, Lisa
Miller, Tim
Olip, Ruth
Santos, Tessie
Sawtell, Olga
Sexton, Bronwyn
Tetradis, Natasha
Witting, Yvonne

Finance

Bismire, Doris
Connell, Robin
Wang, Christy

Systems Administration/ IT Support

Briozzo, Paul
Fiford, Rod
Nguyen, Xuan Anh

Workshop Staff

Senior Technical Officers

Attia, Muhammad Esa
Crundwell, Bruce
Cumberland, Greg
Elder, Greg
Lal, Ritesh
Maclean, Andrew
Mifsud, Christopher
Nichani, Vijay
Oliver, Bruce
Randle, Jeremy
Rodgers, Craig
Scaysbrook, Brian
Shearing, Trevor

Technical Officers

Bandara, Dharmapriya
Beauport, Jean-Gerard
Bishop, Mark
Brown, Stuart
Calleija, Mark
Chan, Pak Hung (Victor)
Connolly, Laura
Fan, Xiuya
Geier, Matthew
Hale, Timothy
Head, Adrian
Hennessy, Ross
Karkada, Stanley
Keep, Steve
Kim, Yeop
Klemme, Stanley
Mear, Paul
Mercer, Duncan
Miller, Timothy
Oppolzer, Florian
O'Shannessy, Robert
Potts, John
Riviere, Greg
Sadrossadat, Amir
Stenger, Duncan
Todhunter, John
Trinder, Alan

Visiting Scholars

A/Prof Bao, Ronghao
Dr Cazorla, Miguel
Prof Cotterell, Brian
Prof Chen, Wei Qiu
Professor Gao, Cun-Fa
Dr Han, Wenbo
A/Prof Housiadas, Konstantinos
Prof HWU, Chyanbin
Dr Kang, Zhan
A/Prof Kao-Walter, Sharon
A/Prof Li, Jinping
Prof Li, Xian-Fang
Prof Liu, Dongsheng
Prof Liu, Jinxi
Prof Ma, Haitao
Dr Niraula, Om Prakash
A/Prof Qiu, Wan-Qi
Prof Shi, Dean
Prof Tanimoto, Toshio
A/Prof Walter, Mats Fredrik
Dr Viejo, Diego
Dr Wang, Chaoyuan
Prof Wang, Jianxiang
Dr Wang, Yong-Guang
Prof Williams, Gordon
Prof Xie, Xiao-Lin
Prof Xu, Shi-Ai
A/Prof Yan, Jiwang
Dr Yu, Zhong-Zhen
Prof Zhang, Hongwu
A/Prof Zhang, Qin
A/Prof Zhang, Zhenyu
Dr Zhao, Guozhong

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Research and Teaching Grants Awarded in 2008

Australian Orthopaedic Association Grant

Hala ZREIQAT $58,000

Australian Research Council (ARC) Discovery Grant

ARMFIELD, KIRKPATRICK and Lin $300,000
Investigation and optimisation of displacement ventilation and cooling systems

Barton and FAN $405,000
Numerically Robust Extruder Die Design for Microstructured Polymer Optical Fibres

LIAO, Wang, Lu and Shen $300,000
Atomistic mechanisms of the mechanical behaviour of nanostructured silicon carbide

LU $300,000
Fundamentals of Damage Identification in Tubular Structures Using Guided Waves

See and JABBAZADEH $210,000
Multiscale modeling of flexible fibrous suspensions under flow

VELONIKA $756,000
Physicality, tactility, intimacy: interaction between humans and
robots

Australian Research Council (ARC) Linkage Grant

LI, Swain and Pieper $309,000
Design optimisation for fabrication of ceramic prosthetic devices

Sword, SUKKARIEH, BROOKER, Simpson and Spurgin $340,000
Autonomous tracking and predictive modelling of Australian plague locust migratory band movement

WILLIAMS, Pizzaro and Fox $320,000
Autonomous repeatable surveys for long term monitoring of marine habitats

Australian Weeds Research Centre Grant

Salah Sukkarieh $108,575
Using UAVs and Innovative Classification Algorithms in the Detection of Cacti

National Health and Medical Research Council Grant (NHMRC)

Zhou, Seibel, Chen and DUNSTAN $425,875
How Osteoblasts Control Mesenchymal Progenitors

ZREIQAT and DUNSTAN $430,125
Better anchorage of joint replacements

University of Sydney Early Career Researcher Scheme (ECR)

Graham Brooker $40,000
Monostatic radar-acoustic sounding systems (RASS) for indoor temperature profiling

University of Sydney Major Equipment Scheme (ME)

Hala Zreiqat $25,000
Image Analysis Workstation

University of Sydney Teaching Improvement and Equipment Scheme (TIES)

Doug Auld $96,000
CUSP Curse and Unit of Study portal of Engineering and IT, Architecture and Health

Graham Brooker $9,650
Myoelectric control of a robotic arm for teaching mechanics

University of Sydney TIS Large Grant Scheme

Xiaozhou Liao $42,000
Table mounted materials testing system

Research Highlights

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Appointments

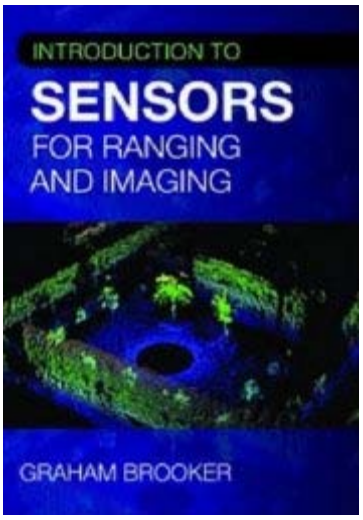
Professor Steve **Armfield** is appointed the new Head of School.

Dr Colin **Dunstan** is appointed as Associate Professor (Biomedical Engineering).

Dr Xiaozhou **Liao** is promoted to Senior Lecturer.

Dr Xiaofeng **Wu** is appointed as Lecturer for Space Engineering.

Awards and Honours



Dr Graham **Brooker** published his first book on remote sensing and imaging.
Brooker, G.M., *Introduction to Sensors for Ranging and Imaging*, SciTech Publishing, Raleigh, USA

Professor Hugh **Durrant-Whyte** was elected to the Australian Academy of Science. He was distinguished for his work on autonomous vehicle navigation and sensor data fusion.

Engineers Australia's Excellence Awards
Professor Hugh **Durrant-Whyte** was awarded Professional Engineering of the year. Ms Susan **Graham** (3rd Year Undergraduate Biomedical Engineering and Medical Science Student) was awarded Student of the Year.

Mr Alex **Hall** (PhD student) - best paper award at the 7th Australian Pacific Vertiflite Conference on Helicopter Technology, presented at the 13th Australian International Aerospace Congress.
(Hall, A., Wong, K.C. and Auld, D., Coaxial Rotor Interaction Modelling Using Blade Element Momentum Theory)

Professor Yiu-Wing **Mai** was elected as a Fellow of the Royal Society.

Ms Amelia **Parker**, 3rd Year biomedical Engineering students was presented with an Order of Australia Association and Foundation Scholarship at Parliament House by the Governor General of the Commonwealth of Australia, Michael Jeffery.

Ms Yogambha **Ramaswamy** won the Student's presentation award at the Jules Byrnes Student Presentation Evening organized by the NSW Branch of Materials Australia. She also won a travel award from the Australasian Society for Biomaterials and Tissue Engineering to attend the 8th World Biomaterials Congress in Amsterdam, Netherlands.

Dr Greg **Roger**, Adjunct Associate Professor in Biomedical Engineering has been named Joint Engineering Sydney Alumni of the Year of 2008.

Professors Roger **Tanner** and Xijun **Fan** were awarded the Chairman's Award for Excellence in Commercialisation, Moldflow WARP-P.

Aerospace Research

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Research Group

Design Optimisation Research

Dr K Srinivas
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(Also a member of the Bio-medical, 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
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(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
P: +61 2 9351 7350
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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
s.sukkarieh@cas.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

Space Engineering Research (continued)

Dr Doug Auld
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douglass.auld@gmail.com

(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 reentry 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

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

Unmanned Aerial Vehicle (UAV) Research

Dr KC Wong
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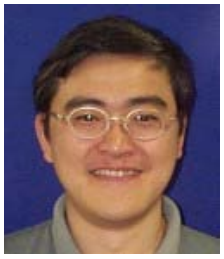

Current UAV related research activities include the following:

- 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.

Emeritus Professors

Prof Bird, Graeme
Prof Steven, Grant

Research Associates

Dr Bryson, Mitchell
Dr Gu, Ying

Postdoctoral Fellows

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

Honorary Staff

Dr Bates, Peter
Dr Houghton, Ron
Dr Stone, Hugh

Research Students

Abuhashim, Tariq
Adlgostar, Rahman
Brown, Sonya
Chapman, Airlie
Cole, David
Dumble, Steven
Gan, Seng Keat
Hall, Alexander
Hung, Calvin Kai-Yuan
Kiang, Jademond
Lawrance, Nicholas
Lee, Chang-Joon
Leslie, Angus
Lin, Jiangzi
Lupton, Todd William
Medagoda, Eran
Meikle, Scott
Moscosco Lavagna, Luis
Plain, Kristopher
Reid, Alistair
Richardson, Adam
Scamps, Alex
Thompson, Paul
Tsai, Allen
Xu, Zhe

Research Grants

Sponsor/ Grant Name	Chief Investigator	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Linkage Projects (LP)	Dr Hugh Stone	Vision Based Guidance, Navigation and Control of a Tail-Sitter Unmanned Aerial Vehicle	Jan 2006- Dec 2008	**76,000**
Australian Research Council/Discovery Projects (DP)	A/Prof Salah Sukkarieh	Data Fusion for Self-Localisation and Team Situational Awareness in Unknown Structured Environments	Jan 2006- Dec 2008	**170,000**
Meat and Livestock Australia Ltd/Research Support	A/Prof Salah Sukkarieh	UAV Surveillance Systems for the Management of Woody Weed Infestations	Jan 2008- Dec 2010	**285,000**
Land and Water Australia/Research Support	A/Prof Salah Sukkarieh	Cost-Effective Surveillance of Emerging Aquatic Weeds Using Robotic Aircraft	Jan- Dec 2008	**222,930**
Australian Research Council/Discovery Projects	Prof Liyong Tong	Shape adaptive structures with built-in compact smart material based actuators	Jan 2006- Dec 2008	**275,000**
Australian Research Council/Discovery Projects (DP)	Prof Liyong Tong	Morphing flexible structures with PLZT based optical actuators	Jan 2007- Dec 2009	**351,942**
Asian Office of Aerospace Research and Development (USA)/Research Support	Prof Liyong Tong	Active pin reinforced sandwich panels	Jan 2007- Dec 2010	**79,738**

2008 Publications

Books

Srinivas, K 2008, Basics of Aerospace Propulsion, Sydney

Srinivas, K 2008, Gasdynamics, An introduction, Sydney

Book Chapters

Tan, P, Tong, L 2008, Integrated and discontinuous piezoelectric sensor/actuator for delamination detection, Delamination behaviour of composites, Woodhead Publishing Limited, Cambridge, UK, 1, 141-168

Tong, L, Luo, Q T 2008, Analysis of cracked lap shear (CLS) joints, Modeling of Adhesively Bonded Joints, Springer, Heidelberg, 22-51

Conference Papers

Cole, D T, Goktogan, A H, Sukkarieh, S 2008, The Demonstration of a Cooperative Control Architecture for UAV Teams, Experimental Robotics- the 10th International Symposium on Experimental Robotics, Springer-Verlag Berlin Heidelberg, Germany, 1, 501-510

Leslie, A E, Wong, K C, Auld, D J 2008, Broadband Noise reduction from a mini-UAV propeller through boundary layer tripping, Acoustics 2008 Acoustics and Sustainability: How should acoustics adapt to meet future demands?, Australian Acoustical Society, Castlemaine, Victoria

Viquerat, A D, Blackhall, L, Reid, A, Sukkarieh, S, Brooker, G M 2008, Reactive Collision Avoidance for Unmanned Aerial Vehicles Using Doppler Radar, Field and Service Robotics: Results of the 6th International Conference, Springer-Verlag Berlin Heidelberg, Germany, 42, 245-254

Journal Papers

Bryson, M T, Sukkarieh, S 2008, Observability Analysis and Active Control for Airborne SLAM, IEEE Transactions on Aerospace and Electronic Systems, 44(1), 261-280

Chen, J, Tong, L, Wei, J, Sun, D 2008, Numerical investigation on multiphase coupling heat conduction with subcooling boiling boundary conditions and effect of shape during quenching process, Journal of Materials Processing Technology, 203, 86-94

Goktogan, A H, Sukkarieh, S 2008, Distributed Simulation and Middleware for Networked UAS, Journal of Intelligent and Robotic Systems: theory and applications, online - DOI 10.1007/s10846-008-9269-7

Kang, Z, Tong, L 2008, Integrated Optimization of Material Layout and Control Voltage for Piezoelectric Laminated Plates, Journal of Intelligent Material Systems and Structures, 19, 889-904

Kang, Z, Tong, L 2008, Topology optimization-based distribution design of actuation voltage in static shape control of plates, Computers & Structures, 86(19-20), 1885-1893

Lee, D S, Gonzalez, L, Periaux, J, Srinivas, K 2008, Robust Design Optimisation using Multi-objective Evolutionary Algorithms, Computers & Fluids, 37, 565-583

Lee, D S, Gonzalez, L, Srinivas, K, Periaux, J 2008, Robust Evolutionary Algorithms for UAV/UCAV Aerodynamic and RCS Design Optimisation, Computers & Fluids, 37, 547-564

Liu, S, Tong, L, Lin, Z 2008, Simultaneous optimization of control parameters and configurations of PZT actuators for morphing structural shapes, Finite Elements in Analysis and Design, 44, 417-424

Luo, J, Luo, Z, Chen, L, Tong, L, Wang, M 2008, A semi-implicit level set method for structural shape and topology optimization, Journal of Computational Physics, 227(11), 5561-5581

Luo, J, Luo, Z, Chen, S, Tong, L, Wang, M 2008, A new level set method for systematic design of hinge-free compliant mechanisms, Computer Methods in Applied Mechanics and Engineering, 198(2), 318-331

Luo, Q T, Tong, L 2008, Analytical solutions for adhesive composite joints considering large deflection and transverse shear deformation in adherents, International Journal of Solids and Structures, 45(22-23), 5914-5935

Luo, Z, Tong, L 2008, A level set method for shape and topology optimization of large-displacement compliant mechanisms, International Journal for Numerical Methods in Engineering, 76(6), 862-892

Luo, Z, Tong, L, Wang, M 2008, Design of distributed compliant micromechanisms with an implicit free boundary representation, Structural and Multidisciplinary Optimization, 36(6), 607-621

Mahmood, M, Srinivas, K, Budair, M 2008, Experimental Study of Flow Past a Low-Rise Building, Arabian Journal for Science and Engineering, 33(2B), 551-568

Srinivas, K, Nakayama, T, Ohta, M, Obayashi, S, Yamaguchi, T 2008, Studies on Design Optimization of Coronary Stents, Journal of Medical Devices, 2, 011004-1-011004-7

Stone, H R, Anderson, P W, Hutchison, C J, Tsai, A C, Gibbens, P W, Wong, K C 2008, Flight Testing of the T-Wing Tail-Sitter Unmanned Air Vehicle, Journal of Aircraft, 45(2), 673-685

Sun, D, Tong, L 2008, Theoretical investigation on wireless vibration control of thin beams using photostrictive actuators, Journal of Sound and Vibration, 312, 182-194

Tan, P, Tong, L, Sun, X 2008, Effective properties for plain weave composites through-thickness reinforced with carbon nanotube forests, Composite Structures, 84(1), 1-10

Tong, L, Sun, X, Tan, P 2008, Effect of Long Multi-walled Carbon Nanotubes on Delamination Toughness of Laminated Composites, Journal of Composite Materials, 42(1), 5-23

Lee, D S, Gonzalez, L, Periaux, J, Srinivas, K 2008, Robust Design Optimisation using Multi-objective Evolutionary Algorithms, *Computers & Fluids*, 37, 565-583

Lee, D S, Gonzalez, L, Srinivas, K, Periaux, J 2008, Robust Evolutionary Algorithms for UAV/UCAV Aerodynamic and RCS Design Optimisation, *Computers & Fluids*, 37, 547-564

Mahmood, M, Srinivas, K, Budair, M 2008, Experimental Study of Flow Past a Low-Rise Building, *Arabian Journal for Science and Engineering*, 33(2B), 551-568

Srinivas, K, Nakayama, T, Ohta, M, Obayashi, S, Yamaguchi, T 2008, Studies on Design Optimization of Coronary Stents, *Journal of Medical Devices*, 2, 011004-1-011004-7

Biomedical Engineering Research

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Research Group

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

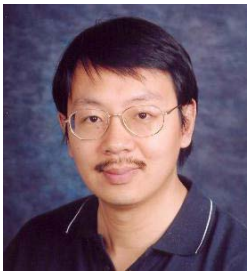
Biomaterial synthesis & testing

Associate Professor Colin Dunstan
P: + 61 2 9351 7127
c.dunstan@usyd.edu.au

Bone cell regulation; Biomaterials; Cancer metastasis to bone; Osteoporosis

Dr Hala Zreiqat
P: + 61 2 9351 2392
hzreiqat@usyd.edu.au

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@aeromech.usyd.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 Academics
Prof Brandwood, Arthur
A/Prof Bilston, Lynne
Dr Boughton, Philip
A/Prof Roger, Greg

Research Fellows
Dr Li, Wei
Dr Wu, Chengtie

Research Associates
Dr Jones, Katie
Dr Liu, Jane (Zizhen)

Postdoctoral Fellows
Dr Zhou, Shiwei

Honorary Associates
Dr Binder, Waltraud (Trudie)
Dr Jones, Katie
Dr Mitra, Ashish
Dr Swain, Michael

Research Assistant
James, Barbara

Project Officer
Merry, Lisa

Research Students
Boughton, Elizabeth
Chan, Cynthia
Chavara, Dorji
Field, Clarice
Lau, Howard
Lin, Daniel
Ramaswamy, Yogambha
Rungsiyakull, Chaiy
Soh, Edwin
Yu, Nicole
Zhang, Erika

Biomedical Engineering Research

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Research Grants

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Discovery Projects	Dr Qing Li [Dr Wei Li]	Computational Scaffold Optimisation for Tissue Engineering	1 Jan 2007 to 31 Dec 2009	**215,000**
Australian Research Council/Discovery Projects	Dr Wei Li [Dr Michael Swain]	Effects of prosthesis design on bone remodelling and longevity of dental restorations	1 Jan 2006 to 31 Dec 2008	**350,000**
Australian Research Council/Linkage Projects	A/Prof Andrew Ruys	Oxide Bioceramics for Drug Delivery	1 Jan 2006 to 31 Dec 2009	**86,275**
Australian Research Council/Linkage Projects	A/Prof Andrew Ruys [Drs Qing Li & Wei Li]	Cochlear implants: Identifying current paths through computational modelling of MRI data	1 Jan 2007 to 31 Dec 2010	**102,346**
DVC Research/Postdoctoral Research Fellowship Scheme	Dr Chengtie Wu	Biomaterials chemical and topographical modification for tissue engineering	1 Jan 2007 to 31 Dec 2009	**267,838**
National Health and Medical Research Council/Career Development Awards	Dr Hala Zreiqat	Molecular Mechanisms Controlling The Maintenance And Differentiation Of Skeletal Tissue/Device Interface For Biomedical Engineering Applications	1 Jan 2006 to 31 Dec 2010	**436,250**
Rebecca L Cooper Medical Research Foundation/Research Support	Dr Hala Zreiqat	Developing better treatment and novel prosthetic implants for joint replacement damaged due to arthritis	1 Jan 2008 to 31 Dec 2008	**20,000**

2008 Publications

Conference Papers

Li, W, Lin, D, Li, Q, Swain, M V 2008, Bone remodelling due to dental prosthesis, *Joint 8th World Congress on Computational Mechanics (WCCM8) and 5th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)*, WCCM8 and ECCOMAS, online

Zhou, S, Li, Q 2008, Level-set based topological optimization for steady-state navier stokes flow, *Joint 8th World Congress on Computational Mechanics (WCCM8) and 5th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)*, WCCM8 and ECCOMAS, online

Journal Papers

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Materials & Structures Research

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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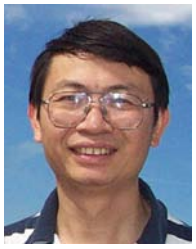

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Materials characterisation using advanced electron microscopy techniques

Materials & Structures Research

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Tang, Chi
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Wang, Gongtao
Yao, Qingyu
Zhang, Jianing
Zhou, Mengjian

Research Grants

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Discovery Projects (DP)	Dr Li Chang	Towards new generations of lubricants using nanoparticles	Jan 2008- Dec 2010	**290,000**
Australian Research Council/Discovery Projects (DP)	Dr Xusheng Du	Novel nanostructured high energy cathode material	Jan 2007- Dec 2009	**260,000**
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/Linkage Infrastructure, Equipment and Facilities (LIEF)	Dr Xiaozhou Liao	Transmission Electron Mircroscope-Nanoindenter for Nano-Mechanical Testing	Jan 2008- Dec 2009	**100,000**
Department of Education, Science and Training (Federal)/Innovation Access Programme (IAP): International Science and Technology	Prof Yiu-Wing Mai	Fatigue Crack Growth In Polymer Nanocomposites	Jan 2006- Dec 2008	**30,000**

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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- Dec 2009	**490,000**
Australian Research Council/Discovery Projects (DP)	Prof Yiu-Wing Mai	Nanostructure Design and Toughening Mechanisms of Novel Thermosets	Jan 2008- Dec 2011	**630,000**
DVC Research/Postdoctoral Research Fellowship Scheme	Dr Maosong Mo	University of Sydney - Postdoctoral Fellowship	Jan 2006- Dec 2008	**267,838**
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**
DVC Research/Bridging Support Fellowship	Dr Baolin Wang	Mechanics for Developing New Micro/nano-Multilayer Systems - Bridging Support Fellowship	Jan- Dec 2008	**31,955**
DVC Research/International Visiting Research Fellowship (IVRF)	Dr Shing-Chung Wong [Prof Yiu-Wing Mai]	Deformation studies of electrospun polymer nanofibres	Jan 2008- Dec 2008	**8,500**
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	**300,000**
Australian Research Council/Discovery Projects (DP)	Prof Lin Ye [Dr Zhongzhen Yu]	Fundamental roles of nano-particles in CF/EP composites	Jan2008- 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- Dec 2010	**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- Dec 2011	**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- Dec 2010	**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**

2008 Publications

Books

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Zhu, Y, Estrin, Y, Langdon, T, Liao, X, Lowe, T, Shan, Z, Valiev, R 2008, Preface, Journal of Materials Science, 43, 7255-7256

Zhu, Y, Liao, X, Wu, X 2008, Deformation Twinning in Bulk Nanocrystalline Metals: Experimental Observations, JOM - The Member Journal of TMS, 60(9), 60-64

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 Professors

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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ahmadj@aeromech.usyd.edu.au

- 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 Nanometer Thick
- Linking Material Properties and Molecular Architecture en route to Design of Customized Purpose Materials
- Using Molecular Simulations to Study Crystallization of Polymers

Honorary Associates

Prof Fan, Xijun
Dr Mai-Duy, Nam
Dr Pereira, Gerald

Research Students

Bertevas, Erwan
Lee-Wo, Duane
Ramin, Leyla

Postdoctoral Fellows

Dr Dai, Shao Cong
Dr Qi, Fuzhong

Visiting Scholars

A/Prof Housiadas, Konstantinos

Research Grants

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Discovery Projects (DP)	Dr Nam Mai-Duy	Meshless, Numerical Modelling for Polymer Processing	Jan 2006- Dec 2008	**240,000**
Cooperative Research Centre for Polymers/Research Support	Prof Roger Tanner	Project 4.1 Effect of additives on Polymer properties	Jan 2006- Dec 2011	**234,009**
Australian Research Council/Discovery Projects (DP)	Prof Roger Tanner [Dr Ahmad Jabbarzadeh]	Nano-Rheology and Nano-Tribology: Atomistic Simulation of Boundary Lubrication	Jan 2006- Dec 2008	**360,000**
Australian Research Council/Discovery Projects (DP)	Prof Roger Tanner	Mullins-type effects in soft filled viscoelastic solids	Jan 2007- Dec 2009	**280,985**

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2008 Publications

Books

Fan, X, Phan-Thien, N, Tanner, R I 2008, Numerical Study on Some Rheological Problems of Fibre Suspensions: Numerical Simulations of Fibre Suspensions, Germany

Conference Papers

Jabbarzadeh-Khoei, A, Tanner, R I 2008, Complex Rheology of Molecularly Thin Films and the Role of Surface and Structure, The XVth International Congress On Rheology- The Society of Rheology 80th Annual Meeting, American Institute of Physics, Melville NY 11747-4501 USA, United States of America, 1027, 1063-1065

Tanner, R I 2008, Towards a simple constitutive model for bread dough, The XVth International Congress On Rheology- The Society of Rheology 80th Annual Meeting, American Institute of Physics, Melville NY 11747-4501 USA, United States of America, 1027-1029

Journal Papers

Qi, F, Dai, S C, Newberry, M, Love, R, Tanner, R I 2008, A simple approach to predicting dough sheeting thickness, Journal of Cereal Science, 47(3), 489-495

Tanner, R I, Dai, S C, Qi, F 2008, Bread dough rheology in biaxial and step-shear deformations, Rheologica Acta, 47(7), 739-749

Tanner, R I, Jabbarzadeh-Khoei, A 2008, Thin-film lubrication nano-rheology via molecular dynamics, Australian Journal of Mechanical Engineering, 5(1), 43-50

Tanner, R I, Qi, F, Dai, S C 2008, Bread dough rheology and recoil I. Rheology, Journal of Non-Newtonian Fluid Mechanics, 148, 33-40

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 future 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 heterogenous 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
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Perception Research

Associate Professor Salah Sukkarieh
P: +61 2 9351 8154
s.sukkarieh@cas.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
d.rye@cas.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
s.williams@cas.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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Academics

A/Prof Sukkarieh, Salah

Research Associates

Dr Brooks, Alex
Dr Bryson, Mitchell
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 Ong, Sharon
Dr Perera, Lochana
Dr Peynot, Thierry
Dr Ramos, Fabio
Dr Vasudevan, Shrihari

Research Fellows

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

Postdoctoral Fellows

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

Administrative Staff

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

Technical Staff

Attia, Muhammad Esa
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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
Mifsud, Christopher
Miller, Timothy
Nichani, Vijay
Oppolzer, Florian
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Rodgers, Craig
Sadrossadat, Amir
Trinder, Alan

Research Students

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Allen, Thomas
Barkby, Stephen
Bishop, Mark
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Brown, Iain Duncan
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Cole, David
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Douillard, Bertrand
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Gomez Escobar, Jairo
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Johnson-Roberson, Matthew
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Katz, Roman
Lawrance, Nicholas
Lupton, Todd William
Mariam, Nazifa
Medagoda, Lashika Janith Bandara
Moser, Michael
O'Callaghan, Simon
Orchansky, David
Parthy, Anindha
Reid, Alistair
Rigby, Paul
Robertson, Scott
Silvera Tawil, David
Soon, Kah Hol (Ben)
Thompson, Paul
Underwood, James
Van De Ven, Joop Johannes Wilhelmus
Wood, David
Worrall, Stewart
Yang, Kwang

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/ Centre of Excellence	Prof Hugh Durrant-Whyte [Prof Eduardo Nebot]	Centre for autonomous systems	Jan 2003- Dec 2010	**10,000,000**
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**
US Army Research Laboratory (USA)/Research Support	Prof Hugh Durrant-Whyte	Data Fusion in Ground Sensor Networks	Jan 2007- Dec 2009	**93,794**
Office of Naval Research (USA)/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	**204,234**
DVC Research/Postdoctoral Research Fellowship Scheme	Dr Michael Jakuba	Efficient multiple plume source search	Jan 2008- Dec 2010	**196,379**
Australian Research Council/Discovery Projects (DP)	Dr Fabio Ramos	Learning from Uncertain and Missing labelling in Relational Data	Jan 2008- Dec 2010	**235,944**
Australian Research Council/Linkage Projects (LP)	Dr Steven Scheding [Prof Hugh Durrant-Whyte]	Autonomous Cooking: Sensing, Estimation and Control	Jan 2006- Dec 2008	**225,000**
Asian Office of Aerospace Research and Development (USA)/Research Support	Dr Steven Scheding [Prof Hugh Durrant-Whyte]	Sensor Data Integrity	Jan- Dec 2008	**70,665**
Australian Research Council/Discovery Projects (DP)	Prof Salah Sukkarieh	Data Fusion for Self-Localisation and Team Situational Awareness in Unknown Structured Environments	Jan 2006- Dec 2008	**170,000**
Meat and Livestock Australia Ltd/Research Support	Prof Salah Sukkarieh	UAV Surveillance Systems for the Management of Woody Weed Infestations	Jan 2008- Dec 2010	**285,000**
Land and Water Australia/Research Support	Prof Salah Sukkarieh	Cost-Effective Surveillance of Emerging Aquatic Weeds Using Robotic Aircraft	Jan 2008- Dec 2008	**222,930**
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 Defence (Federal)/Research Support	Dr Stefan Williams [Dr Oscar Pizarro]	Autonomous Bathymetric Mapping in the Littoral	Nov 2008- Nov 2009	**67,095**
Department of Innovation, Industry, Science and Research (Federal)/National Collaborative Research Infrastructure Strategy (NCRIS)	Dr Stefan Williams [Drs Michael Jakuba & Oscar Pizarro]	Use of Autonomous Underwater Vehicle at the IMOS AUV Facility	Jun 2008- Jun 2011	**400,000**

2008 Publications

Books

Brooker, G M 2008, *Introduction to Sensors for Ranging and Imaging*, USA

Book Chapters

Brooker, G M, Hennessy, R C, Bishop, M V, Lobsey, C R, Maclean, A J P 2008, Millimetre Wave Imaging for Industrial Applications, *Advances in Broadband Communication and Networks*, River Publishers, Denmark, 1, 1-35

Brooker, G M, Lobsey, C R, McWilliams, K 2008, Combined Infrared and Acoustic Beacon Tracker and its Application on an Autonomous Following Vehicle, *Lecture Notes Electrical Engineering - Smart Sensors and Sensing Technology*, Springer-Verlag Berlin Heidelberg, Germany, 119-138

Brooks, A M, Makarenko, A, Upcroft, B, Durrant-Whyte, H F 2008, Learning Informative Features for Indoor Traversability, *Experimental Robotics- the 10th International Symposium on Experimental Robotics*, Springer-Verlag Berlin Heidelberg, Germany, 309-319

Cole, D T, Goktogan, A H, Sukkarieh, S 2008, The Demonstration of a Cooperative Control Architecture for UAV Teams, *Experimental Robotics- the 10th International Symposium on Experimental Robotics*, Springer-Verlag Berlin Heidelberg, Germany, 1, 501-510

Durrant-Whyte, H F, Henderson, T 2008, Multi-sensor data fusion, *Springer Handbook of Robotics*, Springer-Verlag Berlin Heidelberg, Germany, 585-610

Johnson, D G, Brooker, G M 2008, Wide Band Linearization of a Millimetre-Wave, Linear Frequency Modulated Radar Employing a Surface Acoustic Wave, Delay Line Discriminator, *Lecture Notes Electrical Engineering - Smart Sensors and Sensing Technology*, Springer-Verlag Berlin Heidelberg, Germany, 153-164

Katz, R, Frank, O, Nieto, J I, Nebot, E M 2008, Dynamic Obstacle Detection Based on Probabilistic Moving Feature Recognition, *Field and Service Robotics: Results of the 6th International Conference*, Springer-Verlag Berlin Heidelberg, Germany, 42, 83-91

Mathews, G M, Durrant-Whyte, H F, Prokopenko, M 2008, Decentralised decision making for multiagent systems, *Advances in Applied Self-organizing Systems*, Springer - Verlag, London, 1, 77-103

Ramos, F T, Nieto, J I, Durrant-Whyte, H F 2008, Combining Object Recognition and SLAM for Extended Map Representations, *Experimental Robotics- the 10th International Symposium on Experimental Robotics*, Springer-Verlag Berlin Heidelberg, Germany, 55-64

Scheding, S J, Grover, R F, Durrant-Whyte, H F 2008, Machine Perception in Unstructured and Unknown Environments, *Robotics and Cognitive Approaches to Spatial Mapping*, Springer-Verlag Berlin Heidelberg, Germany, 38, 65-81

Upcroft, B, Ridley, M F, Ong, L, Douillard, B, Kaupp, T, Sureshkumar, S, Bailey, T A, Ramos, F T, Makarenko, A, Brooks, A M, Sukkarieh, S, Durrant-Whyte, H F 2008, Multi-level State Estimation in an Outdoor Decentralised Sensor Network, *Experimental Robotics- the 10th International Symposium on Experimental Robotics*, Springer-Verlag Berlin Heidelberg, Germany, 355-365

Viquerat, A D, Blackhall, L, Reid, A, Sukkarieh, S, Brooker, G M 2008, Reactive Collision Avoidance for Unmanned Aerial Vehicles Using Doppler Radar, *Field and Service Robotics: Results of the 6th International Conference*, Springer-Verlag Berlin Heidelberg, Germany, 42, 245-254

Widzyk-Capehart, E, Brooker, G M, Scheding, S J, Maclean, A J P, Hennessy, R C, Lobsey, C R, Sivadorai, M 2008, Millimetre Wave Radar Visualisation System: Practical Approach to Transforming Mining Operations, *Mechatronics and Machine Vision in Practice*, Springer-Verlag Berlin Heidelberg, Germany, 1, 139-165

Conference Papers

Agamennoni, G, Nieto, J I, Nebot, E M 2008, Mining GPS Data for Extracting Significant Places, *Australasian Conference on Robotics and Automation 2008*, ARAA: Australian Robotics & Automation Association, Canberra, online

Bender, A, Steinberg, D, Friedman, A, Williams, S B 2008, Analysis of an Autonomous Underwater Glider, *Australasian Conference on Robotics and Automation 2008*, ARAA: Australian Robotics & Automation Association, Canberra, online, 1-10

Brooker, G M, Bishop, M V, Hennessy, R C 2008, Evolution of a Suite of Millimetre Wave Radar Systems for situational Awareness and Automation in mines, *2008 Fifth Annual Australian Mining Technology Conference 'Smart Technologies for Sustaining the Minerals Boom'*, The Australasian Institute of Mining and Metallurgy, Victoria, Australia, 1, 3-33

Brooker, G M, Martinez, J 2008, Low-cost monostatic radio-acoustic sounding system for indoor temperature profiling, *2008 IEEE Radar Conference*, IEEE, USA/online, CD/online, 245-250

Brooker, G M, Lobsey, C R, Hennessy, R C 2008, Radar cross sections of small boats at 94 GHZ, *2008 IEEE Radar Conference*, IEEE, USA/online, CD/online, 1484-1489

Brooker, G M, Hennessy, R C, Lobsey, C R 2008, Real Aperture Imaging of a Small Boat at 94GHz, *2008 International Conference on Radar*, IEEE, On line, 44-47

Brooks, A M, Bailey, T A 2008, HybridSLAM: Combining FastSLAM and EKF-SLAM for reliable mapping, *WAFR 2008: The Eighth International Workshop on the Algorithmic Foundations of Robotics*

Callmer, J, Granstrom, K, Nieto, J I, Ramos, F T 2008, Tree of Words for Visual Loop Closure Detection in Urban SLAM, *Australasian Conference on Robotics and Automation 2008*, Australian Robotics and Automation Association, Australia, CD/online

Connolly, L, Scheding, S J 2008, Comparative Analysis of Sensors, Algorithms, and Models within a Navigation System, *2008 IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems*, IEEE, Korea, CFP08MFI-CDR, 26-32

Desai, S, Brooker, G M 2008, Pattern Synthesis of Planar Arrays Using GeneticAlgorithms, *2008 International Conference on Radar*, IEEE, On line, 541-545

Douillard, B, Fox, D, Ramos, F T 2008, Laser and Vision Based Outdoor Object Mapping, *Robotics: Science and Systems IV 2008 Conference*, Institute of Robotics and Intelligent Systems (IRIS), online, IV

Ferri, G, Jakuba, M, Yoerger, D 2008, A Novel Method for Hydrothermal Vents Prospecting Using an Autonomous Underwater Robot, *2008 IEEE International Conference on Robotics and Automation*, IEEE, online, 1055-1060

Fitch, R C, Hengst, B, Suc, D, Calbert, G, Scholz, J 2008, Structural Abstraction Experiments in Reinforcement Learning, *18th Australian Joint Conference on Artificial Intelligence (AI 2005)*, Springer Berlin Heidelberg New York, Sydney, 164-175

Galin, N, Worby, A, Massom, R, Brooker, G M, Leuschen, C, Gogineni, P, Jansen, P 2008, 2 8 GHz FMCW Radar for Estimating Snow Depth on Antarctic Sea Ice, *2008 International Conference on Radar*, IEEE, On line, 276-281

Gomez Escobar, J A, Brooker, G M 2008, Opportunities for imaging in distributed robotics applications with ultra-wideband radars, *Third International Conference on Sensing Technology (ICST 2008)*, IEEE, online, CD, 15-20

Huber, M, Bailey, T A, Durrant-Whyte, H F, Hanebeck, U 2008, On Entropy Approximation for Gaussian Mixture Random Vectors, *2008 IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems*, IEEE, Korea, CD, 181-188

Jakuba, M, Yoerger, D 2008, Autonomous Search for Hydrothermal Vent Fields with Occupancy Grid Maps, *Australasian Conference on Robotics and Automation 2008*, ARAA: Australian Robotics & Automation Association, Canberra, online

Johnson, D G 2008, Development of a fast ultra-wide bandwidth SWISAR system for rock size measurement, *2008 Fifth Annual Australian Mining Technology Conference 'Smart Technologies for Sustaining the Minerals Boom'*, The Australasian Institute of Mining and Metallurgy, Victoria, Australia, 299-306

Johnson, D G 2008, Development of a high resolution MMW Radar employing an antenna with combined frequency and mechanical scanning, *2008 IEEE Radar Conference*, IEEE, USA/online, CD/online, 409-413

Johnson, D G, Brooker, G M 2008, Research Radar for Unmanned Navigation, *2008 International Conference on Radar*, IEEE, On line, 165-170

Katz, R, Douillard, B, Nieto, J I, Nebot, E M 2008, A Self-supervised Architecture for Moving Obstacles Classification, *2008 IEEE/RSJ International Conference on Intelligent Robots and Systems*, IEEE/Omnipress, n/a, CD, 155-160

Katz, R, Nieto, J I, Nebot, E M 2008, Probabilistic Scheme for Laser Based Motion Detection, *2008 IEEE/RSJ International Conference on Intelligent Robots and Systems*, IEEE/Omnipress, n/a, CD, 161-166

Kaupp, T, Makarenko, A 2008, Decision-Theoretic Human-Robot Communication, *3rd ACM/IEEE International Conference on Human-Robot Interaction*, Association for Computing Machinery, Inc, USA, CD, 89-96

Kaupp, T, Makarenko, A, 2008, Measuring Human-Robot Team Effectiveness to Determine an Appropriate Autonomy Level, *2008 IEEE International Conference on Robotics and Automation*, IEEE, online, CD, 2146-2151

Kunz, C, Murphy, C, Camilli, R, Singh, H, Bailey, J, Eustice, R, Roman, C, Jakuba, M, Willis, C, Sato, T, Nakamura, K, Sohn, R 2008, Deep Sea Underwater Robotic Exploration in the Ice-Covered Arctic Ocean with AUVs, *IEEE/RSJ 2008 International Conference on Intelligent Robots and Systems*

Lupton, T W, Sukkarieh, S 2008, Removing Scale Biases and Ambiguity from 6DoF Monocular SLAM Using Inertial, *2008 IEEE International Conference on Robotics and Automation*, IEEE, online, CD, 3698-3703

Monteiro, S T, Uto, K, Kosugi, Y, Oda, K, Iino, Y, Saito, G 2008, HYPERSPECTRAL IMAGE CLASSIFICATION OF GRASS SPECIES IN NORTHEAST JAPAN, *2008 IEEE International Geoscience & Remote Sensing Symposium*, IEEE, USA, 399-402

Ong, L, Bailey, T A, Durrant-Whyte, H F, Upcroft, B 2008, Decentralised Particle Filtering for Multiple TargetTracking in Wireless Sensor Networks, *The 11th International Conference on Information Fusion*, Institute of Electrical and Electronics Engineers, Inc, New Jersey, USA, CD, 342-349

Orchansky, D, Worrall, S J, Nebot, E M 2008, An effective way of displaying situation awareness information in mining vehicles, *2008 Fifth Annual Australian Mining Technology Conference 'Smart Technologies for Sustaining the Minerals Boom'*, The Australasian Institute of Mining and Metallurgy, Victoria, Australia, 51-56

Ramisa, A, Vasudevan, S, Scaramuzza, D, de Mantaras, R, Siegwart, R 2008, A Tale of Two Object Recognition Methods for Mobile Robots, *6th International Conference on Computer Vision Systems*, Springer, Germany, 353-362

Singh, S. P. N., Trujillo, S, Waldron, K 2008, A Screw Representation for Attitude Estimation and Its Application to Legged Locomotion, *17th CISM-IFToMM Symposium on Robot Design, Dynamics, and Control (RoManSy'08)*, RoManSy'08, cd, 1, 504-510

Velonaki, M, Scheding, S J, Brown, I D, Rye, D C 2008, Physicality and Synthetic Reality, *ISEA2008 - 14th International Symposium on Electronic Art*, ISEA2008 Pte Ltd, Singapore, 513-515

Wood, D K, Scheding, S J 2008, Interest/Intention Classification for the Fish-Bird New Media Artwork, *The 2008 International Conference on Intelligent Sensors, Sensor Networks, and Information Processing*, IEEE, Australia/online, CD, 213-218

Worrall, S J, Nebot, E M 2008, A Probabilistic Method for Detecting Impending Vehicle Interactions, *2008 IEEE International Conference on Robotics and Automation*, IEEE, online, online, 1787-1791

Yang, K J, Sukkarieh, S 2008, 3D Smooth Path Planning for a UAV in Cluttered Natural Environments, *2008 IEEE/RSJ International Conference on Intelligent Robots and Systems*, IEEE/Omnipress, n/a, 794-800

Yang, K J, Sukkarieh, S 2008, Planning Continuous Curvature Paths for UAVs Amongst Obstacles, *Australasian Conference on Robotics and Automation 2008*, Australian Robotics and Automation Association, Australia, CD

Yang, K J, Sukkarieh, S 2008, REAL-TIME CONTINUOUS CURVATURE PATH PLANNING OF UAVS IN CLUTTEREDENVIRONMENTS, *5th International Symposium on Mechatronics and its Applications (ISMA08)*, IEEE, online

Journal Papers

Barrault, G, Halim, D, Hansen, C, Lenzi, A 2008, High frequency spatial vibration control for complex structures, *Applied Acoustics*, 69, 933-944

Brooks, A M, Makarenko, A, Upcroft, B 2008, Gaussian Process Models for Indoor and Outdoor Sensor-Centric Robot Localization, *IEEE Transactions on Robotics*, 24(6), 1341-1351

Bryson, M T, Sukkarieh, S 2008, Observability Analysis and Active Control for Airborne SLAM, *IEEE Transactions on Aerospace and Electronic Systems*, 44(1), 261-280

Edanaga, T, Minekawa, Y, Monteiro, S T, Kosugi, Y 2008, Studies on human skin extraction from hyper spectral data using particle swarm optimization, *Journal of the Japan Society of Photogrammetry and Remote Sensing*,, 47(3), 23-36

Fitch, R C, Butler, Z 2008, Million Module March: Scalable Locomotion for Large Self-Reconfiguring Robots, *International Journal of Robotics Research*, 27(3-4), 331-343

German, C, Bennett, S, Connelly, D, Evans, A, Murton, B, Parson, L, Prien, R, Ramirez-Llodra, E, Jakuba, M, Shank, T, Yoerger, D, Baker, E, Walker, S, Nakamura, K 2008, Hydrothermal activity on the southern Mid-Atlantic Ridge: Tectonically- and volcanically-controlled venting at 45S, *Earth and Planetary Science Letters*, 273, 332-344

German, C, Yoerger, D, Jakuba, M, Shank, T, Langmuir, C, Nakamura, K 2008, Hydrothermal exploration with the Autonomous Benthic Explorer, *Deep-Sea Research. Part 1: Oceanographic Research Papers*, 55, 203-219

Goktogan, A H, Sukkarieh, S 2008, Distributed Simulation and Middleware for Networked UAS, *Journal of Intelligent and Robotic Systems: theory and applications*, online - DOI 10.1007/s10846-008-9269-7

Halim, D, Barrault, G, Cazzolato, B 2008, Active control experiments on a panel structure using a spatially-weighted objective method with multiple sensors (in press), *Journal of Sound and Vibration*, 315(1), 1-21

Lavis, B, Furukawa, T, Durrant-Whyte, H F 2008, Dynamic space reconfiguration for Bayesian search and tracking with moving targets, *Autonomous Robots*, 24(4), 387-399

Mahon, I J, Williams, S B, Pizarro, O R, Johnson-Roberson, M 2008, Efficient View-Based SLAM Using Visual Loop Closures, *IEEE Transactions on Robotics*, 24(5), 1002-1014

Melkumyan, A, Mai, Y 2008, Influence of imperfect bonding on interface waves guided by piezoelectric/piezomagnetic composites, *Philosophical Magazine (London, 2003)*, 88(23), 2965-2977

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Velonaki, M, Scheding, S J, Rye, D C, Durrant-Whyte, H F 2008, Shared Spaces: Media Art, Computing and Robotics, *ACM Computers in Entertainment*, 6(4), 51:1-51:12

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 Students

Al-Harbi, Ahmed
Angelo, Mark Jose Amaro
Badra, Jihad
Dunn, Matthew
Gounder, James
Juddoo, Mrinal
O'Loughlin, William

Research Grants

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Discovery Projects (DP)	Prof Assaad Masri [Prof Robert Bilger]	Finite Rate Chemistry Effects in Turbulent Combustion	Jan 2007- Dec 2009	**500,000**
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/Linkage Infrastructure, Equipment and Facilities (LIEF)	Prof Assaad Masri	A Laser Facility for Imaging the Time Evolution of Scalars in Turbulent Flows	Jan 2008- Dec 2009	**570,000**

Thermodynamics and Fluids Research

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2008 Publications

Conference Papers

Dunn, M J, Masri, A R, Bilger, R W, Barlow, R, Wang, G 2008, Measurement of Mixing Patterns in Turbulent Piloted Premixed Jet Flames Issuing into a Hot Coflow, *Fifth Australian Conference on Laser Diagnostics in Fluid Mechanics and Combustion*, The University of Western Australia, 35 Stirling Highway, Crawley, WA, 6009, Australia, 71-74

Gounder, J D, Juddoo, M, Masri, A R, Starner, S H 2008, Difficulties associated with using laser induced fluorescence form NO as a conserved scalar in spray jets and flames, *Fifth Australian Conference on Laser Diagnostics in Fluid Mechanics and Combustion*, The University of Western Australia, 35 Stirling Highway, Crawley, WA, 6009, Australia, 11-14

Gounder, J D, Masri, A R 2008, Simultaneous Mie Scattering and Laser Induced Fluorescence Imaging of Formaldehyde and OH and in Spray Flames., *Fifth Australian Conference on Laser Diagnostics in Fluid Mechanics and Combustion*, The University of Western Australia, 35 Stirling Highway, Crawley, WA, 6009, Australia, 87-90

Gounder, J D, Masri, A R, Bilger, R W 2008, Droplet burning behaviour in turbulent jet spray flames of acetone, *Ninth Asia-Pacific International Symposium on Combustion and Energy Utilization*, World Publishing Corporation, Beijing, China, 20-27

Yaroshchyk, P, Masri, A R, Wrighter, GE 2008, Pseudo-Time Sequenced Imaging of OH in Premixed Propagating Flame, *Fifth Australian Conference on Laser Diagnostics in Fluid Mechanics and Combustion*, The University of Western Australia, 35 Stirling Highway, Crawley, WA, 6009, Australia, 95-98

Journal Papers

D'Anna, A, Kent, J H 2008, A model of particulate and species formation applied to laminar, nonpremixed flames for three aliphatic-hydrocarbon fuels, *Combustion and Flame*, 152, 573-587

Gordon, R L, Masri, A R, Mastorakos, E 2008, Simultaneous Rayleigh temperature, OH- andCH2O-LIF imaging of methane jets in a vitiated coflow, *Combustion Theory and Modelling*, 155, 181-195

Gubba, S, Ibrahim, S, Malalasekera, W, Masri, A R 2008, LES Modeling of Premixed Deflagrating Flames in a smale-scale Vented Explosion Chamber with a Series of Solid Obstructions, *Combustion Science and Technology*, 180, 1936-1955

Malalasekera, W, Ranga-Dinesh, K, Ibrahim, S, Masri, A R 2008, LES of recirculation and vortex breakdown in swirling flames, *Combustion Science and Technology*, 180(5), 809-832

Thermodynamics and Fluids Research

Fluid Dynamics

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Research Group

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Computational Fluid Dynamics (CFD)
Stratified flows
Natural convection flows
Turbulence

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Computational Fluid Dynamics (CFD)
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Atmospheric flows

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Heat and mass transfer
Electronic cooling
Ventilation

Academic Staff
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Dr K Srinivas

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Dr Williamson, Nicholas

Research Assistants
Tenne, Joel

Visiting Scholars
Dr Gonzalez, Carlos

Research Students
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Dittko, Karl
Gillam, Natalie
Jiracheewanun, Sujin
Ling, Jack
Luthfi, Luthfi
Nagarathinam, Srinarayana
Rollo, Jennifer

Research Grants

Sponsor/ Grant Name	Chief Investigator [other AMME investigators]	Project Title	Duration	Awarded Amount ($)
Australian Research Council/Linkage Projects (LP)	Prof Steve Armfield [Dr Michael Kirkpatrick]	Freshing, mixing and purging of riverine saline ponds by freshwater overflow	Jan 2005- Dec 2009	**132,400**
Australian Research Council/Discovery Projects (DP)	Prof Steve Armfield	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 Steve Armfield [Dr Michael Kirkpatrick]	Transport by Natural Convection in Reservoir Sidearms	Jan 2008- Dec 2010	**180,000**

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2008 Publications

Book Chapters

Tenne, J, Armfield, S W 2008, A Versatile Surrogate-Assisted Memetic Algorithm for Optimization of Computationally Expensive Functions and its Engineering Applications, Success in Evolutionary Computation, Springer, Berlin, Germany, Studies in Computational Intelligence, Volume 92, 43-72

Conference Papers

Aberra, T, Armfield, S W, Behnia, M 2008, Prandtl number scaling of the natural convection flow over an evenly heated vertical plate (Pr > 1), CHT-08 ICHMT Fourth International Symposium on Advances in Computational Heat Transfer, Begell House Inc., Connecticut, USA, Volume 13, issue 1 (online and cd-rom), paper number 363-(10 pages)

Behnia, M 2008, Transport Phenomena in High Power Electronic Systems A Case Study in High Power Amplifier Design, Fifth International Conference on Flow Dynamics (ICFD5), Korean Society of Mechanical Engineers (KSME), Korea

Komiya, A, Williamson, N J, Srinarayana, S, Behnia, M, Armfield, S W, Maruyama, S 2008, Visualization of Upwelled Saline Flow and its Transition Behaviour from Steady to Oscillatory regimes, The 19th International Symposium on Transport Phenomena (ISTP-19), University of Iceland, Faculty of Industrial Engineering, Mechanical Engineering and Computer Science, Iceland, cd-rom, 1-5

Srinarayana, S, Komiya, A, Armfield, S W, Behnia, M, Maruyama, S 2008, Laminar Plane Free-fountains in a Homogeneous Fluid, Fifth International Conference on Flow Dynamics (ICFD5), Korean Society of Mechanical Engineers (KSME), Korea, Paper OS8-36

Tenne, J, Armfield, S W 2008, Metamodel accuracy assessment in evolutionary optimization, 2008 IEEE Congress on Evolutionary Computation (CEC 2008), IEEE, online, online, 1505-1512

Journal Papers

Ali, A, Kirkpatrick, M P 2008, Toward a grid independent large eddy simulation of premixed turbulent combustion, Computational Fluid Dynamics Journal, 17(1:9), 60-74

Jiracheewanun, S, McBain, G D, Armfield, S W, Behnia, M 2008, Natural Convection in the Cavity with the Differentially Heated Isoflux Boundaries, ANZIAM Journal, 48, C977-C990

Kirkpatrick, M P, Armfield, S W 2008, On the stability and performance of the projection-3 method for the time integration of the Navier-Stokes equations, ANZIAM Journal, 49, C559-C575

Lei, C, Armfield, S W, Patterson, J 2008, Unsteady natural convection in a water-filled isoceles triangular enclosure heated from below, International Journal of Heat and Mass Transfer, 51, 2637-2650

Lin, W, Armfield, S W 2008, Onset of entrainment in transitional round fountains, International Journal of Heat and Mass Transfer, 51(21-22), 5226-5237

Lin, W, Armfield, S W, Patterson, J 2008, Unsteady natural convection boundary-layer flow of a linearly-stratified fluid with Pr<1 on an evenly heated semi-infinite vertical plate, >International Journal of Heat and Mass Transfer, 51, 327-343

Pianthong, K, Matthujak, A, Takayama, K, Milton, B, Behnia, M 2008, Dynamic Characteristics of Pulsed Supersonic Fuel Sprays, Shock Waves: an international journal on shock waves, detonations and explosions, 18(1), 1-10

Srinarayana, S, McBain, G D, Armfield, S W, Lin, W 2008, Height and stability of laminar plane fountains in a homogeneous fluid, International Journal of Heat and Mass Transfer, 51(19-20), 4717-4727

Williamson, N J, Armfield, S W, Behnia, M 2008, Numerical Simulation of Flow in a Natural Draft Wet Cooling Tower - the Effect of Radial Thermofluid Fields, Applied Thermal Engineering, 28(2-3), 178-189

Williamson, N J, Armfield, S W, Lin, W 2008, Direct numerical simulation of turbulent intermediate Froude number fountain flow, ANZIAM Journal, 50, C16-C30

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Williamson, N J, Srinarayana, S, Armfield, S W, McBain, G D, Lin, W 2008, Low-Reynolds-number fountain behaviour, Journal of Fluid Mechanics, 608, 297-317

Wong, P, Prasad, D, Behnia, M 2008, A new type of double-skin facade configuration for the hot and humid climate, Energy and Buildings, 40(10), 1941-1945

Graduates 2008

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Doctor of Philosophy

Abolfathi, Peter Puya

Development of an Instrumented and Powered Exoskeleton for the Rehabilitation of the Hand

Bourgault, Frederic

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Bryson, Mitchell

A Control-Theoretic Approach to Inertial Slam

Clarke, Elizabeth

Biomechanical and Neuropathological Comparisons of Adult and Infant Sine and Spinal Cord Injury

Gordon, Robert

A numerical and Experimental Investigation of Autoignition

Gu, Ying

Dynamic Responses of Delaminated Beams/Plates Considering Contact and Surface Strain Distribution Method for Delamination Detection

Held, Jason

The Modelling of Systems of Systems

Kaupp, Tobias

Probabilistic Human-Robot Information Fusion

Kloos, Gerold

Radio-Frequency Signal Strength Based Localisation in Unstructured Outdoor Environments

Lee, Dong

Uncertainty Based Multiobjective and Multidisciplinary Design Optimisation in Aerospace Engineering

Lee, Teck

A study of Zirconia-Toughened Alumina Nanocomposites

Lim, Szu

Developments and Applications of Nanostructured Particles in Advanced Engineering Materials

Ma, Wen Jie

Deposition-like Carbon Biomaterial Coating: Effect of Physical Properties on Biological Responses

Magdon Ismail, Fathuma Shaira

Surface Engineering of Biomaterials for Optimal Bone Bonding Characteristics

Mahon, Ian

Vision-Based Navigation or Autonomous Underwater Vehicles

Mathews, George

Asynchronous Decision Making for Decentralised Autonomous Systems

Nagarathinam, Srinarayana

Transient Behaviour of Free- and Impinging Fountains

Ong, Lee Ling

Non-Gaussian Representations for Decentralised Bayesian Estimation

Pramanik, Alokesh

Understanding the Deformation and Material Removal Mechanisms of Particulate-Reinforced Metal Matrix Composites Subjected to Machining

Ramos, Fabio

Recognising, Representing and Mapping Features in Unstructured Environments

Williamson, Nicholas

Numerical Modelling of Heat and Mass Transfer and Optimisation of a Natural Draft Wet Cooling Tower

Master of Philosophy (Research)

Badra, Jihad

Transient Heat Transfer Calculations from Multiple Jets Impinging on a Moving Plate

Brown, Shaun

The Value of Information in Multi-Objective Missions

Djanali, Vivien

Numerical Investigations of a Microjet Turbine Rotor

Frank, Oliver

Hemispherical Depth Perception for Micro-UAV's

Hall, Ross

Influence of Obstacle Location and Frequency on the Propagation of Premixed Flames

McCouat, Nicholas

Wideband Arbitary-Signal Digital Radar Platform

Mousavi, Ramin

Thermally Coupled Natural Convection Boundary Layers

Rickard, Nathan

Variable Stability Flight Simulation and an Experimental Education in Flight Dynamics

Roberts, James

Design of an Autonomous Hovering Miniature Air Vehicle as a Flying Research Platform

Master of Engineering (Course work)

Honours

Lee, Chang-Joon
Leitner, Nicholas

Merit

Bilal, Muhammad
Li, Kai Meng
Mo, Yiffan
Subbiah Kumar, Vinod
Zhang, Han

Pass

Le, Tue
Ma, Chiming
Zhu, Zhouyang

Undergraduate Research- FSEA Racing Car

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USYD Formula SAE Competition 8th November 2008, 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

Adam Austin and our extraordinary team of students designed, manufactured and assembled an elegant, compact and very ingenious racing car. This car broke new grounds. We gave away the high rev 4 cylinder engine for a very compact (supposedly temperamental) 2 cylinder Italian Aprilia engine. The new car- henceforth known as the Great Aprilia Car, had potentially the highest power to weight ratio at the competition. It was easily (and I am not biased) the most interesting car there. Unfortunately making a totally new car from stem to stem did not leave us sufficient time to debug all the systems. In particular neither of our 2 ECUs could be made to work effectively.

We came 12th out of 24 teams. Next year about 4 students will debug this car, 6 will make and fit upgrades for it for the Competition and 6 will research and develop new elements for the 010 and later cars. Future cars will be developed and made over 2 years, not on, that is not all in one year.

Many of the top cars at the Competition are not designed and made just by the students. This may not seem as fair but the world is never fair and by actually designing, analyzing and manufacturing their own cars it makes our graduates much better engineers.

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

Adam Austin- Frame, suspension, team leader
Alex Hoffman- body, drag and aerodynamics
Alex Summer- exhaust and cooling systems and fund raiser extraordinaire
Bowen Douglas- wheels and shafts
Jessica Breen- HR Manager and steering
Mike Hodgkinson- drive train differential
Nicholas Bartos- engine intake
Peter Larsen- brakes
Rebecca Meehan- suspension manufacture
Tony Hsu- electrical and electronics

Student Research Showcase

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Engineering Sydney hosted the annual Research Conversazione on Friday 31 October 2008. 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. This year, the event attracted approximate 300 industry representatives from a variety of engineering companies.

There were 33 posters presented from the School, 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 in Aero-Space Engineering

Undergraduate Category: Jessica Brennan

Postgraduate Category: Angus Leslie

Shelston IP Best Poster Awards in Biomedical Engineering

Undergraduate: Andrew Howard

Postgraduate: Vineet Upender and Thanat Ueafea

Shelston IP Best Poster Awards in Mechanical Engineering

Undergraduate: Jonathan Low

Postgraduate: Jack Ling

Shelston IP Best Poster Awards in Mechatronics Engineering

Postgraduate Category: Iain Brown

Watermark Best Poster Awards in Biomedical Engineering

Undergraduate Category: Deepika Nandakumar

Postgraduate Category: Clarice Field

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Research Income Awarded in 2008 for Projects Commencing in 2009

ARC Grants	$3,240,000
NHMRC Grants	$856,000
Other Government Funds	$108,575
Host Institution Support	$212,650
Industry/ Private Funds	$58,000
Total	**$4,475,225**

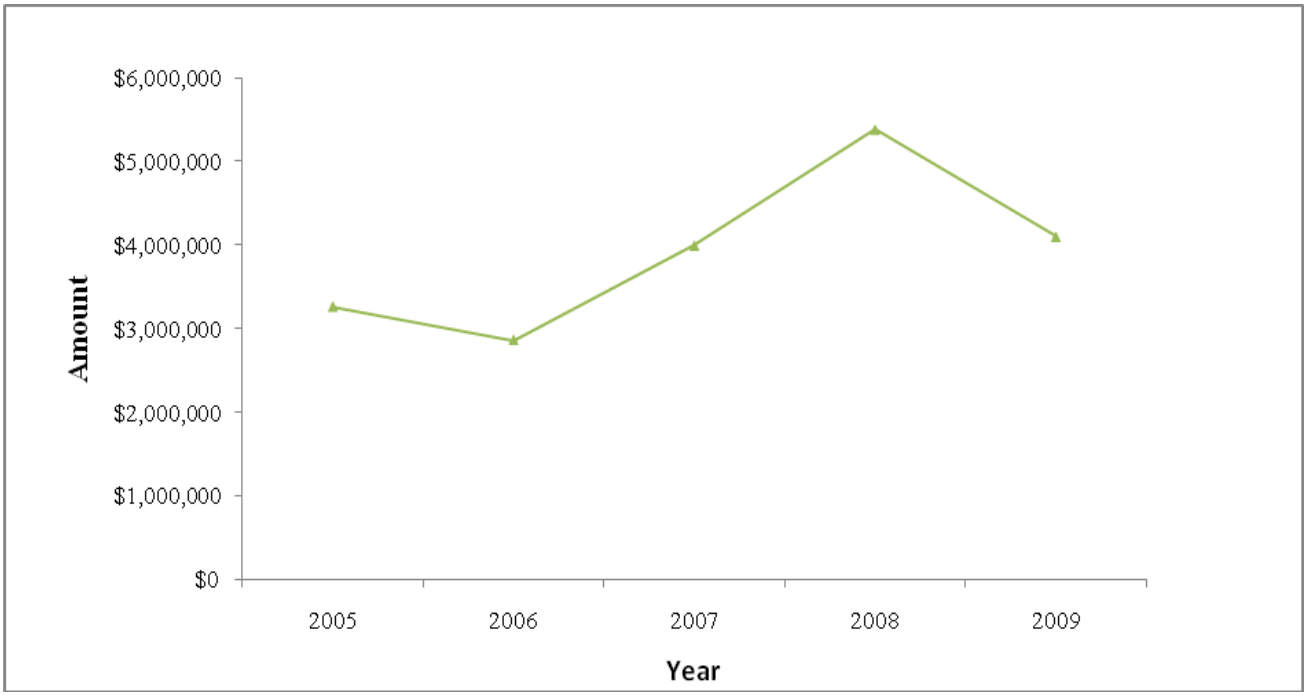

Figure 1: Total ARC and NHMRC Funding per year (2005 – 2009)

Research Output

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

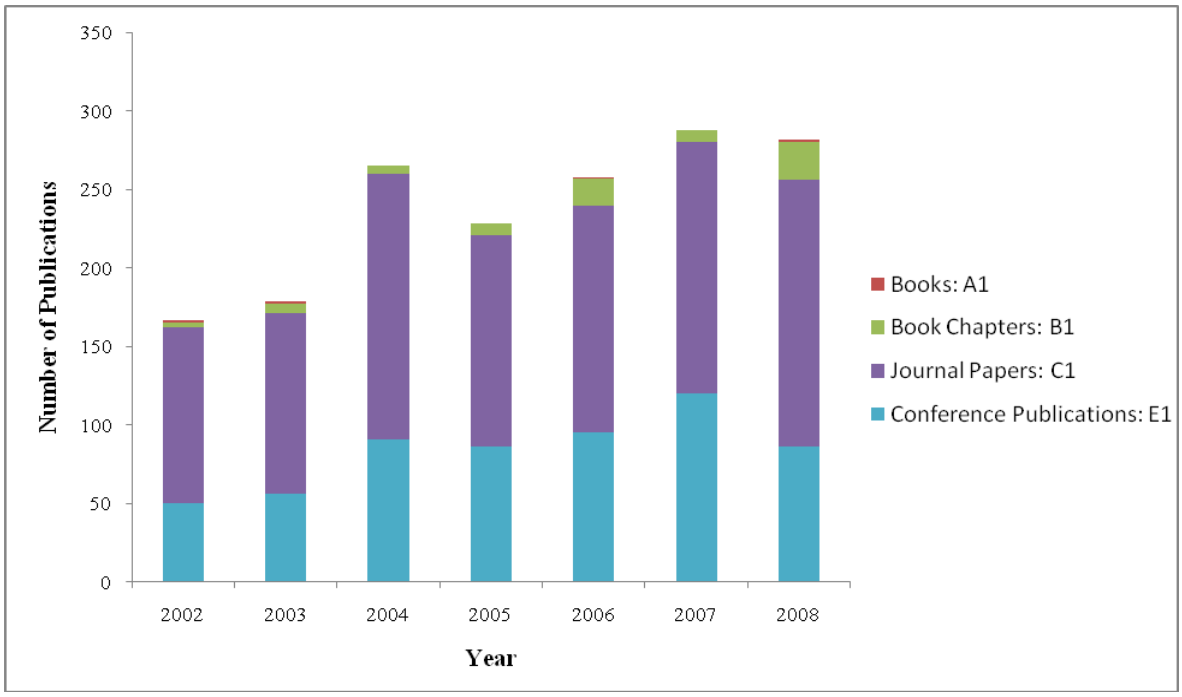

Figure 2: Research Publications 2002- 2008
A1: Authored research books published by commercial publisher (2)
B1: Authored research chapters in commercially published books (24)
C1: Refereed articles in scholarly journals (170)
E1: Full written papers that are published and peer reviewed (86)

Postgraduate Supervision and Completions

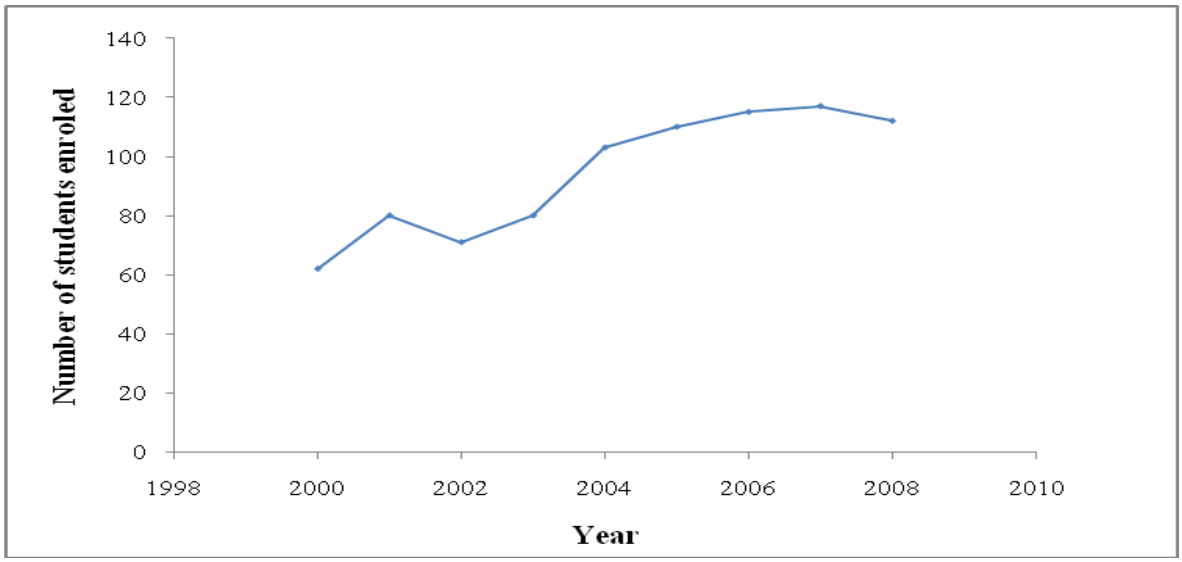

Figure 3: Total number of enroled Master of Philosophy and PhD students (2000- 2008).

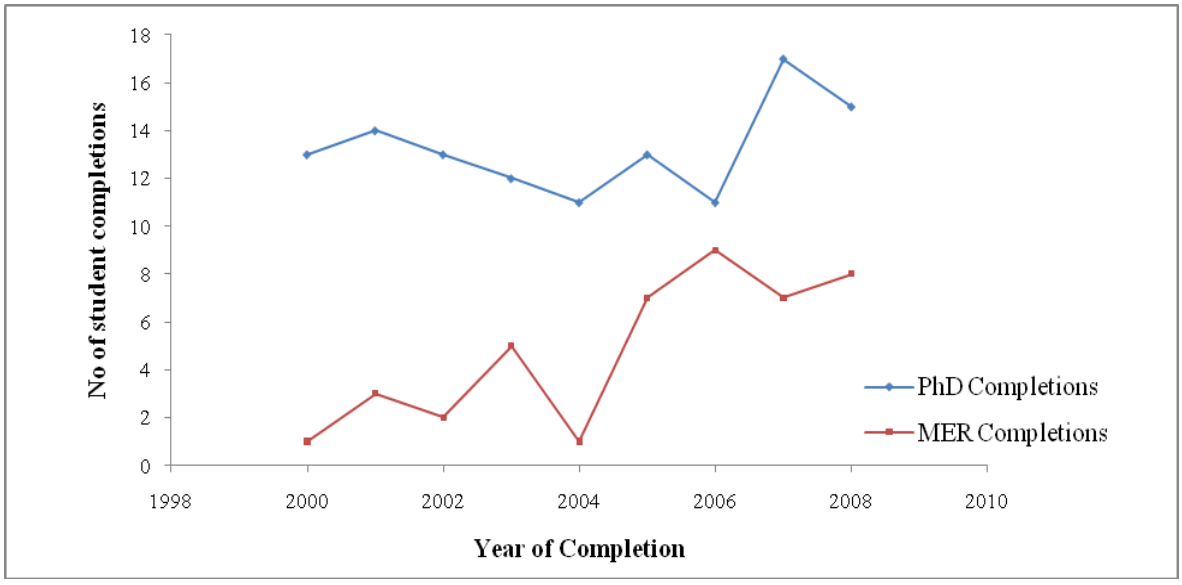

Figure 4: PhD and MPhil completions. (2000 – 2008).

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