# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>2</td>
</tr>
<tr>
<td>Organisational Overview</td>
<td>3</td>
</tr>
<tr>
<td>Research Highlights</td>
<td>5</td>
</tr>
<tr>
<td>• Research and Teaching Grants</td>
<td>5</td>
</tr>
<tr>
<td>• Appointments</td>
<td>6</td>
</tr>
<tr>
<td>• Awards and Honours</td>
<td>6</td>
</tr>
<tr>
<td>Aerospace Research</td>
<td>7</td>
</tr>
<tr>
<td>Biomedical Engineering Research</td>
<td>12</td>
</tr>
<tr>
<td>Materials and Structures Research</td>
<td>15</td>
</tr>
<tr>
<td>• Centre for Advanced Materials Technology (CAMT)</td>
<td>15</td>
</tr>
<tr>
<td>• Finite Element Analysis Research Center</td>
<td>23</td>
</tr>
<tr>
<td>Rheology Research</td>
<td>24</td>
</tr>
<tr>
<td>Robotics Research</td>
<td>26</td>
</tr>
<tr>
<td>• Australian Center for Field Robotics (ACFR)</td>
<td>26</td>
</tr>
<tr>
<td>Thermodynamics and Fluids Research</td>
<td>34</td>
</tr>
<tr>
<td>• Combustion</td>
<td>34</td>
</tr>
<tr>
<td>• Fluid Dynamics</td>
<td>36</td>
</tr>
<tr>
<td>Graduates 2008</td>
<td>39</td>
</tr>
<tr>
<td>• Doctor of Philosophy</td>
<td>39</td>
</tr>
<tr>
<td>• Master of Philosophy</td>
<td>39</td>
</tr>
<tr>
<td>• Master of Engineering</td>
<td>39</td>
</tr>
<tr>
<td>Undergraduate Research- FSAE Racing Car</td>
<td>40</td>
</tr>
<tr>
<td>Student Research Showcase</td>
<td>41</td>
</tr>
<tr>
<td>Research Performance Summary</td>
<td>43</td>
</tr>
</tbody>
</table>
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

## Academic Staff

<table>
<thead>
<tr>
<th>Head of School</th>
<th>Honorary Professors</th>
<th>Adjunct Lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof Steve Armfield</td>
<td>Brandwood, Arthur</td>
<td>Bates, Peter</td>
</tr>
<tr>
<td></td>
<td>Kent, John</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professors</td>
<td>Adjunct Professors</td>
<td>Adjunct Associate Lecturers</td>
</tr>
<tr>
<td>Armfield, Steve</td>
<td>Cox, Brian</td>
<td>Gonzalez, Carlos</td>
</tr>
<tr>
<td>Behnia, Masud</td>
<td>Rose, Francis</td>
<td></td>
</tr>
<tr>
<td>Durrant-Whyte, Hugh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mai, Yiu-Wing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masri, Assaad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nebot, Eduardo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanner, Roger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tong, Liyong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ye, Lin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zhang, Liangchi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emeritus Professors</td>
<td>Associate Professors</td>
<td></td>
</tr>
<tr>
<td>Bilger, Robert</td>
<td>Dunstan, Colin</td>
<td></td>
</tr>
<tr>
<td>Bird, Graeme</td>
<td>Ruys, Andrew</td>
<td></td>
</tr>
<tr>
<td>Steven, Grant</td>
<td>Sukkarieh, Salah</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honorary Senior Lecturers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bilston, Lynne</td>
<td></td>
</tr>
<tr>
<td>Lecturers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Staff</td>
<td>Research Associates</td>
<td>Research Assistants</td>
</tr>
<tr>
<td>ARC Australian Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/ ARC Australian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postdoctoral Fellows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chang, Li</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Du, Xusheng</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makarenko, Alexei</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nguyen, Thai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pizarro, Oscar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARC Postdoctoral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Fellows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Li, Wei</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velonaki, Mari</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Research Fellows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xue, Shicheng</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Fellows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deng, Shiqiang</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goktogan, Ali</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halim, Dunant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liu, Hong-Yuan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mylvaganam, Kausala</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nieto, Juan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singh, Surya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Sydney</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridging Fellows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gu, Bin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wang, Baolin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University Postdoctoral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Fellows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mo, Maosong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wu, Chengtie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postdoctoral Fellows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ali, Yasser</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baji, Avinash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bailey, Tim</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chen, Yiqing Annie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dai, Shao Cong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dasari, Aravind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lu, Ye</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luo, Quantian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luo, Zhen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masson, Favio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melkumyan, Arman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nguyen, Van Ky Quan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pramanik, Alokesh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qi, Fuzhong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starner, Sten</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wang, Yanbo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Williamson, Nicholas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yaroshchyk, Pavel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zhou, Shiwei</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brooks, Alex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramos, Fabio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Associates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bryson, Mitchell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elinas, Pantelis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitch, Robert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gu, Ying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jakuba, Mike</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jones, Katie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaupp, Tobias</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mahon, Ian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monteiro, Sildomar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murphy, Richard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nettleton, Eric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ong, Sharon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perera, Lochana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peynot, Thierry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vasudevan, Shrihari</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Assistants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James, Barbara</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nagarathinam, Srinaraya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenne, Joel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineers (CRC-AS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beehag, Andrew</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qi, Ben</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Organisational Overview

### 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
- Tdhunter, 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, Jinxia
- Prof Ma, Haitao
- Dr Niraula, Om Prakash
- A/Prof Qi, 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, Guo Zhong
### 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

Back to Index

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.
Research Group

**Design Optimisation Research**

Dr K Srinivas  
P: +61 2 9351 4289  
ragh@aeromech.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  
a.tong@chem.usyd.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  
P: +61 2 9351 7350  
pwg@aeromech.usyd.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  
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
P: +61 2 9351 2336
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
x.wu@aeromech.usyd.edu.au

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

Unmanned Aerial Vehicle (UAV) Research

Dr KC Wong
P: +61 2 9351 2347
kc@aeromech.usyd.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;
Aerospace Research

• Autonomous safe recovery and landing of a UAV;
• Terrain Following for autonomous flight vehicles;
• Integration of available technologies into operational UAV systems;
• Real-time flight 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

Research Students
Abuhashim, Tariq
Adlgostar, Rahman
Brown, Sonya
Chapman, Airlie
Cole, David
Dumble, Steven
Gan, Seng Keat
Hall, Alexander
Hug, Calvin Kai-Yuan
Kiang, Jademon
Lawrance, Nicholas

Honorary Staff
Dr Bates, Peter
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
Tsui, Allen
Xu, Zhe

Research Grants

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

Books

Srinivas, K 2008, Basics of Aerospace Propulsion, Sydney
Srinivas, K 2008, Gasdynamics, An introduction, Sydney

Book Chapters


Conference Papers


Journal Papers


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


Sun, D, Tong, L 2008, Theoretical investigation on wireless vibration control of thin beams using photostriective 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


Biomedical Engineering Research

Research Group

Associate Professor Andrew Ruys
P: + 61 409 127 002
a.ruys@aeromech.usyd.edu.au
(Also a member of Materials and Structures Research Group CAMT)

Associate Professor Colin Dunstan
P: + 61 2 9351 7127
c.dunstan@usyd.edu.au
Bone cell regulation; Biomaterials; Cancer metastasis to bone;

Research Group CAMT)

Biomaterial synthesis & testing

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

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

### Research Grants

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

### 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


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

Professor Yiu-Wing Mai  
P: +61 2 9351 2290  
yiu-wing.mai@sydney.edu.au

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

Professor Liangchi Zhang  
P: +61 2 9351 2835  
liang.chi.zhang@sydney.edu.au

Mechanics of advanced materials processing and its applications, including forming, grinding and polishing ceramics and silicon wafers; micro- and nano-mechanics, including mechanics of friction and wear of advanced composites; nanotechnology; theory and applications of solid mechanics; development of numerical methods for non-linear-problems

Professor Lin Ye  
P: +61 2 9351 4798  
lin.ye@sydney.edu.au

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

Dr Xiaozhou Liao  
P: +61 2 9351 2348  
xiaozhou.liao@sydney.edu.au

Materials characterisation using advanced electron microscopy techniques
Materials & Structures Research
Centre for Advanced Materials Technology (CAMT)

Academics
Prof Cox, Brian
Dr Li, Qing
A/Prof Ruys, Andrew

Research Associates
Dr Beehag, Andrew
Dr Gu, Bin
Dr Qi, Ben
Dr Zhou, Shiwei

Research Fellows
Dr Deng, Shiqiang
Dr Du, Xusheng
Dr Liu, Hong-Yuan
Dr Mo, Maosong
Dr Mylvaganam, Kausala
Dr Nguyen, Thai
Dr Wang, Baolin

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

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

Visiting Scholars
Prof Cotterell, Brian
Prof Gao, Cun-Fa
A/Prof Kao-Walter, Sharon
A/Prof Qiu, Wan-Qi
Prof Shi, Dean
A/Prof Walter, Mats Fredrik
Prof Williams, Gordon
Dr Wong, Shing-Chung
Prof Xie, Xiao-Lin
Prof Xu, Shi-Ai
A/Prof Zhang, Qin
Dr Yu, Zhong-Zhen

Administrative Assistant
Santos, Tessie

Technical Staff
Karkada, Stanley
Oliver, Bruce
Shearing, Trevor

Research Grants

<table>
<thead>
<tr>
<th>Sponsor/ Grant Name</th>
<th>Chief Investigator [other AMME investigators]</th>
<th>Project Title</th>
<th>Duration</th>
<th>Awarded Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Dr Li Chang</td>
<td>Towards new generations of lubricants using nanoparticles</td>
<td>Jan 2008- Dec 2010</td>
<td>290,000</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Dr Xusheng Du</td>
<td>Novel nanostructured high energy cathode material</td>
<td>Jan 2007- Dec 2009</td>
<td>260,000</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Dr Xiaozhou Liao</td>
<td>Transmission electron microscopy investigation of the deformation mechanisms of nanostructured materials</td>
<td>Jan 2007- Dec 2011</td>
<td>980,000</td>
</tr>
<tr>
<td>Australian Research Council/Linkage Infrastructure, Equipment and Facilities (LIEF)</td>
<td>Dr Xiaozhou Liao</td>
<td>Transmission Electron Microscope-Nanoindenter for Nano-Mechanical Testing</td>
<td>Jan 2008- Dec 2009</td>
<td>100,000</td>
</tr>
<tr>
<td>Department of Education, Science and Training (Federal)/Innovation Access Programme (IAP): International Science and Technology</td>
<td>Prof Yiu-Wing Mai</td>
<td>Fatigue Crack Growth In Polymer Nanocomposites</td>
<td>Jan 2006- Dec 2008</td>
<td>30,000</td>
</tr>
<tr>
<td>Sponsor/ Grant Name</td>
<td>Chief Investigator [other AMME investigators]</td>
<td>Project Title</td>
<td>Duration</td>
<td>Awarded Amount ($)</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------</td>
<td>---------------</td>
<td>----------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Prof Yiu-Wing Mai</td>
<td>Some Outstanding Mechanics Problems in Layered Ferroelectromagnetic Composites with Enhanced Magnetoelectric Effect</td>
<td>Jan 2006- Dec 2009</td>
<td>490,000</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Prof Yiu-Wing Mai</td>
<td>Nanostructure Design and Toughening Mechanisms of Novel Thermosets</td>
<td>Jan 2008- Dec 2011</td>
<td>630,000</td>
</tr>
<tr>
<td>DVC Research/Postdoctoral Research Fellowship Scheme</td>
<td>Dr Maosong Mo</td>
<td>University of Sydney - Postdoctoral Fellowship</td>
<td>Jan 2006- Dec 2008</td>
<td>267,838</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Dr Thai Nguyen</td>
<td>Developing a new technology: advanced surface hardening and grinding in a single operation</td>
<td>Apr 2008- Apr 2011</td>
<td>305,000</td>
</tr>
<tr>
<td>DVC Research/Bridging Support Fellowship</td>
<td>Dr Baolin Wang</td>
<td>Mechanics for Developing New Micro/nano-Multilayer Systems - Bridging Support Fellowship</td>
<td>Jan- Dec 2008</td>
<td>31,955</td>
</tr>
<tr>
<td>DVC Research/International Visiting Research Fellowship (IVRF)</td>
<td>Dr Shing-Chung Wong [Prof Yiu-Wing Mai]</td>
<td>Deformation studies of electrospun polymer nanofibres</td>
<td>Jan 2008- Dec 2008</td>
<td>8,500</td>
</tr>
<tr>
<td>Cooperative Research Centre for Advanced Composite Structures/Research Support</td>
<td>Prof Lin Ye</td>
<td>CRC Advance Composite Structures II - Program 1 Aerospace Composites</td>
<td>Jan 2005- Dec 2009</td>
<td>300,000</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Prof Lin Ye</td>
<td>Fundamentals of active sensor network for damage identification in engineering structures</td>
<td>Jan 2008- Dec 2010</td>
<td>375,000</td>
</tr>
<tr>
<td>Australian Research Council/Linkage Projects (LP)</td>
<td>Prof Liangchi Zhang</td>
<td>Novel Cutting Picks for Mining Industry and an Australian Standard</td>
<td>Jan 2006- Dec 2010</td>
<td>300,000</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Prof Liangchi Zhang</td>
<td>Damage-free surfacing of large brittle wafers with on-machine flatness control</td>
<td>Feb 2007- Jan 2012</td>
<td>1,202,882</td>
</tr>
<tr>
<td>University of Queensland/Shared Research Support</td>
<td>Prof Liangchi Zhang</td>
<td>Effect of Chemo-Mechanical Grinding on Surface Integrity of Single Crystal Silicon Substrates</td>
<td>Jan 2007- Dec 2009</td>
<td>15,000</td>
</tr>
<tr>
<td>Australian Research Council/Linkage Projects (LP)</td>
<td>Prof Liangchi Zhang</td>
<td>Mechanisms of mixed lubrication in rolling</td>
<td>Jan 2008- Dec 2011</td>
<td>356,034</td>
</tr>
<tr>
<td>Australian Research Council/Linkage Projects (LP)</td>
<td>Prof Liangchi Zhang</td>
<td>Non-destructive characterisation of residual stresses for the silicon-on-sapphire technology</td>
<td>Jan 2008- Dec 2010</td>
<td>290,076</td>
</tr>
</tbody>
</table>
2008 Publications

Books

Ye, L, Zhang, L, Bell, J, Yan, C 2008, Frontiers in Materials Science and Technology, Switzerland

Book Chapters


Zhang, L 2008, Microstructural changes in silicon caused by indentation and machining, Semiconductor Machining at the Micro-Nano Scale, Transworld Research Network, Kerala, India, 1, 155-197

Conference Papers

Large, M C, Moran, J, Ye, L 2008, The role of material properties in the strain testing using micro-structured Polymer Optical Fibres (mPOF), 19th International Conference on Optical Fibre Sensors (OFS 19), SPIE, USA, 7004, 700468-1-700468-4


Ye, L, Rosso, P, Deng, S, Wu, J 2008, Fracture of Epoxy Nanocomposites - Role of Particles, The Eighth International Conference on Fundamentals of Fracture (ICFF VIII), N/A, China, paper O-08, 68-70


Journal Papers


Deng, S, Zhang, J, Ye, L, Wu, J 2008, Toughening epoxies with halloysite nanotubes, Polymer, 49(23), 5119-5127

Du, X S, Mo, M, Zheng, R, Lim, S H, Meng, Y, Mai, Y 2008, Shape-Controlled Synthesis and Assembly of Copper Sulfide Nanoparticles, Crystal Growth & Design, 8(6), 2032-2035


Gao, C-F, Mai, Y, Wang, B 2008, Effects of magnetic fields on cracks in a soft ferromagnetic material, Engineering Fracture Mechanics, 75(17), 4863-4875


Gu, Y, Zhang, L 2008, Coupling of the meshfree and finite element methods for determination of the crack tip fields, Engineering Fracture Mechanics, 75, 986-1004


Huang, G, Mai, Y, Ru, C 2008, Surface deflection of a microtubule loaded by a concentrated radial force, Nanotechnology, 19, 125101-1-125101-8


Ke, Z, Shi, D, Yin, J, Li, R, Mai, Y 2008, Facile Method of Preparing Supertough Polyamide 6 with Low Rubber Content, Macromolecules, 41(20), 7264-7267


Li, Y, Fu, S, Yang, Y, Mai, Y 2008, Facile synthesis of highly transparent polymer nanocomposites by introduction of core-shell structured nanoparticles., Chemistry of Materials, 20(8), 2637-2643


Liao, X, Zhao, Y 2008, Preface, Materials Science Forum, 579, v-v


Lu, Y, Ye, L, Su, Z, Yang, C 2008, Quantitative assessment of through-thickness crack size based on Lamb wave scattering in aluminium plates, NDT and E International, 41(1), 59-68

Lu, Y, Ye, L, Wang, D, Meng, G 2008, Guided wave propagation and interaction with damage in tubular structures, Advanced Materials Research, 32, 289-292

Mai, Y 2008, Special Issue on Green Composites, Journal of Reinforced Plastics and Composites, 27(16-17), 1677-1678
Melkumyan, A, Mai, Y 2008, Influence of imperfect bonding on interface waves guided by piezoelec-
tric/piezomagnetic composites, Philosophical Magazine, 88(23), 2965-2977

Mo, M, Lim, S H, Mai, Y, Zheng, R, Ringer, S P 2008, In Situ Self-Assembly of Thin ZnO Nanoplate-
lets into Hierarchical Mesocrystal Microtubules with Surface Grafting of Nanorods: A General Strate-
gy towards Hollow Mesocrystal Structures, Advanced Materials, 20, 339-342

Pramanik, A, Zhang, L, Arsecularatne, J A 2008, Deformation mechanisms of MMCs under indenta-
tion, Composites Science and Technology, 68(6), 1304-1312

Pramanik, A, Zhang, L, Arsecularatne, J A 2008, Machining of metal matrix composites: Effect of ce-
eramic particles on residual stress, surface roughness and chip formation, International Journal of Ma-
chine Tools and Manufacture, 48(15), 1613-1625

Seltzer, R, Mai, Y 2008, Depth sensing indentation of linear viscoelastic-plastic solids: A simple me-
thod to determine creep compliance., Engineering Fracture Mechanics, 75(17), 4852-4862

Tjong, S, Mai, Y 2008, Processing-structure-property aspects of particulate- and whisker-reinforced
titanium matrix composites, Composites Science and Technology, 68, 583-601

Wang, B, Mai, Y 2008, Accumulation Damage Mode for Ferroelectric Ceramics Subjected to Mode III 
Fatigue Loading Conditions, International Journal of Damage Mechanics, 17(1), 29-44

Wang, B, Mai, Y 2008, An exact analysis for mode III cracks between two dissimilar magnetoelasto-
static layers, Mechanics of Composite Materials, 44(6), 533-548

Wang, B, Mai, Y 2008, Modeling surface electrodes on a piezoelectric layer., Journal of Applied Me-
chanics, 75(2), 021007-1-021007-8

Wang, B, Zhang, H, Niraula, O 2008, An Internal Crack Subjected to a Thermal Flow in Magnetoelae-

Wang, CY, Zhang, L 2008, An elastic shell model for characterizing single-walled carbon nanotubes,
Nanotechnology, 19(Article 195704), 195704-1-195704-6

Wang, CY, Zhang, L 2008, Circumferential vibration of microtubules with long axial wavelength,
Journal of Biomechanics, 41(9), 1892-1896

Wang, W.L., Gu, Y, Zhang, L 2008, Crack analysis using an improved meshless technique with irregu-
lar nodes, Advanced Materials Research, 32, 263-266

Wang, X, Li, K, Mai, Y, Shen, Y 2008, Theoretical analysis of Hertzian contact fracture: Ring crack,
Engineering Fracture Mechanics, 75(14), 4247-4256

Synthesis of 8H Diamond, Advanced Materials, 20(17), 3303-3307

Wu, C, Ramaswamy, Y, Gail, D, Yang, W, Xiao, K, Zhang, L, Yin, Y, Zreiqat, H 2008, Novel sphene 
coatings on Ti-6Al-4V for orthopaedic implants using sol-gel method, Acta Biomaterialia, 4, 569-576

ing Mechanism Generates Zero Macroscopic Strain in Nanocrystalline Metals, Physical Review Letters,
100(9), 095701-1-095701-4

Yan, W, Sun, Q, Liu, H Y 2008, Effect of transformation volume strain on the spherical indentation of 
shape memory alloys, International Journal of Modern Physics B: condensed matter physics etc., 22(31 & 32), 5957-5964

Yang, C, Hodgson, P, Liu, Q, Ye, L 2008, Geometrical effects on residual stresses in 7050-T7451 alu-
minum alloy rods subject to laser shock peening, Journal of Materials Processing Technology, 201, 
303-309

Yang, J, Chen, Z, Yang, G, Fu, S, Ye, L 2008, Simultaneous improvements in the cryogenic tensile 
strength, ductility and impact strength of epoxy resins by a hyperbranched polymer, Polymer, 49, 3168-
3175

Zhang, A-Y, Liu, H Y, Mouritz, A, Mai, Y 2008, Experimental study and computer simulation on de-
gradation of z-pin reinforcement under cyclic fatigue, Composites Part A-Applied Science and Manu-
facturing, 39(2), 406-414

Zhang, L, Mylvaganam, K, Xiao, K 2008, The Intrinsic Frictional Property of Carbon Nanotubes, Ad-
vanced Materials Research, 32, 1-4


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**

**Research Group**

**Professor Roger Tanner**  
P: + 61 2 9351 7153  
rit@aeromech.usyd.edu.au  
Rheology  
Polymer processing  
Computational mechanics

**Dr Ahmad Jabbarzadeh**  
P: + 61 2 9351 2344  
ab-madi@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

**Postdoctoral Fellows**

Dr Dai, Shao Cong  
Dr Qi, Fuzhong

**Research Grants**

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

Books


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


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.
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**  
P: +61 2 9351 2343  
e.nebot@cas.edu.au

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  
g.brooker@cas.edu.au

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
### Academicians
- 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 Montiero, 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
- Tetradis, Natasha
- Wang, Christy (Finance)

### Technical Staff
- Attia, Muhammad Esa
- Bandara, Dharmapriya
- Beaubot, Jean-Gerard
- Bishop, Mark
- Calleja, 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
- Mifsud, Christopher
- Miller, Timothy
- Nichani, Vijay
- Oppolzer, Florian
- Randle, Jeremy
- Rodgers, Craig
- Sadrossadat, Amir
- Trinder, Alan

### Research Students
- Abuhashim, Tariq
- Adlgostar, Rahman
- Agamennoni, Gabriel
- Allen, Thomas
- Barkby, Stephen
- Bishop, Mark
- Blair, Allan Harry
- Brown, Iain Duncan
- Brown, Iain Duncan
- Chapman, Airlie
- Cole, David
- Desai, Shital Harshad
- Douillard, Bertrand
- Douillard, Bertrand
- Gan, Seng Keat
- Gomez Escobar, Jairo
- Hill, Andrew
- Hung, Calvin Kai-Yuan
- Innes, Christopher John
- Johnson, David
- Johnson-Roberson, Matthew
- Karumanchi, Sisir Babu
- Katz, Roman
- Lawrance, Nicholas
- Lupton, Todd William
- Marios, Nazifa
- Medagoda, Lashika Janith
- Bandara
- Moser, Michael
- O'Callaghan, Simon
- Oranshsky, 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
## Research Grants

<table>
<thead>
<tr>
<th>Sponsor/ Grant Name</th>
<th>Chief Investigator [other AMME investigators]</th>
<th>Project Title</th>
<th>Duration</th>
<th>Awarded Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Research Council/ Centre of Excellence</td>
<td>Prof Hugh Durrant-Whyte [Prof Eduardo Nebot]</td>
<td>Centre for autonomous systems</td>
<td>Jan 2003- Dec 2010</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Australian Research Council/Federation Fellowships (FF)</td>
<td>Prof Hugh Durrant-Whyte</td>
<td>Data Fusion and Perception in Autonomous Networks</td>
<td>Jan 2007- Dec 2011</td>
<td>1,606,210</td>
</tr>
<tr>
<td>Technological Resources Pty Ltd/Research Support</td>
<td>Prof Hugh Durrant-Whyte</td>
<td>Rio tinto centre for mine automation</td>
<td>Jan 2007- Dec 2011</td>
<td>18,500,000</td>
</tr>
<tr>
<td>US Army Research Laboratory (USA)/Research Support</td>
<td>Prof Hugh Durrant-Whyte</td>
<td>Data Fusion in Ground Sensor Networks</td>
<td>Jan 2007- Dec 2009</td>
<td>93,794</td>
</tr>
<tr>
<td>Office of Naval Research (USA)/Research Support</td>
<td>Prof Hugh Durrant-Whyte</td>
<td>BRAIN Tactical Sensor Networks</td>
<td>Jan 2008- Dec 2009</td>
<td>268,800</td>
</tr>
<tr>
<td>University of Pennsylvania (USA)/Shared Research Support</td>
<td>Prof Hugh Durrant-Whyte</td>
<td>MAST: Micro Autonomous Systems and Technology</td>
<td>May 2008- Nov 2013</td>
<td>204,234</td>
</tr>
<tr>
<td>DVC Research/Postdoctoral Research Fellowship Scheme</td>
<td>Dr Michael Jakuba</td>
<td>Efficient multiple plume source search</td>
<td>Jan 2008- Dec 2010</td>
<td>196,379</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Dr Fabio Ramos</td>
<td>Learning from Uncertain and Missing labelling in Relational Data</td>
<td>Jan 2008- Dec 2010</td>
<td>235,944</td>
</tr>
<tr>
<td>Australian Research Council/Linkage Projects (LP)</td>
<td>Dr Steven Scheding [Prof Hugh Durrant-Whyte]</td>
<td>Autonomous Cooking: Sensing, Estimation and Control</td>
<td>Jan 2006- Dec 2008</td>
<td>225,000</td>
</tr>
<tr>
<td>Asian Office of Aerospace Research and Development (USA)/Research Support</td>
<td>Dr Steven Scheding [Prof Hugh Durrant-Whyte]</td>
<td>Sensor Data Integrity</td>
<td>Jan- Dec 2008</td>
<td>70,665</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Prof Salah Sukkarieh</td>
<td>Data Fusion for Self-Localisation and Team Situational Awareness in Unknown Structured Environments</td>
<td>Jan 2006- Dec 2008</td>
<td>170,000</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Dr Stefan Williams</td>
<td>Autonomous Exploration and Characterization of Benthic Habitats Linked to Oceanographic Processes</td>
<td>Jan 2008- Dec 2010</td>
<td>134,000</td>
</tr>
<tr>
<td>Department of Defence (Federal)/Research Support</td>
<td>Dr Stefan Williams [Dr Oscar Pizarro]</td>
<td>Autonomous Bathymetric Mapping in the Littoral</td>
<td>Nov 2008- Nov 2009</td>
<td>67,095</td>
</tr>
<tr>
<td>Department of Innovation, Industry, Science and Research (Federal)/National Collaborative Research Infrastructure Strategy (NCRIS)</td>
<td>Dr Stefan Williams [Drs Michael Jakuba &amp; Oscar Pizarro]</td>
<td>Use of Autonomous Underwater Vehicle at the IMOS AUV Facility</td>
<td>Jun 2008- Jun 2011</td>
<td>400,000</td>
</tr>
</tbody>
</table>
2008 Publications

Books

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

Book Chapters


Conference Papers


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


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

**Journal Papers**


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


Vasudevan, S, Siegwart, R 2008, Bayesian space conceptualization and place classification for semantic maps in mobile robotics, *Robotics and Autonomous Systems*, 56, 522-537


Thermodynamics and Fluids Research

Combustion

Back to Index

Research Group

Professor Assaad Masri
P: + 61 2 9351 2288
assaad.masri@sydney.edu.au

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

Research Students

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

Postdoctoral Fellows

Dr Starner, Sten
Dr Yaroschyk, Pavel

Research Grants

<table>
<thead>
<tr>
<th>Sponsor/ Grant Name</th>
<th>Chief Investigator [other AMME investigators]</th>
<th>Project Title</th>
<th>Duration</th>
<th>Awarded Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitch Engineering Pty Ltd/Research Support</td>
<td>Prof Assaad Masri</td>
<td>Optimisation of heat transfer in a furnace heating (or cooling) metal strips</td>
<td>Jan 2007- Dec 2009</td>
<td>23,000</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Prof Assaad Masri</td>
<td>Investigations of Surface-Gas Reactions and Mixing in Micro-combustion</td>
<td>Jan 2008-Dec 2010</td>
<td>390,000</td>
</tr>
<tr>
<td>Australian Research Council/Linkage Infrastructure, Equipment and Facilities (LIEF)</td>
<td>Prof Assaad Masri</td>
<td>A Laser Facility for Imaging the Time Evolution of Scalars in Turbulent Flows</td>
<td>Jan 2008- Dec 2009</td>
<td>570,000</td>
</tr>
</tbody>
</table>
2008 Publications

Conference Papers


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


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


Thermodynamics and Fluids Research

Fluid Dynamics

Research Group

Professor Steve Armfield  
P: + 61 2 9351 2927  
steven.armfield@sydney.edu.au

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

Dr Michael Kirkpatrick  
P: + 61 2 9351 2675  
mi-
chael.kirkpatrick@sydney.edu.au

Computational Fluid Dynamics (CFD)  
Stratified flows  
Atmospheric flows

Prof Masud Behnia  
P: + 61 2 9036 9518  
masud.behnia@sydney.edu.au

Heat and mass transfer  
Electronic cooling  
Ventilation

Academic Staff
Dr Auld, Doug  
Dr K Srinivas

Research Assistants
Tenne, Joel

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

Postdoctoral Fellows
Dr Williamson, Nicholas

Visiting Scholars
Dr Gonzalez, Carlos

Research Grants

<table>
<thead>
<tr>
<th>Sponsor/ Grant Name</th>
<th>Chief Investigator [other AMME investigators]</th>
<th>Project Title</th>
<th>Duration</th>
<th>Awarded Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Research Council/Linkage Projects (LP)</td>
<td>Prof Steve Armfield [Dr Michael Kirkpatrick]</td>
<td>Freshing, mixing and purging of riverine saline ponds by freshwater over-flow</td>
<td>Jan 2005- Dec 2009</td>
<td>132,400</td>
</tr>
<tr>
<td>Australian Research Council/Discovery Projects (DP)</td>
<td>Prof Steve Armfield</td>
<td>Stability, transition and heat transfer in thermally coupled natural convection boundary layers</td>
<td>Jan 2006- Dec 2009</td>
<td>570,000</td>
</tr>
<tr>
<td>James Cook University/Shared Research Support</td>
<td>Prof Steve Armfield [Dr Michael Kirkpatrick]</td>
<td>Transport by Natural Convection in Reservoir Sidearms</td>
<td>Jan 2008- Dec 2010</td>
<td>180,000</td>
</tr>
</tbody>
</table>
Thermodynamics and Fluids Research

Fluid Dynamics

2008 Publications

Book Chapters


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


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


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

Doctor of Philosophy

Abolfathi, Peter Puya
Development of an Instrumented and Powered Exoskeleton for the Rehabilitation of the Hand

Bourgault, Frederic
Decentralized control in a Bayesian world

Bryson, Mitchell
A Control-Theoretic Approach to Inertial Slam

Clarke, Elizabeth
Biomechanical and Neuropathological Comparisons of Adult and Infant 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 Decentralized Autonomous Systems

Nagarathinam, Srinarayana
Transient Behaviour of Free and Impinging Fountains

Ong, Lee Ling
Non-Gaussian Representations for Decentralised Bayesian Estimation

Pramanik, Aloke
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 Arbitrary-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, Yiffin
Subbiah Kumar, Vinod
Zhang, Han

Pass
Le, Tue
Ma, Chiming
Zhu, Zhouyang
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
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 Shelton 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 Ueaefa
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
Research Income Awarded in 2008 for Projects Commencing in 2009

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC Grants</td>
<td>$3,240,000</td>
</tr>
<tr>
<td>NHMRC Grants</td>
<td>$856,000</td>
</tr>
<tr>
<td>Other Government Funds</td>
<td>$108,575</td>
</tr>
<tr>
<td>Host Institution Support</td>
<td>$212,650</td>
</tr>
<tr>
<td>Industry/ Private Funds</td>
<td>$58,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$4,475,225</strong></td>
</tr>
</tbody>
</table>

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.

![Research Publications 2002-2008](image)

**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 enrolled Master of Philosophy and PhD students (2000-2008).

Figure 4: PhD and MPhil completions. (2000 – 2008).
For enquiries, contact:

Bronwyn Sexton/ Radhika Challapalli
School of Aerospace, Mechanical and Mechatronic Engineering,
Building J07, Level 4, University of Sydney, NSW 2006, Australia.

P: +61 2 9351 2338
F: +61 2 9351 7060
E: enquiry@aeromech.usyd.edu.au
W: www.aeromech.usyd.edu.au

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