CURRICULUM VITAE

BIOGRAPHICAL INFORMATION

Name:	**XiaoQi Chen**
Sex:	Male
Date of Birth:	10 November 1963
Marital Status:	Married
Address:	47 Dunster Street, Burnside, Christchurch 8053, New Zealand
Organisation:	Department of Mechanical Engineering, University of Canterbury, Christchurch, New Zealand.
Affiliation:	Professor
Position:	Director, Mechatronics Engineering
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I. EDUCATION

10/1986-09/1989: **The University of Liverpool**, UK, Dept. of Electrical Engineering & Electronics.

PhD. Theses work "Sensor-Based Automatic Control System for Narrow Gap TIG Welding", sponsored by Central Electricity Generating Board, and The Welding Institute.

10/1985-10/1986: **Brunel University**, UK, Dept. of Materials Technology,

M.Sc. Course work "Welding and Adhesive Bonding of Engineering Materials", and thesis work "Mathematical Modelling of Submerged Arc Welding"

09/1980-07/1984: **South China University of Technology**, Dept. of Mechanical Engineering,

B.Eng. (HON). Graduated with high distinction; Best Graduate Medallist.

One of ten recipients (nationwide) for China-UK Technical-Cooperation Award for postgraduate studies in UK.

II. RESEARCH AND ACADEMIC EXPERIENCE

Research Interests: mobile and assistive robotics, manufacturing systems and automation, tissue engineering, energy harvesting.

2006-: **The University of Canterbury, Dept of Mechanical Engineering**

Associate Professor (2006-2009), Professor (2010-), Director for Mechatronics Engineering Program

Manage the inter-department Mechatronics Engineering Degree (Honour) Program involving about 15 staff members from the departments of Mechanical Engineering, Electrical and Computer Engineering, and Computer Science. Design and deliver both mechanical engineering and mechatronics courses. Lead mechatronics and robotics research programs.

2002-2006: **Singapore Institute of Manufacturing Technology (SIMTech)**

Senior Scientist, Head of Integrative Equipment Engineering Program

Coordinated and led inter-department research progrmmes in advanced mechatronics and robotics systems. Responsible for research plan, resources and budget. Initiated and led the industry-wide Equipment Consortium, and strategic use-inspired research projects.

2004-2006: **Nanyang Technological University (NTU), Singapore**

Adjunct Associate Professor (Adjunct Appointment).

Supervised postgraduate theses and final year projects. Organised the biennial International Conference on Automation, Robotics and Computer Vision.

1998-2006: **National University of Singapore (NUS)**

Associate Professor (Joint Appointment, 20%), Mechatronics (M.Sc.) Program.

Supervised postgraduate theses, and conducted collaborative research on "In-situ measurement and control in microlithography".

1999-2002: **Singapore Institute of Manufacturing Technology (SIMTech)**

Technical Manager, Automated Material Processing Group

Established the new research group specialising in material processing automation. Built the team of 20 researchers. Responsible for group research plan, staff development, budget, and KPI. Establish industrial and international collaborations.

1997-1999: **Singapore Institute of Manufacturing Technology (SIMTech),** Senior Research Fellow

Initiated and led robotics and manufacturing automation projects. Led a team of 12 researchers in National Aerospace Technology Program. Developed 3D Grinding/Polishing System for aero-engine components overhaul, winning the ***Singapore National Technology Award*** in 1999.

1992-1996: **Singapore Institute of Manufacturing Technology (SIMTech),** Research Fellow

Provided technical leadership in developing flexible manufacturing systems (FMS), and automation solutions, in partnership with IBM (Singapore).

1990-1992: **Brunel University, UK,** Research Fellow

Led the project team to develop an advanced manufacturing system for aero engine D-Fan blades using dry carbon fibre lay-up assembly, sponsored by Dowty Aerospace and SERC.

1989-1990: **Durham University, UK,** Senior Research Assistant,

Designed electrostatic handling device for flexible materials. Developed a robotic system for handling dry carbon fibre composites.

Industry Advisory / Consultancy

2003-2005: **IC Equipment Pte Ltd**, Technical Advisor

Advised the company on technology road mapping, R&D programs in design and manufacturing of electromechanical systems, innovating new production equipment for semiconductor, security, and display.

2004-2005: **Blaze Technology Limited**, Technical Advisor

Advised the company on moving from being a sales agent to a product developer. Identifies the niche products in adhesives, dispensing. systems and instruments. Developed the product development and marketing plan.

1995: **Delphi Automotive Systems (then GM Singapore),** Consultant (secondment)

Supervised a team of 8 engineers to develop a flexible manufacturing system for car audios. Working with the Design, Engineering, Operation and logistics personnel, thoroughly reviewed the existing manufacturing layout and flow, routing, BOM, assembly and test operations, and scheduling. Implemented DFXs, flexible process flow and operation optimisation for high –mix small-batch production.

1994: **Motorola Manufacturing Systems (Asia)**, Software Developer (secondment)

Developed multi-robot control software using V+ for manufacturing of RF power modules

1990: **Dowty Aerospace Ltd**, UK, Engineer (secondment)

Conducted beta test and production trials on a robotic system for automated lay-up assembly of dry carbon fibre.

III. AWARDS AND HONOURS

2011-2014: **Tang Qing Ao Lecture Professor**, Jilin University.

2011-2014: **Guest Professor**, Shanghai Jiaotong University.

2010-2013: **Guest Professor**, University of Science and Technology of China.

2010 **Best Paper Award** for the paper: Shamsudin, S.S., Chen, X.Q., Wang, W.H., Hann, C.E., Chase, J.G., "Neural Networks Based System Identification for an Unmanned Helicopter System", Proceedings of the Fourth Asia International Symposium on Mechatronics (AISM 2010), Singapore, 15-18 Dec. 2010.

2010: **Best Poster Award Finalist** for the paper: Ghanbari, A., Nock, V., Chen, X.Q., Wang, W.H. "Automated Vision Based Force Measurement of Moving C. elegans", The 6th Annual IEEE International Conference on Automation Science and Engineering, Toronto, Ontario, Canada, 21-24 Aug. 2010.

2009: **ION GNSS 2009 Best Presentation Award** in Unmanned and Autonomous Vehicles for the paper: Pinchin, J., Park, D., and **Chen, X.Q.** "GNSS Attitude Determination on a Mini-UAV Aided By a Platform Dynamics Model" (http://www.ion.org/meetings/gnss2009/gnss2009bpa.cfm). This award is given to the best paper presentations in the international conference The 2009 Institute of Navigation GNSS Conference, September 22 - 25, 2009, Savannah, Georgia, USA. The Institute of Navigation (ION) is the world's premier non-profit professional society dedicated to the advancement of the art and science of positioning, navigation and timing (PNT). It is founded in 1945, located in USA.

2009: **Entré Bright Idea Entrepreneurship Award** for the invention "non-contact adhesion for wall climbing robot". Inventor: **Chen, X.Q.** The award is given to the best project with commercial potential. It is sponsored by government agencies including New Zealand Trade & Enterprise, Canterbury Development Corporation, the University of Canterbury, and PricewaterhouseCoopers.

12/08-02/09: **University of Canterbury Erskine Visiting Fellowship**

2008: **Visiting Professorship**, Beijing University of Aeronautics and Astronautics.

2008: **Best Supervisor for Honours Research Projects**, Dept of Mech Engrg, University of Canterbury.

2008: **Best Student Paper Award** for the paper: Wagner, M., **Chen, X.Q**., Wang, W.H., Chase, J.G. (2008) "A novel wall climbing device based on Bernoulli effect" in the Forth IEEE/ASME International Conference on Mechatronic, Embedded Systems, Applications (MESA08), Beijing, China, 12-15 Oct.

2008: **Institute of Navigation (ION) Student Travel Sponsorship** was awarded to Pinchin J. (PhD Student) for the work "Enhanced Integer Bootstrapping for Single Frequency GPS Attitude Determination" by ION GNSS 2008 Meeting, Supervisor: **Chen X.Q.** The award is given to the outstanding paper accepted by the international conference the 2008 Institute of Navigation GNSS Conference. Savannah, Georgia, USA, 16-19 Sep 2008.

2007: **Best Paper Award** for the paper: Chase, J.G., Mulligan, K.J., Mander, J.B., Rodgers, G.W., **Chen, X.Q.** "Re-shaping semi-active structural response via simple applications of embedded computation, sensors, valves", In the Third ASME/IEEE International Conference on Mechatronic, Embedded Systems, Applications, ASME DETC2007, September 4-7, 2007, Las Vegas, Nevada, USA.

2007: **Elected to Senior Member of Institute of Electrical and Electronics Engineers** (IEEE). IEEE is an international professional organization, located in USA. Senior Member is the highest grade for which IEEE members can apply. Less than 10% of IEEE members achieve this level of professional recognition.

2004: **Best Paper Award Finalist** for the paper: Lin, W.J., Ng, T.J., **Chen, X.Q.**, Gong, Z.M., Zhang, J.B. (2004) "Intelligent System for Turbine Blade Overhaul Using Robust Profile Re-Construction Algorithm", the Eighth International Conference on Control, Automation, Robotics, Vision, (ICARCV), China, 6-9 Dec 2004, pp. 178-183.

2002: **Keynote Speaker**, International Conference on Robotic Welding and Intelligent Automation, Shanghai, China.

2002: **Distinguished Speaker** in Omron 21 Technical Seminar – Bringing Industrial Automation into a New Era, 2002, Omron, Singapore.

1999: **Singapore National Technology Award** presented to **Chen X.Q.** (Project Leader), Ge, S.Z., Gong, Z.M, Huang, H., Lim, S.L. for their outstanding contribution in developing the SMART 3D grinding/polishing system.

1997: **Elected to Senior Member of Society of Manufacturing Engineers (SME)**. SME is The Society of Manufacturing Engineers is the world's leading professional society advancing manufacturing knowledge and influencing more than half a million manufacturing practitioners annually. Senior Member is the highest grade for which SME members can apply.

1985-1989: **UK-China Technical Cooperation Award** for postgraduate studies in UK (one of 10 recipients).

1984: **Best Graduate Medallist**, South China University of Technology.

IV. RESEARCH PUBLICATIONS & GRANTS

Peered reviewed research publications are listed in **Appendix-A**, and research grants in **Appendix B**.

V. SUPERVISION OF POSTGRADUATES, HONOURS AND VISITING RESEARCHERS

Universities: UC – University of Canterbury, NUS – National University of Singapore, NTU – Nanyang Technological University

Supervisor: P – Primary supervisor (senior supervisor); C – Co-supervisor

Postgraduates Enrolled

1. Rejina Choi, PhD, UC, P, "Nonlinear Adaptive Control for UAV", 2011-2014.
2. Hamid Asgari, PhD, UC, P, "Modelling and Control of Industrial Power Plant Gas Turbines (IPGTs) Using Artificial Neural Networks (ANNs)", 2011-2014, Premier Scholarship.
3. Sayyed Masoomi, PhD, UC, P, "Fish Robot", 2011-2014.
4. Malcolm Snowdon, PhD., UC, C, "Solid fuel powered rocket with robust recovery", 2010-2013, Capability Funding.
5. Avinash Rao, PhD, UC, C, "Low cost inertial guidance and rocketry control system", 2010-2013, Capability Funding.
6. Prateek Benhal, PhD, UC, C, "Cell Micromanipulation", 2010-2013
7. Edwin Hayes, MEng, UC, P, "UAV for power line inspection", 2010 – 2012, sponsored by Unison.
8. Robert Tang, MEng, UC, P, "Navigation System for Autonomous Vehicular Systems", 2010 – 2011. Funded by FRST and Dynamic Controls Limited.
9. Robert Schattschneider, PhD, UC, C, "Inspection of the Hulls of Ships with an Unmanned Underwater Vehicle", 2009-2012. Funded by UC Doctoral Scholarship.
10. Shazlina Johari, PhD, UC, C, "MEMS for Biosensing and Bio-micromanipulation", 2009-2012. Funded by Malaysia Government Scholarship.
11. Syariful Syafig Shamsudin, PhD, UC, P, "Multi-sensing fusion control of UAV", 2009-2012. Funded by Malaysia Government Scholarship.
12. Yiwei Hu, MEng, UC, P, "Wireless sensor network for wheelchair control", 2009-2011. Funded by FRST and Dynamic Controls Limited.
13. Fanyin Zhuang, MEng, UC, P, "Pneumatic actuated jumping robot", 2009-2011.
14. Michael Lang, MEng, UC, P, "Micro manipulation and micro assembly for tissue Engineering", 2009-2011.
15. Qing Ou, PhD, UC, P, "Energy harvesting for wireless instrumentation", 2009 – 2012. Funded by FRST and Commtest Instrumentation Limited.
16. Mervin Chaderal, PhD., UC, P, "Intelligent Assistive and Rehabilitation Knee Orthotic Device Utilizing Pneumatic Artificial Muscle", 2009 – 2012. Funded by Premier Scholarship.

17. Mostafa Nayyerloo, PhD, UC, P, “Digital image based structural health monitoring”, 2007-2011. Funded by UC Doctoral Scholarship.
18. Ali Ghanbari, PhD, UC, P, “Visual servoed micromanipulation system for cell processing”, 2007-2011. Funded by UC Doctoral Scholarship.

Postgraduates Graduated

1. James Pinchin, PhD, UC, P, “Low-cost GPS based attitude solution using multiple software based receivers and a platform dynamics model”, 2007-2011. Funded by Geospatial Research Centre.
2. Patrick Wolm, M.Eng, UC, P, “Dynamic Stability Control of Front Wheel Drive Wheelchairs Using Solid State Accelerometers and Gyroscopes”, 2007 – 2009. Funded by FRST and Dynamic Controls Limited.
3. Scott Armstrong Green, PhD, UC, C, “Human Robot Collaboration Utilising Augmented Reality”, 2006-2009. Sponsored by HITLab-NZ Ltd.
4. Mat Keir, PhD, UC, C, “A Low-cost Hybrid Tracking System and Integrated Display Unit for Augmented Reality Applications”, 2005-2008.
5. Pey Yuen Tao, PhD, NUS, C, “Mechatronics Control of Flexible Robots”, 2004-2008.
6. Xiaodong Wu, PhD, NUS, C, “In-situ measurement and control of microlithography”, 2004-2007.
7. Han Yan, PhD, NUS, C, “In-situ wafer temperature metrology”, 2004-2007.
8. Hu Ni, PhD, NUS, C, “Warpage Measurement Modelling and Control in the Microlithography Process”, 2004-2007.
9. Ponnusany Sivaraj Povignesh, MSc, NTU, P, “Interactive robot programming environment for micro dispensing”, 2005-2006.
10. Niranjan Manohar, MSc, NTU, P, “Machine vision for dispensing tool calibration and pico-litre volumetric measurement”, 2005-2006.
11. Songlin Bai, MSc, NTU, P, “A quality optical measurement system for shiny jet engineer turbine vanes”, 2002-2003
12. Kai Yang, MEng, NUS, C, “Wafer warpage detection during bake process in photolithography”, 2002-2004.
13. Jiewen Deng, MEng, NUS, C, “Application of iterative feedback tuning”, 2001-2003.
14. Tan Kat Chui, MSc, NUS, P, “Automatic projectile delivery system”, 2000-2001.
15. Ng Bee Wah Ng, MSc, NUS, P, “Vision sensing for hand-eye coordinated system”, 2000-2001.
16. Choon Guan Ng, MSc, NUS, P, “Hand-eye coordinated control and visual servo using an open robotic system”, 2000-2001.
17. Wenxun Qin, MSc, NUS, C, “Web-based building automation”, 2000-2001.
18. Jenny Jieyu Wang, MSc, NTU, C, “Knowledge-based multi-sensory system for weld quality control”, 1999-2001.
19. Maung Maung Chit, MSc, NUS, P, “Real time tracking using DSP-controlled SCARA robot”, 1999-2000.
20. Aung Moe Lwin, MSc, NUS, P, “Mechatronic integration of a PC-controlled SCARA robot”, 1999-2000.
21. Wee Lee Chang, MSc, NTU, P, “Multi-task programming system for industrial robot applications”, 1997-1998.
22. Say Hwee Ng, MSc, NTU, P, “Development of a PC-Based robotics programming editor”, 1996-1998.
23. Qi Zhu, MSc, NUS, C, “Template-based optimal profile fitting and adaptive path planning”, 1996-1998.

24. Dalei Gu, MSc, NUS, C, “Robotic control of 3d freeform grinding”, 1996-1998.
25. Simon Yin, MSc, NTU, P, “Modelling and simulation of Flexible Manufacturing System for precision machining”, 1993-1994.

Supervision of Honours Research Projects

1. Liam Somerville, Tom Davies, Ben Sachdeva, Andrew Taylor, “Tank inspection robot”, 02/2011-10/2011.
2. Aaron Gamble, Bridget Dean, Elijah Phillips, Peter Tan, UC, “Six DOF UAV Test Rig”, 02/2011-10/2011.
3. Kate Blincoe, Ashley Thyne, Lee Wilson, Benjamin Yetton, UC, “Vertical Robot”, sponsored by PowerHouse, 02/2010-10/2010.
4. Andre Verstappen, Matt Signal, Benjamin Gibb and Robin Wareing, UC, “Pipe Thickness and Eccentricity Measurement”, sponsored by Methanex, 02/2009-10/2009.
5. Brad Snadilands, Joshua Wilson, Amanda Peattie, Agnetha Korevaar，UC, “Rehabilitation Skate”, sponsored by Industrial Research Limited, 02/2009-10/2009.
6. Ben Gadsby, UC, “Robotics Modelling and Programming in MS Robotics Studio”, 11/2008-02/2009.
7. Master of Engineering Management 2008 Class, UC, “Specifications and design requirements of Project Kraken”, 02/2008-02/2008.
8. Qing Ou, David Wong, Matt Sinclair and Yong-Jie Li, UC, “UAV Flight Dynamics Modelling”, sponsored by Geospatial Research Centre (NZ) Ltd, 02/2008-10/2008.
9. Sam Nees, Raymond Benjamin, Matt Nagel, Neils de Ruiter, UC, “Augmented virtual reality exercise system for rehabilitation”, sponsored by Industrial Research Limited, 02/2008-10/2008.
10. Anthony Paterson, Ben Burnell, Darren Hewitt, Frasier McKenzie, Harry Rogers, “Autonomous Underwater Vehicle”, 02/2008-10/2008.
11. Qing Ou, UC, “Flight Dynamics Modelling”, sponsored by Geospatial Research Centre (NZ) Ltd, 11/2007-02/2008
12. Chris Hardie, Luke Clarke, Stacey Rendall, Michael Smith, UC, “Multi-sensor guided wheeled robotic system”, 02/2007-10/2007.
13. Mathew Appleman, Lewis Baker, Huankai Kang, Fanyin Zhuang, UC, “Developing a Low-Cost Unmanned Aerial Vehicle”, sponsored by Geospatial Research Centre NZ Ltd, 02/2007-10/2007.
14. Michael Curtis, Jacob Bertsch, Paul de Lange, Simon Lam, UC, “Low-cost 3D printer for desktop manufacturing of bio-scaffolds”, sponsored by HITLab-NZ Ltd, 02/2007-10/2007.
15. Kieran Shaw, Xilinag Huang, Roderick Burgoyne, Charles North, UC, “Developing an experimental autonomous underwater vehicle”, 02/2007-10/2007.

Supervision of Visiting Researchers

1. Wout Hermans, Fontys Hogeschool Techniek & Logistiek Netherlands, “Vibration-based energy harvesting for wireless sensors”, Aug 2011 – Feb 2012.
2. Damien Baranger, ICAM, France, “Design of UAV test structure”, 02/2011-06/2011.
3. Tim Clephas, Eindhoven University of Technology, Netherland, “Optimising and Untethering of a Wall Climbing Robot”, 09/2010-12/2010
4. Stefan Schalk, Eindhoven University of Technology, Netherland, “Model validation for rotorcrafts”, 15 March 2010 - 18 June 2010.
5. Frank Rauer, University of Applied Sciences, “Sensing and control of autonomous underwater vehicle”, 01 March 2010 – 30 August 2010.
6. Alban Promier, Institut Catholique des Arts et Métiers (ICAM) in Toulouse, France, “Interactive biological cell injection simulation”, Feb– Jun 2010.
7. Tim Clephas, Eindhoven University of Technology, Netherland, “Design of untethered non-contact lifting device”, Aug-Dec 2009.

8. Julien Pain, INSA Rouen, France, "Vision based navigation and control of rotorcrafts", Sep 2009 – Jan 2010.
9. Bob Thijssen, Eindhoven University of Technology, Netherland, "System indentification and model reduction in modelling miniature rotorcraft", Sep-Dec 2009.
10. Kai von Szadkowski, University of Applied Sciences Bremen, Germany, "Modelling and analysis of adhesion force in Bernoulli based suction device", Jul-Nov 2009.
11. Anthony Malherbe, ENSIL, Limoges, France, "Hi-speed displacement measurement of seismically excited structures using line-scan cameras", 28 p, project co-supervisor: Prof Joanny Stephant, 2009.
12. Ben Horan, Deakin University, Australian DEST Endeavour Fellowship, "Haptics technology for bio-micormanipulation", Aug 2008 – Jan 2009
13. Johan H.A.M. Vervoort, Eindhoven University of Technology, Netherland, "Modelling and control of an unmanned underwater vehicle", 137 p, November 2008.
14. Richard C. Engelaar, Eindhoven University of Technology, Netherland, "Modeling and control of an autonomous underwater vehicle", 103 p., November 2008.
15. Nikolas Schaal，University in Stuttgart, "Experimental autonomous underwater vehicle", 26 p, 2007.
16. Matthias Wagner, Technical University of Munich, Germany, "Design of a wall climbing robot using Bernoulli's principle to create adhesion force", 77 pages, 2007
17. Julien Dufen, IFMA (French Institute for Advanced Mechanics), Clermont Ferrand, France, "Design of a wall climbing robot using Bernoulli's effect", 26 pages, 2007

VI. THESES EXAM

1. Examiner for Pavan Gamage, PhD Thesis "3D reconstruction of patient-specific bone models for image guided orthopaedic surgery", University of Auckland (2011).
2. Moderator for Kumaran A/L Kadirgama, PhD thesis "High speed milling of Hastelloy C-22HS using coated carbide tools", University Tenaga Nasional (2010).
3. Oral examiner for Jinxin Zhou, PhD Thesis "Study of Drop-on-Demand Inkjet Printing Technology with Application to Organic Light-Emitting Diodes", National University of Singapore (2010).
4. External examiner for Vien Quy Ho, Master thesis "Development of a Remote Tablet Dispenser Mechanism", University of Tasmania, Australia. (2010)
5. Oral Examiner for Yao Yao (Fiona) Zhao, PhD Thesis "An integrated process planning system for machining and inspection", University of Auckland (2010)
6. Oral Examiner for Evan Hirst , PhD Thesis "Acoustic wave and bond rupture based biosensor: Principle and development", Massey University (2010)
7. Internal Examiner for Patrick Wolm, Master thesis "Dynamic Stability Control of Front Wheel Drive Wheelchairs Using Solid State Accelerometers and Gyroscopes", University of Canterbury (2009).
8. Chair of the oral examination for Scott A Green, PhD Thesis, "An Augmented Reality Human-Robot Collaboration System", University of Canterbury (2009).
9. Oral Examiner for Hongqiang Wang, PhD Thesis "New Control Strategy for CNC Machines Via STEP CNC", University of Auckland (2009).
10. External Examiner for Ben Horan, PhD Thesis "Haptic control methodologies for rover teleoperation in non-deterministic environments", Deakin University (2009).
11. External Examiner for Yueheng Wang, PhD Thesis "Thermal Processing in Lithography: Equipment Design, Control and Metrology", National University of Singapore (2008).
12. External Examiner for Lan Wang, PhD Thesis "Thermal sensing and control in wafer processing", National University of Singapore (2008).

13. External Examiner for Timothy J Black, PhD Thesis "Dynamic Mobile Base Station Positioning and Localisation in Sensor Networks", Deakin University (2008).
14. External Examiner for Michael Charles Edmondson, Master of Engineering Thesis "Generic Electric Propulsion Drive", Massey University (2008).
15. Internal Examiner for Mat Keir, PhD Thesis, "A Low-cost Hybrid Tracking System and Integrated Display Unit for Augmented Reality Applications", University of Canterbury (2008)
16. Chair of the oral examination for Richard Brown, PhD Thesis, "Three-dimensional motion capture for the DIET breast cancer imaging system", University of Canterbury (2008).
17. External Examiner for Huangbo Liang, Master of Engineering Thesis "Energy Scavenging Using Piezoelectric Materials", Massey University (2008).
18. Internal Examiner for Toshinori Yuta, PhD Thesis "Minimal Model of Lung Mechanics for Optimal Ventilation Therapy in Critical Care", University of Canterbury (2007).

VII. TEACHING

2006- : **The University of Canterbury**, Mechanical Engrg & Mechatronics Engrg

- Led curriculum development of the Second Year to the Forth Year Mechatronics Educational Program, with the First Year being common engineering.
- Design and lecture three courses: ENMT201 Introduction to Mechatronics Design, ENME443 Computer Control and Instrumentation, ENMT443 Measurement Technology.
- Coordinate two courses: ENMT301 Mechatronics System Design, ENMT322 Operations and Quality Management.
- Advise on the development of course contents and MS Robotics Studio based robotics projects for ENMT463 Robotics.

1998-2006: **National University of Singapore**, Mechatronics (M.Sc.) Program

Adjunct Associate Professor.

Designed and lectured three courses: MCH5002 Applications of Mechatronics, MCH 5206 Instrumentation and Sensors, and MCH5212 Factory Automation.

1993-1994: **Nanyang Technological University**, M.Sc. in Computer Integrated Manufacturing (CIM)

Principal lecturer for G6124 Computer Aided Manufacturing and Automation.

1986-1989: **The University of Liverpool**

Teaching Assistant for digital circuit laboratory, and microprocessor control laboratory.

VIII. UNIVERSITY/INSTITUTE SERVICES AND MANAGERIAL ROLES

1. Director, Mechatronics Engineering Program, University of Canterbury, 2006-Present.
2. Member of Academic Board, University of Canterbury, 2008-2011.
3. Member of Bachelor of Engineering (HONS) Board of Study, College of Engineering, University of Canterbury, 2006-present.
4. Member of Department Management Team, Dept of Mechanical Engineering, University of Canterbury, 2006-present.

5. Member of Department Industry Committee, Dept of Mechanical Engineering, University of Canterbury, 2007-Present.
6. Member of Department Research Committee, Dept of Mechanical Engineering, University of Canterbury, 2007-Present.
7. Member of Selection Committee, Genesis Energy Engineering Scholarship, 2008.
8. Member of Search Committee for Position in Manufacturing and Mechatronics, Dept of Mechanical Engineering, University of Canterbury, 2009.
9. Member of Search Committee for Position in Operation Management, Dept of Mechanical Engineering, University of Canterbury, 2008.
10. Member of Search Committee for Dynamics and Vibration Position, Dept of Mechanical Engineering, University of Canterbury, 2008.
11. Member of Department Promotion Committee, Dept of Mechanical Engineering, University of Canterbury, 2007.
12. Member of Search Committee for Head of Department, Dept of Mechanical Engineering, University of Canterbury, 2007.
13. Member of Search Committee for Senior Mechatronics Technician, Mechatronics Engineering Program, University of Canterbury, 2007.
14. Member of Search Committee for Position in Mechatronics, Dept of Mechanical Engineering, University of Canterbury, 2007.
15. Co-Facilitator, Operation and Technology Roadmapping, Agency for Science Technology and Research (A*STAR), Singapore, 2002-2006.
16. Chair, Equipment Technology Consortium consisting of 11 companies and 3 research institutes, 2002-2006.
17. Member of Management Committee, Singapore Institute of Manufacturing Technology, Strategising research direction, streamlining operations, re-structuring the organization, and implementing SOP, 2002-2004.
18. Advisor to Resource Utilisation Taskforce, Singapore Institute of Manufacturing Technology, implementing measures to improve resource utilization and operational efficiency, 2002-2006.
19. Member of Quality Taskforce, Singapore Institute of Manufacturing Technology, defining the Leadership dimension in the corporate drive towards Singapore Quality Class, 2002-2006.
20. Member of Selection Committee for National Science Scholarship, Agency for Science Technology and Research, Singapore, 2002.

IX. EDITORIAL BOARDS & REVIEWER

1. Associate Editor, IEEE Transactions on Industrial Electronics
2. Associate Editor, IEEE Transactions on Automation Science and Engineering
3. Associate Editor, Control and Intelligent Systems
4. Member of Editorial Consultants Board, International Journal of Advanced Robotic Systems
5. Associate Editor, 2012 IEEE International Conference on Robotics and Automation (ICRA2012)
6. Associate Editor, 2011 IEEE International Conference on Intelligent and Robotic System (IROS2011)
7. Associate Editor, 2011 IEEE International Conference on Automation Science and Engineering (CASE2011).
8. Associate Editor, 2011 IEEE International Conference on Robotics and Automation (ICRA2011)

9. Associate Editor, 2009 IEEE International Conference on Advanced Intelligent Mechatronics (AIM2009)
10. Associate Editor, Manufacturing Systems, IEEE-CASE2008
11. Associate Editor, Manufacturing Systems, IEEE-CASE2007
12. Reviewer, ASME/IEEE Transactions on Mechatronics
13. Reviewer, IEEE Transactions on Robotics and Automation
14. Reviewer, International Journal of Advanced Manufacturing Technology
15. Reviewer, IEEE Systems Journal
16. Reviewer, International Journal of CAD/CAM
17. Reviewer, Journal of Mechatronics
18. Reviewer, Automation in Construction

X. MEMBERSHIP ON STANDARDS AND COMMITTEES

1. External Examiner for the Bachelor of Engineering (B Eng) of Product Design Engineering program, Universiti Malaysia Perlis, Malaysia (2010 – present)
2. Reviewer of Research Proposal, Research Council for Natural Sciences and Engineering, Academy of Finland, May 2010.
3. Founder and President, New Zealand-China Science and Technology Society, 2009 - present .
4. Founder and Chair, IEEE Robotics and Automation Society (RAS) New Zealand Chapter, 2008 - 2009.
5. Member, Robotics and Mechatronics Network of New Zealand.
6. Member, IFAC Control Education Committee TC9.4.
7. Senior Member, Institute of Electrical and Electronics Engineers (IEEE, USA).
8. Senior Member, Society of Manufacturing Engineers (SME, USA).
9. Senior Member, IEEE Instrumentation and Measurement Society.
10. Senior Member, IEEE Robotics and Automation Society.
11. Member, American Society of Mechanical Engineers (ASME).
12. Member, Engineers Australia.
13. Member, Australian Association for Engineering Education (AaeE).
14. Secretary, ASME/IEEE Mechatronics and Embedded Systems and Applications Committee (2007- 2008).
15. Member, IEEE RAS Technical Committee on Robot Learning
16. Vice Chair, Society of Manufacturing Engineers Singapore Chapter (2004-2006).
17. Chair, A*STAR Equipment Development Working Group (2002-2004).
18. Industry Automation Consultant certified by Singapore Industry Automation Association (SIAA).
19. Council Member, Singapore Industrial Automation Association (SIAA) (2002 – 2004).

XI. CONFERENCE ORGANISATION

1. Program Committee Member of 2011 ACRA Australasian Conference on Robotics and Automation (ACRA 2011), Monash University, Melbourne, Australia, 7-9 December 2011.

2. Program Co-Chair, 2011 International Conference on Fluid Power and Mechatronics August 17-20, 2011, Beijing, China.
3. Program Committee Member of 2010 ACRA Australasian Conference on Robotics and Automation (ACRA 2010), Queensland University of Technology, Brisbane, Australia, 1-3 December 2010.
4. Member of Technical Program Committee, 4th Asia International Symposium on Mechatronics, 15-18 Dec. 2010, Singapore
5. Track Chair, The 11th International Conference on Control, Automation, Robotics and Vision, ICARCV 2010, Singapore, 7-10 December 2010.
6. Member of International Advisory Committee, International Conference on Robotic Welding, Intelligence and Automation (RWIA'2010), 14-16 Oct. 2010, Shanghai, China.
7. Regional Chair, the Eighth IEEE Conference on Control and Automation (ICCA2010), June 9 – 11, 2010, Xiamen, China.
8. General Co-Chair, the Seventh IEEE Conference on Control and Automation (ICCA2009), 9-11 Dec 2009, the University of Canterbury, Christchurch, New Zealand.
9. Member of Program Committee, 2009 Australasian Conference on Robotics and Automation (ACRA'09), 2-4 December 2009, Sydney, Australia
10. Member of International Program Committee, 2009 24th International Conference Image and Vision Computing New Zealand (IVCNZ 2009).
11. Exhibition and Sponsoring Chair, The 8th Annual IEEE Conference on Sensors, 25-28 October 2009, Christchurch Convention Centre, Christchurch, New Zealand.
12. Symposium Co-Char, 2009 IEEE/ASME International Conference on Mechatronics and Embedded Systems and Applications, 30 Aug-2 Sep, 2009, San Diego Convention Center, USA.
13. Member of Technical Program Committee, The 4th International Conference on Autonomous Robots and Agents (ICARA 2009), 10-12 February 2009, Wellington, New Zealand.
14. Member of Organising Committee, Organised Sessions Chair, The 2009 IEEE/ASME International Conference on Advanced Intelligent Mechatronics, Singapore, July 14-17, 2009.
15. Member of International Program Committee for International Conference for Control, Automation, Robotics and Vision 2008, Hanoi, Vietnam, 17-20 Dec. 2008.
16. Member of International Program Committee, The fifteenth annual Conference on Mechatronics and Machine Vision in Practice (M2VIP 2008), Auckland, New Zealand, December 2 - 4, 2008.
17. Member of International Program Committee, 2008 23rd International Conference Image and Vision Computing New Zealand, Lincoln University, Christchurch, 26-28 November 2008 (IVCNZ 2008).
18. Program Co-Char, 2008 IEEE/ASME International Conference on Mechatronics and Embedded Systems and Applications, Beijing, China, October 12-15, 2008.
19. Member of International Program Committee, 2008 IEEE International Conference on Systems, Man, and Cybernetics (SMC2008), Singapore, 12-15 October 2008.
20. Program Committee member, 2008 IEEE Conference on Automation Science and Engineering (IEEE-CASE08), 23-26 August 2008, Washington DC, USA.
21. Organiser and Chair of Highlight Session "Mechatronics Education", and Special Session "Latest Development in Mobile Machines", IFAC World Congress 2008, Seoul, Korea, 6-11 July 2008.
22. Member of International Program Committee, Mechatronics 2008, University of Limerick, Ireland, June 23 - 25 2008.
23. Member of International Program Committee, The 2008 IEEE International Conferences on Robotics, Automation & Mechatronics (RAM 2008), 3 - 6 June 2008, Chengdu, China.
24. Program Committee member, 2007 IEEE Conference on Automation Science and Engineering (IEEE-CASE07), 22-25 September 2007, Scottsdale, Arizona, USA.

25. Symposium organiser, Manufacturing Systems, The Third ASME/IEEE International Conference on Mechatronic and Embedded Systems and Applications, ISBN 0-7918-3806-4, September 4-7, 2007, Las Vegas, Nevada, USA.
26. Member of International Program Committee, IFAC Workshop on Advanced Process Control for Semiconductor Manufacturing, December 4 - 5, 2006, Singapore.
27. Member of International Advisory Panel, International Conference on Robotic Welding and Intelligent Automation 2006 (RWIA'2006), Shanghai, China, 8 -11 Dec. 2006.
28. Member of International Program Committee, International Conference for Control, Automation, Robotics and Vision 2006, Singapore, 5-8 Dec. 2006.
29. Member of International Program Committee, IFAC symposium on semiconductor manufacturing, Singapore, 4-5 Dec 2006.
30. Member of International Program Committee for 4th International IEEE Conference on Industrial Informatics (INDIN'06), Singapore, 16-18 August, 2006.
31. Chair of invited session "Intelligent Automation for Complex Processes", International Conference for Control, Automation, Robotics and Vision 2004, China, 6-9 December 2004.
32. Member of International Program Committee for International Conference for Control, Automation, Robotics and Vision 2004, China, 6-9 December 2004.
33. Chair, "Industry Forum - The Way Forward for Singapore's Equipment Manufacturers", Singapore, 20 Oct 2004.
34. Chair, "Equipment Technology 21 (ET21) Industry Forum – Emerging Technologies and Trends", Singapore, 18 March 2004.
35. Member of International Advisory Panel for International Conference on Robotic Welding and Intelligent Automation, Shanghai, China, 9 -12 Dec 2002.
36. Exhibit Co-Chair for Asian Control Conference 2002 (ASCC'2002), Singapore, 25-27 September 2002.
37. Judge for Singapore Robotics Games, 2002.
38. Session Chair "Advanced Robotics for Material Processing" for Asian Robotics Conference 2001, Singapore, 6-8 June 2001.
39. Chair of invited session "Intelligent Robotic Welding", The Fifth International Conference on Control, Automation, Robotics and Vision, Singapore, 9-11 December 1998.

XII. INVITED SEMINARS AND LECTURES

1. **Chen, X.Q.** (2011) "Haptics-Assisted Cell Manipulation and Micro-Tissue Seeded Bio-Scaffolding", National University of Singapore, Singapore, 03 Jan 2011. Host: Prof Yoke San WANG.
2. **Chen, X.Q.** (2010), "Future Challenges in Mechatronics R&D", 4th Asia International Symposium on Mechatronics, 15-18 December 2010, National University of Singapore, Singapore. (***International Panel Session Speaker***).
3. **Chen, X.Q.** (2010), "Intelligent Autonomous Robotic Systems and Welding Automation – A New Zealand Perspective" for International Conference on Robotic Welding and Intelligent Automation, Shanghai, China, 14-16 December. (***Keynote Address***).
4. **Chen, X.Q.** (2010) "Rocket Science, Bio, Walking and Climbing Machines - A New Zealand Perspective", National University of Singapore, Singapore, 14 Dec 2010. Host: Prof Yoke San WANG.
5. **Chen, X.Q.** (2010) "Use-Inspired Mechatronics and Robotics Research in New Zealand", Hong Kong University, Hong Kong, 30 Nov 2010. Host: Prof James LAM.

6. **Chen, X.Q.** (2010) "Manufacturing Robotisation and Automation – Opportunities and Challenges", Hong Kong Polytechnic University, Hong Kong, 29 Nov 2010. Host: Prof Mingwang FU.
7. **Chen, X.Q.** (2010) "MEMS, Smart Structures and Applications", Beijing University of Aeronautics and Astronautics, Beijing, China, 24 Nov 2010. Host: Prof Lin LI.
8. **Chen, X.Q.** (2010) "Vision-Guided Haptics-Assisted Control in Cell Injection and Micromanipulation", Beijing University of Aeronautics and Astronautics, Beijing, China, 16 Nov 2010. Host: Prof Jianqing MAO.
9. **Chen, X.Q.** (2010) "Research into Micro Device and Assistive Robotics for Biomedical Applications", Institute of Electronics, Chinese Academy of Sciences, Beijing, China, 12 Nov 2010. Host: Dr. Shanhong XIA.
10. **Chen, X.Q.** (2010) "Research into Autonomous Robotic Systems: Opportunities and Challenges", Institute of Automation, Chinese Academy of Sciences, Beijing, China, 11 Nov 2010. Host: Prof De XU.
11. **Chen, X.Q.** (2010) "Forward-Looking Mechatronics Education and Industry-Driven Research – An Experience from the University of Canterbury", Beijing University of Post and Telecommunication, Beijing, China, 11 Nov 2010. Host: Prof Qingxuan JIA.
12. **Chen, X.Q.** (2010) "Embedding Design and Research into Engineering Education". Hebei University of Science and Technology, Shijiazhuang, China, 5 November 2010. Host: Prof. Huiping ZHANG
13. **Chen, X.Q.** (2010) "Industry-Driven Mechatronics Research – A New Zealand Perspective", Beijing University of Aeronautics and Astronautics, Beijing, China, 03 Nov 2010. Host: Prof Zongxia JIAO.
14. **Chen, X.Q.** (2010) "Advancing Mechatronics Technologies to Automate Complex Manufacturing Processes", Dalian Institute of Technology, Dalian, China, 29 Oct 2010. Host: Prof Ming CONG
15. **Chen, X.Q.** (2010) "Robotics and Automation Research in New Zealand", Shenyang Institute of Automation, Shengyang, China, 26 Oct 2010.
16. **Chen, X.Q.** (2010) "Automating Complex Manufacturing Processes under Dynamical Conditions", Northeast University, Shenyang, China, 25 Oct 2010. Host: Prof Tianyou CAI.
17. **Chen, X.Q.** (2010) "Industry-Driven Mechatronics Research – A New Zealand Perspective", Jilin University, Changchun, China, 22 Oct 2010. Host: Prof Yujing SUN.
18. **Chen, X.Q.** (2010) "The Current State and Future of Robotics Research in New Zealand", The Robotics Institute, Harbin Institute of Technology, Harbin, China, 19 Oct 2010.
19. **Chen, X.Q.** (2010) "Automating Dynamical Manufacturing and Welding Processes", The State Key Laboratory of Welding, Harbin Institute of Technology, Harbin, China, 19 Oct 2010. Host: Prof. Tie GANG.
20. **Chen, X.Q.** (2010) "Industry-Driven Mechatronics Research – A New Zealand Perspective", Dept of Precision Machinery and Instrumentation , University of Science and Technology of China, Hefei, China, 11 Oct 2010. Host: Prof. Wenhao HUANG.
21. **Chen, X.Q.** (2010) "Research into Autonomous Systems for Resource Monitoring", Fire Engineering Centre, University of Science and Technology of China, Hefei, China, 09 Oct 2010. Host: Prof. Weiguo SONG
22. **Chen, X.Q.** (2010) "Autonomous Robotics Research – From Factory to Natural Environment", Southeast University, Nanjing, China, 29 Sep 2010. Host: Prof Xinsong WANG.
23. **Chen, X.Q.** (2010) "Bio-Mechatronics Research: Fusion of Electromechanical Systems with Bioengineering", Nanjing University of Science and Technology, Nanjing, China, 27 Sep 2010, Host: Prof Chongkai SUN, Prof Yuming Bo.
24. **Chen, X.Q.** (2010) "Research into Intelligent Mechatronic Systems for Autonomous Operations", Zhengzhou University, Zhengzhou, China, 26 Sep 2010. Host: Vice President, Prof. Hongliang WU.

25. **Chen, X.Q.** (2010) "Latest Research and Development in Microrobotics and Micromanipulation for Precision Engineering", Henan Polytechnic University, Zhengzhou, China, 25 Sep 2010. Host: Weidong SUN.
26. **Chen, X.Q.** (2010) "Opportunities and Challenges in Mobile Robotics Research", South China University of Technology, Guangzhou, China, 21 Sep 2010. Host: Prof Zhengdong SUN.
27. **Chen, X.Q.** (2010) "Automating Complex Manufacturing Processes under Dynamical Conditions", Chongqing University, Chongqing, China, 16 Sep 2010. Host: Prof Fei LIU.
28. **Chen, X.Q.** (2010), "Robotics Frontier – it is not just about entertainment", Okeover U3A (University of the Third Age), Christchurch, New Zealand, 16 Jul 2010. Host: Prof Emeritus Bevan Clarke.
29. **Chen, X.Q.** (2009), "Precision Microassembly and Micromanipulation for Biomedical Applications", Department of Mechanical Engineering, the University of Auckland, 31 Jul 2009. Host: Prof. Xun Xu.
30. **Chen, X.Q.** (2009), "Robotic Servants – Are they mature enough to serve humans?" University of Canterbury Discovery Day, 23 April 2009. Host: College of Engineering.
31. **Chen, X.Q.** (2009) "Multi-Disciplinary Engineering and Fire Engineering Research at the University of Canterbury", Fire Engineering Centre, University of Science and Technology of China, Hefei, China, 8 Jan 2009.
32. **Chen, X.Q.** (2009) "State-of-Art and Future of Mobile Robots", Dept of Automation, University of Science and Technology of China, Hefei, China, 6 Jan 2009.
33. **Chen, X.Q.** (2009) "Develop Precision Machines and Instruments for Manufacturing and Biomedical Applications", Dept of Precision Machinery and Instrumentation, University of Science and Technology of China, Hefei, China, 5 Jan 2009.
34. **Chen, X.Q.** (2008) "Mobile Robots for Missions in Dynamical Natural environments", Tianjin University, Tianjin, China, 25 Dec.
35. **Chen, X.Q.** (2008) "Micro/Nano Manipulation for Precision Manufacturing and Bioengineering Applications", Nankai University, Tianjin, China, 25 Dec.
36. **Chen, X.Q.** (2008) "Scientific Paper Writing", Beijing University of Astronautics and Aeronautics, Beijing, China, 22 Dec.
37. **Chen, X.Q.** (2008) "Mobile Robotics – Can It Emulate The Impact of PC?" Wuhan University of Technology, Wuhan, China, 15 Dec.
38. **Chen, X.Q.** (2008) "Microrobotics for Biomanipulation", Biomedical Imaging Research Centre, Huazhong University of Science and Technology, Wuhan, China, 15 Dec.
39. **Chen, X.Q.** (2008) "Intelligent Manufacturing Automation - Opportunities, Trends and Challenges", Digital Manufacturing Laboratory, Huazhong University of Science and Technology, Wuhan, China, 12 Dec.
40. **Chen, X.Q.** (2008) "Advancing Mechatronics Technologies for Bio-Instrumentation and Control", Zhejiang University, Hangzhou, China, 10 Dec.
41. **Chen, X.Q.** (2008) "Mobile Robots for Demanding Industrial Applications", Shanghai Jiao Tong University, 8 Dec.
42. **Chen, X.Q.** (2008) "An Overview of Mechatronics and Robotics Research at the University of Canterbury", Ruakura Research Centre, Hamilton, 01 Dec.
43. **Chen, X.Q.** (2008), "Interdisciplinary Collaborative Mechatronics and Robotics Research at University of Canterbury", Beijing University of Astronautics and Aeronautics, Beijing, China, 13 Oct.
44. **Chen, X.Q.** (2008), "Two Years of Mobile Robotics Research at University of Canterbury", University of Canterbury, Christchurch, New Zealand, 9 Oct.

45. **Chen, X.Q.** (2008), "Learning and Experimenting Control Methods through Integrative Mechatronics Design Projects", The 17th IFAC World Congress, Seoul, Korea, Jul 10. ***(Invited Plenary Talk).***
46. **Chen, X.Q.** (2007), "Mobile Robots & Applications in Knowledge-Based Economy", Robotics and Mechatronics Research Forum, Victoria University, Wellington, New Zealand, 14 November.
47. **Chen, X.Q.** (2007), "Harmonisation of Robotics and Mechatronics courses", NZ Mechatronics & Robotics Network Meeting, the University of Auckland, Auckland, NZ, 30 October.
48. **Chen, X.Q.** (2007), "Robots in Society", Rotary Club, Avonhead, Christchurch, New Zealand, 6 August.
49. **Chen, X.Q.** (2007), "Project-based mechatronics curriculum development at University of Canterbury", NZ Mechatronics & Robotics Network Meeting, Victoria University, Wellington, New Zealand, 29 June.
50. **Chen, X.Q.** (2007), "Robot Invasion", University of Canterbury Discovery Day, 23 April 2007.
51. **Chen, X.Q.** (2006), "Frontiers of Industry-Driven Mechatronics Research", the University of Canterbury, New Zealand, 09 June.
52. **Chen, X.Q.** (2006), "Robotisation of Complex Manufacturing Processes", Shanghai Jiaotong University, Shanghai, China, 01 June.
53. **Chen, X.Q.** (2006), "Latest Developments in Industry-Driven Mechatronics and Automation Research", University of Science & Technology of China, Hefei, China, 24 May.
54. **Chen, X.Q.** (2006), "R&D in Integrated and Intelligent Mechatronic Applications', Asian Institute of Technology, Bangkok, Thailand, 13 March.
55. **Chen, X.Q.** (2004), "Forging Ahead through Equipment Consortium", Industry Forum - The Way Forward for Singapore's Equipment Manufacturers, Sheraton Towers, Singapore, 20 October.
56. **Chen, X.Q.** (2004), "Gain a Competitive Edge through Multiplying Synergies", Equipment Technology 21 (ET21) Industry Forum - Emerging Technologies and Trends in Precision Equipment Design and Manufacturing, Organised by Science and Engineering Research Council of Agency for Science Technology and Research (A*STAR), Traders Hotel, Singapore, 18 March. (***Keynote Address***).
57. **Chen, X.Q.** (2002), "Advancing Automation Techniques for Highly Skilled Welding Applications–A Singapore Perspective" for International Conference on Robotic Welding and Intelligent Automation, Shanghai, China, 9-12 December. (***Keynote Address***).
58. **Chen, X.Q.** (2002), "SMART 3D Grinding & Polishing System", Shanghai Jiao Tong University, 9 December.
59. **Chen, X.Q.** (2002), "Open Network Manufacturing Automation", the University of Science and Technology of China, Hefei, China, 2 December.
60. **Chen, X.Q.** (2002), "Rapidly Deployable Manufacturing Automation", Omron 21 Technical Seminar – Bringing Industrial Automation into a New Era, Singapore, 8 November. (***Keynote Address***).
61. **Chen, X.Q.** (2002), "Sensor-Fused Adaptive Material Processing", the University of Newcastle, 24 October.
62. **Chen, X.Q.** (2002), "Towards Intelligent Industrial Automation", the University of Science and Technology of China, Hefei, China, 12 April.
63. **Chen, X.Q.** (2001), "Advanced robotics for material processing automation – Reality and Future", National University of Singapore, 29 October.
64. **Chen, X.Q.** (2001), "On-line CAM and real-time sensing for intelligent machining", Singapore Institute of Manufacturing Technology – Georgia Institute of Technology Joint Seminar, Singapore, 27 September.

APPENDIX-A LIST OF PUBLICATIONS

Patents

1. Woodfield, T.B.F., Lang, M., Wang, W.H., **Chen, X.Q.** (2010) "System and method for 3D tissue assembly", New Zealand Provisional Patent, Number: NZ587478, filed 20/08/2010
2. **Chen, X.Q.** (2009) "Non-contact lifting and locomotion device", Number: PCT/NZ2009/000218, filed 9/10/2009.
3. King, M., Nees, S., Nagel, M., Ruiter, N.D., Benjamin, R., **Chen, X.Q.** (2008) "Arm Exercise System", New Zealand Provisional Patent, Number: NZ573334, filed 2/12/2008.
4. **Chen, X.Q.** (2008) "Wall climbing robot", New Zealand Provisional Patent, Number: NZ571914, filed 10/10/08.
5. Lin, W.J., Ng, T.J., **Chen, X.Q.**, Gong, Z.M. (2008) "Method of Determining Shape Data", US Patent No. 7,433,799 B2 granted on 07 Oct. 2008. http://www.patentstorm.us/patents/7433799/description.html
6. Lin, W.J., **Chen, X.Q.**, Gong, Z.M., "System for Surface Finishing a Workpiece", US Patent Application No. 10/758,949, Publication No.: US-2005-0159840-A1, Publication Date: 21 July 2005. http://www.simtech.a-star.edu.sg/Research/patents/US25159840A1.pdf

Edited Books

7. **Chen, X.Q.,** Chen Y.Q., Chase, J.G. (2009), *Mobile Robots - State of the Art in Land, Sea, Air, Collaborative Missions*, ISBN 978-953-307-001-8, I-Tech Education and Publishing, Vienna, Austria, 336 pages, May 2009. http://sciyo.com/books/show/title/mobile-robots-state-of-the-art-in-land-sea-air-and-collaborative-missions
8. **Chen, X.Q.**, Devanathan, R. & Fong, A.M. (2002), *Advanced Automation Techniques in Adaptive Material Processing*, ISBN 981-02-4902-0, World Scientific, Singapore, 302 pages, 2002.

Peer Reviewed Book Chapters

9. Chandrapal, M., Chen, X.Q., Wang, W.H. (2011) "Intelligent Assistive Knee Exoskeleton", *Mechatronics*, Editor: J. Paulo Davim, ISBN: 9781848213081, Wiley. 43 pages. http://www.iste.co.uk/index.php?f=x&ACTION=View&id=395
10. **Chen, X.Q.**, Chen, Y.Q., Chase, J.G. (2009) "Mobiles Robots – Past, Present, Future", *Mobile Robots - State of the Art in Land, Sea, Air, Collaborative Missions*, Editors: Chen, X.Q., Chen Y.Q., Chase, J.G., ISBN 978-953-307-001-8, I-Tech Education and Publishing, Vienna, Austria, pp.1-32.
11. Chen, W.H., **Chen, X.Q.**, Liu, J.M., Zhang, J.B. (2009) "Multi-Sensing, Smooth Motion Control in Bionic Cockroach Robots", *Mobile Robots - State of the Art in Land, Sea, Air, Collaborative Missions*, Editors: Chen, X.Q., Chen Y.Q., Chase, J.G., ISBN 978-953-307-001-8, I-Tech Education and Publishing, Vienna, Austria, pp.85-104.
12. Wang, W.H., Engelaar, R.C., **Chen, X.Q.**, Chase, J.G. (2009) "The State-of-Art of Underwater Vehicles – Theories, Applications" *Mobile Robots - State of the Art in Land, Sea, Air, Collaborative Missions*, Editors: Chen, X.Q., ISBN 978-953-307-001-8, I-Tech Education and Publishing, Vienna, Austria, pp.129-152.
13. **Chen, X.Q.**, Ou, Q., Wong, D. R., Li, Y. J., Sinclair, M., Marburg A. (2009) "A Generic Flight Dynamics Model for Unmanned Aerial Vehicles", *Mobile Robots - State of the Art in Land, Sea, Air, Collaborative Missions,* Editors: Chen, X.Q., Chen Y.Q., Chase, J.G., ISBN 978-953-307-001-8, I-Tech Education and Publishing, Vienna, Austria, pp.177-202.
14. Green, S.A., Chase, J.G., **Chen, X.Q.**, Billinghurst, M. (2009) "The Augmented Reality Human-Robot Collaboration (AR-HRC) System", *Mobile Robots - State of the Art in Land, Sea, Air,*

Collaborative Missions, Editors: Chen, X.Q., Chen Y.Q., Chase, J.G., ISBN 978-953-307-001-8, I-Tech Education and Publishing, Vienna, Austria, pp.245-275.

15. Nayyerloo, M., **Chen, X.Q.**, Wang, W.H., Chase, J.G. (2009) "Cable-Climbing Robots for Power Line Inspection", *Mobile Robots - State of the Art in Land, Sea, Air, Collaborative Missions*, Editors: Chen, X.Q**.**, Chen Y.Q., Chase, J.G., ISBN 978-953-307-001-8, I-Tech Education and Publishing, Vienna, Austria, pp.63-84.
16. **Chen, X.Q.**, Luo, H., Lin, W.J. (2007), "Integrated Weld Quality Control System Based on Laser Strobe Vision", *Robotic Welding, Intelligence, Automation*, Series: Lecture Notes in Control, Information Sciences, Vol. 362, Editors: T.J. Tarn, C. Zhou, S.B. Chen, ISBN 978-3-540-73373-, Springer-Verlag, Heidelberg, pp.257-266, Sept 2007.
17. Green, S.A., Billinghurst, M., **Chen, X.Q.**, Chase, J.G. (2007), "Augmented Reality for Human-Robot Collaboration" in *Human-Robot Interaction*, Editor: Nilanjan Sarkar, ISBN 978-3-902613-13-4, I-Tech Education, Publishing, Vienna, Austria, pp.65-94 (**Invited**).
18. Zha, X.F., **Chen, X.Q.** (2006), "Path Coordination Planning, Control in Robotic Material Handling, Processing" in *Industrial Robotics: Programming, Simulation, Applications*, Editor: Kin Huat Low, ISBN 3-86611-286-6, Pro Literatur Verlag, Germany / ARS, Austria, pp. 231 – 254, Dec 2006 (**Invited**).
19. Luo, H., **Chen, X.Q.** (2004), "Laser Vision Sensing, Process Control in Robotic Arc Welding of Titanium Alloys", *Robotic Welding, Intelligence, Automation*, Editors: T.J. Tarn, C. Zhou, S.B. Chen, ISBN: 3-540-20804-6, Springer-Verlag Heidelberg, Lecture Notes in Control, Information Sciences, pp. 110 – 122, May 2002 (**Invited**).
20. Fong, A.M., **Chen, X.Q.**, Li, H.Z. (2002), "Overview of Material Processing Automation" in *Advanced Automation Techniques in Adaptive Material Processing*, Eds: Chen, X.Q., Devanathan, R. & Fong, A.M., ISBN 981-02-4902-0, World Scientific, Singapore, pp. 1-18
21. **Chen, X.Q.**, Gong, Z.M., Huang, H., Ge, S.S.., Zhou, L.B. (2002), "Process Development, Approach for 3D Profile Grinding, Polishing" in *Advanced Automation Techniques in Adaptive Material Processing*, Eds: Chen, X.Q., Devanathan, R. & Fong, A.M., ISBN 981-02-4902-0, World Scientific, Singapore, pp. 19-54.
22. **Chen, X.Q.**, Gong, Z.M., Huang, H., Ge, S.S.., Zhou, L.B. (2002), "Adaptive Robotic System for 3D Profile Grinding, Polishing" in *Advanced Automation Techniques in Adaptive Material Processing*, Eds: Chen, X.Q., Devanathan, R. & Fong, A.M., ISBN 981-02-4902-0, World Scientific, Singapore, pp. 55-90.
23. Zeng, H., **Chen, X.Q.** (2002), "Acoustic Emission Sensing, Signal Processing for Machining Monitoring, Control" in *Advanced Automation Techniques in Adaptive Material Processing*, Eds: Chen, X.Q., Devanathan, R. & Fong, A.M., ISBN 981-02-4902-0, World Scientific, Singapore, pp. 91-124.
24. Devanathan, R., **Chen, X.Q.** (2002), "Techniques for Weld Seam Tracking" in *Advanced Automation Techniques in Adaptive Material Processing*, Eds: Chen, X.Q., Devanathan, R. & Fong, A.M., ISBN 981-02-4902-0, World Scientific, Singapore, pp.125-166.

Refereed Journal Papers

25. Ou, Q., **Chen, X.Q.**, Gutschmidt, G., Wood, A., Leigh, N., and Arrieta, A.F. "An Experimentally Validated Double-mass Piezoelectric Cantilever Model for Broadband Vibration-based Energy Harvesting", the Journal of Intelligent Material Systems and Structures (Accepted 10/2011).
26. Nayyerloo, M., Chase, J.G., MacRae, G., **Chen, X.Q.** "Seismic Structural Displacement Measurement using a Line-scan Camera: Camera Calibration and Experimental Validation Journal of Civil Structural Health Monitoring", Journal of Civil Structural Health Monitoring. (Accepted 08/2011).
27. Hann, C.E., Snowdon, M. Rao, A., Winn, O., Wongvanich, N., **Chen, X.Q.** "Minimal Modelling Approach to Describe Turbulent Rocket Roll Dynamics in a Vertical Wind Tunnel", Proceedings

of the Institution of Mechanical Engineers, Part G, Journal of Aerospace Engineering. (Accepted 09/2011).

28. Nayyerloo, M., Chase, J.G., MacRae, G., **Chen, X.Q.** (2011) "LMS-based approach to structural health monitoring of nonlinear hysteretic structures", Structural Health Monitoring, 10(4), pp. 429-444, doi: 10.1177/1475921710379519.
29. Hann, C.E., Hewett D., Chase J.G., Rabczuk, T., Sundaresan, A., **Chen, X.Q.**, Wang, W.H, Shaw, G. (2010) "Image-based measurement of alveoli volume expansion in an animal model of a diseased lung", International Journal of Computer Applications in Technology, Volume 39, Number 1-3, pp. 58 – 65, ISSN: 0952-8091.
30. Wolm, P, Chase, J.G., **Chen, X.Q.**, Pettigrew, W. (2010) "Analysis of a PM DC Motor Model for Application in Feedback Design for Electric Powered Mobility Vehicles," Int. J. Computer Applications in Technology, Vol. 39, Nos. 1/2/3, 2010, pp. 116-122, ISSN: 0952-8091.
31. Nayyerloo, M, Chase, JG, MacRae, G, Chen, XQ and Hann, CE (2010). "Structural Health Monitoring using Adaptive LMS Filters," International Journal of Computer Applications in Technology (IJCAT), Vol. 39, Nos 1/2/3, pp. 130-136, ISSN: 0952-8091 (**invited**).
32. Ghanbari, A, Nock, V, Wang, W, Blaikie, R, Chase, J.G., **Chen, X.Q.**, Hann, C.E. (2010) "Force Pattern Characterization of C. elegans in Motion," International Journal of Computer Applications in Technology (IJCAT), Vol. 39, Nos. 1/2/3, 2010 , pp.137-144, ISSN: 0952-8091 (**Invited**).
33. Buksh, S.R., **Chen, X.Q**., Wang, W.H. (2010) "Study of Flea Jumping Mechanism for Biomimetic Robot Design", Journal of Biomechanical Science and Engineering, Special Issue on 4th Asian Pacific Conference on Biomechanics, Vol. 5 No.1, pp 41-52.
34. Tay, A., Ho, W.K., Wu, X.D., **Chen, X.Q.** (2010) "In-situ monitoring of photoresist thickness uniformity of a rotating wafer in lithography", IEEE Transactions on Instrumentation and Measurement, Vol. 58, No. 12, pp. 3978-3984.
35. Green, S.A., Chase, J.G., **Chen, X.Q.**, Billinghurst, M. (2010) "Evaluating the Augmented Reality Human-Robot Collaboration System," International Journal of Intelligent Systems Technologies, Applications (IJISTA), ISSN: 1740-8865, Vol. 8, Nos. 1-4, pp. 130-143 (**Invited**).
36. Ruiter, N.D., Nees, S., Benjamin, R., Nagel, N., **Chen, X.Q.**, King, M. (2010) "A Variable Resistance Virtual Exercise Platform for Physiotherapy Rehabilitation", International Journal of Intelligent Systems Technologies, Applications (IJISTA), ISSN: 1740-8865, Vol. 8, Nos. 1-4, pp. 261-275 (**Invited**).
37. **Chen, X.Q.**, Li, H.Z. (2009) "Development of a Tool Wear Observer Model for On-Line Tool Condition Monitoring and Control in Machining Nickel-Based Alloys", International Journal of Advanced Manufacturing Technologies. ISBN 0268-3768 (Print) 1433-3015 (Online), DOI 10.1007/s00170-009-2003-1, Vol. 45, No. 7-8, pp. 786-800.
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APPENDIX-B LIST OF RESEARCH GRANTS

MSI - Ministry of Science and Innovation
FRST – Foundation for Research, Science and Technology, New Zealand
TechNZ – Technology New Zealand (FRST's business investment programme).

1. **Innovative Harvest Solutions** (2010 to 2016)

   Funding: NZD6,520,000, Primary Growth Partnership Program, Ministry of Agriculture and Forestry

   Role: Team Leader for "Tele-operated robotic system for steep country forest harvesting".

   Develop a cost-effective innovation solution to steep country forest harvesting, and realise the substantial opportunity of establishing forests on New Zealand's marginal land, most of which is on slopes over 20 degrees.

2. **Pruning Robot** (2011 to 2015)

   Funding: NZD4,000,000. MSI

   Role: Team Leader for "Vision Guided Re-configurable Pruning Robot".

   Develop a mobile robotic system for vine pruning. It can be re-configured to adapt to dynamical natural environment and pruning tasks.

3. **UAV for Electricity Distribution Network Condition Assessment** (01/07/2010 to 08/12/2011)

   Funding: NZD66,000. FRST TechNZ Capability Funding, Unison Networks Limited. Contract Number: TP040912

   Role: PI and Senior Supervisor

   Develop an unpiloted aerial vehicle for fault detection and monitoring of electricity distribution network. Achieve autonomous operation through learning reinforcement and intelligent control.

4. **Navigation System** (2010 to 2011)

   Funding: NZD81,000. FRST TechNZ Capability Funding, Dynamic Controls Limited, Contract No. DCLX0901

   Role: PI and Senior Supervisor

   Develop sensor fusion path planning and navigation system for Autonomous Vehicular Systems.

5. **Non Contact Adhesion Pads for Robotics Applications** (03/2010 to 03/2011)

   Funding: NZD361,000. PreSeed Accelerator Fund (PSAF) by FRST, co-funded by Powerhouse Ventures

   Role: PI

   The project looks into two opportunities, both of which will be further developed during the course of this PSAF project. The first of these relates to industrial robots, where the end-effector is used in "pick-and-place" applications. The second opportunity is in mobile robots, which have the capability to move around in their environment and are not fixed to one physical location.

6. **Bernoulli Gripper** (12/2009 to 03/2010)

   Funding: NZD17,440 in grant, Bright Ideas funding, Enterprise South Island

   Role: PI

   The project investigates the commercial applications of non-contact adhesion and lifting technology.

7. **Investigation of possible market applications for non contact suction cups** (09/2009 to 10/2009)

   Funding: NZD2,000 in grant, Bright Ideas Award

Role: PI

The project was awarded after winning Bright Ideas workshop, co-sponsored by Powerhouse Ventures. It explores Explore industrial applications for the patented non-contact adhesion method, particularly operations on vertical planes.

8. **Energy Harvesting for Wireless Instrumentation** (2009 to 2012)

   Funding: NZD160,000 in grant, Commtest Instruments Limited, Contract number: CILX0801

   Role: Principal Investigator

   Research and investigate methods to convert machine vibration to electrical energy, model mechanical solution for efficient conversion of vibration energy to electrical energy, and develop a prototype energy harvesting system which can power a vibration monitoring instrument.

9. **Wireless Sensor Network for Wheelchair Control** (2009 to 2010)

   Funding: NZD75,000. FRST, Dynamic Controls Limited (DCL)

   Role: Principal Investigator

   Develop wireless sensor network architecture, and create development platform and testbed for next generation wheelchair.

10. **Operational Research Grant (Proj N0. 45200 : XXXX : 452RCGRNT : YYXC : 1) (2009)**

    Funding: NZD5,000. College of Engineering, University of Canterbury

    Role: Principal Investigator

11. **Wearable artificial muscle for assistance and resistance** (2009-2012)

    Funding: NZD67,500 in grant. Premier Scholarship.

    Role: Principal Investigator

    Study and develop novel actuation and control methods for wearable and compact artificial muscle device. The device can serve either as assistance to patients as well as resistance for rehabilitation and physiotherapy.

12. **Variable Resistance Virtual Reality Exercise System for Rehabilitation** (2009)

    Funding: NZD8,000. Industrial Research Limited.

    Role: Principal Investigator

    The main focus of this project is to design an adaptive resistance system for the arm skate. The adaptive resistance will allow computer controlled adaptation of the level of resistance, dependant on the user's ability.

13. **Key Technology Research on Motion Smoothness of Bionic Cockroach Robots based on Multi-Sensor Information Fusion** (2008 to 2011)

    Collaborator: Beijing University of Aeronautics and Astronautics

    Funding: NZD65,000. National Science Foundation of China

    Role: Co-Principal Investigator

    Develop multi-sensing system including tactile and vision, location, and non-linear adaptive controller, and a distributed multi-CAN bus-mastering system based on Field Programmable Gate Array (FPGA) and Advanced RISC Machine (ARM) microprocessor

14. **Biomimetic Robotics Research** (11/2008 – 02/2009)

    Funding: NZD30,000, Erskine Fellowship, University of Canterbury

    Role: Principal Investigator

    Collaborate with top engineering schools in exploring collaborative research in biomechanics, sensing and navigation for biologically inspired robots.

15. **Operational Research on Motion Smoothness (2008)**

    Funding: NZD5,000 in grant. College of Engineering, University of Canterbury

Role: Principal Investigator

Study adaptive control algorithms for motion smoothness control for legged robots and walking machines. Form international collaborative research program.

16. **Augmented and Virtual Reality Exercise System for Rehabilitation (2008)**

Funding: NZD8,000. Industrial Research Limited.

Role: Principal Investigator

Develop a very economical commercial system would use a commercial game platform to provide a user interface to the computer. This is coupled with a beneficial therapy to provide motivation for the patient to carry out the exercise.

17. **Visual Servoing & Precision Motion Control for Bio-micromanipulation (11/2007 – 11/2011)**

Funding: NZD98,000 in grant. Premier Scholarship and University Doctorial Scholarship

Role: Principal Investigator

This project is to develop new methods and techniques for automation of bio-micromanipulation. The ultimate goal is to develop a fully autonomous micro-robotic system for biological cell injection with fast and precise and high rate of injection.

18. **Vision-based structural health monitoring (11/2007 – 11/2011)**

Funding: NZD98,000 in grant. Premier Scholarship and University Doctorial Scholarship

Role: Principal Investigator

The research project focuses on the determination of structure's level of damage through a non-linear model-based method utilizing a Bouc-Wen hysteretic model. It employs adaptive LMS filtering theory to identify changes in stiffness due to modelling error damage, as well as critical parameter to determine ongoing safety and use of the structure, permanent displacement.

19. **Development of low-cost UAV for environmental monitoring (01/2007 – 01/2010)**

Funding: NZD90,000. Geospatial Research Centre.

Role: Principal Investigator

Develop a plug and play position and orientation solution potentially including GPS, INS and imagery to geo-reference, in real time, a suite of environmental monitoring sensors and enable the generation of 3D features /orthophotos / terrain models etc.

20. **Dynamic Stability Control of Front Wheel Drive Wheelchairs Using Solid State Accelerometers and Gyroscopes (01/2007 – 07/2009)**

Funding: NZD50,000 in grant (TPV:100,000). Dynamic Controls Limited, FRST

Role: Principal Investigator

Develop a reliable wireless control for an existing front wheel drive wheelchair test-bed which contains solid state sensors, for experimental and validation purposes. Validate an existing model of a front wheel drive wheelchair and expand the model as necessary. Utilise the model to design a dynamic feedback control using the test-bed to validate the controller design.

21. **Real-time Monitoring and Control of Critical Dimension Uniformity in Microlithography (01/2007 – 01/2010)**

Collaborator: National University of Singapore

Funding: SGD577,990 in grant (TPV: S$1,201,990). A*STAR SERC Public Sector Funding

Role: Co-Principal Investigator

22. **Open-architecture precision positioner**

Funding: NZD36,000 in grant. University Research Grant

Duration: 2007

Role: Principal Investigator

Develop a precise positioning system for industrial inspection and high-speed precision motion.

23. Robotic micromanipulator with dSpace advanced control (2007)

Funding: NZD50,000 in grant. University Research Grant

Role: Principal Investigator

Design and system integration of PC-based controller for micro assembly and cell injection.

24. In-situ measurement and control in microlithography process (04/2004 – 01/2007)

Collaborators: National University of Singapore

Funding: SGD744,990 in grant (TPV: S$1,836,980). Public Sector Funding by Agency for Science, Technology and Applied Research (A*STAR) Science and Engineering Research Council (SERC)

Role: Co-Principal Investigator

An in-situ photoresist thickness monitoring system which integrates a single spectrometer to measure the photoresist thickness contour on the wafer during the spin-coating step or the edge-bead removal step.

25. Intelligent 3D micro dispensing system (06/2005 – 10/2006)

Funding: SGD250,000 in grant (TPV: SGD750,000). Epoxy and Equipment Technology Pte Ltd, International Enterprise (IE) Singapore

Role: Principal Investigator

The project involves the development of high-throughput precision dispensing equipment for electronics manufacturing applications including solder paste, underfill, encapsulation, etc. The technology developed is also applicable for bio-engineering applications such as drug delivery and tissue engineering.

26. Mechanised edge profiling (MEP) for aero engine components (Mar. 2006 – May 2006**)**

Funding: SGD20,000 in grant. Rolls-Royce Plc, UK

Role: Principal Investigator

This is the Phase 1 of Rolls-Royce new research programme to develop mechanized edge profiling technology for its new generation aircraft engines. Lead a team of six researchers to conduct technology benchmarking and assessment. Identify the opportunities in robotics, manufacturing processes and measurement technologies to automate the labour-intensive manual operation. Assist Rolls-Royce in establishing the feasibility and Manufacturing Capability Readiness Level to introduce MEP into the manufacturing of T1000 engines. This project also led to the next phase "Feasibility study of tooling and process for precision mechanical edge profiling" contracted at the value of SGD90,000.

27. Integrated Twyman/Green interferometry system for hermiticity and warpage measurement (12/2004-04/2005)

Funding: SGD60,000 in grant. Hewlett Packard Singapore (Pte) Ltd

Role: Principal Investigator

Develop the optical design, mechanical design, and fringe image process software, and integrate the entire system for the process development in HP. The system processes Newtonian rings and laser interference pattern with reference beam to obtain static and dynamic warpage of components in a vacuum chamber. HP has successfully deployed the system to conduct process study for its new product development.

28. Development of an Integrated Bake/Chill System for Microlithography (07/2002-06/2005)

Collaborator: National University of Singapore

Funding: SGD884,400. Singapore Institute of Manufacturing Technology, Chartered Semiconductors.

Role: Co-Principal Investigator

Model the thermal process in baking wafers for microlithography. Develop precision thermal sensing and integrated real-time control of uniform temperature profile for large wafers.

29. Intelligent Adaptive Precision Finishing System for Processing Super Alloys (06/2001-06/2003)

Collaborator: Nanyang Technological University, Georgia Institute of Technology

Funding: SGD320,000 in grant (TPV: SGD1,200,000). Agency for Science, Technology and Applied Research (A*STAR), Singapore; Beijing Machinery and Electricity Institute

Role: Principal Investigator

The Singapore-China Joint Research Programme aims to achieve precision finishing in spite of machine dynamics, tool wear, and workpiece variations. Acoustic emission (AE) signals were analysed with time-frequency domain and Wavelet methods. Develop an embedded Tool Condition Monitoring (eTCM) system to detect tool breakage, chatter, and tool wear using multi-channel sensory data fusion including accelerometer and acoustic emission sensor.

30. Smart embedded controller (03/2002-01/2003)

Funding: SGD200,000 in grant (TPV: SGD400,000). Tata Consultancy Services, Economic Development Board

Role: Team Leader

Set up the development platform and software development for the next-generation industrial controller for high-end control applications. Implement device interface and industrial applications.

31. Robotic welding of large boxed titanium structure (02/2000-11/2000)

Funding: SGD150,000 in grant. Ordnance Development & Engineering Company of Singapore

Role: Principal Investigator

Address process automation problems associated welding of large Titanium structure, such as dynamic thermal distortions, real-time seam tracking, and optimal process control. Conduct technology evaluation, conceptual design and system design.

32. Automated chemical bottle packaging system (01/1998-03/2000)

Funding: SGD210,000 in grant (TPV: SGD450,000). Fuji Hunt Photochemical Pte Ltd

Role: Principal Investigator

Design and implement a flexible packaging line consisting of two dual-arm robotic Bottle Handling Cells to handle more than 180 layouts and more than ten different kinds of chemical bottles. Optimise the system layout, throughput and line balancing.

33. Knowledge-based multi-sensory weld quality control (11/1996-03/2000)

Funding: SGD750,000. National Science and Technology Board

Role: Principal Investigator

Develop seam tracking techniques, neural network pattern recognition, and knowledge-based system for real-time weld quality control.

34. Automated 3d grinding and polishing system for HPT vanes (04/1996-09/1999)

Collaborator: National University of Singapore

Funding: SGD1,200,000. Economic Development Board, Turbine Overhaul Services Pte Ltd

Role: Principal Investigator

As part of the Singapore National Aerospace Programme, develop the adaptive robotic system integrating an industrial finishing robot, in-situ gauging, on-line robot path planner, and knowledge-based supervisory controller. Innovate a novel concept “Soft Contact Damping Passive

Force Control". Lead the team to the success in developing the first-of-its-kind working system in the world, winning Singapore ***National Technology Award*** in 1999.

35. Integrated inspection & laser drilling system for HPT vanes (07/1996-11/1998)

Funding: SGD1,500,000. General Electric Asia Service Operation, Economic Development Board

Role: Co-Principal Investigator

Develop a vision-guided laser drilling system to re-drill the blocked cooling holes on distorted High-Pressure Turbine (HTP) vanes. The vision system provides the positional guidance to the 5-axis CNC machine to drill through Inconel materials.

36. Manufacturing process automation for hard metal deposition (11/1996-04/1997)

Funding: SGD180,000 in grant. Read Tool Singapore Pte Ltd

Role: Team leader

Developed precision machining process for machine drilling bits, a laser-guided robotic system for hard metal deposition on the edge of a drilling bit, and an optical measurement method to measure the diameter of blind holes.

37. Sensor-guided robotic welding system for understructure (04/1995-03/1996)

Funding: SGD2,800,000. Singapore Technologies Automotive

Role: Team Leader

Lead the team in system conceptualization, simulation, prototyping validation, drafting tender documents, evaluation of tenders, supervision of system construction and commissioning. The sophisticated mechatronic system has multiple sensors for seam tracking in a constrained working space, and adaptive process control. It has been deployed to manufacture Infantry Fighting Vehicle (IFV) BIONIX for Singapore Arm Force.

38. Design and development of an integrated shop floor control system (01/1993-06/1994)

Funding: SGD800,000. IBM Singapore Pte Ltd, NSTB

Role: Team Leader

Lead the team in design of modular fixturing and tooling, and automated fixturing assembly and disassembly, and CNC programs. Develop a computer-integrated flexible manufacturing system for machining precision mechanical parts. Integrate the Automatic Storage and Retrieval System (ASRS), robotic fixturing station, machining centre, Coordinate Measurement Machine (CMM), and Automatic Guided Vehicle (AGV).