

Time	Sir Neil Waters Foyer	SNW100	SNW200	SNW300
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## Monday, November 20

06:00 am- 08:00 pm ER: Evening drinks reception

## Tuesday, November 21

08:45 am- 09:00 am				WE: Welcome to M2VIP2017
09:00 am- 10:00 am				Key1: Industry 4.0 and Automation
10:00 am- 10:30 am	MT1: Morning Tea			
10:30 am- 12:00 pm		S1B: Artificial and computational intelligence	S1C: Localization for mechatronic and robotic systems	S1A: Manipulative, mobile, walking, flying robots
12:00 pm- 01:00 pm	L1: Lunch			
01:00 pm- 03:00 pm		S2B: Special Session: Autonomous cars and electric car technologies	S2C: Special session: Additive manufacturing of composite materials	S2A: Special Session on Soft Robotics
03:00 pm- 03:30 pm	AT1: Afternoon Tea			
03:30 pm- 05:00 pm		S3B: Machine vision, image processing and pattern recognition	S3C: Vision and sensing Systems	S3A: IEEE RAS Chapter Meeting

## Wednesday, November 22

09:00 am- 10:00 am				Key2: Additive Manufacturing: A Reality Check
10:00 am- 10:30 am	MT2: Morning Tea			
10:30 am- 12:00 pm		S4B: Signals and Systems in Mechatronics	S4C: Mechatronics In Medicine 1	S4A: Control systems and automation 1
12:00 pm- 01:00 pm	L2: Lunch			
01:00 pm- 03:00 pm		S5B: Sensors	S5C: Mechatronics In Medicine 2	S5A: Control systems and automation 2
03:00 pm- 03:30 pm	AT2: Afternoon Tea			
03:30 pm- 05:00 pm		S6B: Machine Learning	S6C: Robotics 1	S6A: Grippers and actuators
07:30 pm- 09:00 pm	CD: Conference Dinner			

## Thursday, November 23

09:00 am- 10:00 am Key3: Resilient Robots: Concept and Technology

10:30 am-  
12:00 pm

01:00 pm-  
03:00 pm

**S7B:** Mechatronics applications  
1

**S8B:** Mechatronics applications  
2

**S7C:** Manipulators and  
Inspection

**S8C:** Mechatronics systems

**S7A:** Robotics 2

**S8A:** 3D Manufacturing  
Techniques

**Monday, November 20**

**Monday, November 20, 06:00 - 20:00**

**ER: Evening drinks reception**

Room: Sir Neil Waters Foyer

Join us for some refreshments on the eve on the conference.

**Tuesday, November 21**

**Tuesday, November 21, 08:45 - 09:00**

**WE: Welcome to M2VIP2017**

**Dr Fakhrol Alam general Chair M2VIP2017**

Room: SNW300

**Tuesday, November 21, 09:00 - 10:00**

**Key1: Industry 4.0 and Automation**

**Prof Alexander W. Verl**

Room: SNW300

Chair: Xiangyang Zhu (Shanghai Jiao Tong University, P.R. China)

Biography. Alexander W. Verl was born in Frunse, USSR in 1966 and moved back to Germany with his German parents in 1976. He received the Dipl.Ing. degree in Electrical Engineering from Friedrich-Alexander-University Erlangen Nürnberg in 1991 and the Dr.Ing. degree in Control Engineering at the Institute of Robotics and Mechatronics (DLR), Oberpfaffenhofen, Germany in 1997 and was appointed Full Professor (Univ.Prof. W3) at University of Stuttgart, Germany in 2005. He is currently Full Professor and Head of the Institute for Control Engineering of Machine Tools and Manufacturing Units (ISW) at the University of Stuttgart. 1997 - 2005 he was Founder and Managing Director of AMATEC Robotics GmbH (part of KUKA Roboter GmbH since 2005). Prof. Verl was awarded the Diesel Gold Medal from the German Institute of Inventions (D.I.E) in 2014, the Julius von Haast Fellowship Award by the Royal Society of New Zealand in 2012, the Honorary doctoral degree (Dr. h.c.) of the Technical University of Cluj Napoca, Romania in 2012, the Honorary Professor of the University of Auckland, New Zealand in 2012, the Invention & Entrepreneurship Award (IERA Award) of the IEEE Robotics and Automation Society (IEEE RAS), the International Federation of Robotics (IFR) in 2010, and the Honorary doctoral degree (Dr. h.c.) of the "Politehnica" University of Timisoara, Romania in 2009.

**Tuesday, November 21, 10:00 - 10:30**

**MT1: Morning Tea**

Room: Sir Neil Waters Foyer

**Tuesday, November 21, 10:30 - 12:00**

**S1A: Manipulative, mobile, walking, flying robots**

Room: SNW300

Chair: David I Wilson (Auckland University of Technology, New Zealand)

**S1A.1 10:30 Platform Design and Three-dimensional Underwater Experiment of Robotic Tuna Swimming**

Dan Xia and Yi Zhao (Southeast University, P.R. China); Po Dai (Harbin Institute of Technology, P.R. China)

**S1A.2 10:52 A humanoid kicking robot**

Rory Flemmer and Claire Flemmer (Massey University, New Zealand)

**S1A.3 11:15 *Automatic Weight Selection for Mixed Sensitivity Optimization Control of a Quadrotor***

Joseph Thomas (Auckland University of Technology, New Zealand); Jonathan Currie (AUT University, New Zealand); David I Wilson (Auckland University of Technology, New Zealand)

**S1A.4 11:37 *Design and Fabrication of a Soft-bodied Gripper with Integrated Curvature Sensors***

Mingzhu Zhu, Wang Zhongkui, Sadao Kawamura and Shinichi Hirai (Ritsumeikan University, Japan)

**S1B: Artificial and computational intelligence**

Room: SNW100

Chair: Mark Beckerleg (Auckland University of Technology, New Zealand)

**S1B.1 10:30 *Towards a Decentralised Mobile Robot Learning System for Indoor Environments***

Nicol Naidoo (University of KwaZulu-Natal, South Africa); Glen Bright (UKZN, South Africa); Riaan Stopforth (University of KwaZulu - Natal, South Africa)

**S1B.2 10:52 *ANN based noise filtering and position estimation for inertial navigation systems***

Wuxin Yang and Loulin Huang (Auckland University of Technology, New Zealand)

**S1B.3 11:15 *Multi-task Learning From Demonstration Via Embedded Network***

Rong Zhou, Yiming Guo, He Fuyun and Zhisheng Zhang (Southeast University, P.R. China)

**S1B.4 11:37 *Learning to Chase a Ball Efficiently and Smoothly for a Wheeled Robot***

Yaoyao Wei, Tianlin Liu, Yian Deng, Xihong Wu and Dingsheng Luo (Peking University, P.R. China)

**S1C: Localization for mechatronic and robotic systems**

Room: SNW200

Chair: Loulin Huang (Auckland University of Technology, New Zealand)

**S1C.1 10:30 *The Effects of Interference On The RSSI Values Of A ZigBee Based Indoor Localization System***

Daniel Konings, Nathaniel Faulkner, Fakhrul Alam and Frazer K. Noble (Massey University, New Zealand); Edmund Lai (Auckland University of Technology, New Zealand)

**S1C.2 10:52 *Analysis of sensor arrangements to localize mobile robots with one laser lighthouse***

Antonius Paijens and Loulin Huang (Auckland University of Technology, New Zealand); Ahmed Al-Jumaily (The Auckland University of Technology, New Zealand)

**S1C.3 11:15 *Development of an Autonomous Robotic System for Terrain Mapping***

Matthew Young, XiaoQi Chen and Christopher Pretty (University of Canterbury, New Zealand); Stuart Ralston and Mathias Roehring (Trimble Navigation New Zealand Ltd, New Zealand)

**S1C.4 11:37 *Floor Surface Mapping using Mobile Robot and 2D Laser Scanner***

Scott Wilson, Johan Potgieter and Khalid M Arif (Massey University, New Zealand)

**Tuesday, November 21, 12:00 - 13:00**

**L1: Lunch**

Room: Sir Neil Waters Foyer

**Tuesday, November 21, 13:00 - 15:00**

**S2A: Special Session on Soft Robotics**

Room: SNW300

Chair: Peter Xu (The University of Auckland, New Zealand)

**S2A.1 1:00 A Cloud-based Control Architecture Design for the Interaction of Industrial Robots with Soft Objects**

Christoph Hinze (University of Stuttgart, Germany); Peter Xu (The University of Auckland, New Zealand); Armin Lechler (University of Stuttgart, Germany); Alexander Verl (Stuttgart University, Institute for Control Engineering of Machine Tools, Germany)

**S2A.2 1:24 Roadmap for In-Vitro Investigation of Interaction Between Food and Teeth**

Naser Mostashiri and Jaspreet Dhupia (The University of Auckland, New Zealand); Alexander Verl (Stuttgart University, Institute for Control Engineering of Machine Tools, Germany); Peter Xu (The University of Auckland, New Zealand)

**S2A.3 1:48 Concept for a Simulation-based Approach Towards Automated Handling of Deformable Objects - A Bin Picking Scenario**

Markus Wnuk and Andreas Pott (University of Stuttgart, Germany); Peter Xu (The University of Auckland, New Zealand); Armin Lechler (University of Stuttgart, Germany); Alexander Verl (Stuttgart University, Institute for Control Engineering of Machine Tools, Germany)

**S2A.4 2:12 Requirements for a cloud-based Control System interacting with Soft Bodies**

David Tomzik and Xun Xu (University of Auckland, New Zealand)

**S2A.5 2:36 Escape Behaviour for the Task-Level Control of a Soft Robot**

Martin Stommel (Auckland University of Technology, New Zealand); Zhicong Deng and Peter Xu (The University of Auckland, New Zealand)

**S2B: Special Session: Autonomous cars and electric car technologies**

Room: SNW100

Chair: Ziming (Tom) Qi (Auckland Institute of Smart Technology, New Zealand)

**S2B.1 1:00 Suspension Design for Single- passenger Electric Vehicles**

Ziming (Tom) Qi (Auckland Institute of Smart Technology, New Zealand); Yu Liang (Otago Polytechnic, New Zealand)

**S2B.2 1:30 The Potential LTO Battery Products Applications for New Zealand Electric Buses**

Ning Ding, Krishnamachar Prasad and Tek Tjing Lie (Auckland University of Technology, New Zealand)

**S2B.3 2:00 Simulation Research on Rear Active Steering-Based 4WIS Electric Vehicle Steering Control**

Zhurong Dong, Songhua Hu and Xiaochun Zhu (Shenzhen Polytechnic, P.R. China); Ziming (Tom) Qi (Auckland Institute of Smart Technology, New Zealand); Zhanyu Li (Shenzhen Polytechnic, P.R. China)

**S2B.4 2:30 Simulation-assisted run-to-run control for battery manufacturing in a cloud environment**

Karl Kübler (University of Stuttgart, Germany); Michael Oberle (Fraunhofer Institute for Manufacturing Engineering and Automation, Germany); Alexander Verl (Stuttgart University, Institute for Control Engineering of Machine Tools, Germany); Oliver H. Riedel (University of Stuttgart, Germany)

**S2C: Special session: Additive manufacturing of composite materials**

Room: SNW200

Chair: Xiaowen Yuan (Massey University, New Zealand)

**S2C.1 1:00 Analysing the Tensile Properties of 3D Printed Fibre Reinforced Thermoplastic Composite Specimens**

Andrew Kvalsvig, Xiaowen Yuan and Johan Potgieter (Massey University, New Zealand); Peng Cao (Auckland University, New Zealand)

**S2C.2 1:24 The effects of electrospinning collection surface modification on nylon 6-6 placement**

Juan Schutte, Johan Potgieter, Steven Dirven and Xiaowen Yuan (Massey University, New Zealand)

**S2C.3 1:48 *The opportunity of Electrospinning as a form of Additive Manufacturing in Biotechnology***

Juan Schutte, Xiaowen Yuan and Steven Dirven (Massey University, New Zealand)

**S2C.4 2:12 *3D Printed Carbon Fibre Composite Knee and Hip Replacements***

Bradford Milne, Xiaowen Yuan and Andrew Kvalsvig (Massey University, New Zealand); Peng Cao (Auckland University, New Zealand)

**S2C.5 2:36 *Opportunities and challenges for large scale 3D printing of complex parts***

Kevin Silver, Johan Potgieter, Khalid M Arif and Richard Archer (Massey University, New Zealand)

**Tuesday, November 21, 15:00 - 15:30**

**AT1: Afternoon Tea**

Room: Sir Neil Waters Foyer

**Tuesday, November 21, 15:30 - 17:00**

**S3A: IEEE RAS Chapter Meeting**

Room: SNW300

Chair: Peter Xu (The University of Auckland, New Zealand)

**S3B: Machine vision, image processing and pattern recognition**

Room: SNW100

Chair: Martin Stommel (Auckland University of Technology, New Zealand)

**S3B.1 3:30 *A comparison and analysis of RGB-D cameras' depth performance for robotics application***

Changjuan Jing, Johan Potgieter, Frazer K. Noble and Ruili Wang (Massey University, New Zealand)

**S3B.2 3:52 *An Approach for Fault Monitoring of Insulators Based on Image Tracking***

Li-jun Lv (Tongji University, P.R. China); Shui-qing Li (CHINT Electric Co., Ltd., P.R. China); Heng Wang and Lijun Jin (Tongji University, P.R. China)

**S3B.3 4:15 *A Level Set Based Real-time Object Recognition Algorithm for Air Target***

Jijun Ren and Liu Weihua (Xi'an University of Post & Telecommunications, P.R. China)

**S3B.4 4:37 *Adaptive Stereo Vision System using Portable Low-cost 3D Mini Camera Lens***

Minh Nguyen (Auckland University of Technology & Auckland University of Technology, New Zealand); Huy Le, Huy Tran and Wai Yeap (Auckland University of Technology, New Zealand)

**S3C: Vision and sensing Systems**

Room: SNW200

Chair: Steven Dirven (Massey University, New Zealand)

**S3C.1 3:30 *Multi-Channel Visual Reality System Based on Computer Cluster***

Lihong Luo, Jianqing Mo and Heng Chen (Guangdong University of Technology, P.R. China)

**S3C.2 3:52 *Applying Convolutional Neural Networks for Pre-detection of Alzheimer's Disease from Structural MRI data***

Nishan Gunawardena (University of Colombo School of Computing & Millennium Information Technologies, Sri Lanka); Roshan Rajapakse (University of Colombo School of Computing, Sri Lanka); Nihal Kodikara (UCSC, University of Colombo, Sri Lanka)

**S3C.3 4:15 *Computer Vision for Automatic Accurate Plasma Arc Cutting Measurement***

Mathew Flemmer (School of Engineering and Advanced Technology & Massey University, New Zealand); Liqiong Tang (Massey University, New Zealand)

**S3C.4 4:37 Soil Property Spatial & Temporal Variability Sensing for Precision Agriculture**

George Chisholm, Jerome Leveneur, John Futter and John Kennedy (GNS Science, New Zealand)

**Wednesday, November 22**

**Wednesday, November 22, 09:00 - 10:00**

**Key2: Additive Manufacturing: A Reality Check**

**Prof Olaf Diegal**

Room: SNW300

Chair: Xiangyang Zhu (Shanghai Jiao Tong University, P.R. China)

Additive manufacturing comprises a range of incredible technologies that have revolutionized the way we design and bring new products to market, and have become an entirely new catalyst for innovation. Over the last 10 years, it has become a hot-topic that has received an inordinate amount of media coverage and hype. This presentation examines some of this hype and attempts to redress some of the myths that have grown from it in a positive way by looking at real industrial application examples, including some from the world of robotics and mechatronics, which demonstrates the true advantages that additive manufacturing offer if used in the most appropriate way.

Biography: Professor Olaf Diegal is Professor of Product Development, Lund University, Sweden. He is both an educator and a practitioner of product development with an excellent track record of developing innovative solutions to engineering problems. In his role as professor of product development, in the department of design sciences of the faculty of engineering at Lund University, in Sweden, he is heavily involved in all aspects of product development and is widely published in the areas of additive manufacturing and rapid product development. In his consulting practice he develops a wide range of products for companies around the world. Over the past three decades he has developed over 100 commercialized new products including innovative new theatre lighting products, security and marine products and several home health monitoring products and, for this work, has received numerous product development awards. Over the last 20 years, Olaf has become a passionate follower of 3D printing (additive manufacturing). He believes it is one of the technologies that has been a real godsend to innovation as it allows designers and inventors to instantly test out ideas to see if they work. It also removes the traditional manufacturing constraints that have become a barrier to creativity, and allows us to get real products to market without the normally high costs that can become a barrier to innovation. In 2012, Olaf started manufacturing a range of 3D printed guitars and basses that has developed into a successful little side-business (and gives Olaf the therapy he needs in allowing him to make things that are a blend of high-technology and traditional hand-crafting).

**Wednesday, November 22, 10:00 - 10:30**

**MT2: Morning Tea**

Room: Sir Neil Waters Foyer

**Wednesday, November 22, 10:30 - 12:00**

**S4A: Control systems and automation 1**

Room: SNW300

Chair: Loulin Huang (Auckland University of Technology, New Zealand)

**S4A.1 10:30 Position and Torque Sensorless Motion Transmission for Haptic Teleoperation Using Two Types of Voltage Compensation**

Shuhei Akutsu, Hiromu Sekiguchi, Takahiro Nozaki and Toshiyuki Murakami (Keio University, Japan)

**S4A.2 10:52 A System Control Strategy of a Conflict-free Multi-AGV Routing based on Improved A\* Algorithm**

Fang Jia, Chenglong Ren and Zhixiang Xu (Southeast University, P.R. China)

**S4A.3 11:15 Semi-Autonomous Robot Control System and with 3D Vision Scheme for Search and Rescue Missions**

Nicol Naidoo (University of KwaZulu-Natal, South Africa); Glen Bright (UKZN, South Africa); Riaan Stopforth (University of KwaZulu - Natal, South Africa); Jose Zelasco (University of Buenos Aires, Argentina); Jorge Kamlofsky (Interamerican Open University, Argentina)

**S4A.4 11:37 A Comparison Study of Velocity and Torque Based Control of Two-Wheel Mobile Robot for Human Operation**

Sho Amagai, Miyuki Kamatani and Toshiyuki Murakami (Keio University, Japan)

**S4B: Signals and Systems in Mechatronics**

Room: SNW100

Chair: Fakhru Alam (Massey University, New Zealand)

**S4B.1 10:30 Digital Beam Scanning in HMSIW Millimeterwave Leaky Wave Antenna**

Syed Muhammad Ammar Ali (National University of Sciences and Technology, Pakistan); Zubair Ahmed (National University of Sciences & Technology, Islamabad, Pakistan); Mojeeb Bin Ihsan (National University of Science and Technology, Pakistan)

**S4B.2 10:52 Transmission Line Sag Measurement Based on Single Aerial Image**

Heng Wang (Tongji University, P.R. China); Shijia Han (University of Otago, P.R. China); Li-jun Lv and Lijun Jin (Tongji University, P.R. China)

**S4B.3 11:15 Adaptive fuzzy dynamic surface controller for positioning of vessels**

Yuanhui Wang and Yulong Tuo (Harbin Engineering University, P.R. China); Simon Yang (University of Guelph, Canada); Mingyu Fu (Harbin Engineering University, P.R. China)

**S4B.4 11:37 Real-time Remote Data Acquisition and Process Monitoring System for Automatic Filling Line**

Chaoqiang Zheng, Min Dai, Zhisheng Zhang, Yubo HU and Yiming Guo (Southeast University, P.R. China)

**S4C: Mechatronics In Medicine 1**

Room: SNW200

Chair: Frazer K. Noble (Massey University, New Zealand)

**S4C.1 10:30 Respiration Gating Beam Steering to Break Moving Stones by Shock Wave Lithotripsy: Experimental Results**

Tangwen Yang (Beijing Jiaotong University, P.R. China)

**S4C.2 10:52 Experimental Study on the Dynamic Displacement Characteristics of Double Parallel Pneumatic Artificial Muscles**

Chongwei He, Xingsong Wang and Mengqian Tian (Southeast University, P.R. China)

**S4C.3 11:15 Force Analysis and Experiment of a Redundantly Actuated Chewing Robot**

Haiying Wen (Dalian University of Technology, P.R. China); Xiang Ren (Dalian Medical University, P.R. China); Ming Cong (Dalian University of Technology, P.R. China); Peter Xu (The University of Auckland, New Zealand); Yi Liu (Dalian University of Technology, P.R. China)

**S4C.4 11:37 A Review of Commercially Available Exoskeletons' Capabilities**

Amy Gardner, Frazer K. Noble and Johan Potgieter (Massey University, New Zealand)

**Wednesday, November 22, 12:00 - 13:00**

**L2: Lunch**

Room: Sir Neil Waters Foyer



**Wednesday, November 22, 13:00 - 15:00**

**S5A: Control systems and automation 2**

Room: SNW300

Chair: David I Wilson (Auckland University of Technology, New Zealand)

**S5A.1 1:00 *An Application of Predictive Functional Control with a State Observer-Type Internal Model***

Toshiyuki Satoh and Naoki Saito (Akita Prefectural University, Japan); Jun-ya Nagase (Ryukoku University, Japan); Norihiko Saga (Kwansei Gakuin University, Japan)

**S5A.2 1:24 *RESEARCH ON FUZZY CONTROL OF CONTROL MOMENT GYRO DRIVEN BY TRAVELING WAVE HOLLOW ULTRASONIC MOTOR***

Niu Zijie (Northwest Agriculture and Forestry University, P.R. China); Cui Yongjie (Northwest A&F University, P.R. China)

**S5A.3 1:48 *Integration of Model Reference Adaptive Control (MRAC) with PX4 Firmware for Quadcopters***

Edgar Niit and Willie Smit (Stellenbosch University, South Africa)

**S5A.4 2:12 *Finite-time Flocking Control of A Swarm of Cucker-Smale Agents with Collision Avoidance***

Jing Ma and Edmund Lai (Auckland University of Technology, New Zealand)

**S5A.5 2:36 *A decision support system for stabilizing flow of fixtures using fuzzy case-based reasoning and discrete-event simulation***

Fentahun Kasie (University of KwaZulu-Natal & University of KwaZulu-Natal, Ethiopia); Glen Bright (UKZN, South Africa); Anthony Walker (University of KwaZulu-Natal, South Africa)

**S5B: Sensors**

Room: SNW100

Chair: Peter Brett (University of Southern Queensland, Australia)

**S5B.1 1:00 *Study on sensing and monitoring of sewing machine for textile stream smart manufacturing innovation***

Jae-yong Lee and Dae-Hee Lee (Korea Textile Machinery Convergence Research Institute, Korea); Jeung-Hyun Park (Bogang Engineering Co., Korea); Joon-Hee Park (iFashionBizCenter)

**S5B.2 1:24 *Comprehensive Evaluation of Human Activity Classification based on Inertia Measurement Unit with Air Pressure Sensor***

Takahiro Ishikawa, Hitoshi Hayami and Toshiyuki Murakami (Keio University, Japan)

**S5B.3 1:48 *Design of a Wireless Surface EMG Acquisition System***

Asnor Juraiza Ishak (Universiti Putra Malaysia & Faculty of Engineering, Malaysia); Siti Anom Ahmad and Azura Che Soh (Universiti Putra Malaysia, Malaysia); Chikamune Wada (Kyushu Institute of Technology, Japan); Raja Madihah Raja Jusoh and Naagajoothi Adin Naraina (Faculty of Engineering, Universiti Putra Malaysia, Malaysia)

**S5B.4 2:12 *Towards Chinese Sign Language Recognition Using Surface Electromyography and Accelerometers***

Yongjie Zhuang, Bo Lv, Xinjun Sheng and Xiangyang Zhu (Shanghai Jiao Tong University, P.R. China)

**S5B.5 2:36 *Dynamic Patterns on a Circular Dielectric Elastomer Thin Film***

Hui Zhang, Zhisheng Zhang, Min Dai, Zhijie Xia and Qi Zhang (Southeast University, P.R. China)

**S5C: Mechatronics In Medicine 2**

Room: SNW200

Chair: Frazer K. Noble (Massey University, New Zealand)

**S5C.1 1:00 *An Energy Harvesting Mechanism Transfer Human Walking Energy to Hydraulic Power***

Zheng Wang, Hu Shi, Haitao Wang and Xuesong Mei (Xi'an Jiaotong University, P.R. China)

**S5C.2 1:24 *Opportunities and Challenges in Developing a Next Generation Masticatory Robot***

Bangxiang Chen, Peter Xu and Jaspreet Dhupia (The University of Auckland, New Zealand); John Bronlund (Massey University, New Zealand)

**S5C.3 1:48 *Actuation Planning and Modeling of a Soft Swallowing Robot***

Dipankar Bhattacharya (The University of Auckland, New Zealand); Leo Cheng (University of Auckland, New Zealand); Steven Dirven (Massey University, New Zealand); Peter Xu (The University of Auckland, New Zealand)

**S5C.4 2:12 *Epidural space identification exploration by a fiber optic tip-force sensing needle***

Zonglai Mo, Peter Xu and Neil Broderick (The University of Auckland, New Zealand)

**S5C.5 2:36 *Design and Testing of a low-cost Electromyogram that Uses a Right Leg Driver Circuit***

Ben Fortune, Ashley Stewart, Eva Hansenne, Lachlan McKenzie, Logan Chatfield and Christopher Pretty (University of Canterbury, New Zealand)

**Wednesday, November 22, 15:00 - 15:30**

**AT2: Afternoon Tea**

Room: Sir Neil Waters Foyer

**Wednesday, November 22, 15:30 - 17:00**

**S6A: Grippers and actuators**

Room: SNW300

Chair: Steven Dirven (Massey University, New Zealand)

**S6A.1 3:30 *Review of Motion Control in Redundantly Actuated Parallel Manipulators***

Chen Cheng and Zhongbao Qin (Xi'an Research Institute of High-Tech, P.R. China); Jianzhong Shang (National University of Defense Technology, P.R. China)

**S6A.2 3:52 *Design and Performance Analysis of High Response Actuator Using Magnetic Shape Memory Alloy***

Bin He, Hu Shi, Haitao Wang and Xuesong Mei (Xi'an Jiaotong University, P.R. China)

**S6A.3 4:15 *Online Compensation of Gravity and Friction for Haptics with Incremental Position Sensors***

Satoshi Fukushima, Hiromu Sekiguchi, Yuki Saito, Takahiro Nozaki and Kouhei Ohnishi (Keio University, Japan)

**S6A.4 4:37 *Soft Robotics: Definition and Research Issues***

Ang Chen (University of Saskatchewan, Canada); Ruixue Yin (University of Saskatchewan, Canada & Shanghai University, P.R. China); Lin Cao (Nanyang Technological University, Singapore); Chenwang Yuan (University of Saskatchewan, Canada); HongKai Ding (East China University of Science and Technology & University of Saskatchewan, Canada); WJ Zhang (Complex and Intelligent Research Center, East China University of Science and Technology & University of Saskatchewan, Canada)

**S6B: Machine Learning**

Room: SNW100

Chair: Glen Bright (UKZN, South Africa)

**S6B.1 3:30 *Recognition of Speed Limits on Speed-Limit Signs by Using Machine Learning***

Shigeharu Miyata (Kindai University, Japan)

**S6B.2 3:52 A Mobile Robot Platform for Supervised Machine Learning Applications**

Frazer K. Noble (Massey University, New Zealand)

**S6B.3 4:15 On Solving the Inverse Kinematics Problem using Neural Networks**

Akos Csiszar and Jan Eilers (University of Stuttgart, Germany); Alexander Verl (Stuttgart University, Institute for Control Engineering of Machine Tools, Germany)

**S6B.4 4:37 A Method for Optimising the Evolution of Cellular Manufacturing Systems**

Jared Padayachee (University of KwaZulu-Natal, South Africa); Glen Bright (UKZN, South Africa)

**S6C: Robotics 1**

Room: SNW200

Chair: Iain Emerson (Massey University, New Zealand)

**S6C.1 3:30 Evaluation of a Prototype Integrated Robotic and Virtual Mirror Therapy System for Stroke Rehabilitation**

Iain Emerson (Massey University, New Zealand); Peter Xu (The University of Auckland, New Zealand); Johan Potgieter (Massey University, New Zealand)

**S6C.2 3:52 The Bayesian Search Criterion- An Adaptation to EEG Artefact Search and Selection for Robotic Control**

Chiemela Onunka (Mangosuthu University of Technology, South Africa)

**S6C.3 4:15 Research and Development of a 5-Axis Hybrid Kinematic CNC Machine**

Rokiev Aidan (University of Kwazulu-Natal, South Africa); Glen Bright (UKZN, South Africa); Jared Padayachee (University of KwaZulu-Natal, South Africa)

**S6C.4 4:37 Self Morphing Soft-Robotic Gripper for Handling and Manipulation of Delicate Produce in Horticultural Applications**

Dean Venter (Massey University & Massey University, New Zealand); Steven Dirven (Massey University, New Zealand)

**Wednesday, November 22, 19:30 - 21:00**

**CD: Conference Dinner**

Room: Sir Neil Waters Foyer

**Thursday, November 23**

**Thursday, November 23, 09:00 - 10:00**

**Key3: Resilient Robots: Concept and Technology**

**Prof Chris Zhang**

Room: SNW300

Chair: Xiangyang Zhu (Shanghai Jiao Tong University, P.R. China)

Resilient robots are relatively new in the field of robotics. In this talk, the speaker will first discuss the concept of resilience and resilient robots in particular with a focus on the difference of resilience from robustness. Then, the speaker will discuss an architecture of the under-actuated resilient robot and its benefit and some computational issues in operation management and control of the under-actuated resilient robot. Three developments of resilient robots will be illustrated. Finally, a generalized implication of the under-actuated resilient robot to a system that is composed of a group humans and a group of active machines and passive machines are discussed.

Biography. Dr. Zhang is a professor of University of Saskatchewan of Canada and a Chair Professor of East China University of Science and Technology of China under Chinese National 1000 Talent Plan. Dr. Zhang received his Ph.D. from Delft University of Technology (The Netherlands) in 1994 on the design theory and computer aided design of mechanism systems. He was then appointed as Assistant Professor of Manufacturing Engineering at City University of Hong Kong. In June 1998, he was appointed as Associate Professor in the Department of Mechanical Engineering at the University of Saskatchewan (Canada), and an Industrial Research Chair sponsored by Atomic Energy Canada Limited (AECL) to direct the research work at the Advanced Engineering Design Laboratory (AEDL) of the Department. He was also an adjunct professor at University of Adelaide (Australia) during 2001 to 2006. Dr. Zhang was promoted to a Full Professor at the University of Saskatchewan in

2004. Dr. Zhang has published over 400 refereed technical publications, among which over 237 papers appear in refereed journals in a broad scope of fields including design and mechatronics, manufacturing, informatics, human-machine systems. His h-index 40 (GS) and h-index 32(Scopus). Dr. Zhang currently holds 8 patents. Dr. Zhang has supervised or co-supervised 31 PhD, 56 Master (thesis), 10 Master (non-thesis), and 37 Post-Doctoral Students or Visiting Scholars. Among the PhD students, 6 received NSERC PDF awards and 7 received faculty positions in post-secondary institutions in USA, Canada, Hong Kong, and China. This achievement has been recognized by both the university (2012 Distinguished Graduate Supervisor Award by University of Saskatchewan) and the professional realm (2014 Educator of the Year by Saskatoon Engineer Society). Dr. Zhang has been appointed as technical editor/associate editor for three reputed journals, including flagship journal, Journal of Mechatronics, IEEE Transaction on Mechatronics. He has been invited to review technical papers from 70 different journals, which cover design, mechatronics, informatics, management, material, and chemistry. He also served as Chair of Division of Biomedical Engineering at the U of S from 2007 to 2011, growing the division from 24 faculty members to 64 and 20 graduate students to over 60 (half of them on PhD study). Dr. Zhang is a fellow of ASME, senior member of IEEE, and senior member of SME.

**Thursday, November 23, 10:30 - 12:00**

### **S7A: Robotics 2**

Room: SNW300

Chair: Edmund Lai (Auckland University of Technology, New Zealand)

#### **S7A.1 10:30 *Design of a semi-autonomous water-driven flight platform***

Johann Gerken (University of KwaZulu Natal, South Africa); Glen Bright (UKZN, South Africa)

#### **S7A.2 10:52 *An Efficient Grasp Planning Algorithm for 3-D Objects Considering Hand Configuration***

Lei Hua, Xinjun Sheng and Xiangyang Zhu (Shanghai Jiao Tong University, P.R. China)

#### **S7A.3 11:15 *HVLP: Hybrid Visible Light Positioning of a Mobile Robot***

Daniel Konings, Baden Parr, Caleb Waddell, Fakhrul Alam and Khalid M Arif (Massey University, New Zealand); Edmund Lai (Auckland University of Technology, New Zealand)

#### **S7A.4 11:37 *A Generalised, Modular, Approach for the Forward Kinematics of Continuum Soft Robots with Sections of Constant Curvature***

Jessica Faulkner and Steven Dirven (Massey University, New Zealand)

### **S7B: Mechatronics applications 1**

Room: SNW100

Chair: Glen Bright (UKZN, South Africa)

#### **S7B.1 10:30 *Design of Multi-step Stepper Motor Coordinated Control System Based On Bresenham Algorithm***

Min Dai, Yuan Chen, Chaoqiang Zheng and Yiming Guo (Southeast University, P.R. China)

#### **S7B.2 10:52 *Motion Loading System Taking Into Account The Variable Control Stiffness and Human Reactions***

Toshiaki Okano, Kenji Ogawa and Kouhei Ohnishi (Keio University, Japan)

#### **S7B.3 11:15 *Development of an Optimization Algorithm for Inspection of Customizable Jigs and Fixtures***

Denver White (University of KwaZulu Natal, South Africa); Glen Bright (UKZN, South Africa); Anthony Walker (University of KwaZulu Natal, South Africa); Shaniel Davrajh (CSIR, South Africa)

#### **S7B.4 11:37 *Bioinspired Venus flytrap: A dielectric elastomer actuated soft gripper***

Liang Xu and Guoying Gu (Shanghai Jiao Tong University, P.R. China)

### **S7C: Manipulators and Inspection**

Room: SNW200

Chair: Ziming (Tom) Qi (Auckland Institute of Smart Technology, New Zealand)

#### **S7C.1 10:30 *Modeling of Multi-Cavity Composite Soft Pneumatic Actuators***

Zhisheng Zhang, Qi Zhang, Min Dai, Xiqi Ding and Zhijie Xia (Southeast University, P.R. China)

**S7C.2 10:52 Characterization of Multi-Cavity Composite Soft Pneumatic Actuators**  
Qi Zhang, Min Dai, Xiqi Ding and Zhisheng Zhang (Southeast University, P.R. China)

**S7C.3 11:15 Development of a Flexible Manipulator with Changing Stiffness by Granular Jamming**  
Shoma Yamane and Shuichi Wakimoto (Okayama University, Japan)

**S7C.4 11:37 Bilateral Control between Manipulators with Different Structure Considering Singular Configuration**  
Wanping Lyu, Hiromu Sekiguchi and Kouhei Ohnishi (Keio University, Japan)

**Thursday, November 23, 13:00 - 15:00**

## **S8A: 3D Manufacturing Techniques**

Room: SNW300

Chair: Steven Dirven (Massey University, New Zealand)

**S8A.1 1:00 The effects of Acetone vapour inter-layer processing on Fused Deposition Modelling 3D Printed Acrylonitrile Butadiene Styrene**  
Juan Schutte and Pamitha Wjesundera (Massey University, New Zealand)

**S8A.2 1:24 Large scale 3D printing: feasibility of novel extrusion based process and requisite materials**  
Muhammad Harris (Massey University, Auckland, New Zealand & Rachna College of Engineering and Technology, Gujranwala, Pakistan); Johan Potgieter, Khalid M Arif and Richard Archer (Massey University, New Zealand)

**S8A.3 1:48 Experimental analysis of the effectiveness of current modelling methods for SLS parameter determination**  
Cameron Mearns, Johan Potgieter and Steven Dirven (Massey University, New Zealand); Marie Joo Le Guen (Scion, New Zealand)

**S8A.4 2:12 Design of Remote Monitoring System for 3D Printing Based on Cloud Platform**  
Yiming Guo, Rong Zhou, Zhisheng Zhang and Zhen Chen (Southeast University, P.R. China)

**S8A.5 2:36 A fundamental study of 3D printing testing methods for the development of new quality management strategies**  
Tanisha Pereira (Massey University & Massey University, New Zealand); Johan Potgieter (Massey University, New Zealand); John Kennedy (GNS Science, New Zealand)

## **S8B: Mechatronics applications 2**

Room: SNW100

Chair: Rory Flemmer (Massey University, New Zealand)

**S8B.1 1:00 Coverage of Apple Surface for Adequate Machine Vision Inspection**  
Huub Bakker, Rory Flemmer and Claire Flemmer (Massey University, New Zealand)

**S8B.2 1:30 Modal Analysis of Machining Processess on an Automated Flexible Fixture for a Reconfigurable Manufacturing System**  
Erlank Slabbert (University of kwa Zulu Natal, South Africa); Glen Bright (UKZN, South Africa); Anthony Walker (University of KwaZulu Natal, South Africa)

**S8B.3 2:00 Detection of abnormal noises from tapered roller bearings by a sound sensing system**  
Daoyong Sun (CRRRC Qingdao Sifang Co., Ltd., P.R. China); Zhangliang Xu and Yong J Yuan (Southwest Jiaotong University, P.R. China)

**S8B.4 2:30 New dry electrode printed by 3D for non-contact bioelectricity measurement**  
Hong Wang (Northeastern University, P.R. China); Xudong Wang and Chengcheng Hua (School of Mechanical Engineering and Automation Northeastern University, P.R. China)

## **S8C: Mechatronics systems**

Room: SNW200

Chair: Glen Bright (UKZN, South Africa)

### **S8C.1 1:00 *Investigating geometric adaptability for flexible grippers in reconfigurable assembly systems***

Christian Basson (University of KwaZulu-Natal, South Africa); Glen Bright (UKZN, South Africa); Anthony Walker (University of KwaZulu Natal, South Africa)

### **S8C.2 1:30 *Biomimetic Evaluation of Bolus Transit in Modelled Esophageal Swallowing***

Abdul Sattar Din (University of Auckland, New Zealand); Peter Xu (The University of Auckland, New Zealand); Leo Cheng (University of Auckland, New Zealand); Steven Dirven (Massey University, New Zealand)

### **S8C.3 2:00 *Extending the Stixel World Using Polynomial Ground Manifold Approximation***

Noor Saleem (Auckland University of Technology, New Zealand); Mahdi Rezaei (The University of Auckland, New Zealand); Reinhard Klette (Auckland University of Technology, New Zealand)

### **S8C.4 2:30 *Shape Sequence Deformation Model based Structured Matrix Decomposition***

He Fuyun, Zhisheng Zhang, Qi Zhang and Rong Zhou (Southeast University, P.R. China)