The 3rd IFTOMM International Symposium on Robotics and Mechatronics

1 – 4 October 2013, Singapore

Program Booklet

ORGANIZERS

IFToMM Technical Committee on Robotics & Mechatronics (IFToMM TC-RM)

Singapore Committee for the Technologies of Machines and Mechanisms (SiCToMM)

IEEE Robotics & Automation Singapore Chapter

School of Mechanical & Aerospace Engineering (MAE), Nanyang Technological University (NTU)

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Robotics Research Centre

WELCOME MESSAGE

I-Ming Chen
General Chairman
ISRM 2013

It is a pleasure to welcome everybody to the beautiful garden city and country, Singapore, for the 2013 IFToMM International Symposium on Robotics and Mechatronics (ISRM). This is the third in the series following the previous ones held in Hanoi, Vietnam (2009) and Shanghai, China (2011).

ISRM 2013 is an event organized by the Technical Committee on Robotics and Mechatronics under the International Federation for the Promotion of Mechanism and Machine Science (IFToMM). The aim of this symposium is to promote timely scholarly exchange for the robotics and mechatronics R&D community. The ISRM 2013 proceedings present state-of-the-art research findings in robotics and mechatronics in the 78 articles by authors from 15 countries throughout five continents. Major topics of the papers are in parallel manipulators, bio-inspired robotics, mobile robotics, locomotion and gait planning, sensors and sensing systems, actuators and drive mechanisms, compliant mechanisms, and motion tracking and localization. All papers have been rigorously reviewed by at least two international peer reviewers, and are organized into a 3-day conference with 14 technical sessions held from 2 to 4 October 2013 in Nanyang Technological University, Singapore.

As the trend of 21st century R&D work is moving toward interdisciplinary and socially relevant, ISRM 2013 invited two distinguished plenary speakers, Prof. Yoshihiko Nakamura (University of Tokyo, Japan) and Dr. Ser Yong Lim (Singapore Institute of Manufacturing Technology, Singapore) to share their experiences and perspectives in carrying out robotics and mechatronics R&D for disaster relief, especially the decommissioning and safety of nuclear facilities, as well as for advanced manufacturing, especially ultra-precision manufacturing and highly challenging automation works. Sustainable environmentally safe development and economic growth of the society we live in through manufacturing productivity improvement and improved quality of life are very critical to nation building. Robotics and mechatronics are at the heart of these interdisciplinary and advance society-relevant areas.

The organizers would like to thank members of the International Program Committee, the Scientific Committee of ISRM and the Local Organizing Committee for their efforts in reviewing the submitted articles, and the authors in addressing the comments and suggestions of the reviewers in their final submissions. The financial support received from IFToMM for the Young Delegation Program (YDP) is also acknowledged. The technical support received from Singapore Committee for Promotion of Mechanism and Machine Science (SiCToMM), the School of Mechanical and Aerospace Engineering, Robotics Research Center (RRC), Intelligent Systems Center (Intellisys) in Nanyang Technological University, Singapore Institute of Manufacturing Technology (SIMTech), Singapore University of Technology and Design, and National University of Singapore are all acknowledged. Strong support received from Beijing University of Aeronautics and Astronautics, China is also much appreciated.

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ACKNOWLEDGEMENT

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CONFERENCE VENUE

Nanyang Technological University (NTU)
50 Nanyang Avenue
SINGAPORE 639798

SECRETARIAT DESK

(for the duration of the conference only)
Address: **LT3 (NS4-02-32)**
Block NS4, Level 2, Room No 32
Nanyang Technological University
50 Nanyang Avenue
SINGAPORE 639798
Contact Person: Albert Causo
+65 90873849 (mobile)

Secretariat Desk Operating Hours:

Tuesday, 1 October:	14:30 – 19:00
Wednesday, 2 October:	08:30 – 17:30
Thursday, 3 October:	08:30 – 14:00
Friday, 4 October:	08:30 – 17:30

REGISTRATION

Registration is at the Secretariat Desk outside LT3 (NS4-02-32).

Delegates may collect their conference materials at the registration desk during these hours. Name badges are provided and must be worn at the conference are.

WIFI INTERNET

Participants are free to use the NTU wireless network within the campus.

WIRELESS NETWORK: **NTUWL**
DOMAIN: **ASSOC**

Please get your wifi account at the Secretariat desk. Each delegate will be issued an account valid for the duration of the conference.

TOURS & SOCIALS

Campus Tour
Date: 1 October, Tuesday
Time: 15:00-15:45 (Batch 1), 16:00-16:45 (Batch 2)
Venue: Around NTU Campus
Assembly Point: LT3

Welcome Reception
Date: 1 October, Tuesday
Time: 17:00-19:00
Venue: LT3
Assembly Point: LT3 at 16:50

Cultural Tour of Singapore (City Tour)
Date: 3 October, Thursday
Time: 14:00-18:30
Venue: Chinatown, Little India, Merlion Park, Esplanade, Gardens By The Bay
Assembly Point: LT3 at 13:45

Banquet
Date: 3 October, Thursday
Time: 19:00-21:00
Venue: The Seafood International @ East Coast
Assembly Point: Right after the Cultural Tour

Technical Tour
Date: 4 October, Friday
Time: 15:10-17:30
Venue: The Singapore Institute of Manufacturing Technology (SIMTech)
Robotics Research Centre (RRC)
Assembly Point: LT3 at 15:00

Farewell Party
Date: 4 October, Friday
Time: 17:30-19:30
Venue: TBA
Assembly Point: LT3 at 17:30

SHUTTLE BUS FROM PARK AVENUE ROCHESTER HOTEL TO NTU

- Available on mornings of Oct 2, 3, and 4.
- Departure time from hotel will be available at the hotel, website, and the Secretariat Desk.

PROGRAMME-AT-A-GLANCE

1 Oct 2013 (Tuesday)	**14:30 - onwards**	**Registration** (LT3)		
	15:00 - 15:45	**Campus Tour**		
	16:00 - 16:45	**Campus Tour**		
	17:00 - 19:00	**Welcome Reception** (LT3)		

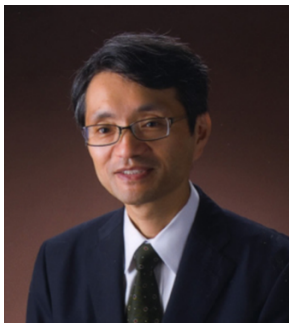
2 Oct 2013 (Wednesday)	**08:45 - 09:00**	**Opening Ceremony** (LT3)	
	09:00 - 10:00	**Keynote Speech by Prof. Yoshihiko Nakamura** (LT3)	
	10:00 - 10:20	*Tea Break*	
	10:20 - 12:20	**WeA1** (LT9)	**WeA2** (LT10)
	12:20 - 13:20	*Lunch*	
	13:20 - 15:20	**WeB1** (LT9)	**WeB2** (LT10)
	15:20 - 15:40	*Tea Break*	
	15:40 - 17:40	**WeC1** (LT9)	**WeC2** (LT10)

3 Oct 2013 (Thursday)	**09:00 - 10:40**	**ThA1** (LT9)	**ThA2** (LT10)
	10:40 - 11:00	*Tea Break*	
	11:00 - 12:40	**ThB1** (LT9)	**ThB2** (LT10)
	12:40 - 14:00	*Lunch*	
	14:00 - 18:30	**Cultural Tour of Singapore (City Tour)**	
	19:00 - 21:00	**Banquet** (The Seafood International @ East Coast)	

4 Oct 2013 (Friday)	**09:00 - 10:00**	**Keynote Speech by Dr. Lim Ser Yong** (LT3)		
	10:00 - 10:20	*Tea Break*		
	10:20 - 12:20	**FrA1** (LT9)	**FrA2** (LT10)	**Industrial Forum I** (LT3)
	12:20 - 13:30	*Lunch*		
	13:30 - 15:10	**FrB1** (LT9)	**FrB2** (LT10)	**Industrial Forum II** (LT3)
	15:10 - 17:30	**Technical Tours**		
	17:30 - 19:30	**Farewell Party**		

Robotics and Community for Decommissioning and Safety of Nuclear Facilities

2 Oct 2013 (Wednesday), 09:00 - 10:00 at LT3



Professor Yoshihiko Nakamura
Department of Mechano-Informatics, University of Tokyo

Abstract

The technologies of robotics and automation are more demanded than ever for nuclear power plants and the other nuclear facilities, after the accidents at TEPCO's Fukushima 1st Nuclear Power Plant following the earthquake and tsunami on March 11th, 2011. Technical Committee on Robotics and Automation in Nuclear Facilities was founded as a TC of IEEE Robotics and Automation Society. This talk will cover the specific technical issues related to robotics for decommissioning TEPCO's Fukushima Daiichi Nuclear Power Plant. The future possibility of robotics solutions in particular with the use of humanoid robots are also discussed.

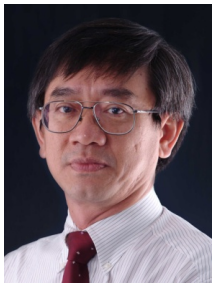
Biography

Yoshihiko Nakamura received Doctor of Engineering Degree from Kyoto University in 1985. He was Assistant Professor of Kyoto University, from 1982 to 1987, and then Assistant and Associate Professor of University of California, Santa Barbara from 1987 to 1991. Since 1991, he has been with University of Tokyo, Japan, and is currently Professor at Department of Mechano-Informatics. Humanoid robotics, cognitive robotics, neuro musculoskeletal human modeling, biomedical systems, and their computational algorithms are his current fields of research. He is Fellow of Japan Society of Mechanical Engineers, Fellow of Robotics Society of Japan, Fellow of IEEE, and Fellow of World Academy of Arts and Science. Dr. Nakamura currently (2012-2015) serves as President of International Federation for the Promotion of Mechanism and Machine Science (IFToMM). He is Foreign Member of Academy of Engineering Science of Serbia, and TUM Distinguished Affiliated Professor of Technische Universität München. Dr. Nakamura is co-chairing IEEE-RAS Technical Committee on Robotics and Automation in Nuclear Facilities.

KEYNOTE SPEAKER II

Enhance Competitiveness through R&D in Manufacturing Technologies

4 Oct 2013 (Friday), 09:00 - 10:00 at LT3



Dr. Ser Yong Lim
Executive Director, Singapore Institute of Manufacturing Technology,
*Agency for Science, Technology and Research (A*STAR), Singapore*

Abstract

Manufacturing is an important driver of Singapore's economy, contributing to more than 20% of its GDP and employing more than 500,000 people. Singapore Institute of Manufacturing Technology (SIMTech), a research institute under the Agency of Science, Technology and Research (A*STAR) of Singapore, was established in 1993 as part of the national initiative to restructure Singapore into a knowledge-based and technology-driven economy. With its mission to develop high value manufacturing technologies to help the manufacturing industry move up the value chain, SIMTech has made great strides in the R&D of a wide spectrum of technologies for the manufacturing industry. This talk aims to give an overview of SIMTech R&D focus and describe the working models with the manufacturing companies in Singapore. In addition, the talk will give some examples of how R&D contributes to the competitiveness and productivity improvement of the manufacturing industry and present several research programmes that aim to transform future manufacturing industries in Singapore.

Biography

Dr. Ser Yong Lim is the Executive Director and Senior Scientist of the Singapore Institute of Manufacturing Technology (SIMTech), a research institute under the Agency for Science, Technology and Research (A*STAR) of Singapore. Dr. Lim leads the institute in the research and development of technologies in manufacturing processes, manufacturing automation, and manufacturing systems to support the manufacturing industry in Singapore. Under his leadership, SIMTech has collaborated with many research organisations and universities around the world. With more than 350 research scientists and engineers, SIMTech works with manufacturing companies in Aerospace, Automotive, MedTech, Precision Engineering, Electronics, Marine, Oil and Gas, and Logistics industry. Dr. Lim received his B.Eng. (1st Class Honours) from the National University of Singapore in 1984, and his Ph.D. from Clemson University, USA, in 1994. He has worked in the industry in Singapore and the US. Currently, Dr Lim is also an Adjunct Associate Professor with the National University of Singapore. His personal research interests are in Dynamics of Motion, Nonlinear Control of Robotic Manipulators, Ultra-precision Motion Systems, Automation, and Real-time Systems.

Time	WeA1: Parallel Manipulators I Session Chair: Yan Jin Venue: LT9		WeA2: Sensing Session Chair: Gim Song Soh Venue: LT10	
10:20 - 10:40	WeA1.1	**DESIGN AND SIMULATION OF CASSINO HEXAPOD II** DANIELE CAFOLLA, FRANCO TEDESCHI AND GIUSEPPE CARBONE	WeA2.1	**IMPROVE EFFICIENCY OF ULTRASONIC TRANSDUCER BY WAVE REFLECTION METHOD** CHIH-CHUNG SU, CHI-NUNG HUANG, YU-JEN CHEN AND SHUO-HUNG CHANG
10:40 - 11:00	WeA1.2	**LESS-SINGULAR ASSEMBLY-MODE FOR 3-RRR SPHERICAL PARALLEL MANIPULATOR** HOUSSEM SAAFI, MED AMINE LARIBI AND SAID ZEGHLOUL	WeA2.2	**DESIGN OF TACTILE SENSOR ARRAY FOR ELECTRIC GRIPPER JAWS AND OBJECT RECOGNITION** WEN-CHING KO, JUI-YIAO SU, YAN-CHEN LIU, CHANG-HO LIOU AND JWU-SHENG HU
11:00 - 11:20	WeA1.3	**STRUCTURAL-PARAMETRIC SYNTHESIS OF THE PLANAR PARALLEL MANIPULATOR WITH TWO END-EFFECTORS** ZHUMADIL BAIGUNCHEKOV, MYRZABAY IZMAMBETOV AND NURLAN BAIGUNCHEKOV	WeA2.3	**DEVELOPMENT OF A SENSOR-BASED GLOVE DEVICE FOR EXTRACTING HUMAN FINGER MOTION DATA USED IN THE DESIGN OF MINIMALLY ACTUATED MECHANICAL FINGERS** NINA P. ROBSON, SHRAMANA GHOSH AND GIM SONG SOH
11:20 - 11:40	WeA1.4	**A STYLIZED GENERIC METHOD FOR FORWARD POSITION ANALYSIS OF 3-SPS TYPE SPHERICAL PARALLEL MECHANISM BASED ON COUPLING DEGREE ANALYSIS** HONGBO YIN, HUIPING SHEN AND TINGLI YANG	WeA2.4	**LEARNING CORIOLIS-TYPE OF FORCE FIELDS WITHOUT ROBOTS** PAOLO TOMMASINO, YEOW NEO ENG, GIA HOANG PHAN, FERDINAN WIDJAJA, KUMUDU GAMAGE AND DOMENICO CAMPOLO
11:40 - 12:00	WeA1.5	**AUTOMATED AIRCRAFT ASSEMBLY WITH PARALLEL KINEMATIC MACHINE** YAN JIN, PETER MCTOAL, COLM HIGGINS, HARVEY BROOKES AND MARK SUMMARS	WeA2.5	**UNCALIBRATED VISION-BASED CONTROL FOR OPTICAL MANIPULATION OF MICROSCOPIC PARTICLES** XIANG LI AND CHIEN CHERN CHEAH
12:00 - 12:20	WeA1.6	**A NOVEL PARALLEL ROBOT WITH SCARA MOTIONS AND ITS KINEMATIC ISSUES** FUGUI XIE, XIN-JUN LIU AND YANHUA ZHOU	WeA2.6	**AMBULATORY MEASUREMENT OF SHOULDER KINEMATICS USING INERTIAL MEASUREMENT UNITS AND SHOULDER RHYTHM MODEL** WEI SIN ANG, I-MING CHEN AND QI LONG YUAN

PRESENTATION LISTING: Wednesday, 2 October 2013

Time	WeB1: Parallel Manipulators II Session Chair: Yukio Takeda Session Co-chair: Chao Chen Venue: LT9		WeB2: Actuators and Drives Session Chair: Liang Yan Session Co-Chair: Pham Hong Phuc Venue: LT10	
13:20 - 13:40	WeB1.1	**SYNTHESIS OF ADJUSTABLE PLANAR AND SPHERICAL FOUR-LINK MECHANISMS FOR APPROXIMATE MULTI-PATH GENERATION** PRASAD VILAS CHANEKAR AND ASHITAVA GHOSAL	WeB2.1	**DYNAMIC SYNTHESIS OF MANIPULATOR ADAPTIVE DRIVE** KONSTANTIN IVANOV, GAKHIP UALIEV AND BAURJAN TULTAEV
13:40 - 14:00	WeB1.2	**NOVEL LINKAGE WITH REMOTE CENTER OF MOTION** CHAO CHEN AND MAX PAMIETA	WeB2.2	**MULTI-SISO CONTROL TO REGULATE CONSTANT POWER AND MITIGATE DRIVE-TRAIN LOAD IN WIND TURBINE** LIZA WAN YUAN CHUA, IRVING PAUL GIRSANG AND JASPREET SINGH DHUPIA
14:00 - 14:20	WeB1.3	**PATH PLANNING OF THE 3-RPR USING GLOBAL WORKSPACE ROADMAPS** WESLEY AU, CHAO CHEN AND HOAM CHUNG	WeB2.3	**DESIGN AND FABRICATION OF A MICRO CAM MECHANISM BASED ON ELECTROSTATIC COMB-DRIVE ACTUATORS** PHUC PHAM HONG, TOAN DINH KHAC, KHOA NGUYEN TUAN AND LAM DANG BAO
14:20 - 14:40	WeB1.4	**KINEMATIC AND DYNAMIC SIMULATION OF A RECONFIGURABLE PARALLEL ROBOT** DOINA PISLA, DRAGOS COCOREAN, CALIN VAIDA, BELA GYURKA, ADRIAN PISLA AND NICOLAE PLITEA	WeB2.4	**DYNAMIC ANALYSIS OF PLANETARY GEAR INCREASER USING A VARYING STIFFNESS DISCRETE MODEL** KUO JAO HUANG AND SUNG WEN CHEN
14:40 - 15:00	WeB1.5	**ON THE SLIDING MODE CONTROL OF REDUNDANT PARALLEL ROBOTS USING NEURAL NETWORKS** NGUYEN VAN KHANG AND LUONG ANH TUAN	WeB2.5	**A CURRENT-SENSING BASED CONTROLLER OF BRUSHED DC MOTORS FOR ROBOTIC APPLICATIONS** ARUN UDAI AND SUBIR SAHA
15:00 - 15:20	WeB1.6	**COMPLIANCE ANALYSIS OF 3-RPSR PARALLEL MECHANISM FOR MOVABLE-DIE DRIVE MECHANISM OF PIPE BENDER** YUKIO TAKEDA, SHOHEI KAWASUMI, DAISUKE MATSUURA AND EDUARDO CASTILLO-CASTANEDA	WeB2.6	**MAGNETIC FIELD ANALYSIS OF ROTARY MACHINES WITH DOUBLE-LAYERED HALBACH ARRAY** LIANG YAN

Time	WeC1: Bio-inspired Robotics Session Chair: Wenbin Lim Venue: LT9		WeC2: Mobile Robotics I Session Chair: Dikai Liu Session Co-chair: Bingbing Li Venue: LT10	
15:40 - 16:00	WeC1.1	**BIO-INSPIRED MECHANICAL DESIGN OF WALKING HEXAPOD ROBOT FOR TERRAIN NEGOTIATION** DONG LIU, WEIHAI CHEN, ZHONGCAI PEI AND JIANHUA WANG	WeC2.1	**TOWARDS AN ACTIVE SPINE FOR MOBILE ROBOTS** DANIEL KUEHN, FRANK BEINERSDORF, MARC SIMNOFSKE, FELIX BERNHARD AND FRANK KIRCHNER
16:00 - 16:20	WeC1.2	**SLIDING FRICTION MECHANISM THAT MIMICS THE SLIDING FILAMENT MODEL OF SKELETAL MUSCLE** FRANCIS NICKOLS	WeC2.2	**ROBUST ADAPTIVE CONTROL OF AN OMNIDIRECTIONAL MOBILE ROBOT USING OMNIDIRECTIONAL VISION SENSOR** YC YANG, CC CHENG AND CY CHEN
16:20 - 16:40	WeC1.3	**AN ACTIVE JOINT DRIVEN BY MULTIPLE ACTUATORS WITH HYDRAULIC SKELETON MECHANISM MADE OF FLEXIBLE BAGS** HITOSHI KIMURA, TAKUYA MATSUZAKI, MOKUTARO KATAOKA AND NORIO INOU	WeC2.3	**AN ACCURATE AND RELIABLE APPROACH TO CALIBRATION OF A ROBOT MANIPULATOR-MOUNTED IR RANGE CAMERA FOR FIELD APPLICATIONS** DAVID RUSHTON-SMITH, ANDREW TO, GAVIN PAUL AND DIKAI LIU
16:40 - 17:00	WeC1.4	**INVERSE KINEMATICS OF A WIRE-ACTUATED CONSTANT-CURVATURE FLEXURAL MECHANISM** CHIN-HSING KUO AND WANG-NIN LIAN	WeC2.4	**MOVING OBSTACLE AVOIDANCE VIA TIME-VARYING COST MAP** SCOTT PENDLETON, XIAOTONG SHEN AND MARCELO ANG
17:00 - 17:20	WeC1.5	**DISPLACEMENT AND TENSION ANALYSIS FOR CABLE-DRIVEN MANIPULATORS** WENBIN LIM, SONG HUAT YEO, GUILIN YANG AND YAN XIN TAN	WeC2.5	**MOTIVATED LEARNING EMBODIED IMPLEMENTATION IN AUTONOMOUS SYSTEMS - A CASE STUDY IN NAO ROBOT** LILI LIU, BINGBING LI, CHUNYANG SUN AND I-MING CHEN
17:20 - 17:40	WeC1.6	**DYNAMIC FRICTION MODEL FOR TENDON SHEATH ACTUATED SURGICAL ROBOTS: MODELLING AND STABILITY ANALYSIS** THANH NHO DO, TEGOEH TJAHJOWIDODO, MICHAEL WAI SHING LAU AND SOO JAY PHEE	WeC2.6	**DEXTERITY ANALYSIS FOR QUADRUPED ROBOTS BASED ON THE IMPROVED SERVICE SPHERE** XILUN DING AND HAO CHEN

PRESENTATION LISTING: Thursday, 3 October 2013

Time	ThA1: Compliant Mechanisms Session Chair: Weihai Chen Session Co-chair: Xu Pei Venue: LT9		ThA2: Mobile Robotics II Session Chair: Martim Brandao Session Co-chair: Xiaolei Han Venue: LT10	
9:00 - 9:20	ThA1.1	**MAKE A COMPLIANT MECHANISM WITH A LOW-COST DESKTOP 3D PRINTER** XU PEI, I-MING CHEN AND QILONG YUAN	ThA2.1	**ARX-FCM METHOD FOR STEERING SYSTEM FAULT DIAGNOSIS OF A HEAVY CONSTRUCTION VEHICLE** LIMAN YANG, MING ZHANG, KOK-MENG LEE AND YUNHUA LI
9:20 - 9:40	ThA1.2	**DESIGN AND MODELING OF A LARGE DISPLACEMENT FLEXURE-BASED PARALLEL MICRO-POSITIONING STAGE** WEIHAI CHEN, JIANLIANG QU, JIANBIN ZHANG AND YAN JIN	ThA2.2	**MULTI-INFORMATION PARTICLE SWARM OPTIMIZATION FOR WEAPON TARGET ASSIGNMENT OF MULTIPLE KILL VEHICLE** YUNTAO HUANG AND LIMAN YANG
9:40 - 10:00	ThA1.3	**DESIGN OF A COMPLIANT DELTA ROBOT FOR FLEXIBLE ASSEMBLY** JWU-SHENG HU, CHENG-HUA WU, YI-JENG TSAI, WEI-HAN WANG AND SHOU-WEI CHI	ThA2.3	**ACTIVE GAZE STRATEGY FOR REDUCING MAP UNCERTAINTY ALONG A PATH** MARTIM BRANDAO, KENJI HASHIMOTO AND ATSUO TAKANISHI
10:00 - 10:20	ThA1.4	**PRECISION ANALYSIS AND VERIFICATION OF A FIVE-BAR LINKAGE WITH COMPLIANT JOINTS** CHING-SHIN LIN AND JYH-JONE LEE	ThA2.4	**LOW BIT RATE SPEECH CODING FOR RESCUE ROBOTICS** XIAOLEI HAN AND FENG GAO
10:20 - 10:40	ThA1.5	**AN ACTIVE HANDHELD INSTRUMENT AIDED WITH VIRTUAL FIXTURES FOR REAL-TIME MICROMANIPULATION USING FUSION OF VISION AND INERTIAL SENSING** YAN NAING AYE, SU ZHAO, ZENAN WANG AND WEI TECH ANG	ThA2.5	**STATISTICAL ATLAS BASED 3D-2D REGISTRATION** KEYU WU AND HONGLIANG REN

Time	ThB1: Modeling and Analysis Session Chair: Yuo Tern Tsai Venue: LT9		ThB2: Locomotion and Gait Planning Session Chair: Kin Huat Low Session Co-chair: Trung Kien Dao Venue: LT10	
11:00 - 11:20	ThB1.1	**A STUDY OF RELIABILITY OPTIMIZATION DESIGN FOR ROBOTS BASED ON FINITE ELEMENT ANALYSIS** YT TSAI AND KH LIN	ThB2.1	**A HUMAN GAIT MODEL USING GRAPH-THEORETIC METHOD** TRUNG KIEN DAO AND VAN HIEP DAO
11:20 - 11:40	ThB1.2	**DESIGN OF A 4-LINK PLANAR STATICALLY BALANCED SERIAL MANIPULATOR WITH CHANGEABLE PAYLOAD** HUAN-HAO CHANG AND DAR-ZEN CHEN	ThB2.2	**NEURAL PATTERN GENERATION AND KINEMATICS CALCULATION FOR A HEXAPOD ROBOT'S ADAPTIVE LOCOMOTION CONTROL** GUANJIAO REN, WEIHAI CHEN AND JIANHUA WANG
11:40 - 12:00	ThB1.3	**ACCELERATION AND NONLINEAR OSCILLATIONS OF PARALLEL SPHERICAL MECHANISM** SERGEY KHEYLO, VICTOR GLAZUNOV AND THANH NGUYEN MINH	ThB2.3	**TROT GAIT DESIGN FOR BABY ELEPHANT ROBOT WITH SERIES CPG MODEL** JIAQI ZHANG AND FENG GAO
12:00 - 12:20	ThB1.4	**A COMPARATIVE STUDY ON THE CONPUTATIONAL EFFICIENCY OF SOME NUMERICAL METHODS FOR SOLVING THE INVERSE KINEMATICS OF REDUNDANT ROBOTS** NGUYEN VAN KHANG, NGUYEN PHONG DIEN AND LUONG ANH TUAN	ThB2.4	**EXPERIMENTAL INVESTIGATION ON MANEUVERABILITY OF A BIONIC FISH PROPELLED BY OSCILLATING PAIRED PECTORAL FINS** YEURI CAI, SHUSHENG BI AND K. H. LOW
12:20 - 12:40	ThB1.5	**SYNTHESIS OF MANIPULATORS THAT CAN REACH MULTIPLE SPECIFIED ISOTROPIC POSITIONS** K. Y. TSAI AND P. J. LIN	ThB2.5	**GAIT ANALYSIS AND MODELING OF ROBOTIC ORTHOSIS WITH BALANCE STABILIZER** LEI LI, K. H. HOON AND K. H. LOW

PRESENTATION LISTING: Friday, 4 October 2013

Time	FrA1: Mechanisms and Mechatronics Devices Session Chair: Yan Chen Session Co-chair: Massimo Sorli Venue: LT9		FrA2: Advanced Robotics Session Chair: Qilong Yuan Venue: LT10	
10:20 - 10:40	FrA1.1	**RECONFIGURATION IN LINKAGES BY VARIABLE ALLOCATION OF JOINT POSITIONS: A MODULAR DESIGN APPROACH** NICOLAS ROJAS, RAJESH ELARA MOHAN AND RICARDO SOSA	FrA2.1	**MODELING AND FORCE ANALYSIS OF A TASK-ORIENTED HAND-FINGERS REHABILITATION DEVICE FOR ROBOTICS THERAPY** YUNYUN HUANG AND K. H. LOW
10:40 - 11:00	FrA1.2	**BIFURCATION BEHAVIOR OF THE LINE-SYMMETRIC BRICARD LINKAGE WITHOUT OFFSETS** CHAOYANG SONG, YAN CHEN AND I-MING CHEN	FrA2.2	**DEVELOPMENT OF AN INTERACTIVE VIRTUAL SYSTEM FOR TREATMENT OF SELECTIVE MUTISM** TAN ANH KHOA PHAM AND I-MING CHEN
11:00 - 11:20	FrA1.3	**OPTIMIZATION OF REALIZATION OF STATIC BALANCING FOR AN ANTHROPOMORPHIC ROBOT** GIUSEPPE QUAGLIA AND ZHE YIN	FrA2.3	**CONTROL DESIGN OF HAPTIC DEVICE FOR MEDICAL APPLICATION** ABDELBADIÂ CHAKER, MED AMINE LARIBI, SAID ZEGHLOUL AND LOTFI ROMDHANE
11:20 - 11:40	FrA1.4	**DYNAMIC VIBRATION OF CLASS IV MECHANISM** SKANDERBEK JOLDASBEKOV AND YERBOL TEMIRBEKOV, A.A. JOMARTOV	FrA2.4	**DESIGN AND ADMITTANCE CONTROL FOR A HUMANOID MANIPULATOR TO ADAPT TO ENVIRONMENT** GAN MA, QIANG HUANG AND ZHANGGUO YU
11:40 - 12:00	FrA1.5	**ISWEC (INERTIAL SEA WAVE ENERGY CONVERTER): MODELING, CONTROL AND PRODUCTIVITY ANALYSIS** ERMANNO GIORCELLI, GIULIANA MATTIAZZO, MATTIA RAFFERO AND MASSIMO SORLI	FrA2.5	**A DESIGN OF NOVEL MANIPULATOR USING DISTRIBUTED ACTUATION MECHANISM** SUNG-HWAN KIM, KYUNG-SOO KIM AND SOOHYUN KIM
12:00 - 12:20	FrA1.6	**STUDY OF THE CONFIGURATION SPACE OF A MECHANISM FOR A THRUST VECTORING NOZZLE** STEFANO PASTORELLI, GIOVANNI JACAZIO AND MASSIMO SORLI	FrA2.6	**OPTIMAL WORKPLACEMENT FOR ROBOTIC FRICTION STIR WELDING TASK** ACHIN JAIN, JINNA QIN AND GABRIEL ABBA

Time	FrB1: Calibration Session Chair: Hongliang Ren Venue: LT9		FrB2: Motion Tracking and Localization Session Chair: Hong Luo Session Co-Chair: Albert Causo Venue: LT10	
13:30 - 13:50	FrB1.1	**POSE ESTIMATION OF A SIX DEGREES OF FREEDOM PIPE-BENDER USING A 3D-VISUAL MEASUREMENT SYSTEM OF HIGH ACCURACY** EDUARDO CASTILLO-CASTANEDA, YUKIO TAKEDA, SHOHEI KAWASUMI AND DAISUKE MATSUURA	FrB2.1	**WORKPIECE RE-LOCALIZATION FOR AUTOMATIC ROBOT PATH CORRECTION** HONG LUO, TECK CHEW NG AND GUILIN YANG
13:50 - 14:10	FrB1.2	**AUTOMATIC CALIBRATION OF A SURGICAL GUIDANCE ROBOT USING A 3D OPTICAL LOCATOR** MING JUNE TSAI, CHUN-LIN. CHEN, HONG-WEN LEE AND JIA-HONG. CHAO	FrB2.2	**A TRACKING METHOD USING ACTIVE UNIAXIAL SENSOR AND VARIABLE STEP SIZE SEARCHING STRATEGY** SHUANG SONG AND HONGLIANG REN
14:10 - 14:30	FrB1.3	**GEOMETRIC MODEL IDENTIFICATION OF A SERIAL ROBOT** RAJEEVLOCHANA G. CHITTAWADIGI, ABDULLAH AAMIR HAYAT AND SUBIR KUMAR SAHA	FrB2.3	**IMAGE FUSION AT PIXEL LEVEL OF THERMAL AND OPTICAL IMAGES FOR MOTION DETECTION** PATCHARANAN SRITANAUTHAIKORN AND NITIN AFZULPURKAR
14:30 - 14:50	FrB1.4	**TWIST-LOCK POSE ESTIMATION AND GRASPING BASED ON CAD MODEL** LIANDONG ZHANG, CHANGJIU ZHOU, XINYU HAN, SHUANG MA AND RONGHUA LI	FrB2.4	**FULL-BODY MOTION AND VELOCITY TRACKING BASED ON CONTACTS AND BODY KINEMATICS: A KENDO DEMONSTRATION** QILONG YUAN, I-MING CHEN, AND ALBERT CAUSO
14:50 - 15:10	FrB1.5	**REFORMULATION OF THE LOCAL POE FORMULA FOR ROBOT KINEMATIC CALIBRATION** GENLIANG CHEN, HAO WANG AND ZHONGQIN LIN	FrB2.5	**RESEARCH ON THE SWINGING DRIVING MODE BASED ON SLOPING UNIVERSAL WHEELS** XU PEI, SICHENG YANG, I-MING CHEN AND QILONG YUAN

INDUSTRIAL FORUM PROGRAM

DATE: 4 October 2013, Friday

VENUE: Lecture Theatre 3 (LT3), Nanyang Technological University

09:00 - 10:00	ISRM Keynote Speech: Enhancing Competitiveness through R&D in Manufacturing Technologies	Dr. Ser Yong Lim *Executive Director, SIMTech*
10:00 - 10:20	***Tea Break***	
10:20 - 10:25	Opening Remarks	Prof. I-Ming Chen (NTU) *ISRM General Chairman*
10:25 - 10:40	Introduction of A*STAR Industrial Robotics Program	Prof. Marcelo Ang (NUS) *Program Manager*
10:40 - 10:50	Interface for human-robot interaction	Dr. Haizhou Li (I2R)
10:50 - 11:00	Distributed sensing and perception	Prof. Sam Ge (NUS)
11:00 - 11:10	Manipulation & planning	Prof. Kin Huat Low (NTU)
11:10 - 11:30	Robotic Welding	Dr. Wei Lin (SIMTech)
11:30 - 12:20	**Panel Discussion I** (Industrial Robotics Technology & Applications) *Chairman: Prof. Marcelo Ang*	
12:20 - 13:30	***Lunch***	
13:30 - 13:40	Control of dynamic interaction between motion and force during contact	Prof. Marcelo Ang (NUS)
13:40 - 13:50	Adaptation: Task-oriented agile workcell	Prof. I-Ming Chen (NTU)
13:50 - 14:00	Robotic Finishing	Dr. Guilin Yang (SIMTech)
14:00 - 14:10	Robot application development and operating environment (RADOE)	Prof. Marcelo Ang (NUS)
14:10 - 14:20	Talk by Industrial Speaker	Mr. Wee Kwong Na (ST Engineering)
14:20 - 15:10	**Panel Discussion II** (Industrial Robotics Technology & Applications) *Chairman: Prof. Marcelo Ang*	
15:10 - 17:30	**Technical Tour:** NTU Robotics Research Center and SIMTech	
END		

TRANSPORTATION TO CONFERENCE SITE AT NTU

Shuttle Bus from Park Avenue Rochester Hotel to NTU

- Available on the morning of October 2, 3 and 4. Departure time from hotel will be available at the hotel, website, and the Secretariat Desk

Bus Stops inside NTU nearest to conference rooms:

a) **Lee Wee Nam Library (Bus 179)**
b) **Opposite Lee Wee Nam Library (Bus 199)**
c) **Administration Building (Taxi or Campus Rider Shuttle Bus)**

Option 1: TAXI

- It costs around SGD 40 to SGD 50 from airport to NTU, and around SGD 25 - SGD 35 from city centre to NTU
- Get off at the Administration Building (50 Nanyang Avenue).

Option 2: MRT (train) then take BUS 179 at Pioneer Station

- From anywhere in Singapore, get to the East West Line and take the train going to Joo Koon.
- Get off at Pioneer Station (EW28). Turn left as you exit the MRT ticket gates.

- Get down the stairs and take Bus 179 at the bus stops a few stops away from the food court.

- Get off at Lee Wee Nam Library

TRANSPORTATION TO CONFERENCE SITE AT NTU

Option 3: MRT (train) then take BUS 199 at Boon Lay Station

- From anywhere in Singapore, get to the East West Line and take the train going to Joo Koon.
- Get off at Boon Lay Station (EW27).
- Go to the Boon Lay bus interchange (it's inside the shopping mall) and take Bus 199.
- Get off at Opposite Lee Wee Nam Library and walk up the pedestrian overpass.

Option 4: MRT (train) then take NTU-Pioneer Shuttle Bus (a.k.a Campus Rider) at Pioneer Station

- From anywhere in Singapore, get to the East West Line and take the train going to Joo Koon.
- Get off at Pioneer Station (EW28). Turn right as you exit the MRT ticket gates. Get down the stairs.
- Take the Campus Rider at Block 649A (the bus stop at the base of the stairs).
- Get off at Administration Building.

ADMINISTRATION BUILDING (Get off here if you take taxi or the Shuttle Bus from Pioneer)

LT3 is behind the Tan Chin Tuan Lecture Theatre

(across from this blue building, Admin Building)

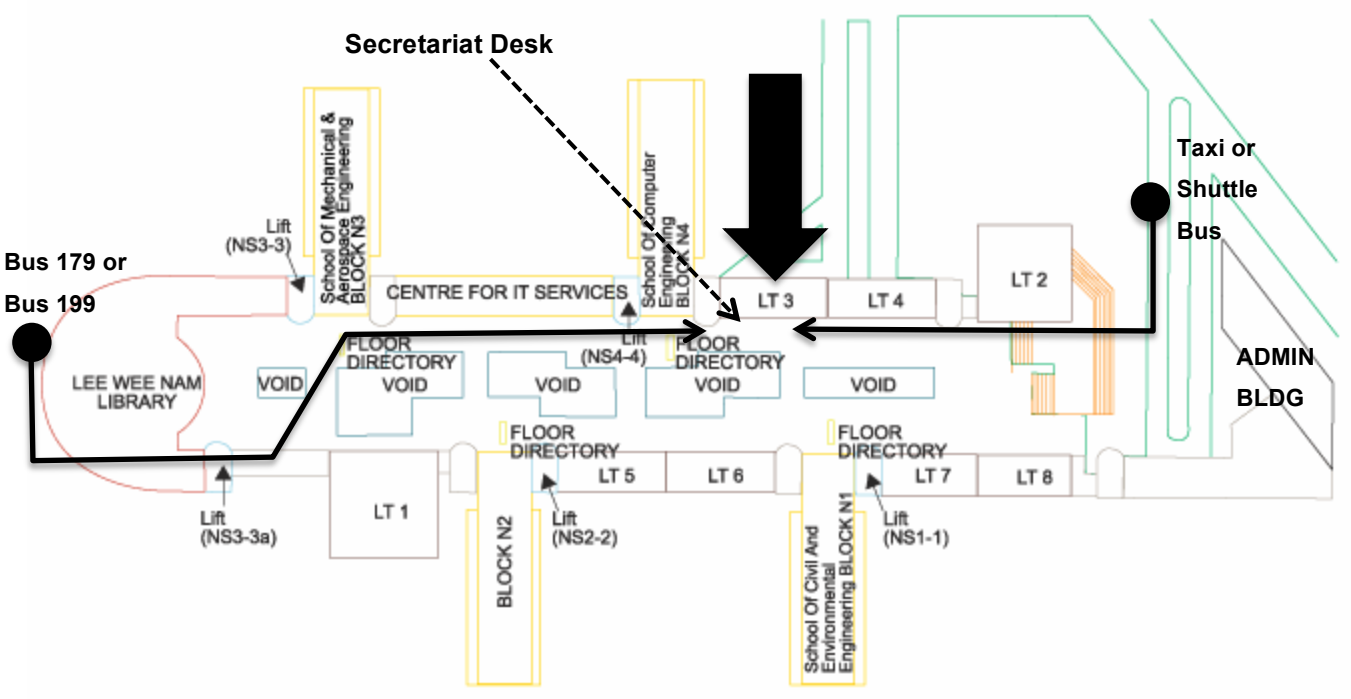
LT3 is behind the Tan Chin Tuan Lecture Theatre

(go up the stairs, follow the arrow)

MAP OF CONFERENCE SITE

The conference are organized in three lecture theatres (LT):

a) **LT3: Block NS4-02-32**
b) **LT9: Block NS4-04-39**
c) **LT10: Block NS4-04-41**



Floor plan of NS4, Level 2

View coming from Lee Wee Nam Library

View coming from Administration Building

SINGAPORE PRACTICAL INFORMATION

Time: GMT+8

Currency: SGD (Singapore Dollars)

Foreign currency and traveller cheques can be exchanged at the Changi International Airport, hotels, shops and licensed money changers. No commission is charged. Visitors are discouraged from changing money with unlicensed money changers.

Climate

Tropical climate with temperatures ranging from a low of 24◦C to a high of around 31◦C. Rainfall usually takes the form of sudden showers and storms.

Language

English is the common language spoken by all. Signs in Singapore are also written in English.

Electricity

Singapore uses the “Type G” (British 3-pin) electrical plug. Voltage is 230V, 50Hz.

Goods and Services (GST) Tax

When you shop in Singapore, a 7% Goods and Services (GST) Tax is applicable and is normally included in the price of items. Tourists may claim refund of GST paid on goods purchased from retailers participating in the Tourist Refund Scheme. GST is refundable if visitors spend a combined sum of at least S$100 from the same retailer, and the Refund Form should be obtained from the retailer. The goods must be taken out of Singapore within two months from the date of purchase. For more information, please visit www.globalrefund.com.

Useful Numbers

Police: 999

Ambulance/Fire Brigade: 995

Tourism

More information on Singapore can be found in http://www.visitsingapore.com.