

# Technical Program

## June 29 (Thu)

09:00-10:30 **[TA1]** Invited Talk 1 + Humanoid & Legged Robots

**Convention Hall A (1F)**

Chair: Kyoungchul Kong (Sogang Univ., Korea)  
Co-Chair: Jaeheung Park (Seoul Nat'l Univ., Korea)

**TA1-1** 09:00-09:30

**[Invited Talk 1] Consumer Robotics in the Age of Accelerations**

Paul Oh  
*UNLV, USA*

**TA1-2** 09:30-09:45

**Control Strategy for Stabilization of the Biped Trunk-SLIP Walking Model**

Minh Nhat Vu<sup>1,2</sup>, Jongwoo Lee<sup>1</sup> and Yonghwan Oh<sup>1,2</sup>  
<sup>1</sup>*Korea Institute of Science and Technology(KIST), Seoul, Korea,* <sup>2</sup>*University of Science and Technology(UST), Korea*

**TA1-3** 09:45-10:00

**Efficiency Improvement of a Robotic Leg using a Pneumatic-Electric Hybrid Actuation System**

Jungsoo Cho, Byeounghun Na, Kyoungchul Kong  
*Sogang University, Korea*

**TA1-4** 10:00-10:15

**Toward Deep Space Humanoid Robotics Inspired by the NASA Space Robotics Challenge**

Yoshimaru Tanaka<sup>1</sup>, Hyunhee Lee<sup>2</sup>, Dylan Wallace<sup>2</sup>, Youngbum Jun<sup>2</sup>, Paul Oh<sup>2</sup>, Masayuki Inaba<sup>1</sup>  
<sup>1</sup>*The University of Tokyo, Japan,* <sup>2</sup>*University of Nevada, USA*

**TA1-5** 10:15-10:30

**Kinematic design optimization of anthropomorphic robot hand using a new performance index**

Won Suk You, Young Hun Lee, Gitae Kang, Hyun Seok Oh, Joon Kyue Seo, Hyouk Ryeol Choi  
*Sungkyunkwan University, Korea*

09:00-10:30 **[TA2]** Culture-Aware Robots

**Amethyst Hall (2F)**

Chair: Jaeryoung Lee (Chubu Univ., Japan)  
Co-Chair: Yuto Lim (JAIST, Japan)

**TA2-1** 09:00-09:15

**Learning Social Relations for Culture Aware Interaction**

Pakpoom Patompak<sup>1</sup>, Sungmoon Jeong<sup>1</sup>, Itthisek Nilkhamhang<sup>2</sup>, Nak Young Chong<sup>1</sup>  
<sup>1</sup>*Japan Advanced Institute of Science and Technology, Japan,* <sup>2</sup>*Thammasat University, Thailand*

**TA2-2** 09:15-09:30

**Modelling the Influence of Cultural Information on Vision-Based Human Home Activity Recognition**

Roberto Menicatti, Barbara Bruno and Antonio Sgorbissa  
*University of Genova, Italy*

- TA2-3** 09:30-09:45  
**Audio-based Emotion Estimation for Interactive Robotic Therapy for Children with Autism Spectrum Disorder**  
Jonathan C. Kim<sup>1</sup>, Paul Azzi<sup>1</sup>, Myoungsoon Jeon<sup>2</sup>, Ayanna M. Howard<sup>3</sup>, and Chung Hyuk Park<sup>1</sup>  
<sup>1</sup>The George Washington University, USA, <sup>2</sup>Michigan Technological University, USA, <sup>3</sup>Georgia Institute of Technology, USA
- TA2-4** 09:45-10:00  
**Learning Human Behavior for Emotional Body Expression in Socially Assistive Robotics**  
Nguyen Tan Viet Tuyen, Sungmoon Jeong, Nak Young Chong  
Japan Advanced Institute of Science and Technology, Japan
- TA2-5** 10:00-10:15  
**The Influence of Robot Design on Acceptance of Social Robots**  
Jaclyn Barnes<sup>1</sup>, Maryam FakhrHosseini<sup>2</sup>, Myoungsoon Jeon<sup>1,2</sup>, Chung-Hyuk Park<sup>2</sup>, and Ayanna Howard<sup>3</sup>  
<sup>1</sup>Michigan Technological University, USA, <sup>2</sup>The George Washington University, USA, <sup>3</sup>Japan University, USA
- TA2-6** 10:15-10:30  
**Bridging Between universAAL and ECHONET for Smart Home Environment**  
Yuto LIM, Sin Yee LIM, Minh Dat NGUYEN, Cheng LI, Yasuo TAN  
Japan Advanced Institute of Science and Technology (JAIST), Japan

13:00-14:30 **[TB1]** Invited Talk 2 + Soft Robotics and Actuators

**Convention Hall A (1F)**

Chair: Kyujin Cho (Seoul Nat'l Univ., Korea)

Co-Chair: Cecilia Laschi (Scuola Superiore Sant'Anna, Pisa, Italy)

- TB1-1** 13:00-13:30  
**[Invited Talk 2] Soft Robotics: scientific questions, technological challenges and new robotics scenarios - Cecilia Laschi**  
Scuola Superiore Sant'Anna  
Pisa, Italy
- TB1-2** 13:30-13:45  
**Flexible and Highly Sensitive Multi-dimensional Strain Sensor with Intersecting Metal Nanowire Arrays**  
Kyun Kyu Kim, In Ho Ha and Seung Hwan Ko  
Seoul National University, Korea
- TB1-3** 13:45-14:00  
**Soft Robotics and Actuators**  
Kwang Hyun Han, Sinyoung Lee, Dongjun Shin  
Chung-Ang University, Korea
- TB1-4** 14:00-14:15  
**Development of Magnet Connection of Modular Units for Soft Robotics**  
Jun-Young Lee and Kyu-Jin Cho  
Seoul National University, Korea
- TB1-5** 14:15-14:30  
**Investigation on Repeatable and Consistent Direct Writing of Eutectic Gallium-indium (EGaln) and its Application to a Soft Sensor**  
Suin Kim, Wookeun Park, Joonbum Bae  
UNIST, Korea

13:00-14:30 **[TB2]** Mechanism Design and Control

**Jade Hall (2F)**

Chair: Hyunmin Do (KIMM, Korea)  
Co-Chair: Joono Cheong (Korea Univ., Korea)

- TB2-1** 13:00-13:15  
**Synthesis of Tendon Driven Mechanism by Null Basis Selection**  
Youngsu Cho, Joono Cheong  
*Korea University, Korea*
- TB2-2** 13:15-13:30  
**Development of Semi-Passive Biped Walking Robot Embedded with CPG-based Locomotion Control**  
Hirotatsu Suzuki, Jae Hoon Lee, and Shingo Okamoto  
*Ehime University, Japan*
- TB2-3** 13:30-13:45  
**Design of Soft Actuator using 3D-Printed Composite**  
Sung-Hyuk Song<sup>1,2</sup>, Sung-Hoon Ahn<sup>2</sup>, Cheol Hoon Park<sup>1</sup> and Young Su Son<sup>1</sup>  
<sup>1</sup>*Korea Institute of Machinery & Materials, Korea, <sup>2</sup>Seoul National University, Korea*
- TB2-4** 13:45-14:00  
**Evaluation of Artificial Muscle Using SMA Spring Bundle with High Load Capacity and Power Density**  
Cheol Hoon Park and Young Su Son  
*Korea Institute of Machinery & Materials, Korea*
- TB2-5** 14:00-14:15  
**Design of High Payload Dual Arm Robot with Modifiable Forearm Module depending on Mission**  
Hwi-Su Kim, Chan-Hun Park, Dong-il Park, Hyun-Min Do, Tae-Yong Choi, Doo-Hyung Kim and Jin-Ho Kyung  
*Korea Institute of Machinery & Materials, Korea*
- TB2-6** 14:15-14:30  
**Modeling and Control of Quadrotor UAV Subject to Variations in Center of Gravity and Mass**  
Sangheon Lee, Dipak Kumar Giri and Hungsun Son  
*UNIST, Korea*

15:50-17:35 **[TC1]** Invited Talk 3 + Emerging Trends in Robotics and Machine Learning with/for New Media **Convention Hall A (1F)**

Chair: Joo-Ho Lee (Ritsumeikan Univ., Japan)  
Co-Chair: Joo-Haeng Lee (ETRI, Korea)

- TC1-1** 15:50-16:20  
**[Invited Talk 3] Towards Assistive Robots Enabled by Autonomous Learning and Human Guidance**  
Dongheui Lee  
*TMU, Germany*
- TC1-2** 16:20-16:35  
**Correcting Aspect Ratio Distortion of Natural Images by Convolutional Neural Network**  
Ryuhei Sakurai, Sasuke Yamane, Joo-Ho Lee  
*Ritsumeikan University, Japan*
- TC1-3** 16:35-16:50  
**Reliable Multi-Person Identification Using DCNN-Based Face Recognition Algorithm and Scale-Ratio Method**  
Junghoon Kim<sup>1</sup>, Sang-Seok Yun<sup>2</sup>, Bong-Nam Kang<sup>3</sup>, Daijin Kim<sup>3</sup>, and Jongsuk Choi<sup>1</sup>  
*<sup>1</sup>Korea Institute of Science and Technology, Korea, <sup>2</sup>Silla University, Korea, <sup>3</sup>POSTECH, Korea*
- TC1-4** 16:50-17:05  
**An information addition system on books using a projector-camera**  
Koki Yoshida, Hirotake Yamazoe, and Joo-Ho Lee  
*Ritsumeikan University, Japan*
- TC1-5** 17:05-17:20  
**Synthetic Learning Set for Object Pose Estimation: Initial Experiments**  
Joo-Haeng Lee<sup>1,2</sup>, Woo-Han Yun<sup>1</sup>, Jaeyeon Lee<sup>1</sup>, Jaehong Kim<sup>1</sup>  
*<sup>1</sup>ETRI, Korea, <sup>2</sup>University of Science and Technology, Korea*
- TC1-6** 17:20-17:35  
**Application of Fuzzy Logic to Damping Controller for Safe Human-Robot Interaction**  
Nguyen Van Toan<sup>1,2</sup>, Jeong-Jung Kim<sup>1</sup>, Kang-Gyun Kim<sup>1</sup>, Woosub Lee<sup>1</sup> and Sungchul Kang<sup>1</sup>  
*<sup>1</sup>Korea Institute of Science and Technology, Korea, <sup>2</sup>University of Science and Technology, Korea*

15:50-17:35 **[TC2]** Control, Estimation, Medical Applications

**Jade Hall (2F)**

Chair: H. Jin Kim (Seoul Nat'l Univ., Korea)  
Co-Chair: Chunwoo Kim (KIST, Korea)

- TC2-1** 15:50-16:05  
**Dual Quaternion Based Kinematic Control for Yumi Dual Arm Robot**  
Jimin Liang<sup>1,2</sup>, Gong Zhang<sup>1</sup>, Weijun Wang<sup>1</sup>, Zhicheng Hou<sup>4</sup>, Jun Li<sup>1,3</sup>, Xiying Wang<sup>1,3</sup> and Chang-Soo Han<sup>4</sup>  
*<sup>1</sup>Chinese Academy of Science, China, <sup>2</sup>Shenzhen institutes of Advanced Technology, China, <sup>3</sup>Shaanxi University of Science & Technology, China, <sup>4</sup>Hanyang University, Korea*
- TC2-2** 16:05-16:20  
**Nonlinear Robust Control of Underwater Vehicle-Manipulator System Based on Time Delay Estimation**  
Yaoyao Wang<sup>1,2</sup>, Bai Chen<sup>1</sup>, Hongtao Wu<sup>1</sup>  
*<sup>1</sup>Nanjing University of Aeronautics and Astronautics, China, <sup>2</sup>Zhejiang University, China*
- TC2-3** 16:20-16:35  
**Learning Stable Dynamical Systems using Contraction Theory**  
Caroline Blocher<sup>2</sup>, Matteo Saveriano<sup>1</sup> and Dongheui Lee<sup>1</sup>  
*<sup>1</sup>Technical University of Munich, Germany, <sup>2</sup>Imperial College, UK*

- TC2-4** 16:35-16:50  
**Time-efficient Dense Visual 12-DoF State Estimator using RGB-D Camera**  
Changhyeon Kim, Sangil Lee, Pyojin Kim, H. Jin Kim  
*Seoul National University, Korea*
- TC2-5** 16:50-17:05  
**PCA-based Surgical Phases Estimation with a Multi-Camera System**  
Dinh Tuan Tran, Ryuhei Sakurai, Hirotake Yamazoe, Joo-Ho Lee  
*Ritsumeikan University, Japan*
- TC2-6** 17:05-17:20  
**Design Parameter Optimization of a Novel Serial Manipulator for Microsurgery**  
Byungchul An<sup>1</sup>, Woosub Lee<sup>2</sup>, Sungchul Kang<sup>2</sup>, Chunwoo Kim<sup>2</sup>  
*<sup>1</sup>Seoul National University, Korea, <sup>2</sup>Korea Institute of Science and Technology, Korea*
- TC2-7** 17:20-17:35  
**Head and shoulders pose estimation using a body-mounted camera**  
Hirotake Yamazoe  
*Ritsumeikan University, Japan*

17:30-19:00 **[P1]** Poster Session 1

**Grand Hall (1F)**

Chair: Hungsun Son (UNIST, Korea)

Co-Chair: Tan Tien Nguyen (Hochiminh City Univ. of Tech., Vietnam)

**P1-01~P1-10 Care and Monitoring by Robot**

- P1-01** **A Simple Method to Estimate the Impedance of the Human Hand for Physical Human-Robot Interaction**  
Kyeong Ha Lee<sup>1</sup>, Hyuk Jin Lee<sup>1</sup>, Junghoon Lee<sup>1</sup>, Sang-Hoon Ji<sup>2</sup>, Ja Choon Koo<sup>1</sup>  
*<sup>1</sup>Sungkyunkwan University, Korea, <sup>2</sup>KITECH, Korea*
- P1-02** **Application of Soar Cognitive Agent Based on Utilitarian Ethics Theory for Home Service Robots**  
Chien Van Dang, Tin Trung Tran, Ki-Jong Gil, Yong-Bin Shin, Jae-Won Choi, Geon-Soo Park and Jong-Wook Kim  
*Dong-A University, Korea*
- P1-03** **Automated psychophysical personality data acquisition system for human-robot interaction**  
Hyeonuk Bhin, Yoonseob Lim, Sungkee Park and Jongsuk Choi  
*Korea Institute of Science and Technology, Korea*
- P1-04** **Histogram based Fall Prediction of Patients using a Thermal Imagery Camera**  
Kyu-Seob Song, Young-Hoon Nho, and Dong-Soo Kwon  
*Korea Advanced Institute of Science and Technology, Korea*
- P1-05** **Learning Bowing Gesture with Motion Diversity by Dynamic Movement Primitives**  
Chan-Soon Lim, Dong-Soo Kwon  
*KAIST, Korea*
- P1-06** **Modeling and Simulation for the Human Workload Analysis in the Operation of Unmanned Ground Vehicles**  
Sang Yeong Choi, Kang Park  
*Myongji University, Korea*
- P1-07** **Recognition of SSMVEP signals based on multi-channel integrated GT2circ statistic method**  
Jun Xie, Xingliang Han, Guanghua Xu, Xiaodong Zhang, Min Li, Ailing Luo and Xiaoqi Mu  
*Xi'an Jiaotong University, China*

**P1-08**      **Robotic Solutions to Facilitate Studying Human Motor Control**  
Ahmed Ramadan<sup>1</sup>, Jongeun Choi<sup>1,2</sup>, Clark J. Radcliffe<sup>1</sup>, Jacek Cholewicki<sup>1</sup>, N. Peter Reeves<sup>1</sup> and John M. Popovich Jr.<sup>1</sup>  
*<sup>1</sup>Michigan State University, USA, <sup>2</sup>Yonsei University, Korea*

**P1-09**      **Simulation to Assess User Needs for the Development of a Bedside Robot**  
Hyeongsuk Lee<sup>1</sup>, Jeongeun Kim<sup>2</sup>, Sukwha Kim<sup>2</sup>, Jisan Lee<sup>2</sup>, Ahjung Byun<sup>2</sup>, Hyeongju Ryu<sup>2</sup>, and Hyoun-Joong Kong<sup>3</sup>  
*<sup>1</sup>Seoul Women's College of Nursing, Korea, <sup>2</sup>Seoul National University, Korea, <sup>3</sup>Chungnam National University College of Medicine, Korea*

**P1-10**      **User friendly podalic interface for light weighted wearable robot arm**  
Akimichi Kojima, Hirotake Yamazoe, Joo-ho Lee  
*Ritsumeikan University, Japan*

#### **P1-12~P1-17**      **Development of Modular Manipulation System Capable of Self-Reconfiguration of Control and Recognition System**

**P1-12**      **Connection Mechanism Capable of Genderless Coupling for Modular Manipulator System**  
Seonghun Hong<sup>1,2</sup>, Woosub Lee<sup>2</sup>, Kanggyun Kim<sup>2</sup>, Hyeongcheol Lee<sup>1</sup>, Sungchul Kang<sup>2</sup>  
*<sup>1</sup>Hanyang University, Korea, <sup>2</sup>Korea Institute of Science and Technology, Korea*

**P1-13**      **Development of a kinematics library creation software for the module based manipulator**  
Taeyong Choi, Hyunmin Do, Dongil Park, Jinho Kyung, Doohyung Kim, Youngsoo Son  
*Korea Institute of Machinery and Materials, Korea*

**P1-14**      **High Performance Stand-alone Structured Light 3D Camera for Smart Manipulators**  
Inzamam Anwar and Sukhan Lee  
*Sungkyunkwan University, Korea*

**P1-15**      **Kinematics of Variable Topology Truss Using Affine Coordinate Transformation**  
Yulai Weng, Mark Yim  
*University of Pennsylvania, USA*

**P1-16**      **Object recognition and pose estimation for modular manipulation system: overview and initial results**  
Woo-han Yun, Jaeyeon Lee, Joo-Haeng Lee, Jaehong Kim  
*Electronics and Telecommunications Research Institute, Korea*

**P1-17**      **Pick-and-place Task with Manipulator by Modular Approach**  
Jeong-Jung Kim<sup>1</sup>, Woosub Lee<sup>2</sup>, and Sungchul Kang<sup>2</sup>  
*<sup>1</sup>Korea Institute of Machinery and Materials (KIMM), Korea, <sup>2</sup>Korea Institute of Science and Technology (KIST), Korea*

#### **P1-18~P1-21**      **Disaster Response Robot Technology**

**P1-18**      **Development of FAROS (fire-proof drone) using an aramid fiber armor and air buffer layer**  
W.C. Myeong, K.Y. Jung, and H. Myung  
*KAIST, Korea*

**P1-19**      **Kinematic Analysis of Hydraulic Manipulators for a Disaster Response Robot**  
Eui-Jung Jung, Ju Hyun Kim, and Maolin Jin  
*Korea Institute of Robot and Convergence, Korea*

**P1-20**      **Path Planning using Flexible Region Sampling for Arbitrarily-Shaped Obstacles**  
Yeong Sang Park<sup>1</sup>, Ayoung Kim<sup>1</sup> and Young Sam Lee<sup>2</sup>  
*<sup>1</sup>KAIST, Korea, <sup>2</sup>Inha University, Korea*

**P1-21**      **SOC Estimation and BMS Design of Li-ion Battery Pack for Driving**  
Youngryul Kim<sup>1</sup>, Sunghyun Yun<sup>2</sup> and Junho Lee<sup>1</sup>  
*<sup>1</sup>JINWOO SMC Co.,Ltd., Korea, <sup>2</sup>Seoul University, Korea*

P1-22~P1-28, P2-09, P2-11, P2-23, P2-60 Field Robots

- P1-22**      **A survey on the formation control of multiple quadrotors**  
Zhicheng Hou<sup>1,2</sup>, Weijun Wang<sup>1</sup>, Gong Zhang<sup>1</sup>, Changsoo Han<sup>1,2</sup>  
*<sup>1</sup>Chinese Academy of Sciences, China, <sup>2</sup>Hanyang University, Korea*
- P1-23**      **Dual Expanded Guide Circle (Dual-EGC) Algorithm for Obstacle Avoidance of Remotely Operated Mobile Robot**  
Do-Hyeong Kim, Gon-Woo Kim  
*Chungbuk Nat'l University, Korea*
- P1-24**      **Lidar-guided Autonomous Landing of an Aerial Vehicle on a Ground Vehicle**  
Jonghwi Kim, Sangwook Woo, and Jinwhan Kim  
*KAIST, Korea*
- P1-25**      **Model Predictive Control of a Multi-Rotor with a Slung Load for Avoiding Obstacles**  
Clark Youngdong Son, Taewan Kim, Suseong Kim, and H. Jin Kim  
*Seoul National University, Korea*
- P1-26**      **Reactive Controller Synthesis for UAV Mission Planning**  
Kyunghoon Cho, Yunho Choi and Songhwa Oh  
*Seoul National University, Korea*
- P1-27**      **Report on Work in Progress of Small Insect Tracking System using Autonomous UAV**  
Quang Son Le, Jeongeun Kim, Jinsu Kim and Hyoung Il Son  
*Chonnam National University, Korea*
- P1-28**      **Towards a Variable Topology Truss for Shoring**  
Alexander Spinos and Mark Yim  
*University of Pennsylvania, USA*
- P2-09**      **Dynamic analysis on hexapedal water-running robot with compliant joints**  
HyunGyu Kim<sup>1</sup>, Yanheng Liu<sup>2</sup>, Kyungmin Jeong<sup>3</sup>, Metin Sitti<sup>1</sup>, and TaeWon Seo<sup>2</sup>  
*<sup>1</sup>Max Planck Institute, Germany, <sup>2</sup>Yeungnam University, Korea, <sup>3</sup>Korea Atomic Energy Research Institute, Korea*
- P2-11**      **Empirical study on gallop/trot gaits for water-running robot**  
Changmin Park, Jinkuk Kim, and TaeWon Seo  
*Yeungnam University, Korea*
- P2-23**      **Multi-body dynamics simulations of high speed transfer robots disposed between presses**  
Dong-Hwan Shin<sup>1</sup>, Sungho Jin<sup>1</sup>, Seonghun Lee<sup>1</sup>, Choong-Pyo Jeong<sup>1</sup>, Younghwan Song<sup>2</sup> and Woo-Young Jung<sup>1</sup>  
*<sup>1</sup>DGIST, Korea, <sup>2</sup>LOFA, Co. Ltd., Korea*
- P2-60**      **Mechanical analysis of mass drifts due to accelerations and decelerations of mobile platforms**  
Dong-Hwan Shin, Sungho Jin, Junhyung Bae, Choong-Pyo Jeong, Kel-Seh Lee and Woo-Young Jung  
*DGIST, Korea*

**P1-29~P1-35, P2-74 Force Control and Haptics**

- P1-29**      **A Study for Estimating Reaction Force of Robot Arm by Using PDSP0**  
Hyun Hee Kim<sup>1</sup>, Sun Oh Park<sup>1</sup>, Jin Ho Kyung<sup>2</sup>, Hyun Min Do<sup>2</sup> and Min Cheol Lee<sup>1</sup>  
*<sup>1</sup>Pusan National University, Korea, <sup>2</sup>Korea Institute of Machinery and Materials, Korea*
- P1-30**      **An Approach for Fuzzy Control of Elderly-assistant & Walkingassistant Robot**  
Huanjie Han, Xiaodong Zhang, Xiaoqi Mu  
*Xi'an Jiao tong University, China*
- P1-31**      **Design of a Miniature 6-Axis Force/Torque Sensor for Robotic Applications**  
Uiikyum Kim, Yong Bum Kim, Jinho So, and Hyouk Ryeol Choi  
*Sungkyunkwan University, Korea*
- P1-32**      **Flexible Force Sensor Based Input Device for Gesture Recognition Applicable to Augmented and Virtual Realities**  
Jinyong Kim<sup>1,2</sup>, Yeon Hwa Kwak<sup>2</sup>, Wonhyo Kim<sup>2</sup>, Kwangbum Park<sup>2</sup>, James Jungho Pak<sup>1</sup> and Kunnyun Kim<sup>2</sup>  
*<sup>1</sup>Korea University, Korea, <sup>2</sup>Korea Electronics Technology Institute, Korea*
- P1-33**      **Design of Force Support Device for Human Ankle Joint**  
Nguyen Duc Chinh, Pham Nhat Tan, Chu Ba Long and Nguyen Tan Tien  
*Ho Chi Minh City University of Technology, Vietnam*
- P1-34**      **Virtual Ground Robot for Balance Control**  
Hyunwook Lee, Sehoon Oh  
*DGIST (Daegu Gyeongbuk Institute of Science and Technology), Korea*
- P1-35**      **Versatile Vision-based Touch Sensor for Autonomous Robots**  
Angela Faragasso, Atsushi Yamashita and Hajime Asama  
*The University of Tokyo, Japan*
- P2-74**      **Bilateral Control of Hydraulic Servo System for End-Effector of Master-Slave Manipulators**  
Karam Dad Kallu, Saad Jamshed Abbasi and Min Cheol Lee  
*Pusan National University, Korea*

**P1-36~P1-39 Haptics**

- P1-36**      **Conceptual Design of a Kinesthetic Rotary Dial**  
In-Ho Yun and Sang-Youn Kim  
*Korea University of Technology and Education, Korea*
- P1-37**      **Haptic Texture Rendering Using Random Fractal Surface**  
Seongwon Cho, Sunghwan Shin and Seungmoon Choi  
*POSTECH, Korea*
- P1-38**      **Perceptual Thresholds for Haptic Texture Discrimination Discrimination**  
Waseem Hassan, Arsen Abdulali, Seokhee Jeon  
*Kyung Hee University, Korea*
- P1-39**      **Design and Testing of a New Radial Pulsation Simulator**  
Tae-Heon Yang<sup>1</sup>, Young-Min Kim<sup>2</sup> and Sam-Yong Woo<sup>1</sup>  
*<sup>1</sup>KRISS, Korea, <sup>2</sup>KIOM, Korea*



**P1-40~P1-45 Humanoid**

- P1-40**      **Case studies of a industrial dual-arm robot application**  
GukHwa Kim, JooHan Park, TaeYong Choi, HyunMin Do, DongIl Park, JinHo Kyung  
*Korea Institute of Machinery and Materials, Korea*
- P1-41**      **Design of Biped Walking Gait on Biped Robot**  
Anh Nguyen Van Tien, Hoai Quoc Le, Thien Phuc Tran, and Tan Tien Nguyen  
*Hochiminh City University of Technology, Vietnam*
- P1-42**      **Foot Angle Determination for Efficient Heel-Toe Walking**  
SeungMin Lee<sup>1</sup>, Beomyeong Park<sup>2</sup>, and Jaeheung Park<sup>2,3</sup>  
*<sup>1</sup>Kwangwoon University, Korea, <sup>2</sup>Seoul National University, Korea, <sup>3</sup>Advanced Institutes of Convergence Technology, Korea*
- P1-43**      **Optimal Control for Stable Walking Gait of a Biped Robot**  
Nhat Dang Khoa Nguyen, Ba Long Chu, Van Tien Anh Nguyen, Van Hien Nguyen and Tan Tien Nguyen  
*Hochiminh City Univ. of Technology, Vietnam*
- P1-44**      **Study on Whole Body Motion Planner of Humanoid Robot**  
Hwan-Joo Kwak<sup>1</sup>, and Dong W. Kim<sup>2</sup>  
*<sup>1</sup>Hyundai Autron Co.,Ltd, Korea, <sup>2</sup>Inha Technical College, Korea*
- P1-45**      **Towards Tasking Humanoids for Lift-and-Carry non-rigid Material**  
Jean Chagas Vaz, Hyunhee Lee, Youngbum Jun, and Paul Oh  
*University of Nevada Las Vegas (UNLV), USA*

**P1-46~P1-49 Intelligence and Its Applications for Robotics**

- P1-46**      **Simulation of Design Conditions of Logistics Robot Transferring Heavy Load**  
Seung Young Yang, Yeon Gil Kim Young-Jae Ryoo and Kyung Seok Byun  
*Mokpo National University, Korea*
- P1-47**      **A Fuzzy-PD Controller for an Autonomous Aerial Robot**  
Do Khac Tiep<sup>1</sup>, Kinam Lee<sup>1</sup>, Young-Jae Ryoo<sup>1</sup>, Si Jung Kim<sup>2</sup>  
*<sup>1</sup>Mokpo National University, Korea, <sup>2</sup>University of Nevada, USA*
- P1-48**      **Design of HF-band RFID Antenna for Automated Guided Vehicular Robot**  
Sang Ho Kim<sup>1,2</sup>, Dae Young Lim<sup>1</sup>, Young Jae Ryoo<sup>2</sup>  
*<sup>1</sup>Korea Institute of Industrial Technology, Korea, <sup>2</sup>Mokpo University, Korea*
- P1-49**      **A Rule-based Context Transforming Model for Robot Services in Internet of Things Environment**  
Jihye Oh, Yoosang Park, Jongsun Choi, and Jaeyoung Choi  
*Soongsil University, Korea*

**P1-50~P1-53 Localization**

- P1-50**      **A Simple Path Planning for Automatic Guided Vehicle in Unknown Environment**  
Huy Hung Nguyen<sup>1</sup>, Dae Hwan Kim<sup>1</sup>, Chang Kyu Kim<sup>1</sup>, Hyuk Yim<sup>2</sup>, Sang Kwun Jeong<sup>3</sup>, Sang Bong Kim<sup>1</sup>  
*<sup>1</sup>Pukyong National University, Korea, <sup>2</sup>Nsquare Co., Ltd., Korea, <sup>3</sup>Korea Polytechnics, Korea*
- P1-51**      **Place Recognition based on Surface Graph for a Mobile Robot**  
Hyejun Yu, Hee-Won Chae and Jae-Bok Song  
*Korea University, Korea*
- P1-52**      **Preliminary Results on Three Dimensional Localization of Underwater Acoustic Sources**  
Jinwoo Choi, Hyun-Taek Choi  
*Korea Research Institute of Ships and Ocean Engineering, Korea*
- P1-53**      **Robust Quadrilateral Detection Method for Using Rectangle Feature**  
Eun-Sung Yang, Gon-Woo Kim  
*Chungbuk Nat'l University, Korea*

**P1-54~P1-66, P2-25 Motion Control and Actuator Design**

- P1-54**      **A Robust Control for a Nuclear Dismantling Robot Based on SMCSP0**  
Wang Jie, Yoon Jin Gon and Min Cheol Lee  
*Pusan National University, Korea*
- P1-55**      **Connecting Motion Control Mobile Robot and VR content**  
Byeong-Hyeon Moon, Jae-Won Choi, Kun-Tak Jung, Dong-Hyun Kim, Hyun-Jeong Song, Ki-Jong Gil,  
and Jong-Wook Kim  
*Dong-A University, Korea*
- P1-56**      **Continuous Terminal Sliding Mode Control with Perturbation Estimation for a Stewart Platform**  
Tuan Anh Luong , Sungwon Seo, Jeongmin Jeon, Jeongyeol Park, Ja Choon Koo, Hyouk Ryeol Choi, Hyungpil Moon  
*Sungkyunkwan University, Korea*
- P1-57**      **Design of Recirculation System and Re-valve for Increasing the Compressing Efficiency**  
S.Y Lee, K.H Han and D. Shin  
*Chung-Ang University, Korea*
- P1-58**      **Development of 3D Printing Simulator Nozzle System Using PID Control for Building Construction**  
Chi Youn Park, Min Gyu Jung, Hwan Young Kim and Min Cheol Lee  
*Pusan National University, Korea*
- P1-59**      **Development of an Omni-Directional Mobile Base Utilizing Spherical Robots as Wheels**  
Dong-Young Kim, Jung-Hee Kim, and Doik Kim  
*KIST, Korea*
- P1-60**      **Input-output Force Transmission Characteristics for the 3T1R Cable-driven Parallel Mechanism**  
Tae Woo Hong<sup>1</sup>, Byung-Ju Yi<sup>2</sup> and Wheekuk Kim<sup>1</sup>  
*<sup>1</sup>Korea University, Korea, <sup>2</sup>Hanyang University, Korea*
- P1-61**      **Motion Generation Algorithm Considering Internal and External Impulses for Soccer Application**  
Abid Imran and Byung-Ju Yi  
*Hanyang University, Korea*
- P1-62**      **Multiple Concurrent Operations and Flexible Robotic Picking for Manufacturing Process Environments**  
Sangseung Kang and Kyekyung Kim  
*ETRI, Korea*

- P1-63**      **Novel 3D Magnetic Tweezer System for Microswimmer Manipulations**  
Xiao Zhang, Hoyeon Kim, Louis W. Rogowski, Samuel Sheckman, and Min Jun Kim  
*Southern Methodist University, USA*
- P1-64**      **Optimal Impedance Control for an Elbow Rehabilitation Robot**  
Runze Wang, Jinhua Zhang and Zhihui Qiu  
*Xian Jiaotong University, China*
- P1-65**      **Path Following Control of Nonlinear Bicycle Model using Online Learning**  
Seungjoon Lee, Taewan Kim, H. Jin Kim  
*Seoul National University, Korea*
- P1-66**      **Using Current Sensing method and Fuzzy PID Controller for Slip Phenomena Estimation and Compensation of Mobile Robot**  
Dong-Eon Kim, Ha-Neul Yoon, Ki-Seo Kim, Sreejith M.S and Jang-Myung Lee  
*Pusan National University, Korea*
- P2-25**      **Torque Transmissibility of Compact Planetary Geared Elastic Actuator**  
Chan Lee, Su-Hui Kwak and Sehoon Oh  
*DGIST, Korea*

**P1-67~P1-73**      **Recognition and Intelligence**

- P1-67**      **Autonomous Lane Keeping Based on Approximate Q-learning**  
Jonggu Lee, Taewan Kim, H. Jin Kim  
*Seoul National University, Korea*
- P1-68**      **Classification of Rock-Paper-Scissors using Electromyography and Multi-Layer Perceptron**  
Taeho Gang, Younggil Cho and Youngjin Choi  
*Hanyang University, Korea*
- P1-69**      **Combining Single-Channel EEG Measurement and Verbal Fluency Test - A Groundwork for Ambulatory Diagnosis of Dementia**  
Je-Eon Lee<sup>1</sup>, Jaeho Park<sup>1</sup> and Sujeong You<sup>2</sup>  
*<sup>1</sup>Korean Minjok Leadership Academy, Korea, <sup>2</sup>Korea Institute of Industrial Technology, Korea*
- P1-70**      **Controlling Bicycle Using Deep Deterministic Policy Gradient Algorithm**  
Le Pham Tuyen, TaeChoong Chung  
*Kyung Hee University, Korea*
- P1-71**      **The Library for Grasp Synthesis & Robot Simulation**  
Jongwoo Park, Chan-Hun Park, Dong-il Park and Hwi-su Kim  
*Korea Institute of Machinery & Materials, Korea*
- P1-72**      **Three-link Planar Arm Control Using Reinforcement Learning**  
Wonchul Kim, Taewan Kim, H. Jin Kim, Sungwan Kim  
*Seoul National University, Korea*
- P1-73**      **Automatic Topic-based CF Recommendation Method Considering Subject Similarity**  
KyoungJu Noh, KyungDuk Moon and HyunTae Jeong  
*Electronics and Telecommunications Research Institute, Korea*

**P1-74~P1-78 Sensor**

- P1-74**      **High Stiffness Capacitive Type Torque Sensor with Flexure Structure for Cooperative Industrial Robots**  
Jong-In Kim, Hyeong-Seok Jeon, Yong-Jun Jeong and Yong-Jae Kim  
*KoreaTech, Korea*
- P1-75**      **Optimal Design of PPG Sensor Case Geometry to Improve Sensitivity**  
JaeHyung Jang, Gi-Hun Yang  
*Korea Institute of Industrial Technology, Korea*
- P1-76**      **Scalar Field Reconstruction Based on the Gaussian Process and Adaptive Sampling**  
Porsteinn B. Jónsson, Jeonghyeon Wang and Jinwhan Kim  
*KAIST, Korea*
- P1-77**      **The Honey Bee Initiative - Smart Hive**  
Daniel M. Lofaro  
*George Mason University, USA*
- P1-78**      **Two-DOF Orientation Measurement System for a Magnet with Single Magnetic Sensor and Neural Network**  
Junguk Kim and Hungsun Son  
*UNIST, Korea*

**P1-79~P1-85 Telerobotics**

- P1-79**      **Design of a Remote Control System for Maintaining and Repairing Tasks in NPP**  
Hocheol Shin, You-rak Choi and Chang-hoi Kim  
*Korea Atomic Energy Research Institute, Korea*
- P1-80**      **Development of Shared Autonomy and Virtual Guidance Generation System for Human interactive Teleoperation**  
Kwang-Hyun Lee, Vitalii Pruks and Jee-Hwan Ryu  
*KOREATECH, Korea*
- P1-81**      **Development of VR Visualization System including Deep Learning Architecture for Improving Teleoperability**  
Kyunghwan Cho, Kwangun Ko, Heereen Shim and Inhoon Jang  
*Korea Institute of Industrial Technology, Korea*
- P1-82**      **Experimental Evaluation of Passivity-Based Control of Manipulator-Stage System on Flexible Beam**  
Changsu Ha, Hackchan Kim, and Dongjun Leey  
*Seoul National University, Korea*
- P1-83**      **Preliminary User Evaluation of Inaccuracy in Haptic Guidance for Teleoperated Maintenance Task of Nuclear Power Plant**  
Hyunjin Lee, Chanyoung Ju, Sungjun Park, Sangsoo Park and Hyoung Il Son  
*Chonnam National University, Korea*
- P1-84**      **Singularity Avoidance in Teleoperation System through Force Feedback of Master Device**  
JiWoong Han, Gi-Hun Yang  
*Korea Institute of Industrial Technology, Korea*
- P1-85**      **Study on Measure to Shorten Work Time, Through the Haptic Device in Teleoperation System**  
KyuSang Choi, SeukWoo Ryu, Gi-Hun Yang  
*Korea Institute of Industrial Technology, Korea*

**P1-86~P1-93 Vision**

- P1-86**      **3D Face Recognition via Discriminative Keypoint Selection**  
Jiwhan Kim<sup>1</sup>, Dongyoon Han<sup>1</sup>, Wonjun Hwang<sup>2</sup>, and Junmo Kim<sup>1</sup>  
*<sup>1</sup>Korea Advanced Institute of Science and Technology, Korea, <sup>2</sup>Ajou University, Korea*
- P1-87**      **A Calibration Algorithm of the Structured Light Vision for the Arc Welding Robot**  
Wen-Bo Li, Guang-Zhong Cao, Jun-Di Sun, Yu-Xin Liang and Su-Dan Huang  
*Shenzhen University, China*
- P1-88**      **Convolutional Neural Network-Based Spacecraft Attitude Control for Docking Port Alignment**  
Sang-Hyeon Kim, Han-Lim Choi  
*KAIST, Korea*
- P1-89**      **Learning Similarity Metric for Comparing RGB-D Image Patches by CNN**  
Ju-Hwan Seo, Dong-Soo Kwon  
*Korea Advanced Institute of Science and Technology, Korea*
- P1-90**      **Multi-view Image Rectification with Inter- and Intra-disparity Consistency Constraints**  
Ju Hong Yoon, Min-Gyu Park, and Youngbae Hwang  
*Korea Electronics Technology Institute, Korea*
- P1-91**      **Precise Pose Estimation Using Landmark Feature Extraction And Blob Analysis for Bin Picking**  
Jihyeong Pyo<sup>1</sup>, JAEMIN CHO<sup>1</sup>, Sangseung Kang<sup>2</sup>, Kyekyung Kim<sup>2</sup>  
*<sup>1</sup>Korea University of Science and Technology, Korea, <sup>2</sup>Electronics and Telecommunications Research Institute, Korea*
- P1-92**      **Precise Object Detection Using Local Feature for Robot Manipulator**  
JAE MIN CHO<sup>1</sup> and KyeKyung Kim<sup>2</sup>  
*<sup>1</sup>Korea University of Science and Technology, Korea, <sup>2</sup>ETRI, Korea*
- P1-93**      **Selecting Poses of Multiple Cameras for a Panoramic View System of a Fire Fighting Vehicle**  
Kwangmu Shin, Jun-Sik Kim, Doik Kim  
*Korea Institute of Science and Technology, Korea*

# Technical Program

## June 30 (Fri)

09:00-10:30 **[FA1]** Invited Talk 4 + Navigation

**Convention Hall A (1F)**

Chair: Gao Rui (Nat'l Univ. of Singapore, Singapore)  
Co-Chair: Jinwhan Kim (KAIST, Korea)

- FA1-1** 09:00-09:30  
**[Invited Talk 4]** 3D perception for Robotics in Large-scale Structure Manufacturing  
Jing Xu  
*Tsinghua Univ., China*
- FA1-2** 09:30-09:45  
**Towards Accurate Kidnap Resolution Through Deep Learning**  
Kent Sommer, Keonhee Kim, Youngji Kim, Sungho Jo  
*KAIST, Korea*
- FA1-3** 09:45-10:00  
**Navigation and Mapping for Visual Inspection of Underwater Structures using an AUV**  
Seonghun Hong, Dongha Chung, and Jinwhan Kim  
*KAIST, Korea*
- FA1-4** 10:00-10:15  
**On Distributed Processing for Underwater Cooperative Localization**  
Gao Rui and Mandar Chitre  
*National University of Singapore, Singapore*
- FA1-5** 10:15-10:30  
**Swimming in Synthetic Mucus**  
Louis W. Rogowski, Hoyeon Kim, Xiao Zhang, Samuel Sheckman, Daehee Kim, and Min Jun Kim  
*Southern Methodist University, USA*

09:00-10:30 **[FA2]** Disaster Response Robot Technology

**Jade Hall (2F)**

Chair: Jin-ho Suh (KIRO, Korea)  
Co-Chair: Hyun Myung (KAIST, Korea)

- FA2-1** 09:00-09:15  
**Fog Degree Measurement based on Local Contrast and Color Similarity**  
Geun-min Lee, Wonha Kim  
*Kyunghee University, Korea*
- FA2-2** 09:15-09:30  
**A Study on the Disaster Response Scenarios using Robot Technology**  
Oh SeungSub, Hahm Jehun, Jang Hyunjung, Lee Soyeon, Suh Jinho  
*Korea Institute of Robot & Convergence, Korea*
- FA2-3** 09:30-09:45  
**Diachronic Visualization Simulation for Disaster Accident Management Using Robotic System**  
Dong Yeop Kim, Yo Han Jung, Young-Ouk Kim, and Jung-Hoon Hwang  
*Korea Electronics Technology Institute (KETI), Korea*

- FA2-4** 09:45-10:00  
**A High Voltage GaN Impulse Generator for Human Detection UWB Radar Sensor**  
Kisu Kim, Sungdo Kim, Munyang Park, Janghong Choi, Bontae Koo, Piljae Park  
*Electronics and Telecommunications Research Institute (ETRI), Korea*
- FA2-5** 10:00-10:15  
**Light Condition Invariant Visual SLAM via Entropy based Image Fusion**  
Joowan Kim and Ayoung Kim  
*KAIST, Korea*
- FA2-6** 10:15-10:30  
**Adaptive gain back-stepping sliding mode control for Electrohydraulic servo system with uncertainties**  
Duc Thien Tran, Keunhui Jeong, Giho Jun, Jinho Suh(KIRO), Maolin Jin(KIRO), and Kyoung Kwan Ahn  
*University of Ulsan, Korea*

09:00-10:15 **[FA3]** Medical Robots

**Amethyst Hall (2F)**

Chair: Chunwoo Kim (KIST, Korea)

Co-Chair: W. Jong Yoon (Univ. of Washington, USA)

- FA3-1** 09:00-09:15  
**On the Use of General-purpose Serial-link Manipulators in Eye Surgery**  
Yushiro Tomiki, Murilo M. Marinho, Yusuke Kurose, Kanako Harada, and Mamoru Mitsuishi  
*The University of Tokyo, Japan*
- FA3-2** 09:15-09:30  
**Development of Epiduroscopy Training Simulator Using Haptic Master Device**  
Junho Ko, Seong-wook Jang and Yoon Sang Kim  
*Korea University of Technology and Education (KOREATECH), Korea*
- FA3-3** 09:30-09:45  
**Endoscopic Endonasal Skull Base Surgery System**  
Seongil Kwon<sup>1,2</sup>, Wooseok Choi<sup>2</sup>, Geunwoong Ryu<sup>1,2</sup>, Sungchul Kang<sup>2</sup>, Keri Kim<sup>2</sup>  
*<sup>1</sup>University of Science and Technology, Korea, <sup>2</sup>Korea Institute of Science and Technology, Korea*
- FA3-4** 09:45-10:00  
**Telesurgery System Using Surgical Master Device Type of 3PUU**  
SeukWoo Ryu and Gi-Hun Yang  
*Korea Institute of Industrial Technology, Korea*
- FA3-5** 10:00-10:15  
**Design and Verification of a Flexible Device for Steering a Tethered Capsule Endoscope in the Stomach**  
Xianming Ye<sup>1</sup>, John-John Cabibihan<sup>2</sup>, W. Jong Yoon<sup>3</sup>  
*<sup>1</sup>Keystar Intelligence Robot Co., Ltd., China, <sup>2</sup>Qatar University, Qatar, <sup>3</sup>University of Washington, USA*

13:00-14:30 **[FB1]** Invited Talk 5 + Teleoperated Systems

**Convention Hall A (1F)**

Chair: Kuniaki Kawabata (Japan Atomic Energy Agency, Japan)  
Co-Chair: Jeakweon Han (Hanyang Univ., Korea)

**FB1-1** 13:00-13:30

**[Invited Talk 5] Culturally Competent Robots for Elderly Care**

Nak Young Chong  
*JAIST, Japan*

**FB1-2** 13:30-13:45

**Coupling Virtual Reality and Motion Platforms for Snowboard Training**

Blake Hament, Alex Cater, Paul Y. Oh  
*University of Nevada Las Vegas, USA*

**FB1-3** 13:45-14:00

**Development of a Robot Simulation System for Remotely Operated Robots for Operator Proficiency Training and Robot Performance Verification**

Kuniaki Kawabata, Kenta Suzuki, Mitruru Isowa, Kazunori Horiuchi and Rintaro Ito  
*Naraha Remote Technology Development Center, Japan*

**FB1-4** 14:00-14:15

**Communication System of a Segmented Rescue Robot Utilizing Socket Programming and ROS**

Seona Shin, Dongkuk Yoon, Hyunjong Song, Baekseok Kim and Jeakweon Han  
*Hanyang University, Korea*

**FB1-5** 14:15-14:30

**Utilizing the Android Robot Controller for Robots, Wearable Apps, and the Hotel Room of the Future**

Daniel M. Lofaro  
*George Mason University, USA*

13:00-14:30 **[FB2]** Rehabilitation Robotics

**Jade Hall (2F)**

Chair: Hyung-soon Park (KAIST, Korea)  
Co-Chair: Won-Kyung Song (Nat'l Rehabilitation Center, Korea)

**FB2-1** 13:00-13:15

**Gait pattern analysis using an end-effector type rehabilitation robot and a wearable inertial measurement unit**

Suncheol Kwon and Won-Kyung Song  
*National Rehabilitation Center, Korea*

**FB2-2** 13:15-13:30

**Design of a Wearable Hand Exoskeleton System for Evaluation of Hand Functions**

Jeongsoo Lee, Suin Kim, Wookeun Park, Joonbum Bae  
*UNIST, Korea*

**FB2-3** 13:30-13:45

**Improvement of Upper Extremity Rehabilitation Robotic Exoskeleton, NREX**

Won-Kyung Song and Jun-Yong Song  
*National Rehabilitation Center, Korea*

**FB2-4** 13:45-14:00

**On Limb Multi-Joint/DOF Mechanical Impedance Estimation toward Clinical Use**

Sang Hoon Kang<sup>1,2</sup> and Hyun Kyeong Jo<sup>1</sup>  
<sup>1</sup>UNIST, Korea, <sup>2</sup>Northwestern University, United States



**FB2-5** 14:00-14:15  
**Development of Shoulder Rehabilitation Robot for Natural Shoulder Movement**  
Hyung-Soon Park, Kyoung-Soub Lee and Jeong-Ho Park  
*KAIST, Korea*

**FB2-6** 14:15-14:30  
**Towards Subject-Specific Lower Limb Smart Robotic Intervention: Features, Efficacies, and Translation into Clinical Studies**  
Song Joo Lee  
*KIST, Korea*

13:00-14:30 **[FB3] Non-invasive Medical Systems**

**Amethyst Hall (2F)**

Chair: Deukhee Lee (KIST, Korea)

Co-Chair: Norihiro Koizumi (The Univ. of Electro-Communications, Japan)

**FB3-1** 13:00-13:15  
**A study for non-rigid 2x2D-3D registration of coronary artery images using bifurcation points matching with bi-plane x-ray fluoroscopy.**  
Siyeop Yoon<sup>1,2</sup>, Jinwon Son<sup>1</sup>, Youngjun Kim<sup>1,2</sup>, Sehyung Park<sup>1</sup> and Deukhee Lee<sup>1,2</sup>  
*<sup>1</sup>Korea Institute of Science and Technology, Korea, <sup>2</sup>Korea University of Science and Technology, Korea*

**FB3-2** 13:15-13:30  
**Development of Master-Slave Robotic System for Teleoperated Ultrasonography**  
Jang Ho Cho, Joonho Seo, and Hyun Soo Woo  
*KIMM, Korea*

**FB3-3** 13:30-13:45  
**An automatic templates selection method for ultrasound guided tumor tracking**  
Ryosuke Kondo<sup>1</sup>, Norihiro Koizumi<sup>1</sup>, Kyohei Tomita<sup>1</sup>, Yu Nishiyama<sup>1</sup>, Hidenori Sakanashi<sup>2</sup>, Hiroyuki Fukuda<sup>3</sup>, Hiroyuki Tsukihara<sup>4</sup>, Kazushi Numata<sup>3</sup>, Mamoru Mitsuishi<sup>4</sup>, Yoichiro Matsumoto<sup>4</sup>  
*<sup>1</sup>The University of Electro-Communications, Japan, <sup>2</sup>National Institute of Advanced Industrial Science and Technology, Japan, <sup>3</sup>Yokohama City University Medical Center, Japan, <sup>4</sup>The University of Tokyo, Japan*

**FB3-4** 13:45-14:00  
**A Study for Tracking Focal Lesions in Non-invasive Ultrasound Theragnostic System**  
Kyohei Tomita<sup>1</sup>, Norihiro Koizumi<sup>1</sup>, Atsushi Kayasuga<sup>2</sup>, Yu Nishiyama<sup>1</sup>, Hiroyuki Tsukihara<sup>2</sup>, Hideyo Miyazaki<sup>2</sup>, Kiyoshi Yoshinaka<sup>3</sup>, Mamoru Mitsuishi<sup>2</sup>  
*<sup>1</sup>The University of Electro-Communications, Japan, <sup>2</sup>The University of Tokyo, Japan, <sup>3</sup>The National Institute of Advanced Industrial Science and Technology, Japan*

**FB3-5** 14:00-14:15  
**Design and Experimental Evaluations of Robot-assisted Tele-echography System for Remote Ultrasound Imaging**  
Joonho Seo, Jang Ho Cho, Juyoung Cha, Changwon Kim, Ohwon Kwon  
*Korea Institute of Machinery and Materials, Korea*

**FB3-6** 14:15-14:30  
**Feasibility of a photoacoustic image guided telerobotic system for skull base surgery**  
Sungmin Kim<sup>1,2</sup>, Muyinatu A. Lediju Bell<sup>2</sup>, Peter Kazanzides<sup>2</sup>  
*<sup>1</sup>Korea Institute of Machinery and Materials, Korea, <sup>2</sup>Johns Hopkins University, USA*

15:50-17:20 **[FC1]** Invited Talk 6 + Actuator Mechanism

**Crystal Hall (2F)**

Chair: Hyungpil Moon (SKKU, Korea)  
Co-Chair: Byung-Ju Yi (Hanyang Univ., Korea)

**FC1-1** 15:50-16:20

**[Invited Talk 6] Coexistable robotics : relief, safety and convenience**

Joo-Ho Lee

*Ritsumeikan University, Japan*

**FC1-2** 16:20-16:35

**Design of Joint Module Equipped with Manually Configurable Reducer for Gearing**

Kanggyun Kim<sup>1,2</sup>, Wooseok Choi<sup>1</sup>, Woosub Lee<sup>1</sup>, Woojin Chung<sup>2</sup>, Sungchul Kang<sup>1</sup>

<sup>1</sup>*Korea Institute of Science and Technology, Korea*, <sup>2</sup>*Korea University, Korea*

**FC1-3** 16:35-16:50

**Tribological Behavior of Space Rover Gear Train under the Ultra High Vacuum**

Wonil Kwak<sup>1,2</sup>, Jeonkook Lee<sup>3</sup>, Woosub Lee<sup>3</sup>, and Yong-Bok Lee<sup>2</sup>

<sup>1</sup>*University of Science & Technology, Korea*, <sup>2</sup>*Korea Institute of Science and Technology, Korea*,

<sup>3</sup>*Korea Institute of Science and Technology, Korea*

**FC1-4** 16:50-17:05

**Differential hysteresis modeling with adaptive parameter estimation of a super-coiled polymer actuator**

Tuan Anh Luong, Sungwon Seo, Ja Choon Koo, Hyouk Ryeol Choi, Hyungpil Moon

*Sungkyunkwan University, Korea*

**FC1-5** 17:05-17:20

**An Optimal Design of a Two-layered Magnetic Brake**

Hashim Iqbal and Byung Ju Yi

*Hanyang University, Korea*

15:50-17:35 **[FC2]** Microrobots for Future Medical Treatments & Mobile Robots

**Jade Hall (2F)**

Chair: Hongsoo Choi (DGIST, Korea)  
Co-Chair: Sehoon Oh (DGIST, Korea)

**FC2-1** 15:50-16:05

**On-line Position and Attitude Estimation for Magnetic Manipulation System**

Jun Lee, Jung-Ik Ha

*Seoul National University, Korea*

**FC2-2** 16:05-16:20

**Characterization of a mm-scale swimming microrobot for 3D manipulation**

Sunkey Lee, Jin-young Kim, Sungmin Lee, Sangwon Kim, and Hongsoo Choi

*DGIST, Korea*

**FC2-3** 16:20-16:35

**Dynamic Model Based Microrobot Control**

Su-Hui Kwak, Yongsu Park and Sehoon Oh

*DGIST, Korea*

**FC2-4** 16:35-16:50

**Development of Intravascular Ultrasound Transducers to Monitor Chronic Total Occlusion Treatment by Microrobots**

Junsu Lee and Jin Ho Chang

*Sogang University, Korea*

- FC2-5** 16:50-17:05  
**Prototype of ARM processor-based robot module for a multi-agent mobile robot system**  
MIYAHARA, Keizo  
*Osaka University, Japan*
- FC2-6** 17:05-17:20  
**Test and evaluation for the Minimum Gap Go Through in IEC 62885-7 to Improve Reproducibility**  
Jaesub Shin, MinHo Lee, Sun-Young Kang, HyeonSeok Jang  
*Korea Institute for Robot Industry Advancement, Korea*
- FC2-7** 17:20-17:35  
**Image Transformation based on Spherical Sensor Model for Distortion-free Pedestrian Detection**  
Jiwan Kim<sup>1</sup>, Jae-Yeong Lee<sup>1,2</sup>  
*<sup>1</sup>Korea University of Science and Technology, Korea, <sup>2</sup>Electronics and Telecommunications Research Institute, Korea*

15:50-17:05 **[FC3]** The New Era of Robot Design

**Amethyst Hall (2F)**

Chair: Gyuhyun Kwon (Hanyang Univ., Korea)  
Co-Chair: Seung Hun Yoo (Korea Univ., Korea)

- FC3-1** 15:50-16:05  
**Exploring the taxonomic and associative link between emotion and function for robot sound design**  
Eunju Jeong, Gyu Hyun Kwon and Junseop So  
*Hanyang University, Korea*
- FC3-2** 16:05-16:20  
**Understanding the Servicescape of Nurse Assistive Robot: the Perspective of Healthcare Service Experience**  
Ji eun Han, Hyo-Jin Kang and Gyu Hyun Kwon  
*Hanyang University, Korea*
- FC3-3** 16:20-16:35  
**Design Factors and Opportunities of Rehabilitation Robots in Upper-Limb Training after Stroke**  
Yu-Hsiu Hung, Pin-Ju Chen, and Wan-Zi Lin  
*National Cheng Kung University, Taiwan*
- FC3-4** 16:35-16:50  
**Design of the companion robot interaction for supporting major tasks of the elderly**  
Seul Bi Lee, Seung Hun Yoo  
*Korea University, Korea*
- FC3-5** 16:50-17:05  
**Emotion prototyping for Robot Design**  
Jihoon Ryu<sup>1</sup>, Carole Bouchard<sup>2</sup>, and Hokyoung Ryu<sup>2,3</sup>  
*<sup>1</sup>Korea International School, Korea, <sup>2</sup>École Arts et Métiers ParisTech, France, <sup>3</sup>Hanyang University, Korea*

17:30-19:00 **[P2]** Poster Session 2

**Grand Hall (1F)**

Chair: Dongjune Shin (Chung-Ang Univ., Korea)

Co-Chair: Gi-Hun Yang (KITECH, Korea)

**P2-01~P2-03 Advanced Navigation for Marine Robots**

**P2-01 Development of a Side Scan Sonar Module for the UnderWater Simulator**

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<sup>1</sup>Korea Advanced Institute of Science and Technology, Korea, <sup>2</sup>LIG Nex1 Maritime Research Center, Korea

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Kwangyik Jung<sup>1</sup>, Pillip Youn<sup>1</sup>, Sooyoung Choi<sup>1</sup>, Jungwoo Lee<sup>2</sup>, Hyung-Ju Kang<sup>2</sup>, and Hyun Myung<sup>1</sup>  
<sup>1</sup>Korea Advanced Institute of Science and Technology (KAIST), Korea, <sup>2</sup>Korea Institute of Robot and Convergence, Korea

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Jeonghong Park, Jinwoo Choi, Hyun-Taek Choi  
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<sup>1</sup>Korea Testing Laboratory, Korea, <sup>2</sup>Hanyang University, Korea

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Kyoung-Soub Lee, Jeong-Ho Park and Hyung-Soon Park  
Korea Advanced Institute of Science and Technology (KAIST), Korea

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Korea Advanced Institute of Science and Technology (KAIST), Korea

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Samuel Sheckman<sup>1</sup>, Hoyeon Kim<sup>1</sup>, Sheryl Manzoor<sup>2</sup>, Louis W. Rogowski<sup>1</sup>, Li Huang<sup>2</sup>, Xiao Zhang<sup>1</sup>, Aaron T. Becker<sup>2</sup>  
and Min Jun Kim<sup>1</sup>  
<sup>1</sup>Southern Methodist University, USA, <sup>2</sup>University of Houston, USA.

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*<sup>1</sup>Korea Automotive Technology Institute, Korea, <sup>2</sup>RAMS&Q Solution, Korea*

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Mingyo Seo<sup>1</sup>, Woosub Lee<sup>1,2</sup>  
*<sup>1</sup>Korea Institute of Science and Technology, Korea, <sup>2</sup>Korea University of Science and Technology, Korea*

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*<sup>1</sup>Korea University, Korea, <sup>2</sup>Korea Institute of Science and Technology, Korea*

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*<sup>1</sup>Northwest University for Nationalities, China, <sup>2</sup>Xi'an Jiaotong University, China*

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*<sup>1</sup>Seoul National University of Science and Technology, Korea, <sup>2</sup>POSTECH, Korea*

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*Korea Institute of Robot and Convergence, Korea*

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<sup>1</sup>Sungkyunkwan University, Korea, <sup>2</sup>Korea Institute of Industrial Technology, Korea, <sup>3</sup>Puloon Technology Inc., Korea

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Jae-Seong Han and Kwangjin Kim

CEMWARE Inc., Korea

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D. Yu and Hong Seong Park

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<sup>1</sup>Korea University, Korea, <sup>2</sup>Hyundai Heavy Industries, Korea

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<sup>1</sup>Korea University, Korea, <sup>2</sup>Chonnam National University, Korea

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*<sup>1</sup>Harbin Research Institute of Forestry Machinery, China, <sup>2</sup>Harbin Institute of Technology, China*
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*<sup>1</sup>Kansai University, Japan, <sup>2</sup>Nara Women's University, Japan, <sup>3</sup>Ritsumeikan University, Japan*
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*<sup>1</sup>Meijo University, Japan, <sup>2</sup>Misawa Home Institute of Research and Development Co., Ltd., Japan*
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Phi Tien Hoang, Hoa Phung, Canh Toan Nguyen, Tien Dat Nguyen, and Hyouk Ryeol Choi, Member, IEEE  
*Sungkyunkwan University, Korea*

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