Guest Editorial of the Special Issue on Advanced Intelligent Systems for Humanoid Robotics

In recent years, with the advances of the information technology, researches on humanoid robots using intelligent systems have become more and more popular. General research interests in this area include intelligent robot design aiming at humanoid intelligence, machine intelligence for humanoid robotics, robotic agility and motion aiming at intelligence, human-robot interaction/collaboration for intelligence, and robot applications stressing intelligence.

This special issue focuses on intelligent systems for humanoid robotics, where some popular topics, such as humanoid robot control, human robot interaction and hand gesture recognition, have been covered by the selected papers. Also, some samples of the current research in theory, methods, experiments, and applications have presented.

In the paper "*Visual Servoing of Humanoid Dual-arm Robot with Neural Learning Enhanced Skill Transferring Control*", Herrera et.al. propose a novel motion controller for a human-wheelchair system, which perform positioning and path-following tasks in human-shared environments. The experimental results demonstrate that the system can overcome many usual interference situations with good path following performance in the presence of human obstacles.

In the paper "*A Novel Hand Gesture Recognition based on High-level Features*", Petric et.al. propose a framework for robot-assisted Autism Spectrum Disorder evaluation based on Partially Observable Markov Decision Process modeling. The Autism Diagnostic Observation Schedule is emulated through 4 tasks, whose models incorporate observations of multiple social cues such as eye contact, gestures and utterances. The evaluation results demonstrate that chaining the tasks provides fine-grained outcome quantification based on the proposed task models.

In the paper "*Optimal Control of an Inverted Ball Driving Robot based upon Slip Patterns*", Li et.al. propose a static gesture recognition system that combines depth information and skeleton data to classify gestures. Through feature fusion, hand digit

gestures of 0-9 were accurately and efficiently recognized, and experimental results show that the proposed gesture recognition system was effective and robust.

In the paper "*Modeling and path-following control of a wheelchair in human-shared environments*", Yang et.al. investigates the visual servoing control of a humanoid dual-arm robot based on neural network learning. Different to conventional works, a skill transfer mechanism is developed to apply the neural learned knowledge from one arm to the other, to increase the neural learning efficiency. Experiments on a Baxter robot demonstrate the efficiency of the developed control system.

In the paper "*POMDP-based Coding of Child-Robot Interaction within a Robot-Assisted ASD Diagnostic Protocol*", Lee et.al. present an interesting work to drive a ball robot precisely by designing a route with the least amount of slip. In this research, the inverted ball driving robot is omni-directional and suitable for tasks in the indoor environment. The ball robot has an intrinsic slip pattern to minimize the slip during the driving of the ball robot to the desired location. Experiments show that the ball robot can reach the destination more precisely than those following other path planning methods.

Moreover, this special issue has also included a number of extended papers selected from ICIRA 2015 based on review recommendation and suitability to the journal. It is our intention, via the selected papers, to demonstrate the quality of ICIRA conference series and to emphasize future robotics research directions.

Zhaojie Ju *(University of Portsmouth, UK)*
Naoyuki Kubota *(Tokyo Metropolitan University, Japan)*
Jangmyung Lee *(Pusan National University, Korea)*
Honghai Liu *(University of Portsmouth, UK)*