SS05: Robotic and Embedded Systems

Shun-Feng Su
IEEE Fellow, CACS Fellow, Department of Electrical Engineering,
National Taiwan University of Science and Technology, Taiwan, R.O.C.
su@orion.ee.ntust.edu.tw

Chin-Wang Tao
Department of Electrical Engineering,
National Ilan University, I-Lan, Taiwan
cwtao@niu.edu.tw

Recently, soft computing approaches have been wildly proposed and successfully implemented on the research field of robotic and embedded systems. In this special session, we collected papers that reflect current progress in the robotic and embedded systems for intelligent systems. We hope those papers accepted can provide some milestones for the related research fields and also give ideas for further exploration in their research issues. Totally, nine papers are accepted in this session. Among them, five papers are about robotic theories and the related applications are included. The remaining four papers are about embedded systems and applications. Those papers are also in line with the subject of conference (Joint 17th World Congress of International Fuzzy Systems Association and 9th International Conference on Soft Computing and Intelligent Systems). The contributions of those papers are stated as follows.

No. 20: Adaptive PD Networks Tracking Control with Full-State Constraints for Redundant Parallel Manipulators

This paper studies the adaptive PD networks tracking control for redundant parallel manipulators with full-state constraints. APDNs is designed based on the combination of the nonlinear compensation, the PD nonlinear sliding part, and feedforward RBFNs with online learning. The effectiveness of the proposed controller in the tracking control of a 2-DOF redundant parallel manipulator was illustrated by simulation.

No. 21: Real Time Human Tracking Using Improved CAM-Shift

In this paper, we proposed a human tracking method using the depth information captured by the RGB-D camera. The background is eliminated by using the second DOI in order to remove the impact of environment on the approach of original CAM-shift algorithm. The experiment results show us the good performance of human tracking approach.

No. 25: Real-Time Non-contact Breath Detection from Video using Adaboost and Lucas-Kanade algorithm

In this research, a novel non-contact approach is proposed to detect breath motions in real time. The proposed approach only using a normal webcam that connects to laptop without any other devices. Therefore, it has a low installation and maintenance cost.

No. 69: Learning Based Semantic Segmentation for Robot Navigation in Outdoor Environment

A vison-based navigation control scheme is proposed in this research. The main contribution

achieved is utilizing a deep CNN to recognize road regions in front of the robot. Second, a controller is designed based on fuzzy logics to make the robot autonomously travel on road. From the experimental tests, the robot successfully avoids obstacles as travelling on the way.

No. 117: Motion Planning and Control of a Picture-Based Drawing Robot System
There are two main parts in the proposed drawing robot system. One is the delta robot manipulator and the other is image processing. From the real-time experimental results, it can show that the proposed drawing robot system have advantages of fast, simple and save manpower and lots of time.

No. 118: Intelligent Control for a Dynamically Stable Two-Wheel Mobile Manipulator
The DSTMM robot has two driving wheels that attached on the right and left sides of its body, respectively; thus it enables the DSTMM robot to keep its balance and move over rough terrain such as that found in a typical home environment. The experimental results show that the proposed control strategy demonstrated very good efficiency for the DSTMM robot. The stability of system is proved by the experimental results. Thus, the DSTMM robot will hopefully bring us even further into the world of automated smart home technology.

No. 121: A Simplified Interval Type-2 Fuzzy CMAC
In this paper, the master-slave Duffing-Holmes system with the uncertainty and disturbance is addressed for synchronizing, where a simplified interval type-2 fuzzy CMAC is investigated.

No. 132: Constrained Fuzzy Stabilization for Mobile Robots with Laser-Range-Finder Localization
In this paper, the constrained fuzzy control has been designed for the WMR with the LRF-based localization system. The simulation and experimental results validate the effectiveness of the proposed fuzzy control method for the WMR with the LRF-based localization system.

No. 222: Adaptive Navigation and Motion Planning for a Track Robot
Localization and navigation of mobile robots precisely in in-door environment is one of the most important and challenging tasks. Navigation using conventional approaches such as GPS and vision based odometry approach alone is not effective in indoor environments. This paper successfully implemented a dynamic navigation system for mobile robots.