Advanced service robotics and automation

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Abstract:
There are growing demands on robotics and automation in the service sector for many years due to the age quake, silver society and man power shortage. Some need more cost effective systems, while others do more human friendly communication and interactive interface. The system will require more improved functions for physical, skill and intelligence support and assistance. Certainly industrial robots have helped people from the routine type of assembly and manufacturing for better production system. Thus robotics has made remarkable progress to industry. Now that robotics is so advanced with sensor, actuator and computational intelligence along with the CPU development, it is expected to make much wider applications to service sector than to the manufacturing sector. Some are good for robot to be more intelligent, while others are better for automation to be more effective.
In this presentation, the robotics and automation is briefly overviewed for the sake of human assistance and supports. Then there have been so many attempts to make robots more friendly and usable to human and some showed very successful results in bio-medicine field, material flow and daily life. From these applications, it turned out to be much more important for human service sector such that advanced robotics and automation system in this domain should have more cognitive functions as human intention estimation explicitly.
In the robotics, “intelligent cane system” is shown as one of the examples of robotics systems. Human can employ this robot as a partner robot in the daily life, since the robot can help the human to navigate and guide to the goal by estimating human intention. In the manufacturing automation, human coworker and robot coworker can work together at the same working location called “Intelligent Hybrid Cell” by cooperation and collaboration using the human intention estimation. Thus small products systems are expected to work better by trading off the cost of the robot software and human cost, by taking care of the safety issue between human and robots interaction in the automation system.
Robotics and Automation technology will continue to play very important role for the advanced service to human.

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Toshio Fukuda graduated from Waseda University, Tokyo, Japan in 1971 and received the Master of Engineering degree and the Doctor of Engineering degree both from the University of Tokyo, in 1973 and 1977, respectively. He joined the National Mechanical Engineering Laboratory in Japan in 1977, the Science University of Tokyo in 1981, and then joined Department of Mechanical Engineering, Nagoya University, Japan in 1989.

At present, he is Professor of Dept. of Micro and Nano System Engineering and Dept. of Mechano-Informatics and Systems, Nagoya University, Japan. He is director of Center for Micro and Nano Mechatronics. He is mainly engaging in the research fields of intelligent robotic system, micro and nano robotics, bio-robotic system, and technical diagnosis and error recovery system.

He was the President of IEEE Robotics and Automation Society (1998-1999), Director of the IEEE Division X, Systems and Control (2001-2002), the Founding President of IEEE Nanotechnology Council (2002-2005), and Region 10 Director-elect (2011-2012). He was Editor-in-Chief of IEEE/ASME Trans. Mechatronics (2000-2002).

He was the Founding General Chairman of IEEE International Conference on Intelligent Robots and Systems (IROS) held in Tokyo (1988). He was Founding Chair of the IEEE Workshop on Advanced Robotics Technology and Social Impacts (ARSO, 2005), Founding Chair of the IEEE Workshop on System Integration Internatioal (SII, 2008), Founding Chair of the International Symposium on Micro-Nano Mechatronics and Human Science (MHS, 1990-2011).

He has received many awards such as IEEE Eugene Mittelmann Achievement Award (1997), IEEE Third Millennium Medal (2000) , IEEE Robotics and Automation Pioneer Award (2004), IEEE Transaction Automation Science and Engineering Googol Best New Application Paper Award (2007), George Saridis Leadership Award in Robotics and Automation (2009), IEEE Robotics and Automation Technical Field Award (2010). He received the IROS Harashima Award for Innovative Technologies (2011).

IEEE Fellow (1995). SICE Fellow (1995). JSME Fellow (2002), RSJ Fellow (2004), VRSJ Fellow (2011) and member of Science Council of Japan (2008-).