Robotics and AI for Real-world Challenges

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A female dance partner robot, PBDR (Partner Ballroom Dance Robot), was developed as a research platform for physical human-robot interaction and unveiled during Aichi Expo in 2005. How to read its partner's lead is one of the key technologies of the dance partner robot. A Hidden Markov Model-based figure estimator was used to read its partner's lead while dancing the Waltz. A Co-worker Robot, "PaDY" (in-time Parts/tools Delivery to You robot), was developed as an application of pHRI (Physical Human-Robot Interaction) for an automobile assembly process carried out only by a human worker. PaDY was designed to deliver necessary parts and tools to the worker when he/she needs them to reduce the worker's load, improve the efficiency of the work and prevent mistakes in the work. A prototype system was developed and installed for an assembly process of a vehicle. Unfortunately, the system was removed from the process after three months trial. They did not want to do the modification of control software for varying production schedules. An adaptive motion planner was developed for PaDY to solve this problem. Some co-worker robot concepts have been successfully implemented in real car factory facilities. There is much discussion about AI and robots replacing humans. Although current AI does not provide complete solutions for difficult real-world challenges of robotics, AI is a useful tool for applying robotics technology to real-world problems that traditional methods cannot solve. In this talk, we will consider how recent AI and machine learning techniques can be applied to robotic systems for real-world problems, using examples developed by my research team.

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