

## **Toward an Autonomous Service Robot-Human-Robot Interaction, Navigation and Cyber Physical System**

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An autonomous robot is designed and implemented to approach the service works. Many technologies were adapted, namely human-robot interaction, path planning and mapping in indoor, navigation, and Cyber Physical System (CPS). Many subsystems are developed and constructed based on ROS to implement a human-interaction action in completing service robot tasks. A human-robot interaction is designed for the convenient human servicing purpose. Therefore, the customer quickly finds the commodity information through the internet. This system recommends the commodity according to the content of the database. In addition, the customer makes an order by touch screen interface, and then it sends a command to control the robot to deliver the commodity. In navigation, it includes path planning and mapping generation. The well-known simultaneous localization and mapping (SLAM) concept addresses the appropriated maps after completing the exploration of the indoor environment. In order to reach better robustness and agility, the hybrid path planning algorithm includes a global A\* algorithm and local dynamic window approach (DWA) to navigation. The Gazebo makes the perfect construction of CPS design. Finally, the simulation and implementation of dual-arm robot navigation with the interactive order situation to efficiently support servicing actions of the robot and finish the required tasks.

### **Experience:**

Hsuan-Ming Feng Received the B.S. degree in automatic control engineering from Feng-Chia University, Taichung, Taiwan, R.O.C., in 1992. He received M.S. and Ph.D. degrees in Computer Science and Information Engineering from Tamkang University, Tamsui Dist, New Taipei city, Taiwan, R.O.C., in 1994 and 2000, respectively. Hsuan-Ming Feng is a Distinguished Professor and the Dean of College of science and engineering at the National Quemoy University, Taiwan. He was the director of the computer and network center and the Chairman of the CSIE Department at National Quemoy University, Taiwan. Prof. Feng is the director of the Institution of Engineering and Technology (IET). Prof. Feng is the chapter chair of SMC in the IEEE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS TAINAN SECTION. Prof. Feng was the Conference Chair of the 18th International Conference on Automation Technology (Automation 2021) and the co-chair of 2020 International Conference on Mechatronic, Automobile, and Environmental Engineering. His current research interests include fuzzy systems, machine learning, neural networks, wireless networks, optimal learning algorithms, image processing and robot system.