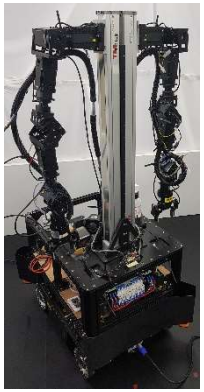
Future Convenience Store Challenge

TIMDA (Taiwan, New Taipei City)

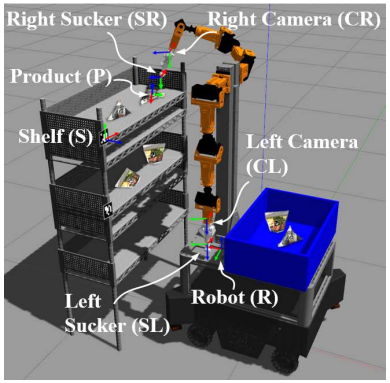
Service Robotics Category

サービスカテゴリー



Development point

The mobile dual-arm robot is developed by the team itself. It includes an autonomous mobile platform, a dual-arm robot (each arm is a 7-DoF arm, and there is a 1-DoF linear slide that allows the arm to move up and down), and a 1-DoF vacuum gripper. A simultaneous localization and mapping (SLAM) method based on two 2D-LIDAR is implemented so that the robot can autonomous localization and mobile navigation. We use the eye-in-hand method, through the RGB-D camera installed on the hand and Aruco Marker, so that the system can recognize the product location, type, and expiration date. Then the dual-arm robot can take expired products off the shelves and put new ones on the shelves. Other technologies include the use of 3D-LIDRA for personnel detection in a 3D environment, and the use of GAZEBO and MoveIt for simulation tests of environmental collision avoidance and other functions in the early stages of development.



Introduction of your team

【Inspiration, motivation to form a team 】

Participating in this competition is to strengthen the technical content of the laboratory and condense the emotions of laboratory members. The most important thing is to enhance the international perspective of laboratory members and to have a better understanding of the technological development of overseas laboratories. Through the exchange of this competition, the team's technical energy can be more mature and more internationally competitive.

【Future outlook】

Use more artificial intelligence and machine learning technologies to make the robot itself more flexible and intelligent. For example, use deep learning to enhance the system's ability to recognize and grasp multiple objects in a cluttered environment, so that the robot can work in a more complex environment. Use deep learning and reinforcement learning to make the dual-arm robot have self-collision avoidance capabilities, and use force sensors to enhance the robot's external perception capabilities, ensure the safety of personnel and robots, and develop various functions for human-robot collaboration.

Role	Name	Affiliation/Title	Specialty, Field of study
Team advisor	WONG, CHING-CHANG	Tamkang University, I.C.Lab, Distinguished Professor	Intelligent Control, Mobile robot manipulator, Deep reinforcement learning for robotic applications
Team advisor	TSAI, CHI-YI	Tamkang University, Robotic Vision Lab, Professor	Image processing, Visual tracking control for mobile robots
Team leader	YANG, SHENG-KAI	Tamkang University, I.C.Lab, Ph.D. student	Dual-arm robot (Stock and Disposal Task)
Team leader	WONG, SHANG-WEN	Tamkang University, I.C.Lab, Ph.D. student	Dual-arm robot (Stock and Disposal Task)
Team member	CHIEN, SHAO-YU	Tamkang University, I.C.Lab, Ph.D. student	Dual-arm robot (Stock and Disposal Task)
Team member	YEH, CHUN-AN	Tamkang University, I.C.Lab, Ph.D. student	Dual-arm robot (Stock and Disposal Task)
Team member	LEE, HUNG-YU	Tamkang University, I.C.Lab, Master student	Dual-arm robot (Customer Interaction Task)
Team member	CHEN, CHONG-JIA	Tamkang University, I.C.Lab, Master student	Dual-arm robot (Stock and Disposal Task)
Team member	TSAI, TAI-TING	Tamkang University, I.C.Lab, Master student	Dual-arm robot (Customer Interaction Task)
Team member	KAO, SHIH-CHUN	Tamkang University, I.C.Lab, Master student	Mobile robot (Customer Interaction Task)
Team member	LIN, XIN-WEI	Tamkang University, I.C.Lab, Master student	Mobile robot (Customer Interaction Task)

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