

## ABSTRACT

Currently, food delivery services to customers in cafes, restaurants, or canteens still rely on human labor. However, this conventional system is considered inefficient in terms of cost and quality. Therefore, in this capstone design, a food delivery robot based on odometry and QR detection is designed to move to predetermined points within a room on flat surfaces and in all directions, capable of identifying and distinguishing customer tables using QR codes. The robot is designed with trays surrounded by covers. One of the trays has a feature to serve food to customers.

The product specifications are as follows: (1) it can move to specific coordinates with a positioning accuracy tolerance of 10 cm and a maximum linear speed of 0.3 m/s, (2) it can move in all directions in a 2-dimensional plane without changing the robot's orientation, (3) the farthest QR code detection distance is at least 25 cm, (4) each tray can hold a maximum weight of 29.43 N (equivalent to a mass of 3 kg), and (5) one tray can slide out with a maximum speed of 1 cm/s.

The test results show that the robot (1) can move to the target point with a linear speed not exceeding 0.3 m/s and a maximum positioning accuracy tolerance of 10 cm, (2) can move forward, backward, left, and right without changing orientation, (3) the maximum QR detection distance ranges from 25.7 to 27.7 cm, (4) the safety factor values for the 4 tested conditions are indicated by blue, green, or yellow indicators, and (5) the maximum linear speed of the tray slider does not exceed 1 cm/s. Therefore, it can be concluded that the robot meets the five specifications representing user needs, making it effective and efficient in the food delivery process.

Keywords: Food Delivery Robot, Mobilization, Odometry, QR Detection, Tray