

# Project Proposal

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***Problem Statement - Guests and patients are in need of having items delivered to their rooms in a timely manner to increase the experience of their stay. To accommodate this problem, businesses hire employees to complete these tasks. However, employees are paid hourly. A better solution is a robot that can accomplish these same tasks at a lower cost. Our robot will accomplish delivering items inside the facilities of various businesses such as hotels and hospitals.***

The objective of our Senior Design Project is to design an Autonomous Delivery Robot capable of learning, mapping, and navigating through its surroundings in its pursuit to deliver a requested item. Last semester our team designed a robot that used machine vision to read preplaced QR codes as room indicators, which communicated to a graphical user interface (GUI). A Raspberry PI scanned for the desired QR code off the walls in the Riverside Hall third floor hallway that served as a basic form of mapping and communication that the robot had reached its desired destination. Ultrasonic sensors were positioned around the robot so the robot would avoid objects. Our team used a dual H-bridge circuit to allow our DC motors to run forwards or backwards. Proportional Integral Derivative controllers were implemented using C++ code in Arduino to control the speed of the motors. The GUI Python code and the motor's C++ code was combined using GPIO pins.

This semester our team will make necessary improvements and modifications to make our robot ready to be sold in the market. First, our team will use radio-frequency identifications (RFID's) to read a frequency assigned to the rooms as an idealistic and more accurate form of mapping. Second, our team will completely redesign the robot's GUI. The redesign will implement the Java programming language, make the robot more user-friendly, enhance communications between the robot's subsystems, and put in place necessary security features. Third, the existing navigation and motor controlling code will be smoothed out and tuned so the robot behaves in a more human-like manner. Depending on the level of accessibility of the Arduino Mega microcontroller, this will incorporate newly designed interrupt service routine (ISR) protocols, various sleep settings based on the state of the robot, and a creation of a library specific to our application. Fourth and finally, we will mount the Raspberry Pi touchscreen and add a item compartment lid to improve the robot's physical design.