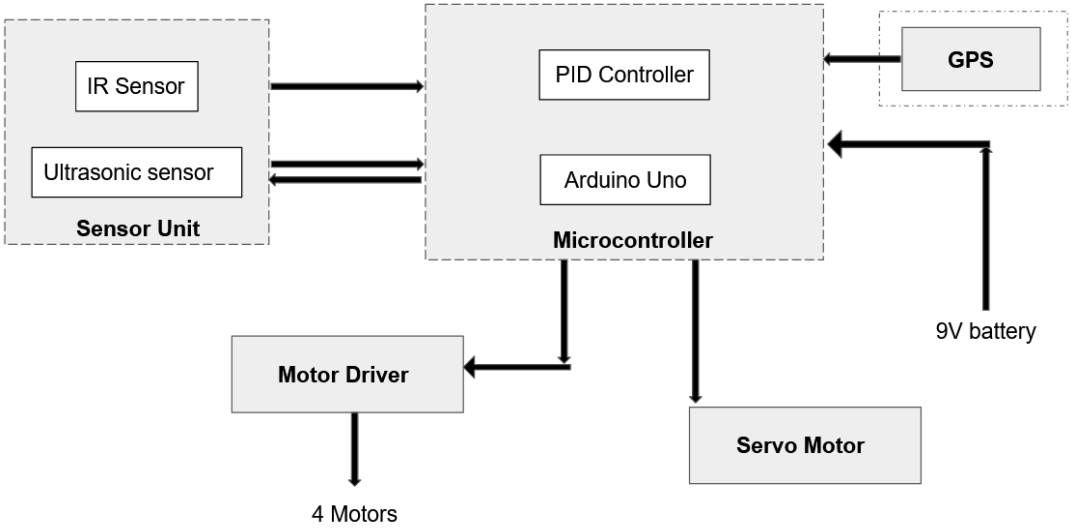
System Requirements Review (SRR)

Autonomous Food Delivery Robot

A. Overview:

The world has been facing the toughest challenge ever in history which is the unexpected battle against COVID19. It has changed the way our world operates. Social distancing has been strictly implemented. Direct human-human contact has been limited. More ways of contactless communication are encouraged to ensure safety, which is mainly to slow down the spread of this virus. Contactless delivery has emerged to fulfill human needs and ensure customers' loyalties toward the business in many areas, including food, mail, grocery, and so on. This facilitates human access to essential goods and food during the circumstances involving a lot of restrictions from the government to fight the virus. For that reason, our team is building an autonomous robot for contact-free food delivery.

B. Block diagram:



C. Existing solutions:

There have been a bunch of food delivery robots implemented by reputed companies, such as Starship, Kiwibot, OzRobotics etc. Since there are still an abundant amount of restrictions, including security, communication, lack of confidence in robotics, dealing with traffics and requiring of high-tech devices knowledge, delivery robots have not been used widely yet, mostly for business districts and school campuses. The high initial cost (starting at 5,000$) of purchasing a delivery robot also takes into account restaurants owners' hesitation. Our goal is to provide a cost-effective solution and overcome drawbacks of food delivery robots.

D. Requirements matrix:

	Requirements	Derived Requirements
1	Avoid obstacles	● Ultrasonic sensors and IR sensors employed for distance detection to any obstructing objects ● Robot will change direction if objects are detected close by 2 feet (approaching customer is the exception)
2	Ability to keep food warm/cold	● Insulated food compartments with multilayer insulation ● Material: foil, heavy vinyl or waterproof and heat reflective plastic wrap ● Keep warm up to 1 hours, cold up to 2 hours ● Dimensions: 9-1/2"W x 7-1/2"H x 7-1/2"D
3	Controllable speed	● Programmable driver motor shield ● Robot operated by 4 motors ● Speed range: maximum up to 3 mph
4	Trackable (TBD)	● GPS integrated to allow both restaurants and customers track real time location ● GPS helps to navigate the robot, find the path to the destination and go back to the original point by providing geolocation (longitude and latitude coordinates) ● Range: within 3 miles (business districts or school campuses)
5	Friendly communication protocol with both client business side (TBD)	● Website ● Send messages for notification