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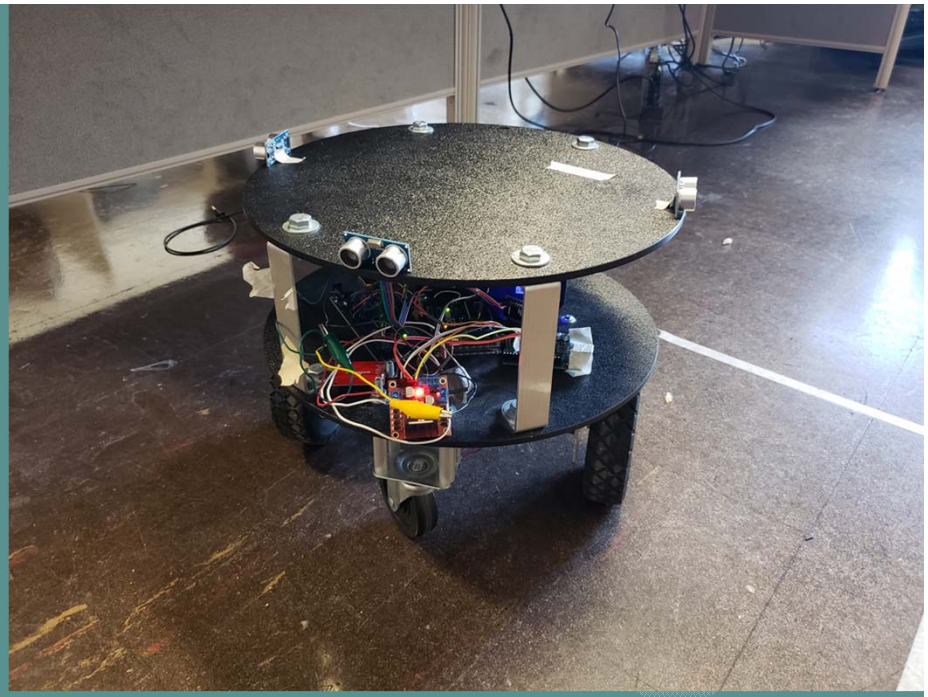
Deliveroid

The Item Delivery Robot



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Faculty Advisor: Charles Kim

2nd EECS Day April 20, 2018
Electrical Engineering and Compute Science (EECS) Howard University

Background:
Purpose of the Autonomous

- What needs to be done?
- If it's complex, simplify it
- If it's repetitive, automate it

Problem Statement:

Automate exchange of documents/items through a delivery robot

Goals

Deliver office items autonomously

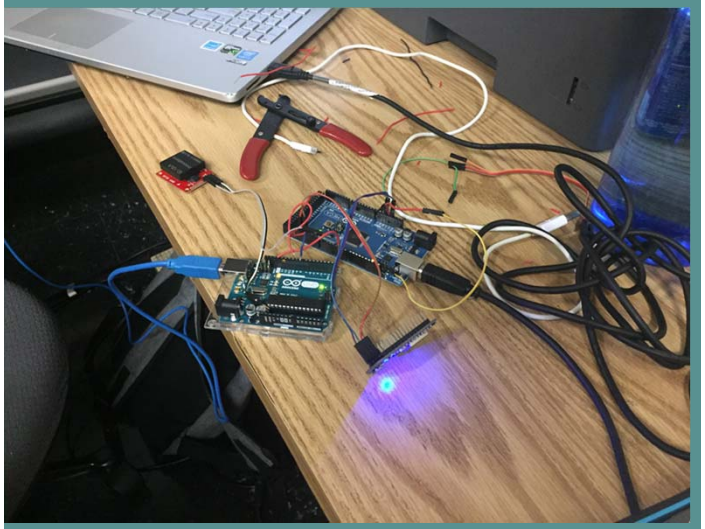
Deliver to Multiple floors/buildings

Long-Term

Deliver to One floor/building

2017-2018

Constraints



Intellectual: Limited Robotics Knowledge

Time: April deadline

Financial: Under $200

Sociocultural: Aesthetically pleasing

Standards & Regulations

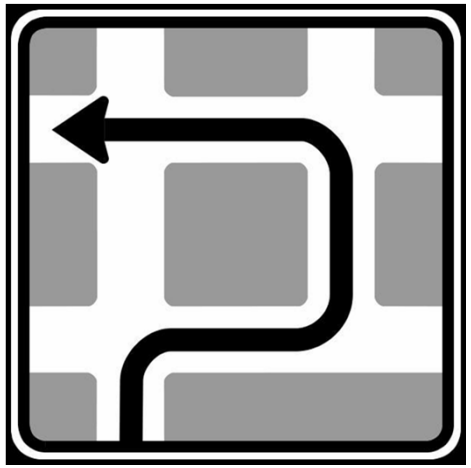
ISO 13849-1 Safety of machinery and parts of control systems

FCC Part 15 for interference in radio frequency devices

International Electrotechnical Commission (IEC) 61000-4-2 Electrostatic Discharge Immunity Test

Design Requirements

- 2ft in length, width and height
- Detects and avoids within 50 cm
- Self-correcting navigation
- Below 45 dB of sound
- Roughly 20 minutes runtime
- At least 4mph speed



Current Status of Art

Starship Technologies Delivery Robot:

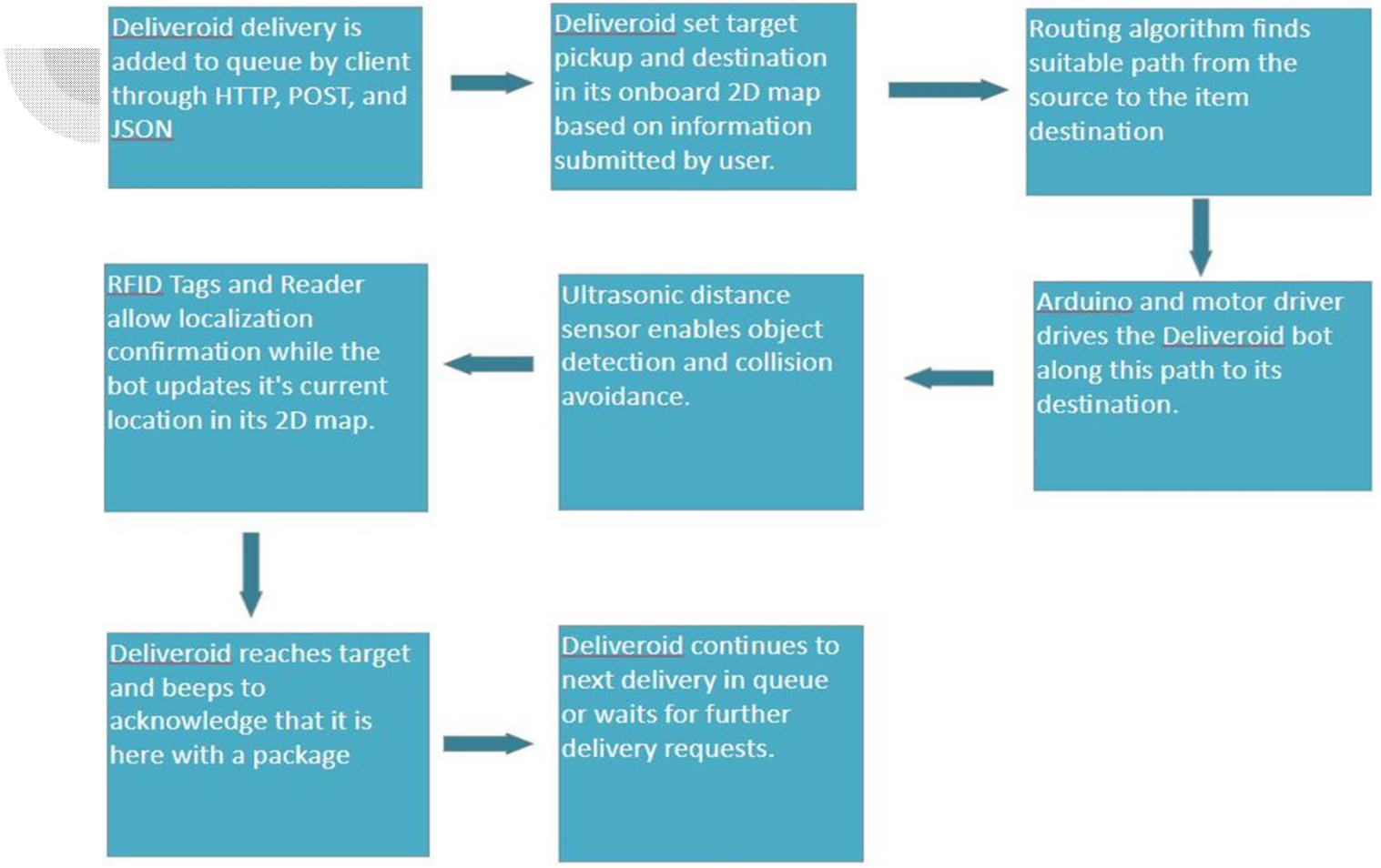
- Uses GPS Nav - not applicable for our small-scale application
- Uses cameras for traffic recognition

Piaggio's Gita:

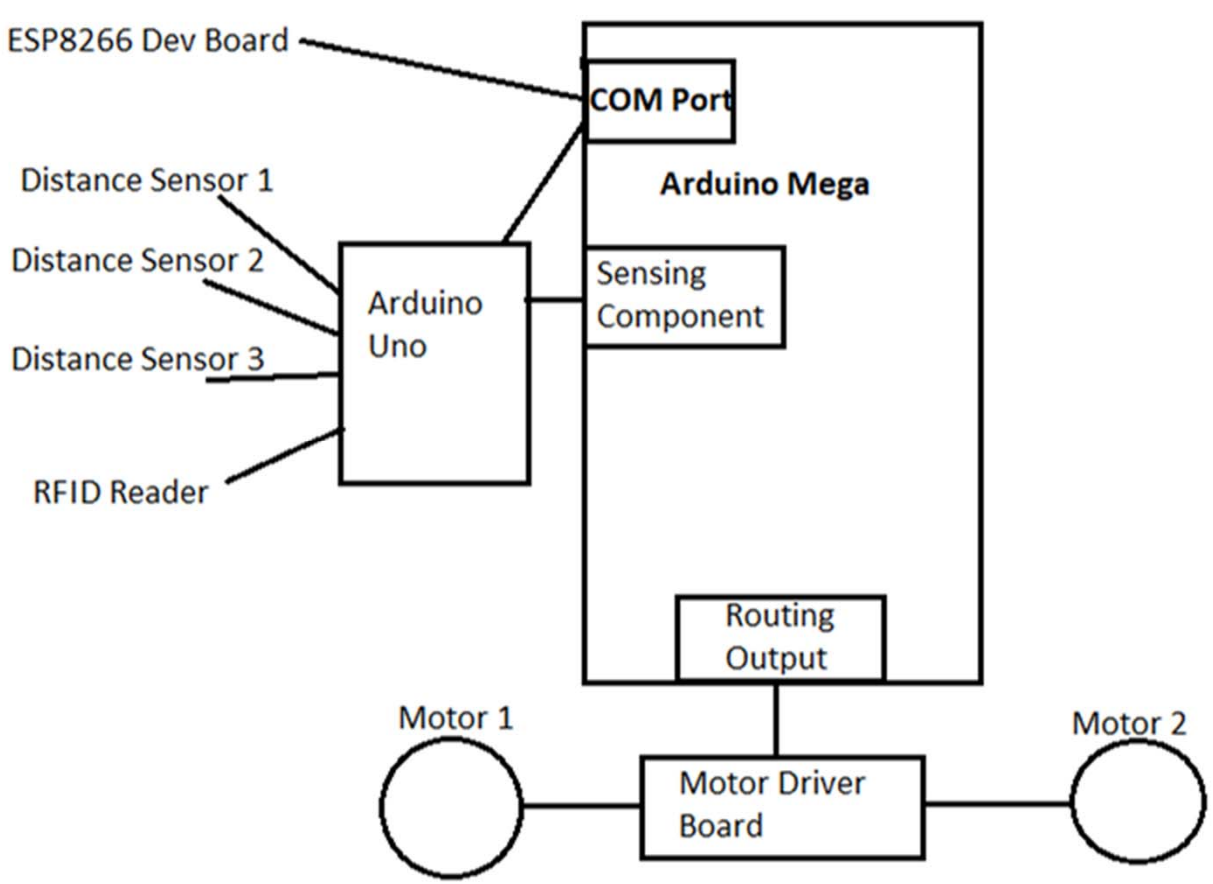
- Uses cameras to form 3D map of previously visited areas
- Primarily follows user around. Not self guided

Solution Implementation

Solution Design - Software Block Diagram

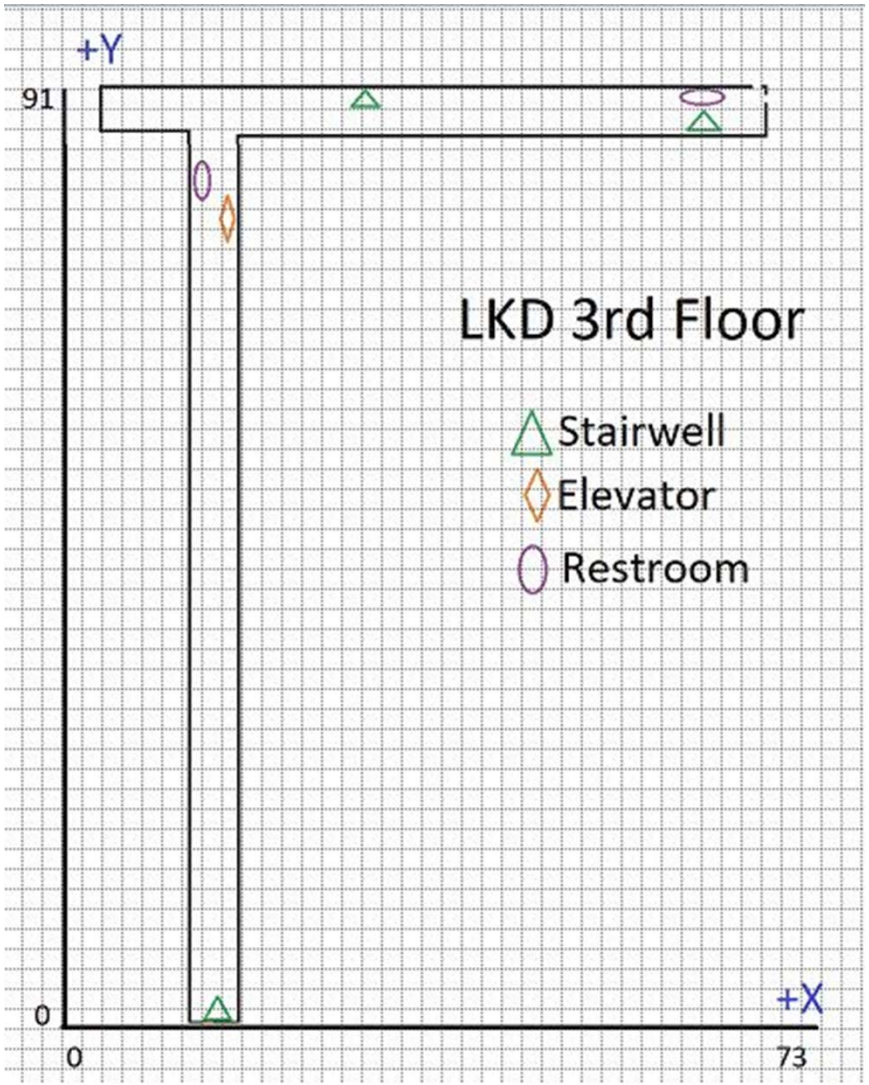


Solution Design - High Level Hardware Overview



Implementation Process

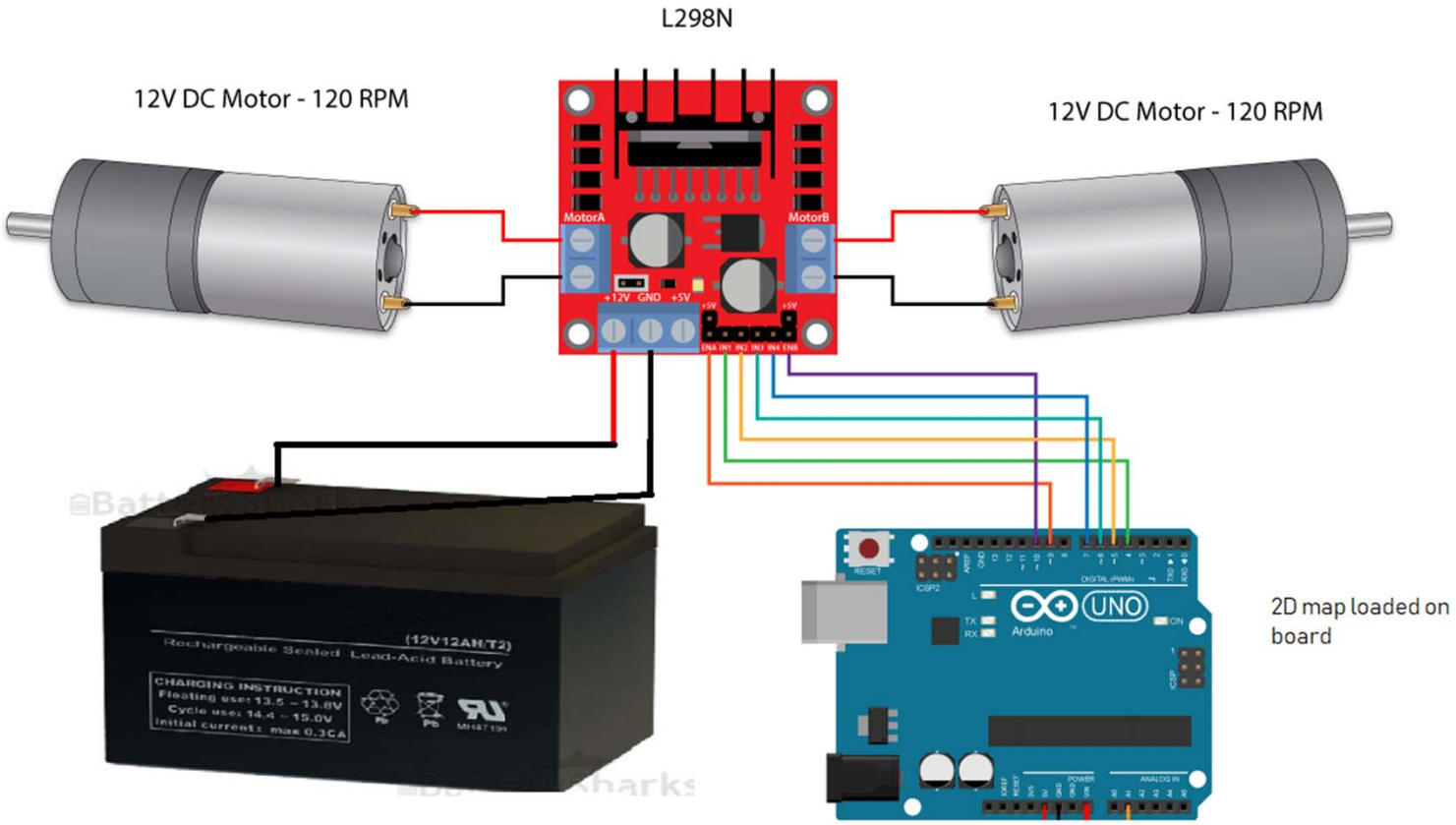
Deliverable	Member in Charge
2D Map and traversal Arduino Code, simulation area mapping and measurement, Meshing map with motor code	Conrad
3D Model, Frame assembly, Motor selection, Motor coding and meshing with 2D map code	Jonathan
Network features, ESP8266 wifi module implementations, Frontend and Backend development for client interface with Deliveroid	Shelton
Assembled Deliveroid Frame, Testing and troubleshooting multiple errors and unexpected behaviours	ALL



Simulation Area Map

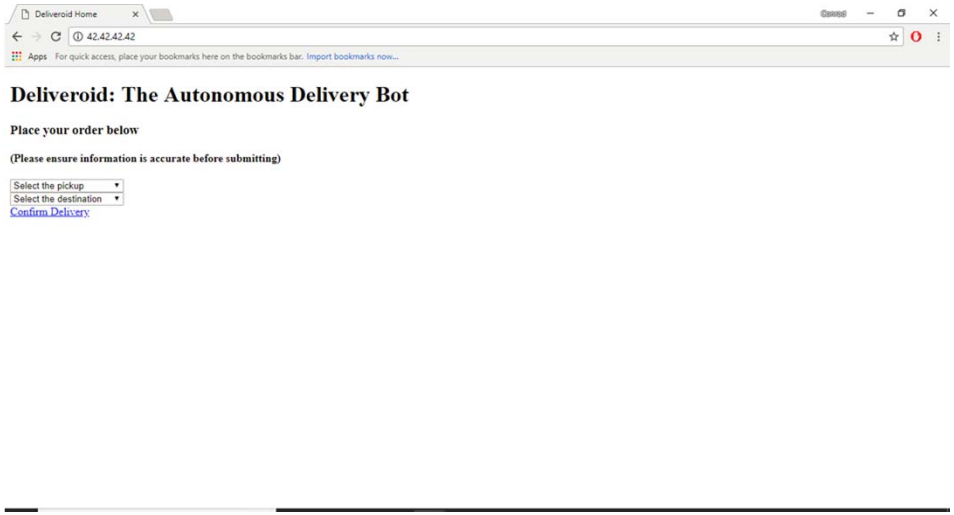
1. Measured 1 tile (1x1 ft)
2. Counted up all tiles
3. 187 length 153 Width
4. Created 2x2 tile blocks
5. Conditional (if) Statements in programming to create boundaries.

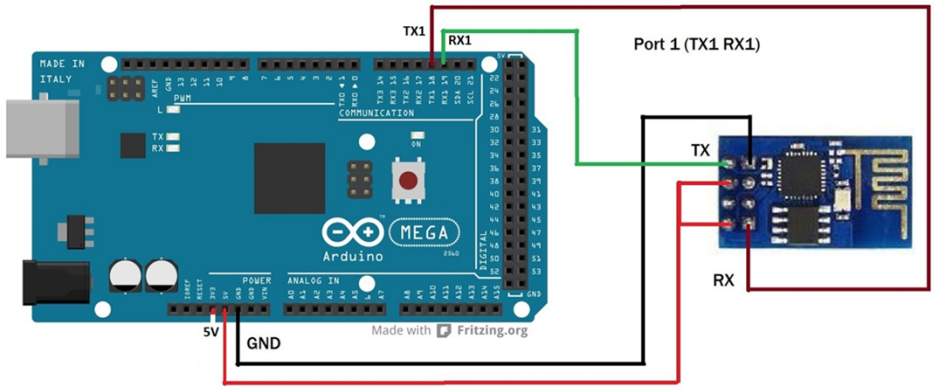
Motor Driver Implementation



Network Communication

- Uses POST, JS and JSON on a ESP8266 Development Board

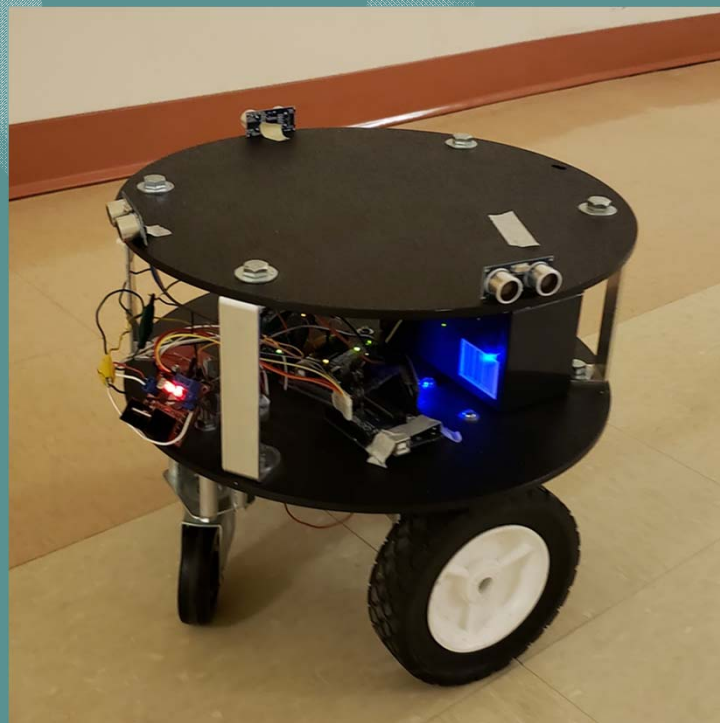




Conclusion

- Due to time constraints and the unavailability of funding for components, Deliveroid is still working to accomplish the 2017-2018 goal.

- Despite the absence of key components, progress was made by working on different modules.



THANK YOU