



Team Deliveroid



Autonomous Campus Delivery Robot

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Meet the Team!



Ileana Bocage

Electrical Engineering;

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Computer Engineering;

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Electrical Engineering;

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Problem Definition

Background:

Pioneer 3-AT



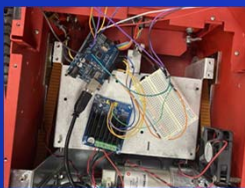
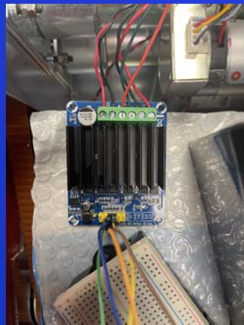
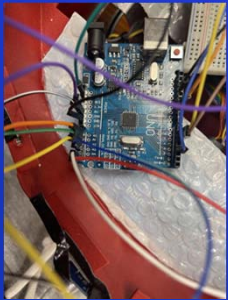
Problem Definition

Problem Statement:

The need of Howard University given the contact delivery health risks posed by the Covid-19 pandemic as well as overcrowded cafeterias, too many food/package orders and too few people to fulfill these requests is to efficiently provide convenient contactless delivery to students on campus so that the cafeteria can maximize its profits and mitigate overcrowding.

Design Requirements

1. Product Specifications



2. Constraints:

a. Environmental Constraints

i. Lead Acid Battery

- Disposing lead is highly toxic to the environment

ii. Object Avoidance/Detection

- Without proper sensors, deliveroid can be a threat to the public/environment

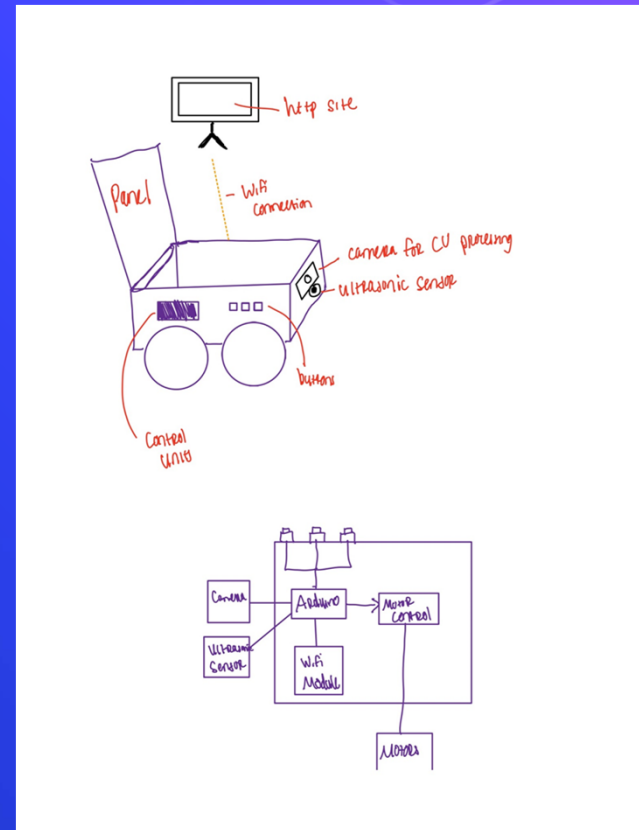
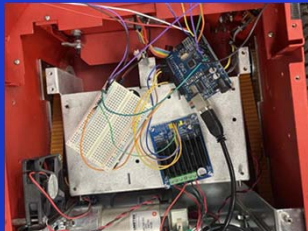
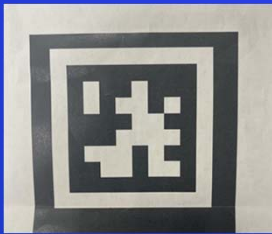
Design Requirements

2. Constraints:

b. Socio-Cultural Constraints

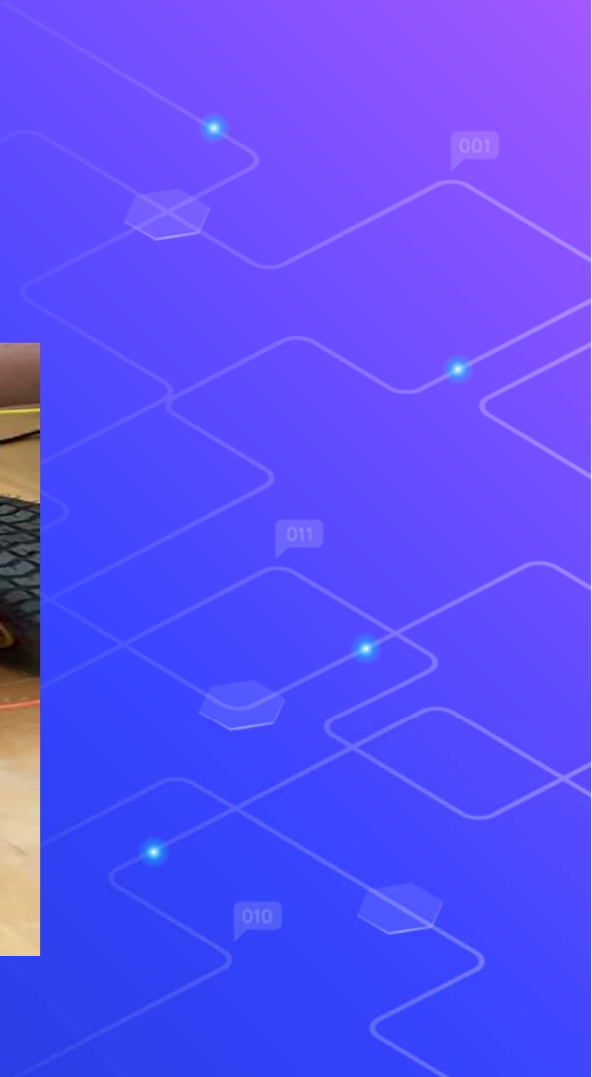
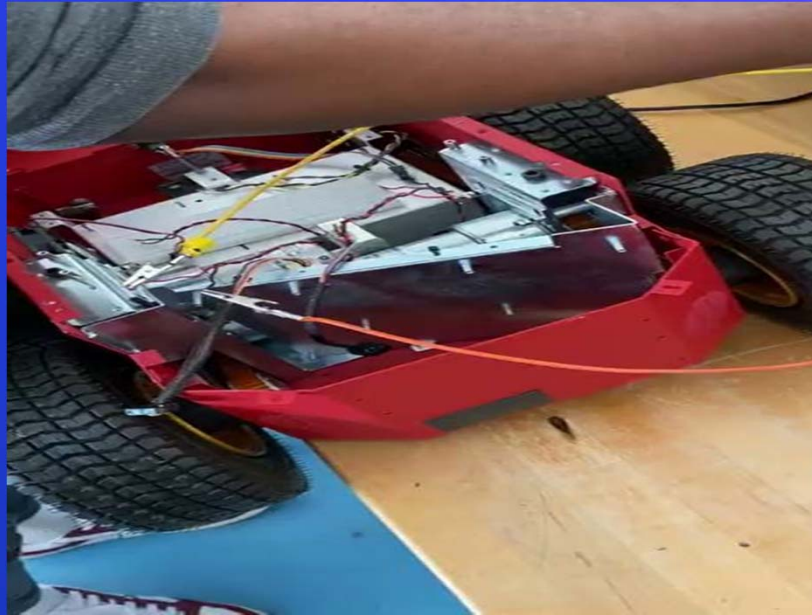
- i. Robot needs to be conscious of physical environment
- ii. Robot cannot impede or strike another human being or physical object
- iii. Robot cannot infringe upon the the privacy of others

Solution Design



Implementation Process

Sprint #1:

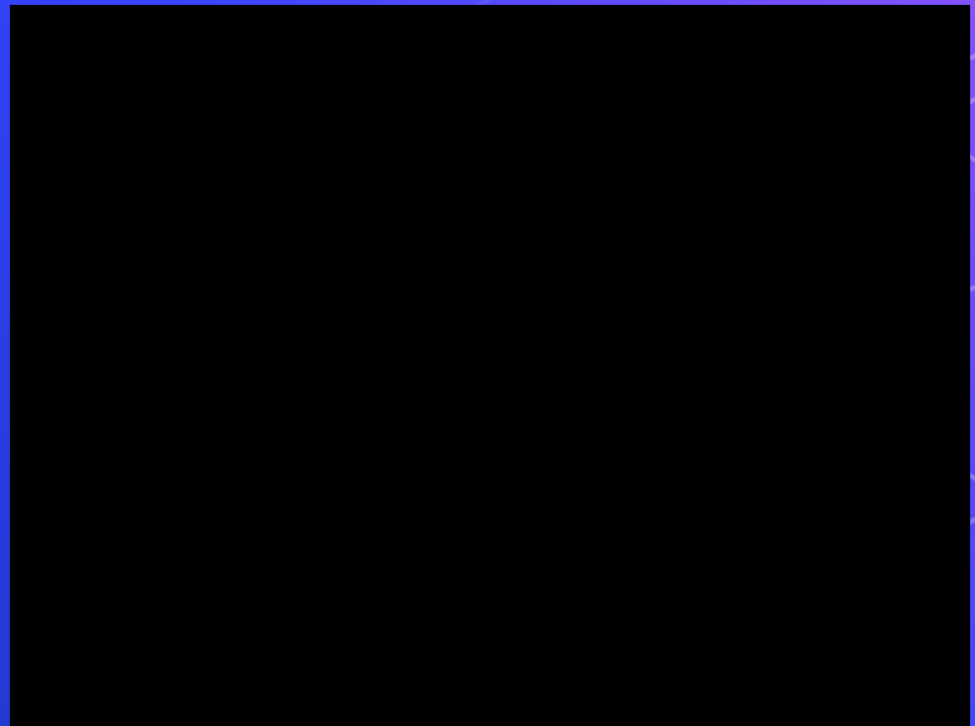


Implementation Process

Sprint #2:

```
sketch_mar1a.ino
3  int IN1    = 8;
4  int EN_A   = 5;
5  int speed  = 120;
6
7  void setup() {
8
9
10     pinMode(IN1, OUTPUT);
11     pinMode(IN2, OUTPUT);
12     pinMode(EN_A, OUTPUT);
13
14     // digitalWrite(EN_A, HIGH);
15
16 }
17
18 void loop() {
19     // put your main code here, to run repeatedly:
20     analogWrite(EN_A, speed);
21     digitalWrite(IN1, HIGH);
22     digitalWrite(IN2, LOW);
23
24
25     // digitalWrite(IN1, HIGH);
26     // digitalWrite(IN2, HIGH);
27     // delay(500);
28
29 }
```

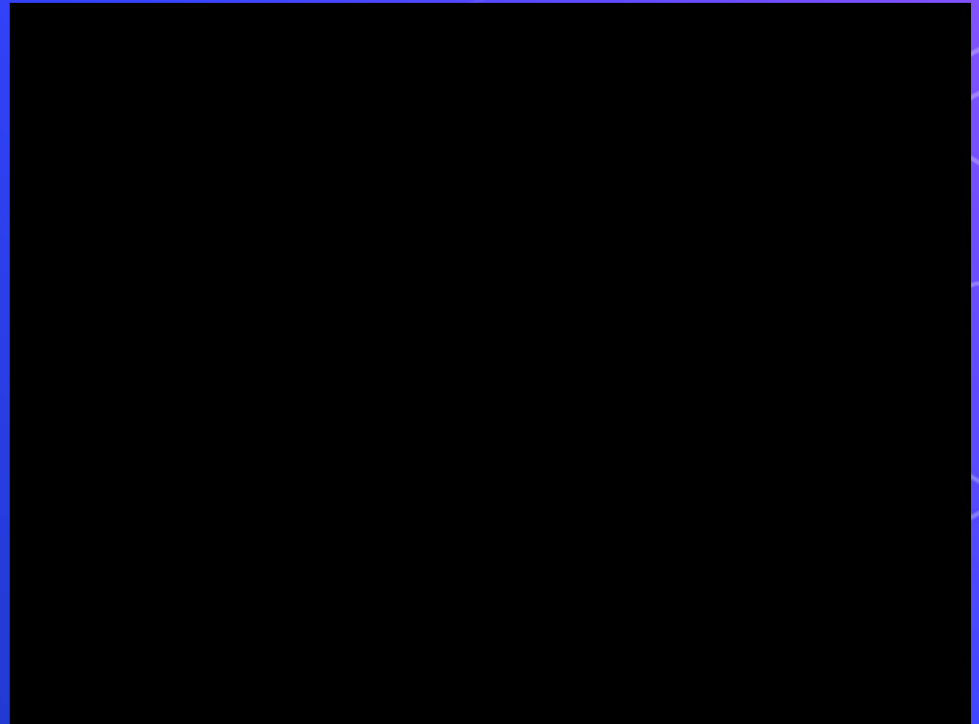
Output



Implementation Process

Sprint #3:

```
void loop() {  
  
    deliveroid_basic_motor_test(500, 500);  
    deliveroid_roam();  
    STOP_PROGRAM();  
  
}
```

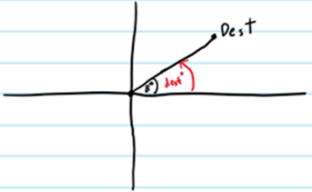


Implementation Process

Sprint #4:


2nd 3rd	1st 4th	$B = \tan^{-1}\left(\frac{y}{x}\right)$ where $y = \Delta y$ from robot to destination $x = \Delta x$ from robot to destination
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Case 1: Destination in 1st quadrant



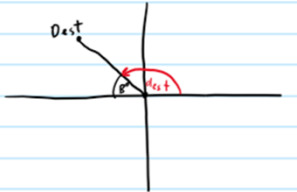
dest angle from x-axis = B

Case 3: Destination in 3rd quadrant




dest angle from x-axis = $-(180^\circ - B)$
or $-(\pi - B)$

Case 2: Destination in 2nd quadrant



dest angle from x-axis = $180^\circ - B$
or $\pi - B$

Case 4: Destination in 4th quadrant



dest angle from x-axis = $-B$

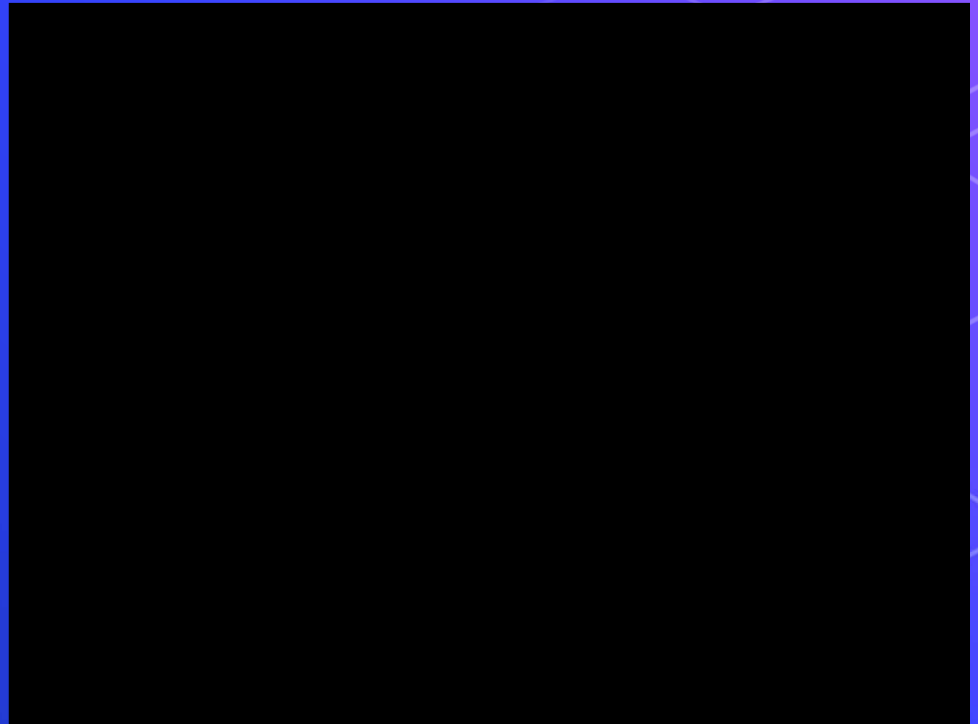
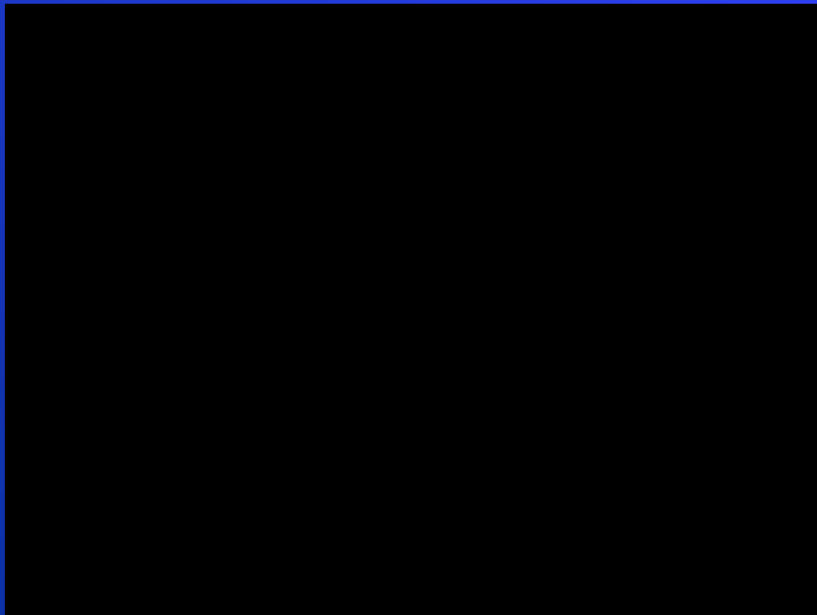
Implementation Process

Sprint #4:



Implementation Process

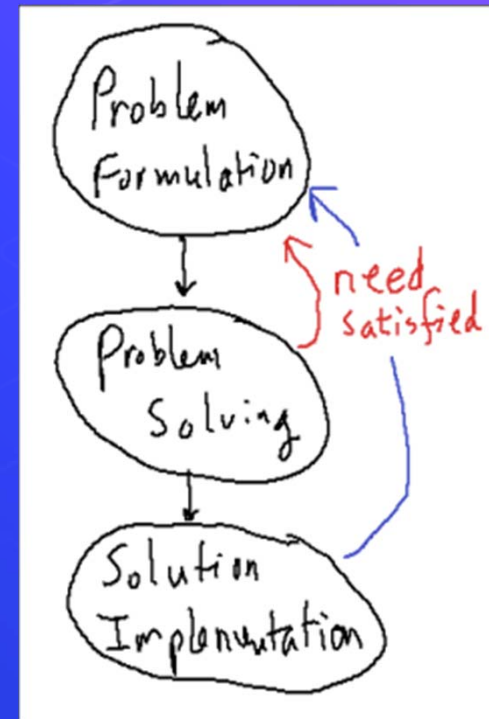
Sprint #4:



Conclusion

This year we were able to accomplish the following:

- Fully immerse ourselves in the design process
- Bring our design to life from prototype to final product



Any Questions?

