





MIT Introduction to Technology,
Engineering, and Science



Welcome to the
2023 Robo World Cup!



The Dream Team!

Lena Araujo

Houston, TX

My favorite player is
Ronaldo!



Ava Lam

Houston, TX

JUDE BELLINGHAM



Ryan Lin

NYC, NY

Favorite Player:
Tom Brady



“If football has taught me anything it is that you can overcome anything if, and only if, you love something enough.”

— LIONEL MESSI





Decisions, Decisions!

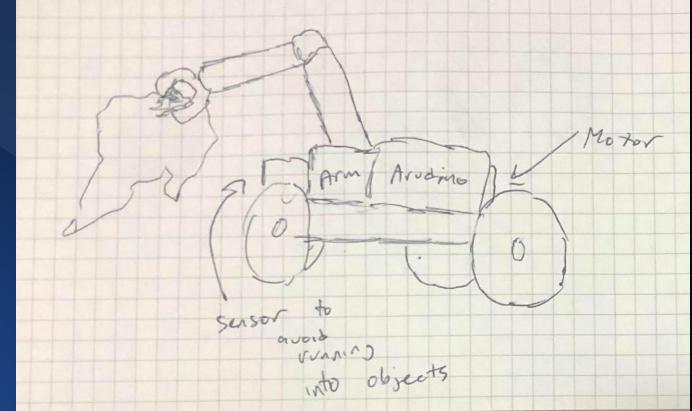
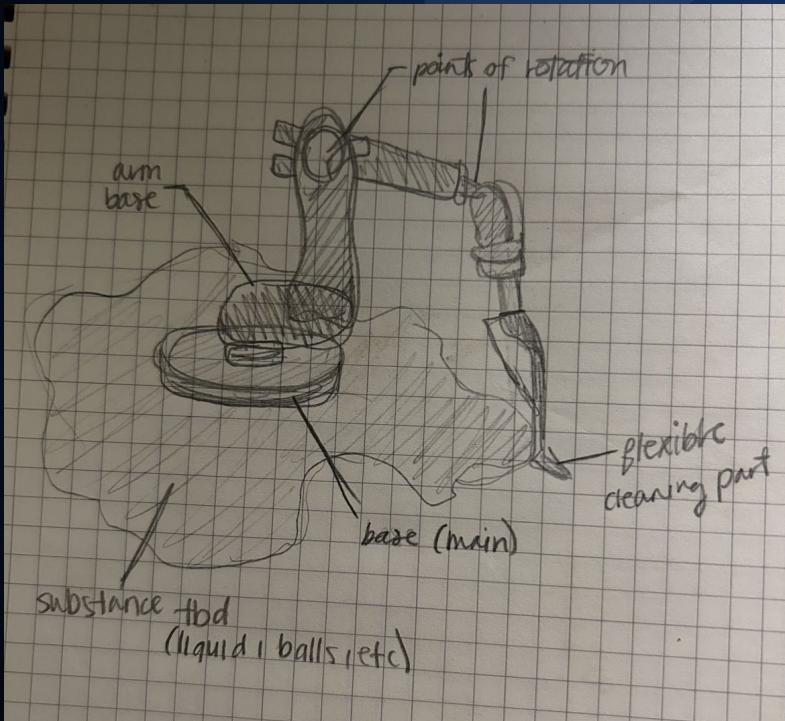
The factors considered included...

- Mechanics
- Feasibility
- Creativity
- Functionality

3 Ideas, Design Matrix

	Mechanics!	Feasibility; Difficulty Higher = Easier	Uniqueness; Is it symposium material?	Functionality	Total
Soccer Robot (Literally Ronaldo)	+1	+1	+1	+1	+4
Art Robot (Statement)	+1	+1	+1	0	+3
Cleaning Robot	+1	-1	+1	+1	+2

Dropped Designs



Cleaning Robot

Controlled by Bluetooth controller to move left or right to clean

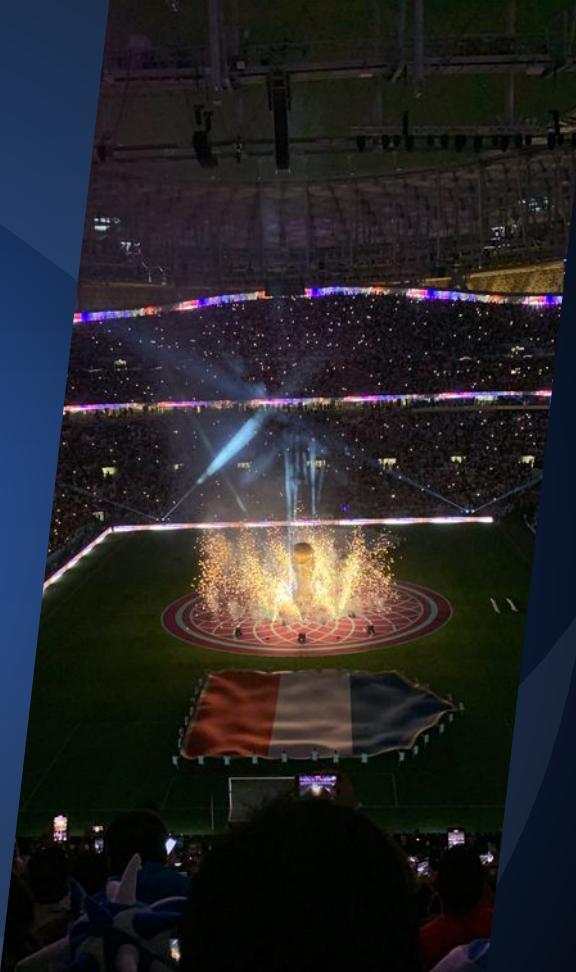
Art Robot

Inspired by Sun Yuan and Peng Yu's Can't Help Myself

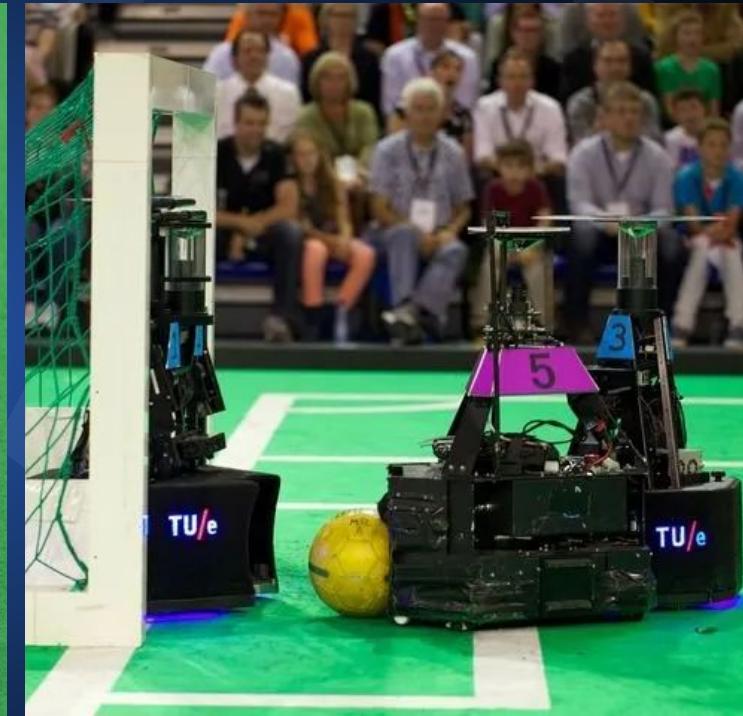
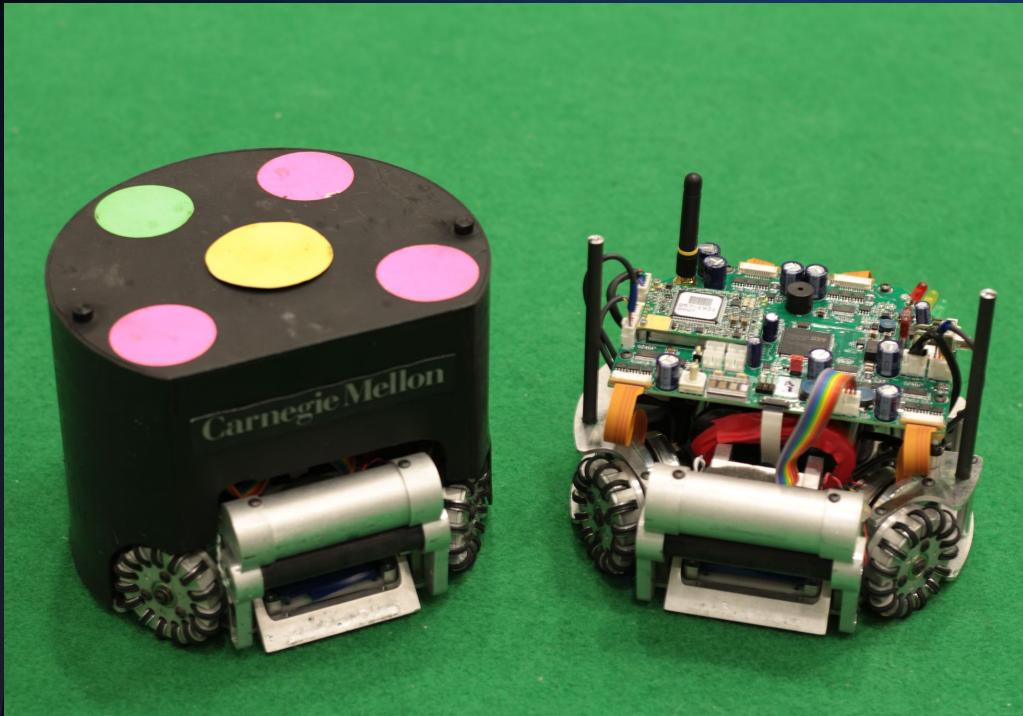


Purpose

- Stepping stone to future projects; possibility for expanding robot's capabilities and learning mechanics
- Inspiring youth through a fun robot



Inspiration



Time is Ticking!

MILESTONE 2 & 3

Sketches and CAD

MILESTONE 5

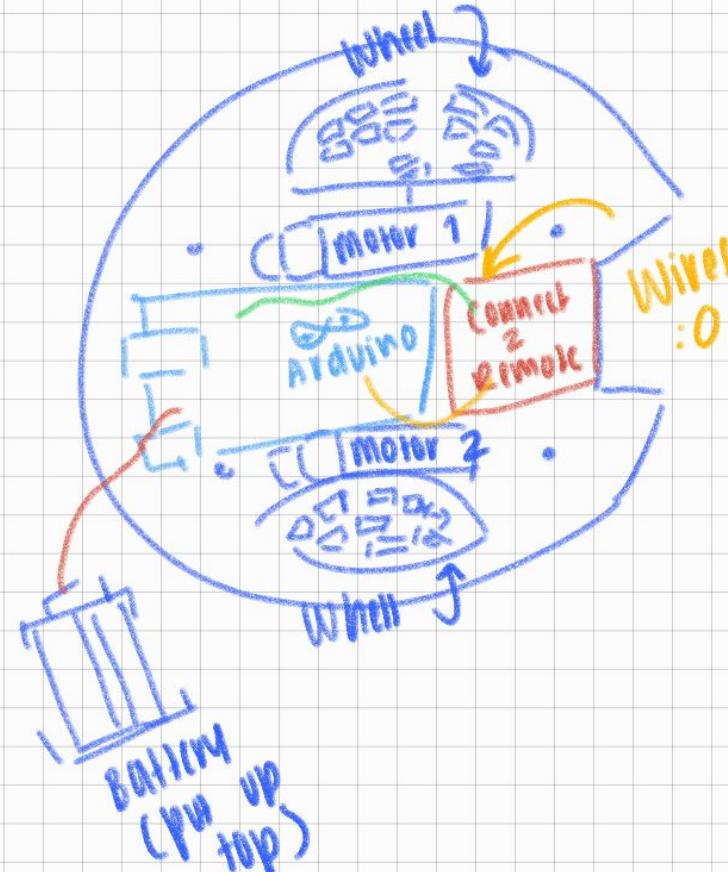
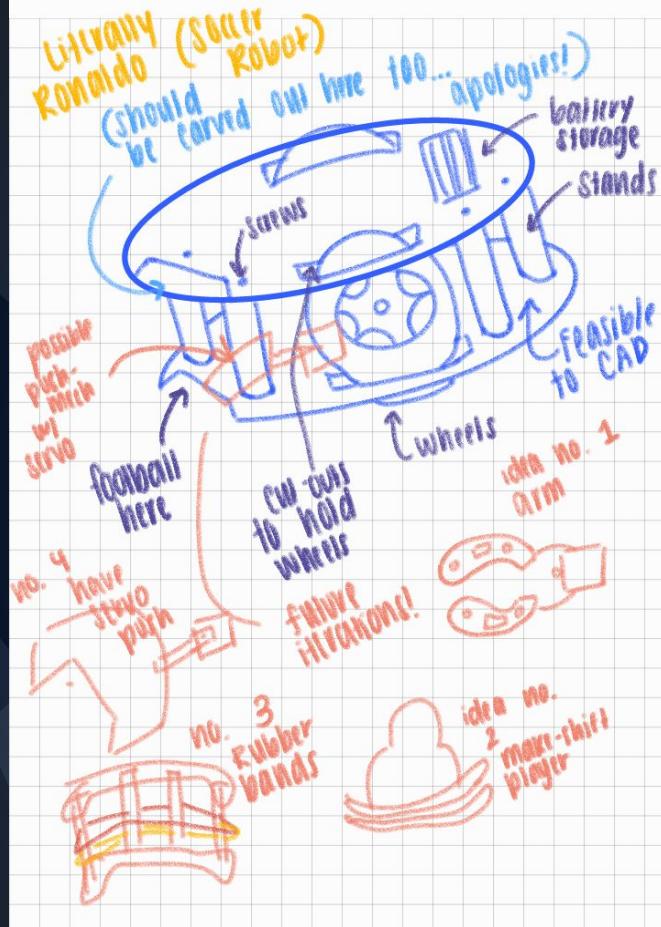
Arduino, variant of C++,
code

MILESTONE 4

Schematic design, or
circuit

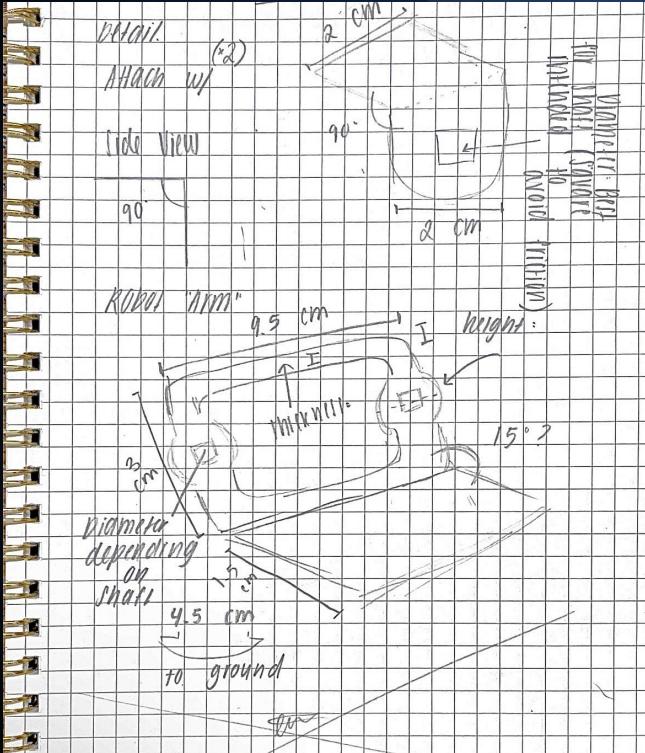
FINAL

Final robot and
presentation

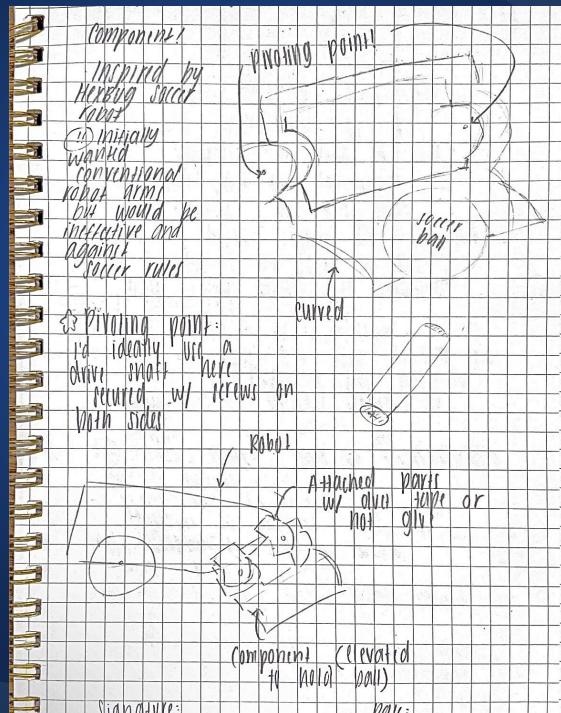


Sketches

1.



2.



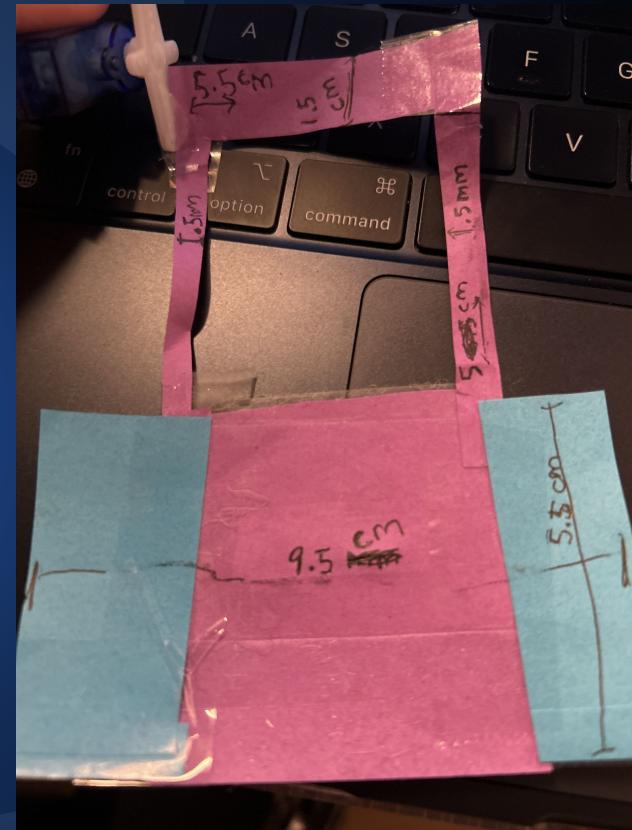
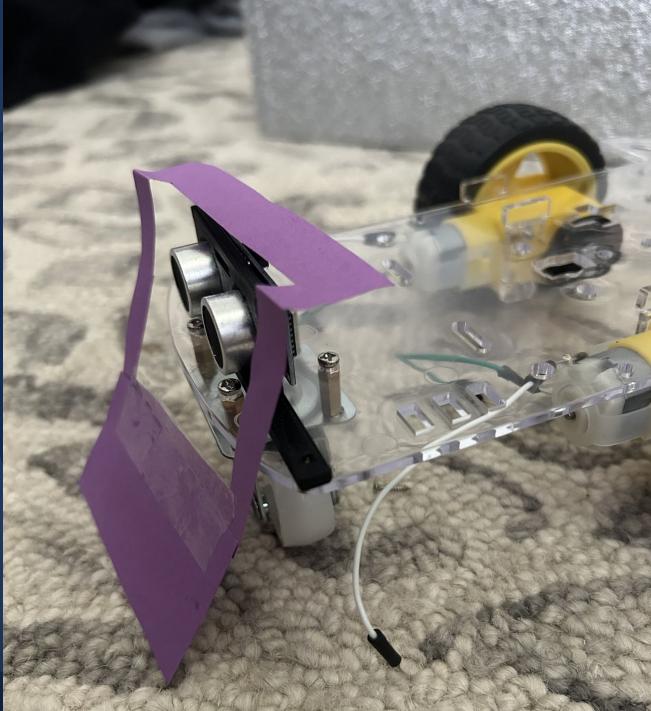
Prototype Galore

I.



Prototype Galore

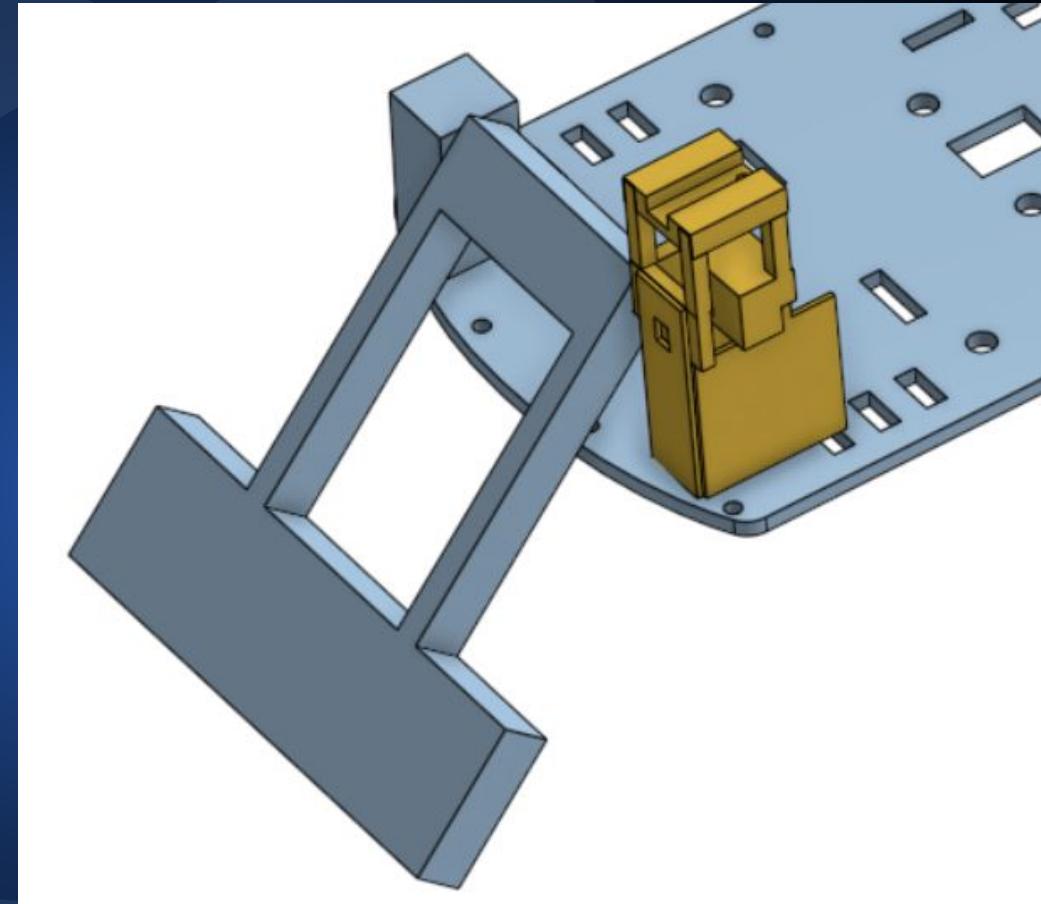
2.



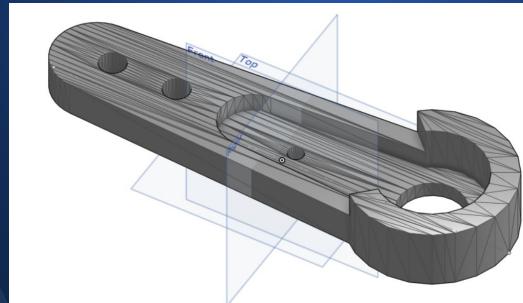
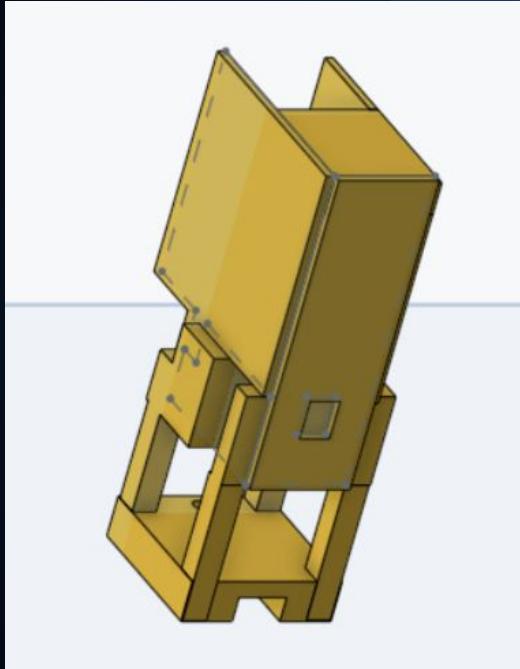
CAD Assembly

Robot kicker needed to kick a miniature soccer ball that's the size of a **golf ball**

- 134 mm circumference
- 42.67 mm diameter



CAD Components

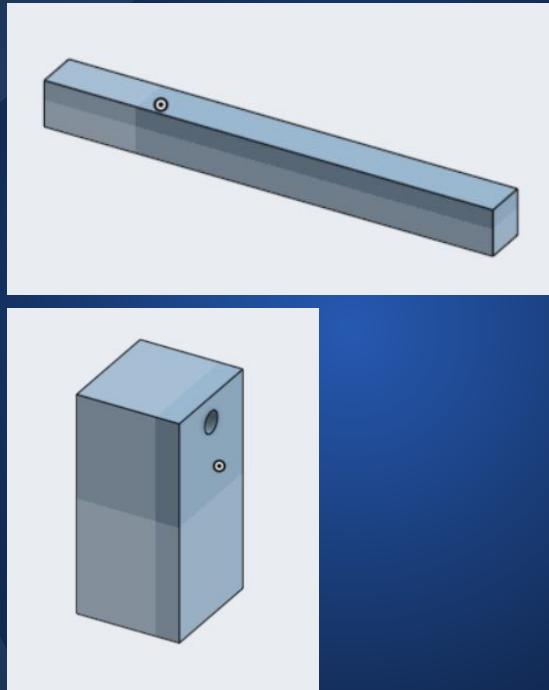
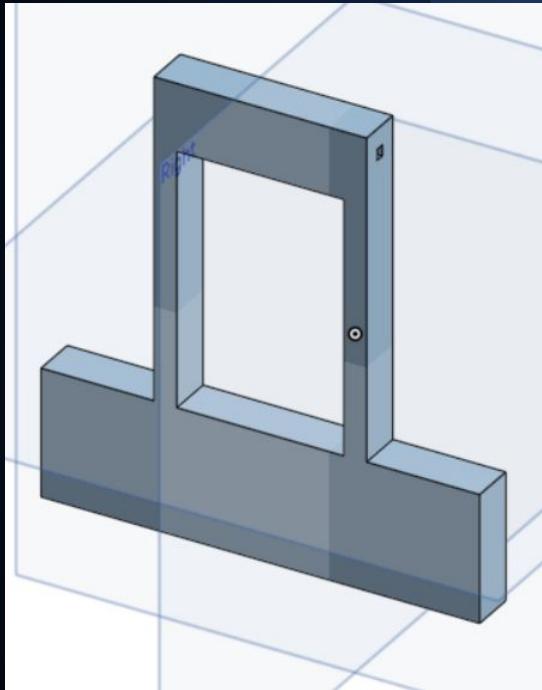


Servo Attachments

- Arm extender
- Servo holder

Secure the servo and ensure it's doing its part in moving the kicker

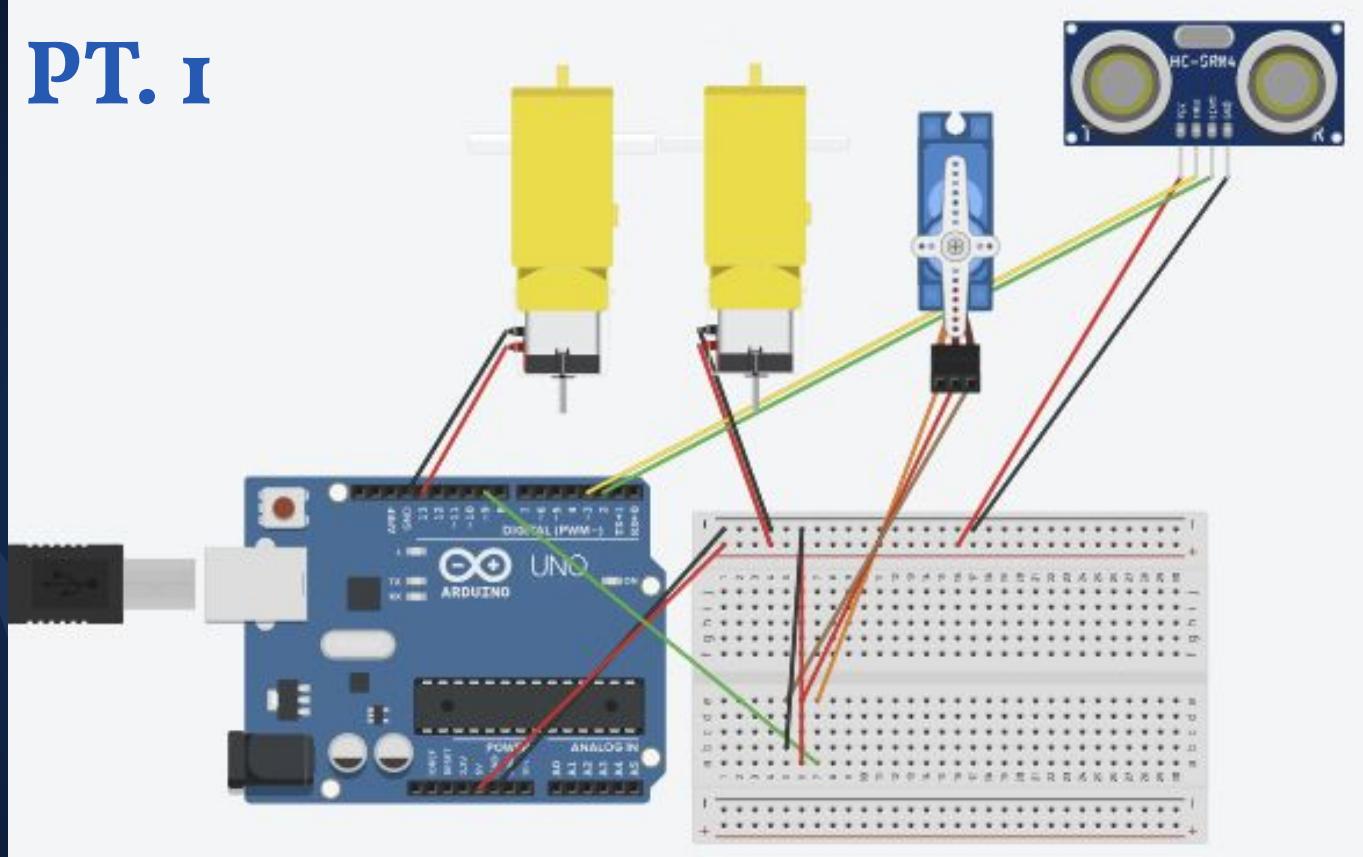
CAD Components



Attaching Kicker to Chassis

- Drive shaft
- Column lining up right part with left part on servo

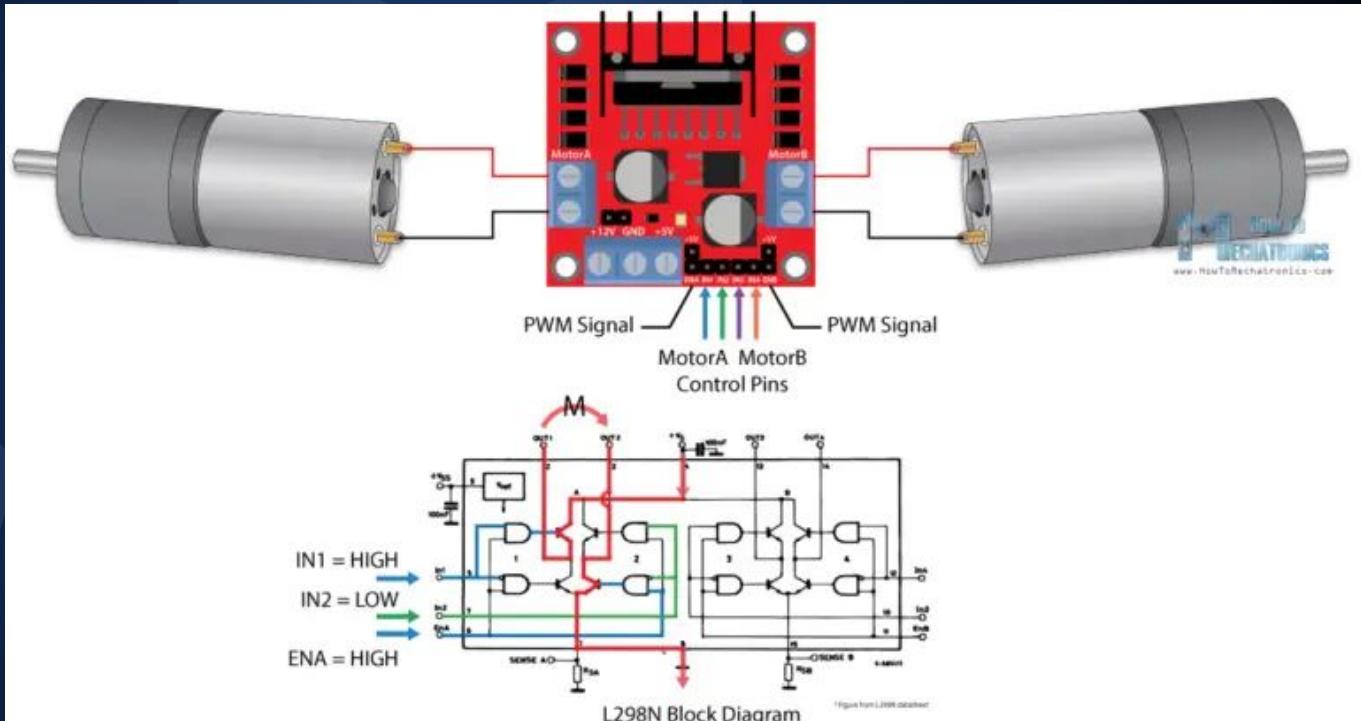
Circuit PT. I



Tinkercad

Circuit PT. 2

How to Mechatronics,
Dejan
L298N Motor Driver



Code Pt. I

```
3 #include <Servo.h>
4 #define trigPin 3
5 #define echoPin 2
6 Servo servo_9;
7 int sound = 250;
8
9 void setup() {
10   Serial.begin (9600);
11   pinMode(trigPin, OUTPUT);
12   pinMode(echoPin, INPUT);
13   servo_9.attach(9, 500, 2500);
14 }
15
16 void loop() {
17   long duration, distance;
18   digitalWrite(trigPin, LOW);
19   digitalWrite(trigPin, HIGH);
20   delay(50);
21   digitalWrite(trigPin, LOW);
22   duration = pulseIn(echoPin, HIGH);
23   distance = (duration/2) / 29.1;
24
25 if (distance <= 30) {
26   Serial.println("the distance is less than 10");
27   servo_9.write(100);
28   delay(1500);
29 }
30 else {
31   servo_9.write(0);
32 }
33 if (distance > 60 || distance < 0) {
34   Serial.println("The distance is more than 60");
35 }
36 else {
37   Serial.print(distance);
38   Serial.println(" cm");
39 }
40 delay(500);
41 }
```

Servo powered by
Ultrasonic Sensor

Code Pt. 2

Motor

```
1 const int motorPin1 = 4;                                39
2 const int motorPin2 = 5;                                40
3 const int motorPin3 = 6;                                41
4 const int motorPin4 = 7;                                42
5 const int enablePinA = 8;                               43
6 const int enablePinB = 9;                               44
7
8 // Stop motor                                         45
9 void stopMotor() {                                     46
10    digitalWrite(motorPin1, LOW);                         47
11    digitalWrite(motorPin2, LOW);                         48
12    digitalWrite(motorPin3, LOW);                         49
13    digitalWrite(motorPin4, LOW);                         50
14 }
15
16 void setup() {                                       51
17   // Start serial communication                      52
18   Serial.begin(9600);                                53
19   Serial.println("Press 'W' to move chassis forward, 'S' to move chassis backward, 'A' to turn 54
left, 'D' to turn right, and 'X' to stop.");           55
20
21 // Set pins as outputs                            56
22 pinMode(motorPin1, OUTPUT);                        57
23 pinMode(motorPin2, OUTPUT);                        58
24 pinMode(motorPin3, OUTPUT);                        59
25 pinMode(motorPin4, OUTPUT);                        60
26 pinMode(enablePinA, OUTPUT);                      61
27 pinMode(enablePinB, OUTPUT);                      62
28
29 // Enable motor driver A and B                  63
30 digitalWrite(enablePinA, HIGH);                   64
31 digitalWrite(enablePinB, HIGH);                   65
32 }                                                 66
33
34 void loop() {                                      67
35 if (Serial.available()) {                         68
36   char command = Serial.read();                  69
37
38 switch (command) {                                70
39   case 'A':                                       71
40     // Move robot forward                         72
41     digitalWrite(motorPin1, HIGH);                73
42     digitalWrite(motorPin2, LOW);                 74
43     digitalWrite(motorPin3, HIGH);                75
44     digitalWrite(motorPin4, LOW);                 76
45     break;                                         77
46
47   case 'D':                                       78
48     // Move robot backward                         79
49     digitalWrite(motorPin1, LOW);                80
50     digitalWrite(motorPin2, HIGH);               81
51     digitalWrite(motorPin3, LOW);                82
52     digitalWrite(motorPin4, HIGH);               82
53     break;                                         82
54
55   case 'W':                                       82
56     // Turn left                                82
57     digitalWrite(motorPin1, LOW);                82
58     digitalWrite(motorPin2, HIGH);               82
59     digitalWrite(motorPin3, HIGH);               82
60     digitalWrite(motorPin4, LOW);                82
61     break;                                         82
62
63   case 'S':                                       82
64     // Turn right                               82
65     digitalWrite(motorPin1, HIGH);               82
66     digitalWrite(motorPin2, LOW);                82
67     digitalWrite(motorPin3, LOW);                82
68     digitalWrite(motorPin4, HIGH);               82
69     break;                                         82
70
71   case 'X':                                       82
72     // Stop Motor                               82
73     stopMotor();                                82
74     break;                                         82
75
76   default:                                         82
77     break;                                         82
78
79 }
```

Introducing...

The Robo World
Cup's Official
Robot!!!



MITES

MIT • 24

Citation

<https://docs.google.com/document/d/1RdmF4CTkXLLOGj86cUzXrBDzaWcG3lt2-itvejUTEDM/edit?usp=sharing>



Thank you!!!!

Q&A



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