CyberCrawlers.

4x4 In Schools

Meet the Team.

Pranav Jain

App Developer

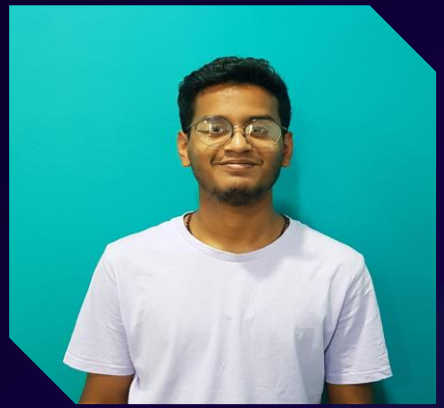
Mhd Adnan Kassoumeh

Electrical Designer

Baraa Al Jilani

Head Coach & Mentor

Marc Leo



Team Designer

Erdzean Nathaniel Sybico

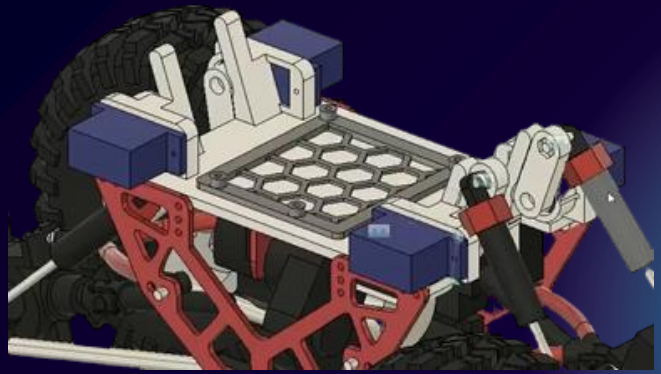
Mechanical Designer

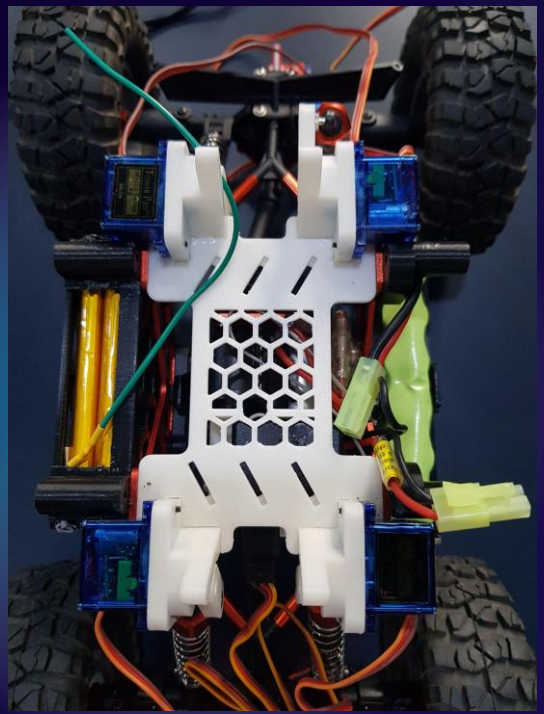
Our Car – Zed 2.0

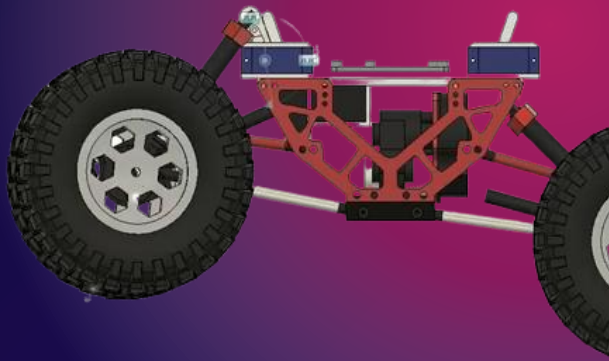
The Mechanical Design

The Adaptive Shell

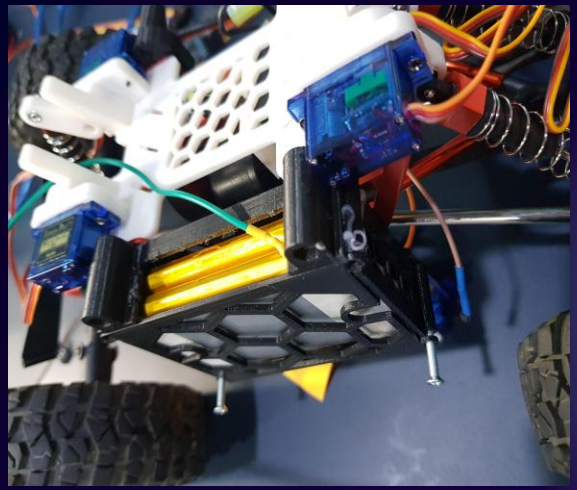
Manual Control of the Suspension

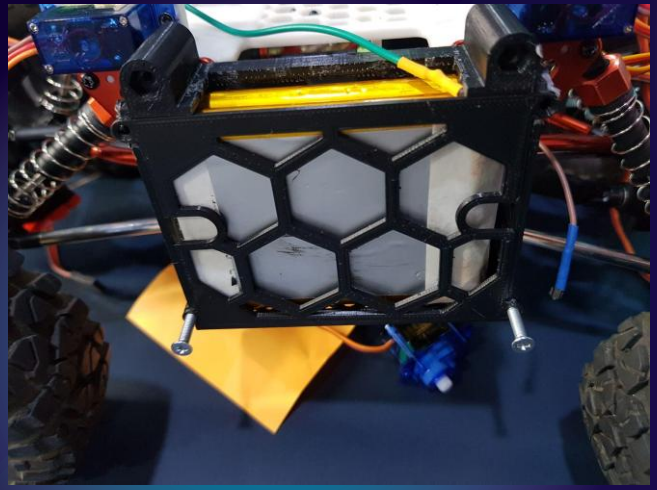


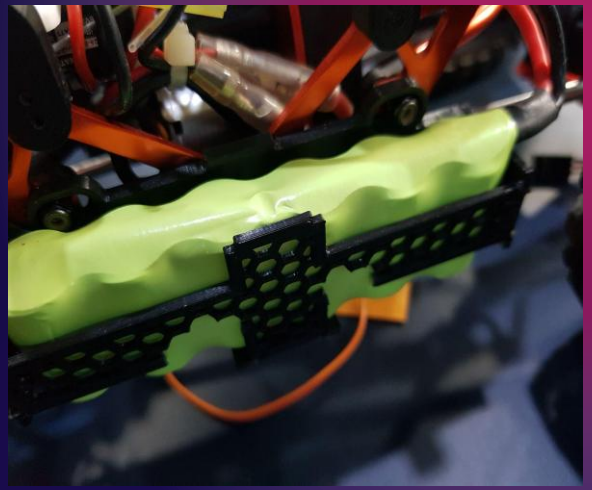




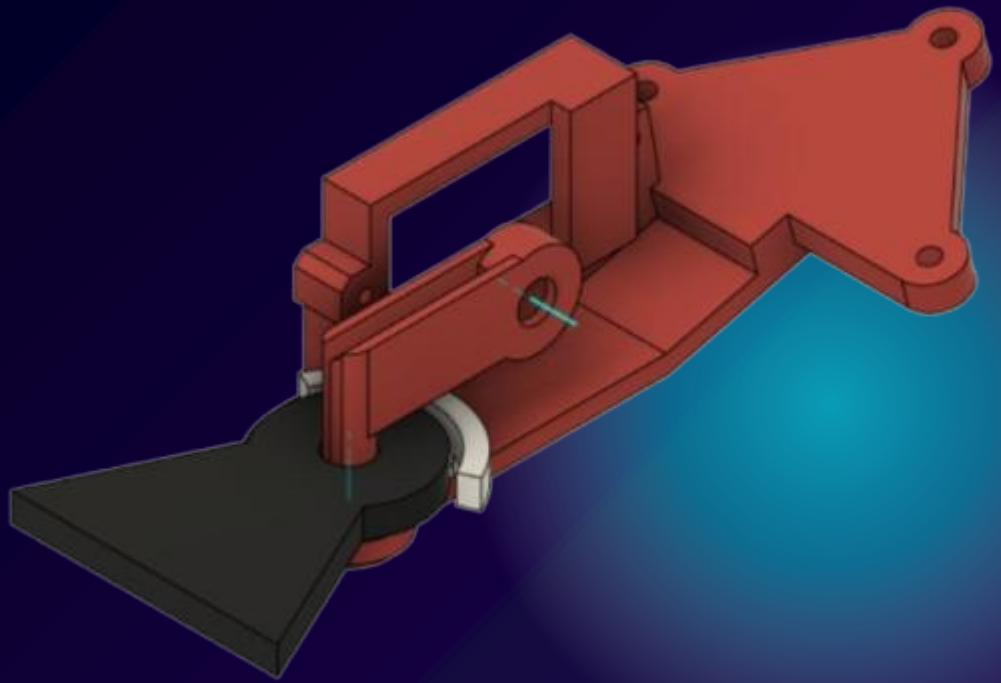
Custom Battery Holders

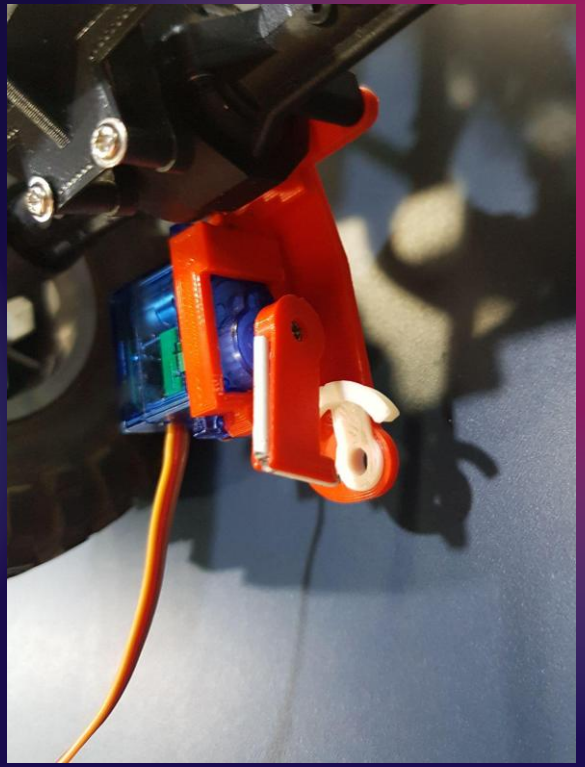


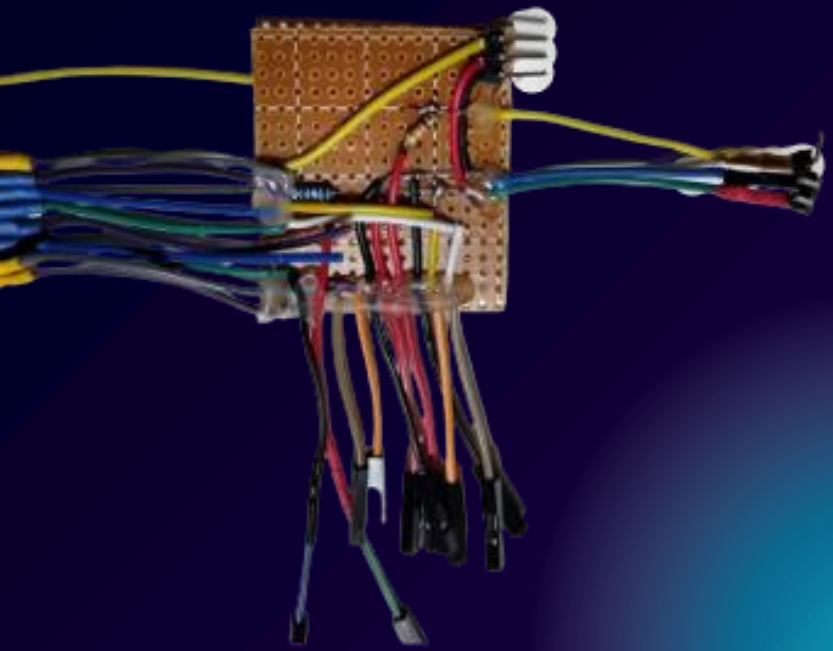




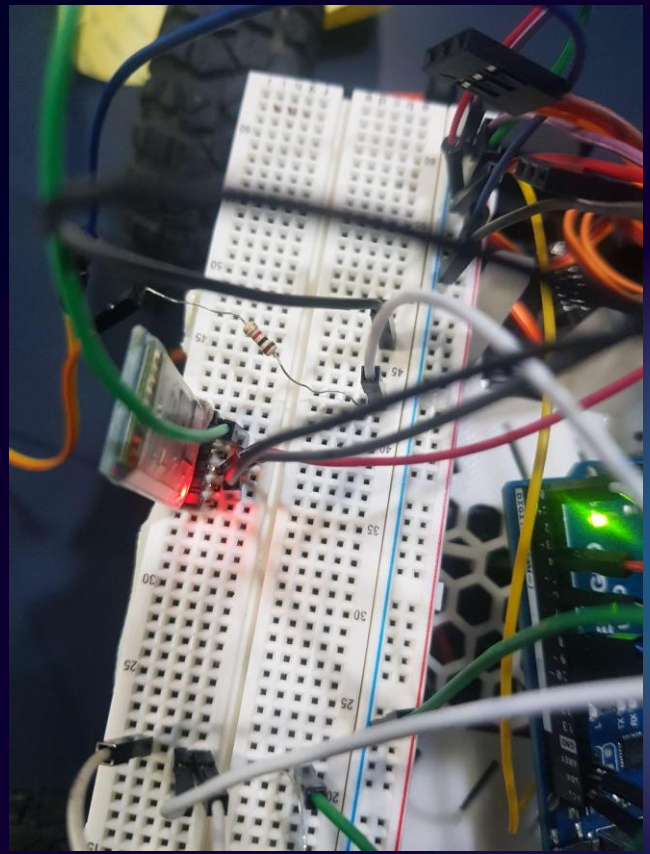
Trailer Tow Hook

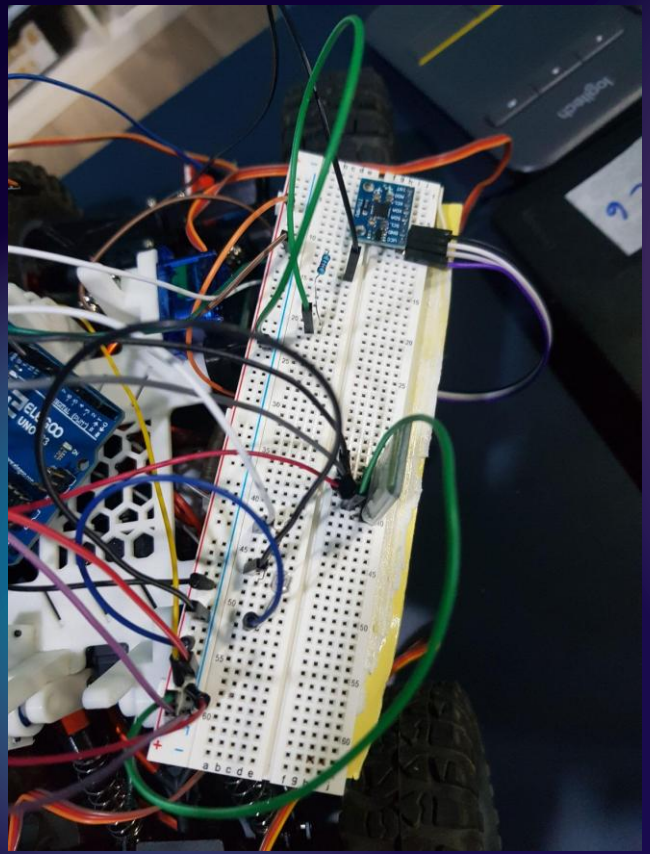


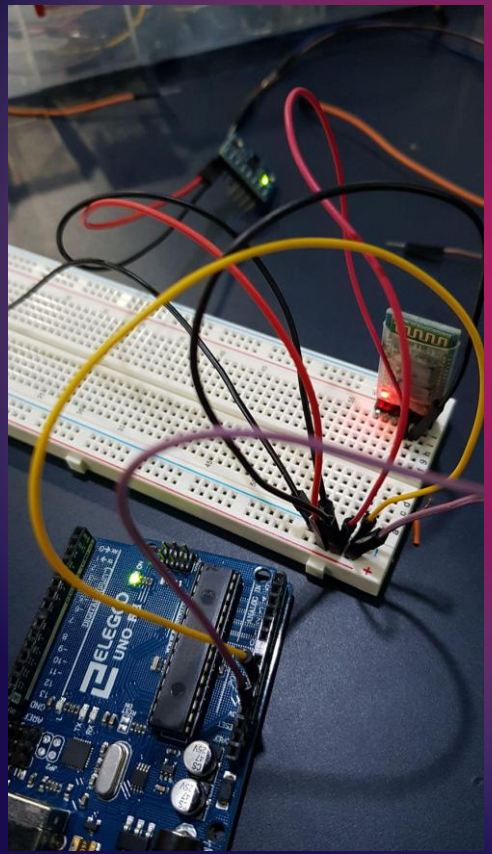




The Electrical Side



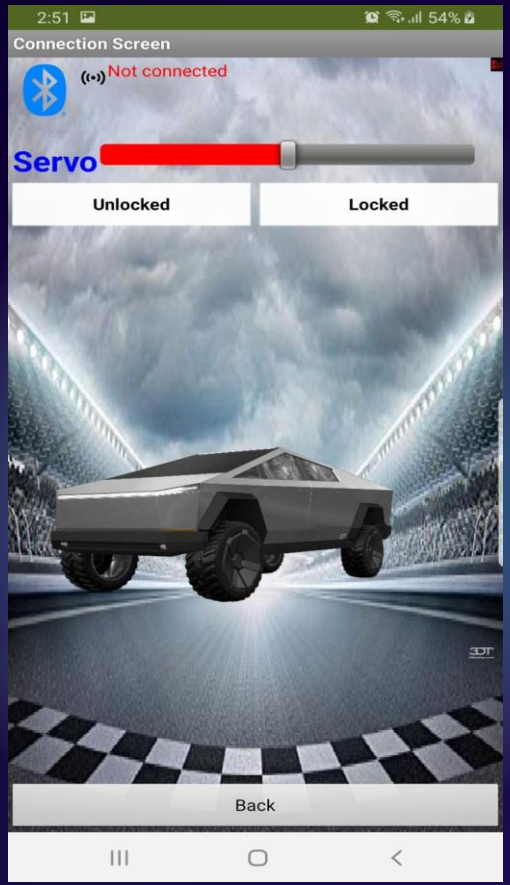




App Development

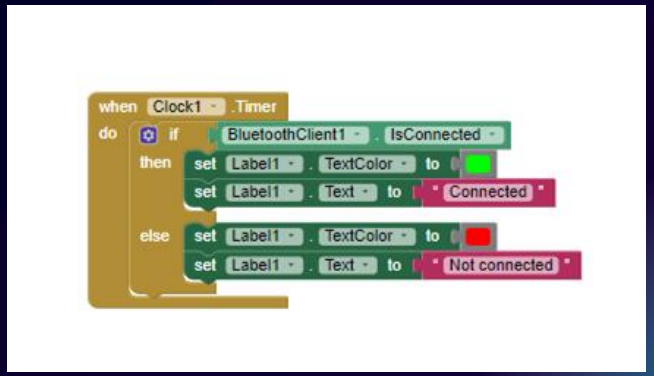
The App

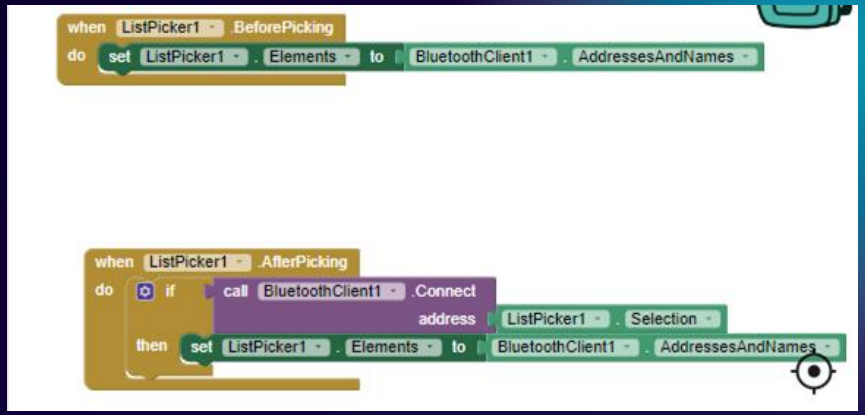

2:50
54%
Main Screen
Home Screen
What's the Competition
About Us
Zed 1.0
Zed 2.0
Robot Connection
Social Media

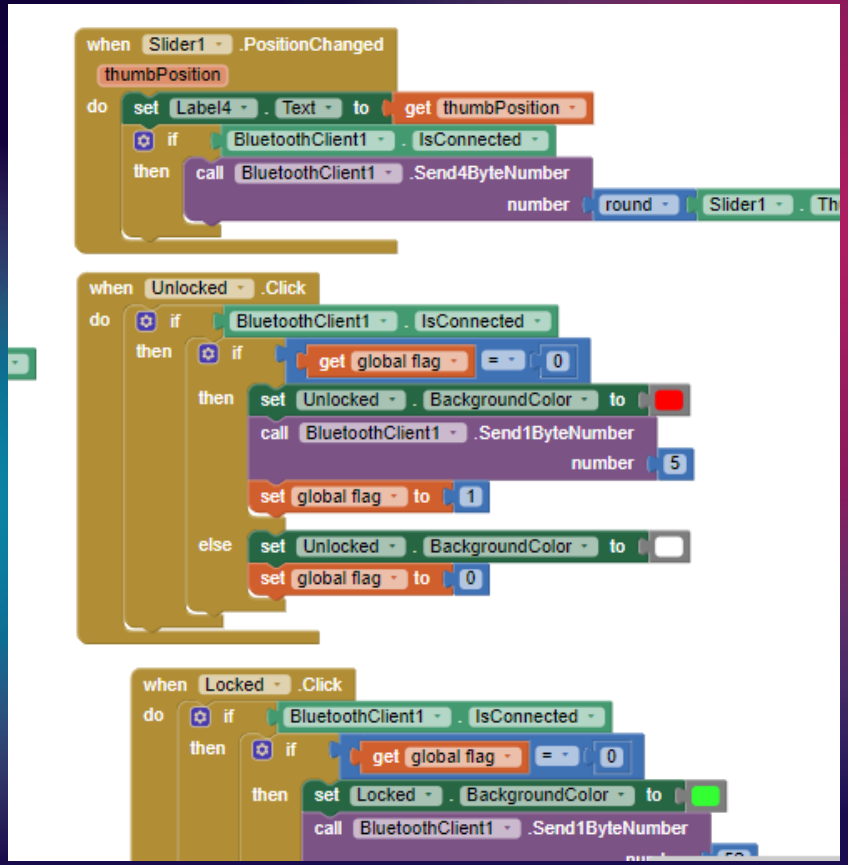

2:51
54%
Connection Screen
Not connected
Servo
Unlocked
Locked
Back


2:54
57%
About Us
About Us
Mhd Adnan Kassoumeh
Marc Leo
Erdzean Nathaniel Sybico
Pranav Jain
Baraa Al Jilani
Back

Programming the App







The Code

```
//Accelerometer angle calculations
acc_total_vector = sqrt((acc_x*acc_x)+(acc_y*acc_y)+(acc_z*acc_z));  //Calculate the total accelerometer vector
//57.296 = 1 / (3.142 / 180) The Arduino asin function is in radians
angle_pitch_acc = asin((float)acc_y/acc_total_vector)* 57.296;       //Calculate the pitch angle
angle_roll_acc = asin((float)acc_x/acc_total_vector)* -57.296;       //Calculate the roll angle

//Place the MPU-6050 spirit level and note the values in the following two lines for calibration
angle_pitch_acc -= 0.0;                                              //Accelerometer calibration value for pitch
angle_roll_acc -= 0.0;                                               //Accelerometer calibration value for roll

if(set_gyro_angles){                                                 //If the IMU is already started
  angle_pitch = angle_pitch * 0.9996 + angle_pitch_acc * 0.0004;     //Correct the drift of the gyro pitch angle wit
  angle_roll = angle_roll * 0.9996 + angle_roll_acc * 0.0004;        //Correct the drift of the gyro roll angle with
}
else{                                                                //At first start
  angle_pitch = angle_pitch_acc;                                     //Set the gyro pitch angle equal to the acceler
  angle_roll = angle_roll_acc;                                       //Set the gyro roll angle equal to the accelerc
  set_gyro_angles = true;                                            //Set the IMU started flag
```

```
void setup() {
  myservo1.attach(5);  // attaches the servo on pin 9 to the servo object
  myservo2.attach(6);  // attaches the servo on pin 9 to the servo object
  myservo3.attach(9);  // attaches the servo on pin 9 to the servo object
  myservo4.attach(10);  // attaches the servo on pin 9 to the servo object
}

void loop() {
  for (pos = 0; pos <= 180; pos += 1) { // goes from 0 degrees to 180 degrees
    // in steps of 1 degree
    myservo1.write(pos2-pos);
    myservo2.write(pos);
    myservo3.write(pos2-pos);
    myservo4.write(pos); // tell servo to go to position in variable 'pos'
    delay(8);                       // waits 15 ms for the servo to reach the position
  }
  for (pos = 180; pos >= 0; pos -= 1) { // goes from 180 degrees to 0 degrees
    myservo1.write(pos2-pos);
    myservo2.write(pos);
    myservo3.write(pos2-pos);
    myservo4.write(pos); // tell servo to go to position in variable 'pos'
```

Challenges Along the Way.

- Restrictions due to COVID-19
- Complex C++ coding was required

The Solutions We Implemented.

- Looked for inspiration online for advanced codes

- Switched to online platforms for team meetings

What We Learnt Along the Way

- Teamwork & Collaboration
- Problem Solving & Critical Thinking
- New Skills
- Innovative Ways of Tackling Challenges