S.C.A.R.A.N

- The Robotic Arm

TEAM 3000

TEAM MEMBERS

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DESCRIPTION :

- **SCARAN** is simple robotic arm which can be used for lifting light weighted objects and placing it
- DOF = 5
- Material made of : plastic (3D printed)
- Mechanics : 3 Servo (MG996R) and 3 (SG90)micro Servo motors
- Micrcontroller : Arduino UNO R3
- Controlled through : Serial monitor of Arduino IDE from computer connected
- Communicating Baud Rate : 9600

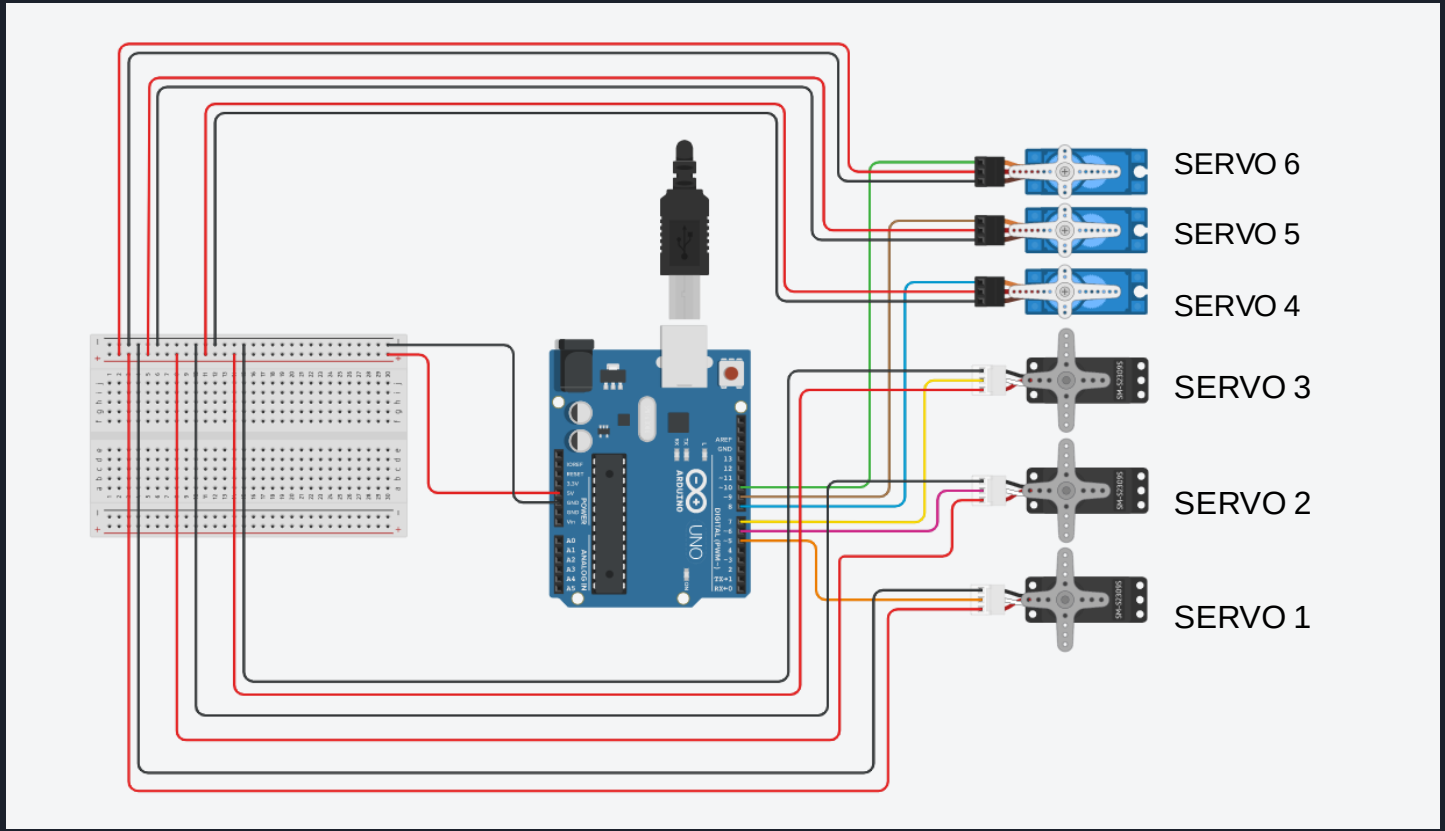
SCARAN Components :

- MG996R Servo Motors x 3
- SG90 Micro Servo Motor x 3
- Arduino Uno R3 microcontroller x 1
- Jumper Wires
- 3D printed parts

MAIN STEPS INVOLVED

- Circuit designing
- Coding
- 3D design
- Combining motors and 3D printed parts
- Conecting the SCARAN with Arduino and uploading Code
- Debugging and checking functionality

Circuit Designing :



Code :

Link for Arduino Code : https://drive.google.com/file/d/1kHbsmPfCC8yjhyvyJ8UXbEvDiqVwHR-P/view?usp=sharing

```
#include <Servo.h>

Servo servo01;
Servo servo02;
Servo servo03;
Servo servo04;
Servo servo05;
Servo servo06;



int servo1Pos, servo2Pos, servo3Pos, servo4Pos, servo5Pos, servo6Pos; // current position
int servo1PPos, servo2PPos, servo3PPos, servo4PPos, servo5PPos, servo6PPos; // previous position
int servo01SP[50], servo02SP[50], servo03SP[50], servo04SP[50], servo05SP[50], servo06SP[50]; // for storing positions/steps
int speedDelay = 20;
int index = 0;
String dataIn = "";
```

```
void setup() {
  servo01.attach(5);
  servo02.attach(6);
  servo03.attach(7);
  servo04.attach(8);
  servo05.attach(9);
  servo06.attach(10);
  Serial.begin(9600);
  Serial.print("i started");

  delay(20);
  // Robot arm initial position
  servo1PPos = 90;
  servo01.write(servo1PPos);
  servo2PPos = 120;
  servo02.write(servo2PPos);
  servo3PPos = 180;
  servo03.write(servo3PPos);
  servo4PPos = 90;
  servo04.write(servo4PPos);
  servo5PPos = 50;
  servo05.write(servo5PPos);
  servo6PPos = 80;
```

```
  servo4PPos = 90;
  servo04.write(servo4PPos);
  servo5PPos = 50;
  servo05.write(servo5PPos);
  servo6PPos = 80;
  servo06.write(servo6PPos);
}

void loop() {
  // Check for incoming data

    Serial.print("im in");
    dataIn =Serial.readString();          // Read the data as string
    Serial.print(dataIn);
                                        // If "Waist" slider has changed value - Move Servo 1 to position
    if (dataIn.startsWith("s1")==true) {
      Serial.print("to s1");
      String dataInS = dataIn.substring(2);
      Serial.print("shortened");              // Extract only the number. E.g. from "s1120" to "120"
      servo1Pos = dataInS.toInt();
      Serial.print("converted to int");          // Convert the string into integer
                                               // We use for loops so we can control the speed of the servo
                                              // If previous position is bigger then current position
```

```
                                                // We use for loops so we can control the speed of the servo
                                              // If previous position is bigger then current position
  if (servo1PPos > servo1Pos) {
    Serial.print("into loop");
    for ( int j = servo1PPos; j >= servo1Pos; j--) {          // Run servo down
      servo01.write(j);
      Serial.print("writing");
      delay(20);                              // defines the speed at which the servo rotates
    }
  }
  // If previous position is smaller then current position
  if (servo1PPos < servo1Pos) {
    Serial.print("into loop");
    for ( int j = servo1PPos; j <= servo1Pos; j++) {     // Run servo up
      servo01.write(j);
      Serial.print("writing");
      delay(20);
    }
  }
  servo1PPos = servo1Pos;                  // set current position as previous position
}
```

```
// Move Servo 2
if (dataIn.startsWith("s2")==true) {
  String dataInS = dataIn.substring(2, dataIn.length());
  servo2Pos = dataInS.toInt();

  if (servo2PPos > servo2Pos) {
    for ( int j = servo2PPos; j >= servo2Pos; j--) {
      servo02.write(j);
      delay(50);
    }
  }
  if (servo2PPos < servo2Pos) {
    for ( int j = servo2PPos; j <= servo2Pos; j++) {
      servo02.write(j);
      delay(50);
    }
  }
  servo2PPos = servo2Pos;
}
```

```
// Move Servo 3
if (dataIn.startsWith("s3")==true) {
  String dataInS = dataIn.substring(2, dataIn.length());
  servo3Pos = dataInS.toInt();
  if (servo3PPos > servo3Pos) {
    for ( int j = servo3PPos; j >= servo3Pos; j--) {
      servo03.write(j);
      delay(30);
    }
  }
  if (servo3PPos < servo3Pos) {
    for ( int j = servo3PPos; j <= servo3Pos; j++) {
      servo03.write(j);
      delay(30);
    }
  }
  servo3PPos = servo3Pos;
}
// Move Servo 4
if (dataIn.startsWith("s4")==true) {
  String dataInS = dataIn.substring(2, dataIn.length());
  servo4Pos = dataInS.toInt();
  if (servo4PPos > servo4Pos) {
```

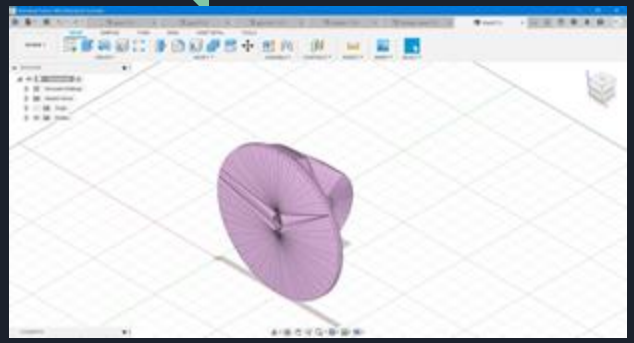
```
  if (dataIn.startsWith("s4")==true) {
    String dataInS = dataIn.substring(2, dataIn.length());
    servo4Pos = dataInS.toInt();
    if (servo4PPos > servo4Pos) {
      for ( int j = servo4PPos; j >= servo4Pos; j--) {
        servo04.write(j);
        delay(30);
      }
    }
    if (servo4PPos < servo4Pos) {
      for ( int j = servo4PPos; j <= servo4Pos; j++) {
        servo04.write(j);
        delay(30);
      }
    }
    servo4PPos = servo4Pos;
  }
  // Move Servo 5
  if (dataIn.startsWith("s5")==true) {
    String dataInS = dataIn.substring(2, dataIn.length());
    servo5Pos = dataInS.toInt();
    if (servo5PPos > servo5Pos) {
      for ( int j = servo5PPos; j >= servo5Pos; j--) {
```

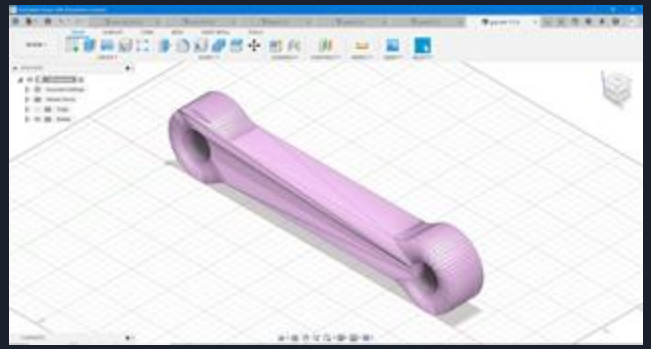
```
    if (servo5PPos > servo5Pos) {
      for ( int j = servo5PPos; j >= servo5Pos; j--) {
        servo05.write(j);
        delay(30);
      }
    }
    if (servo5PPos < servo5Pos) {
      for ( int j = servo5PPos; j <= servo5Pos; j++) {
        servo05.write(j);
        delay(30);
      }
    }
    servo5PPos = servo5Pos;
  }
  // Move Servo 6
  if (dataIn.startsWith("s6")==true) {
    String dataInS = dataIn.substring(2, dataIn.length());
    servo6Pos = dataInS.toInt();
    if (servo6PPos > servo6Pos) {
      for ( int j = servo6PPos; j >= servo6Pos; j--) {
        servo06.write(j);
        delay(30);
```

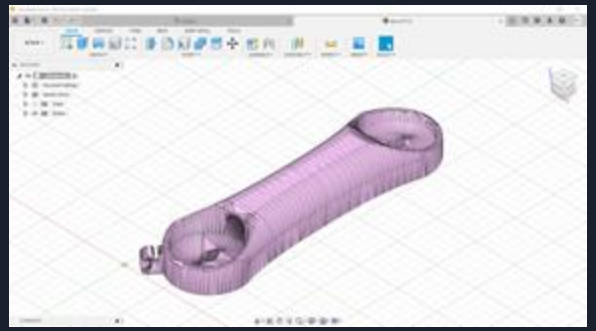
```
    if (servo6PPos > servo6Pos) {
      for ( int j = servo6PPos; j >= servo6Pos; j--) {
        servo06.write(j);
        delay(30);
      }
    }
    if (servo6PPos < servo6Pos) {
      for ( int j = servo6PPos; j <= servo6Pos; j++) {
        servo06.write(j);
        delay(30);
      }
    }
    servo6PPos = servo6Pos;
  }

}
```

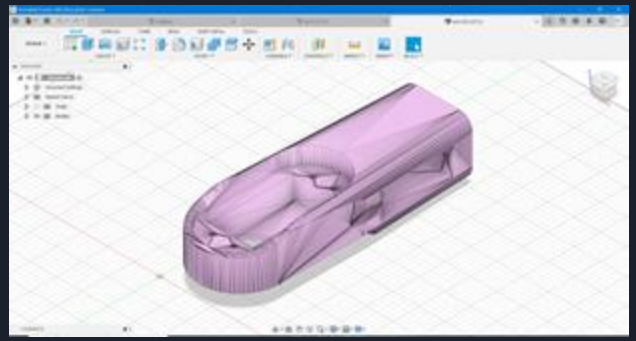
3D Modelling :

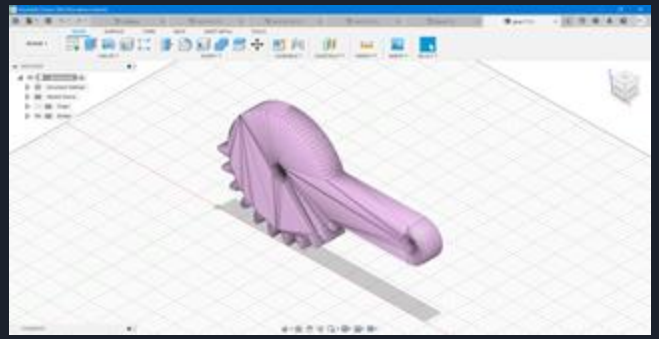
done using FUSION 360

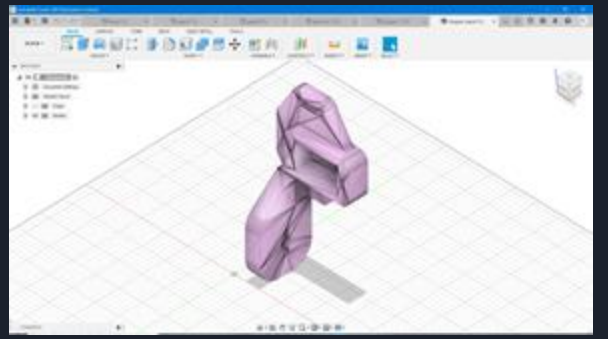






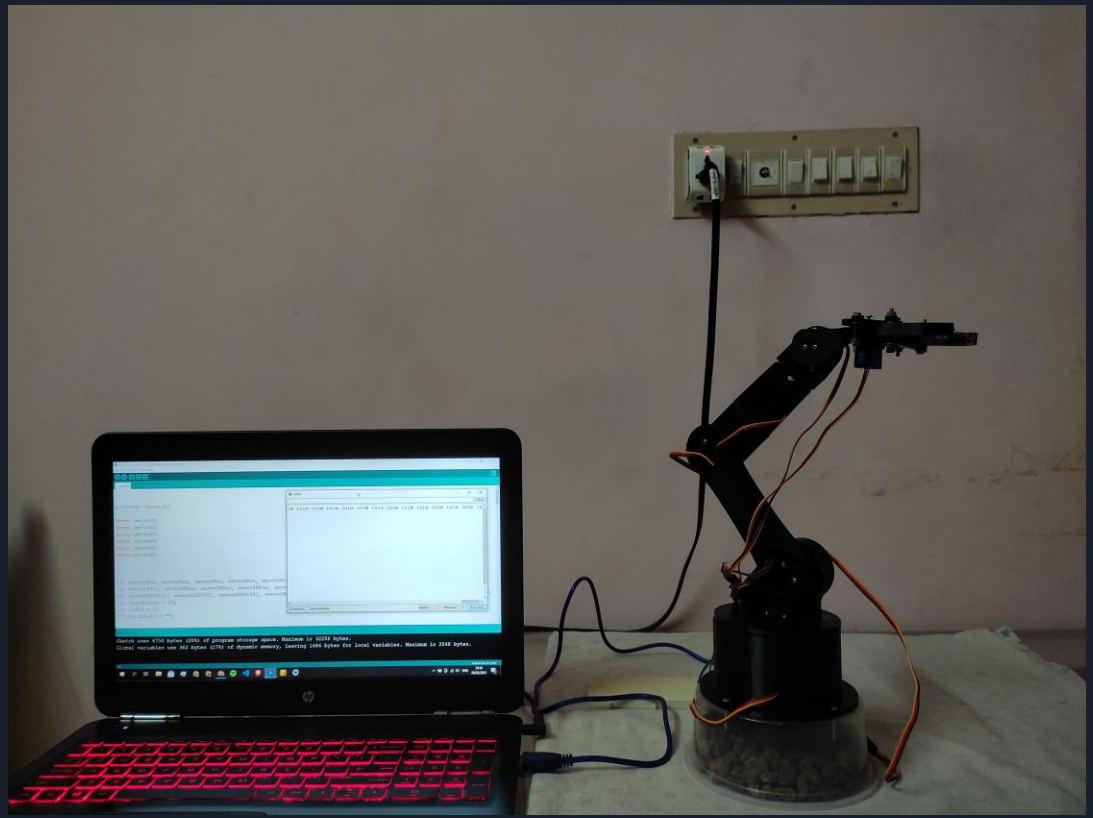


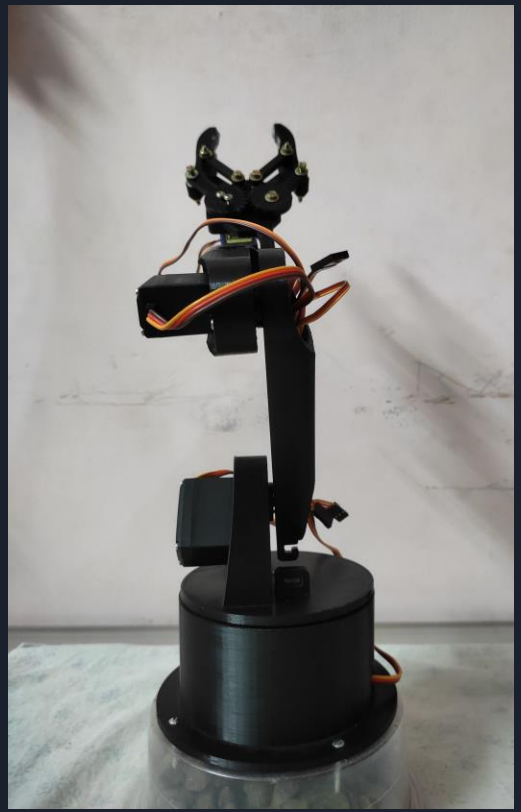


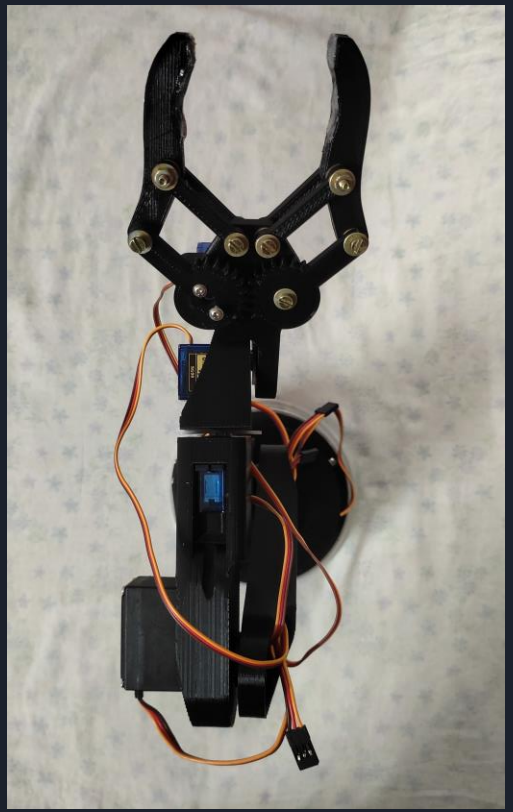


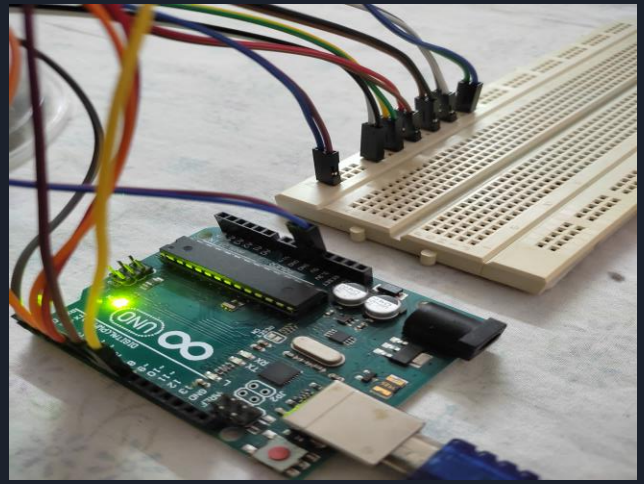
3D printed parts

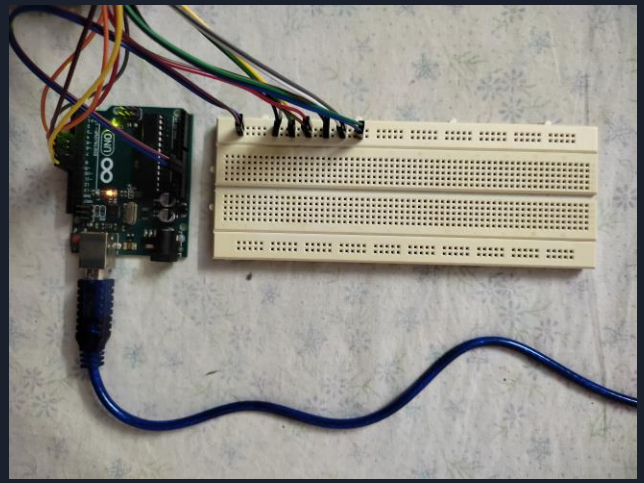
PHOTOS AND VIDEOS :











Link for video – SCARA N DOF :

https://drive.google.com/file/d/1Rs0Vo69NuCyeZw27jOoBYG4NOPHB8dDe/view?usp=sharing

Link for video - SCARA N picking object :

https://drive.google.com/file/d/1Y-1Hgb8N0SQkThnrv_WV9Qim7fIJIizT/view?usp=sharing