Robotic Hand

(Group 13)

Group members:

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Abstract and Motivation-

In everyday life, we come across situations where we have to perform some activities like lifting heavy objects with our hands. Not only that, but we also have to do some activities which cannot be done easily with our own hands. For that purpose, our group has decided to build a prototype of a robotic arm which can perform these activities much easily and efficiently.

Proof of concept-

With this project we are trying to ease ourselves with our everyday activities and also some industrial activities thus saving our time and energy. Our main idea was to create a machine which can lift heavy loads and perform some activities which are difficult for humans. The solution that we got for this problem was our ‘Robotic arm’, which can do all sorts of these activities without human interference. Due to the current situation, we were limited to a virtual model of the arm, but we hope that we shall be able to create an actual one soon. This robotic arm shall be able to lift and transfer loads from and to the desired locations.

Methodology adopted-

Since our group is creating a virtual model, we have decided to create the body of the arm in Freecad and its circuit in Tinkercad.

The Robotic arm will have 5 sections and each section will be controlled by a servo motor thus giving it 5 degrees of freedom.

The sections are as follows:

1. Base – The base of the robot arm, corresponds to a human shoulder. The base is fixed in place, at least for now.

2.Elbow – The first section on the arm. Like a human elbow it allows the harm to bend.

3.Wrist – The second section on the arm. It permits better positioning of the gripper assembly.

4. Grip Pivot – This allows the gripper to be rotates 90 degrees in either direction.

5. Jaws – The gripper mechanism itself, operating much like a bench vice or pliers.

For the circuit, we will be using servo motors, flex sensors and an Arduino. We will program the Arduino in such a way that it takes readings from the flex sensor and gives a value to the servo motor between 0 to 180 degrees thus rotating it.

Conclusions and Future scope-

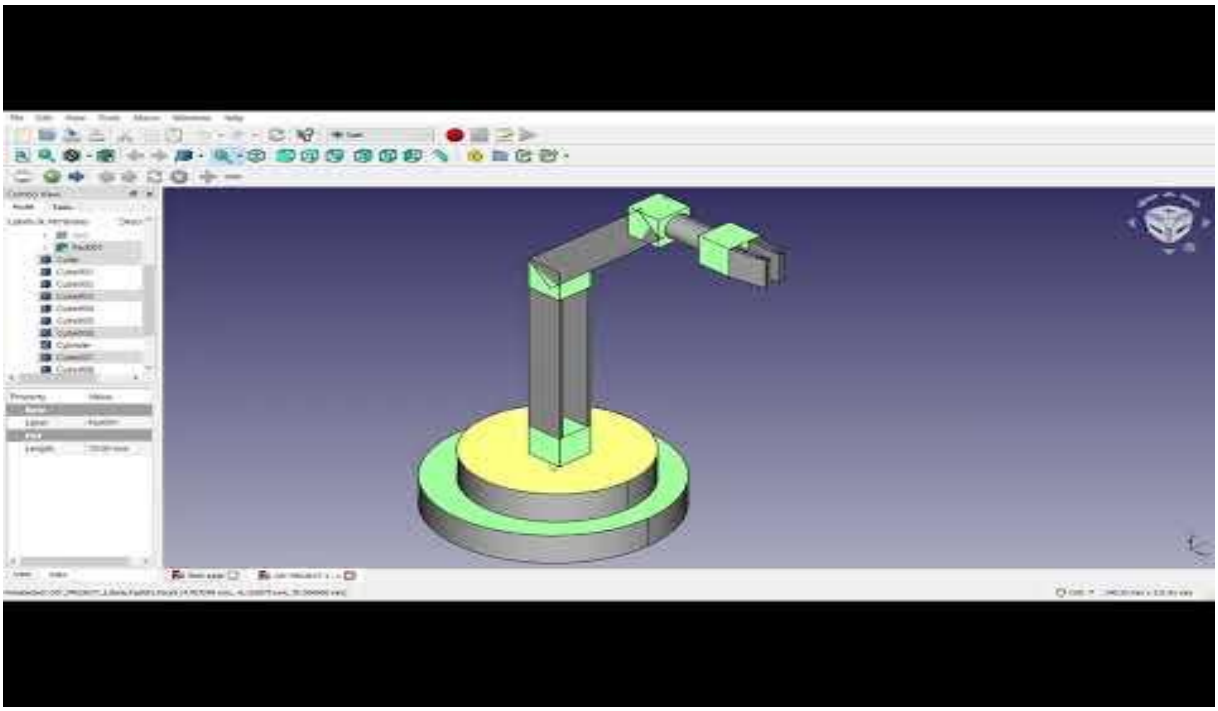
Through this project we have achieved a solution for our everyday problems. Our main motive was to create an arm which can perform some activities which humans cannot perform easily. Ranging from household activities of lifting, to industrial activities, this robotic arm can be of great use. Though we couldn’t add a lot of smart features in our arm, we hope that in the future we will be able to modify it according to the need and make it even more reliable.

Credits and responsibilities of team members-

Sriniwasa & Sarthak - Created a 3D model of the arm in freecad, researched about it, estimated the cost of the components and gathered information about the working of the arm.

Abhishek & Sandeep- Created the circuit in Tinkercad and the code for Arduino, gathered information about various components of the circuit.

Link for YouTube video- [Robotic hand Group 13]



Appendix 1

Code for the arm-

```
#include <Servo.h>

Servo servo_1;
Servo servo_2;
Servo servo_3;
Servo servo_4;
Servo servo_5;

int flex_1 = A0;
int flex_2 = A1;
int flex_3 = A2;
int flex_4 = A3;
int flex_5 = A4;
;
void setup()
{

  servo_1.attach(0);
  servo_2.attach(1);
  servo_3.attach(2);
   servo_5.attach(3);
  servo_4.attach(4);
}


void loop()
{
  int flex_1_pos;
  int servo_1_pos;
  flex_1_pos = analogRead(flex_1);
  servo_1_pos = map(flex_1_pos, 800, 900, 0, 180);
  servo_1_pos = constrain(servo_1_pos, 0, 180);
  servo_1.write(servo_1_pos);
```

```
int flex_2_pos;
int servo_2_pos;
flex_2_pos = analogRead(flex_2);
servo_2_pos = map(flex_2_pos, 800, 900, 0, 180);
servo_2_pos = constrain(servo_2_pos, 0, 180);
servo_2.write(servo_2_pos);


int flex_3_pos;
int servo_3_pos;
flex_3_pos = analogRead(flex_3);
servo_3_pos = map(flex_3_pos, 800, 900, 0, 180);
servo_3_pos = constrain(servo_3_pos, 0, 180);
servo_3.write(servo_3_pos);



int flex_5_pos;
int servo_5_pos;
flex_5_pos = analogRead(flex_5);
servo_5_pos = map(flex_5_pos, 800, 900, 0, 180);
servo_5_pos = constrain(servo_5_pos, 0, 180);
servo_5.write(servo_5_pos);

int flex_4_pos;
int servo_4_pos;
flex_4_pos = analogRead(flex_4);
servo_4_pos = map(flex_4_pos, 800, 900, 0, 180);
servo_4_pos = constrain(servo_4_pos, 0, 180);
servo_4.write(servo_4_pos);
```

Appendix 2-

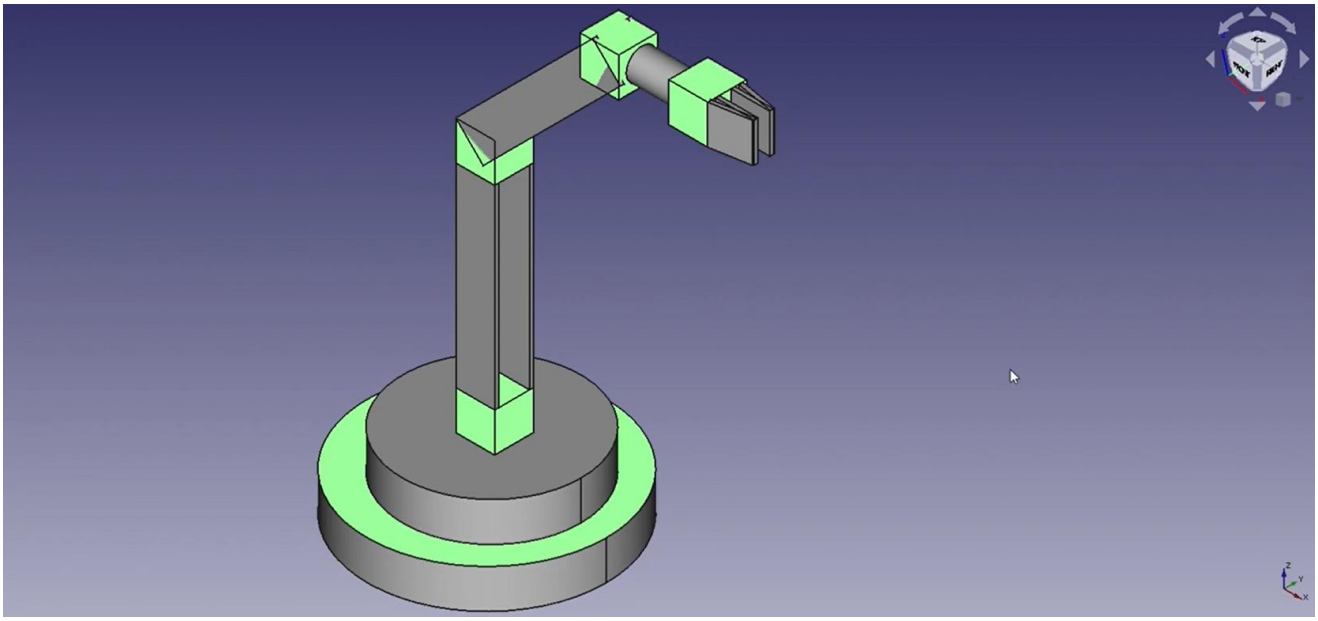


Fig: 3D model of the arm.

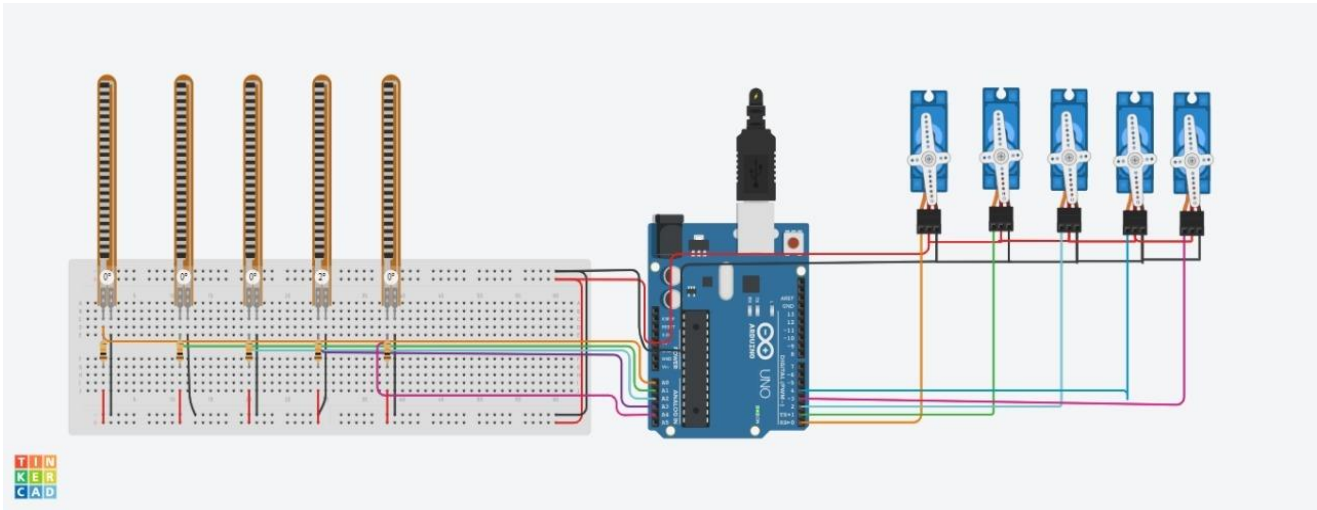


Fig: Circuit of the arm.

Appendix 3

Cost of items-

Name of component	Cost
MG996R Servo Motors 	2550/-
Arduino Board 	770/-
Flex Sensors 	600X5=3000/-

Breadboard and Jumper Wires 	200/-
5V 5A DC Power Supply 	400/-