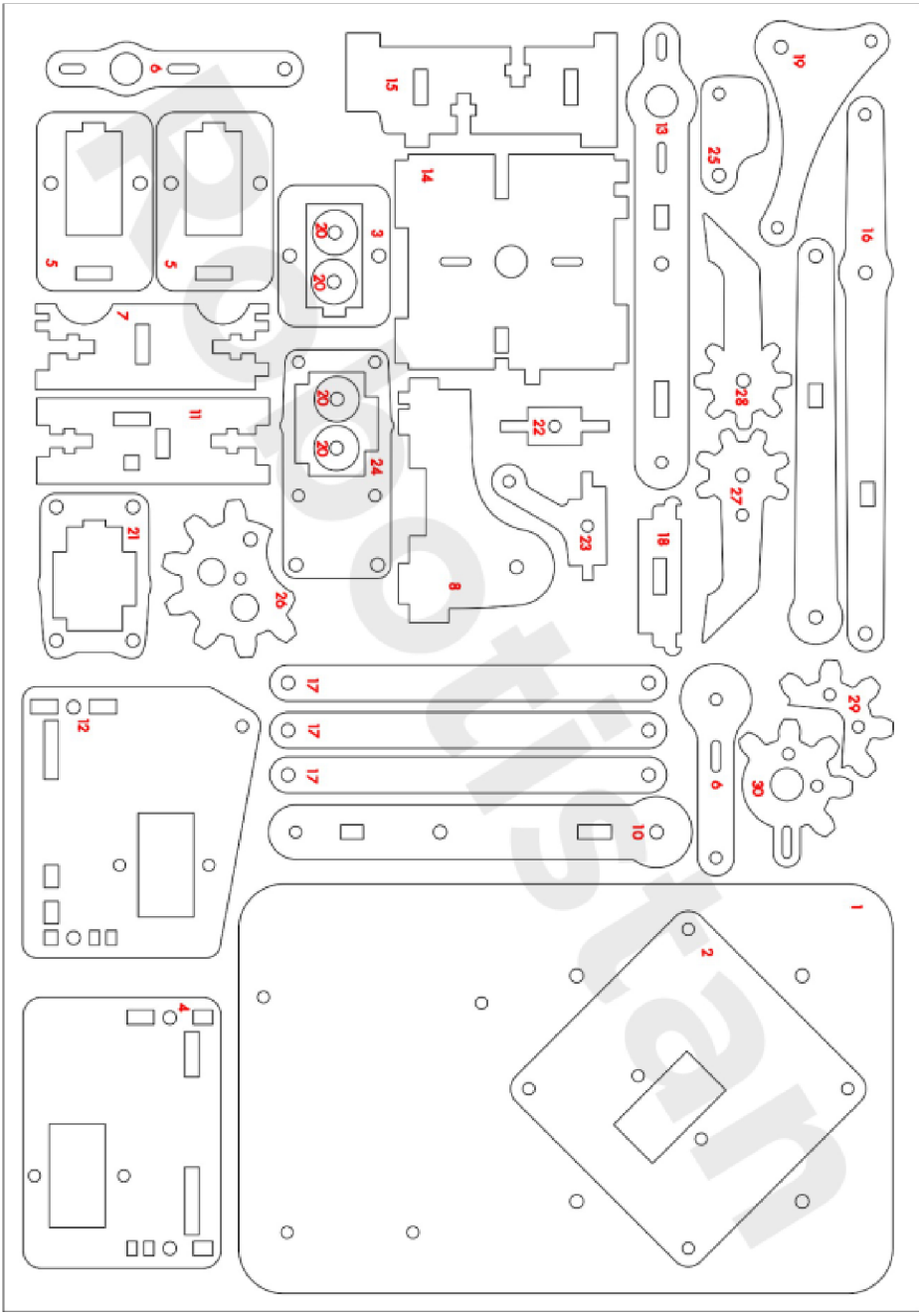
robotistan

Robot Arm Vehicle Project Book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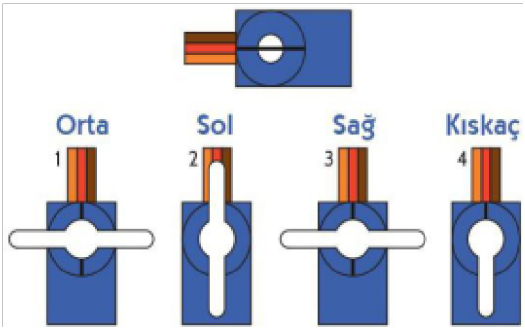
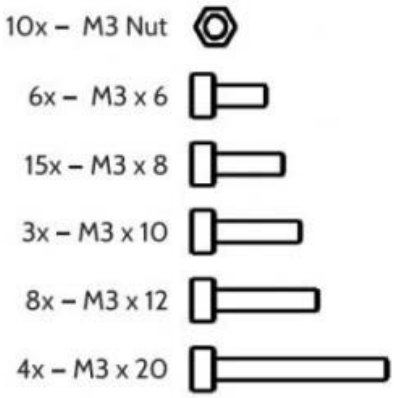


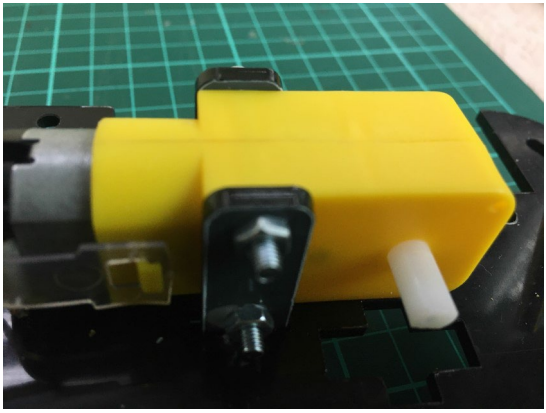
Warning 1:

Before moving on to the assembly part, we stretch our servo motors to the required positions both to test the robustness of our servo motors and to avoid the slightest calibration after assembly.

Warning 2:

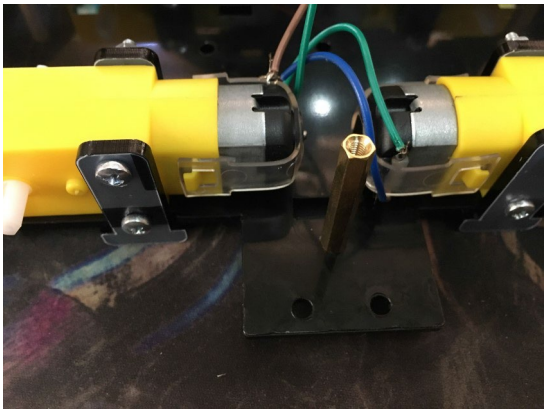
The part shown with the number 1 in the image where we numbered the parts represents the upper chassis of our vehicle!

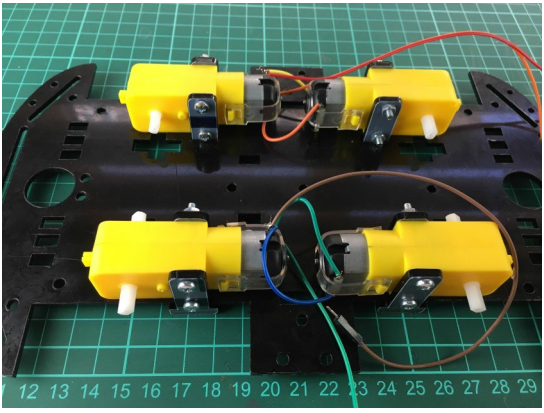




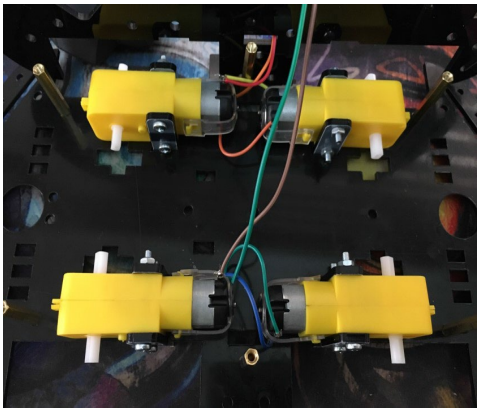
First, let's start with the assembly of our vehicle, fix our motors to our chassis and perform the first operation.

We solder the poles of our motors to opposite each other. Our goal is to make the motors in the same direction turn in the same direction when we energize them.



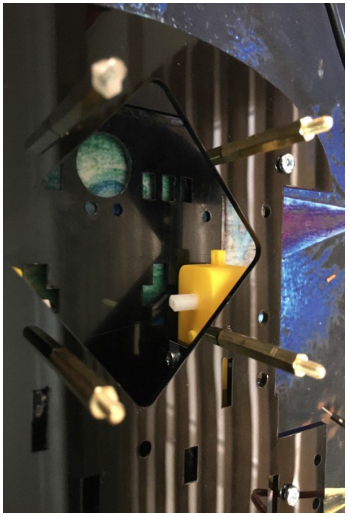


When we finish the assembly and soldering of our 4 motors to the chassis, it will look like the image.



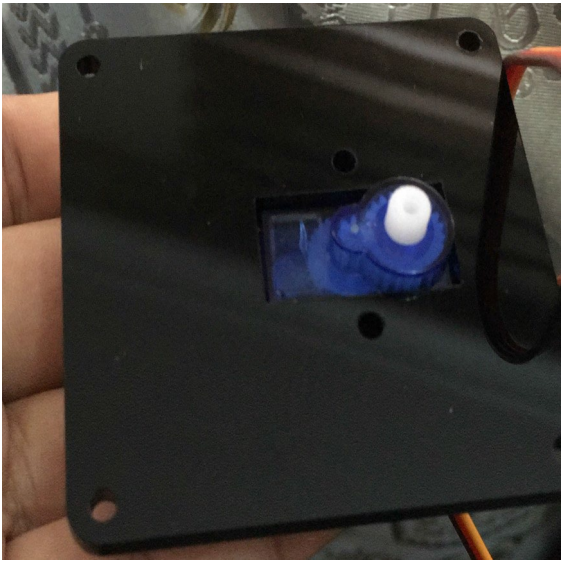
We mount our spacers in suitable places. We will screw the upper chassis of our vehicle to the supports later.

We fix our chassis with screws. Since our product is made of Plexiglass, let's be careful not to over tighten the screws. We have to be careful both for balancing and not to crack the plexi parts.

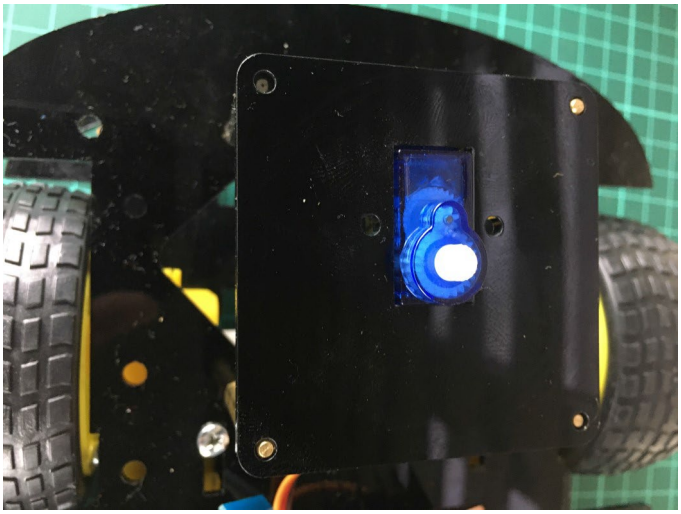


The assembly of our vehicle is finished. In order to prepare the ground for the robot arm, let's assemble the spacers on our chassis as in the image.

Let's start building our part that will move our robot arm left and right. We connect our 2 and 3 parts with our 8mm screws. Pass our servo motor through part 3, which we call the collar. Push the screws through the holes and then screw them into part 2. The screws go into part 2 by themselves, which means they cut their own threads.

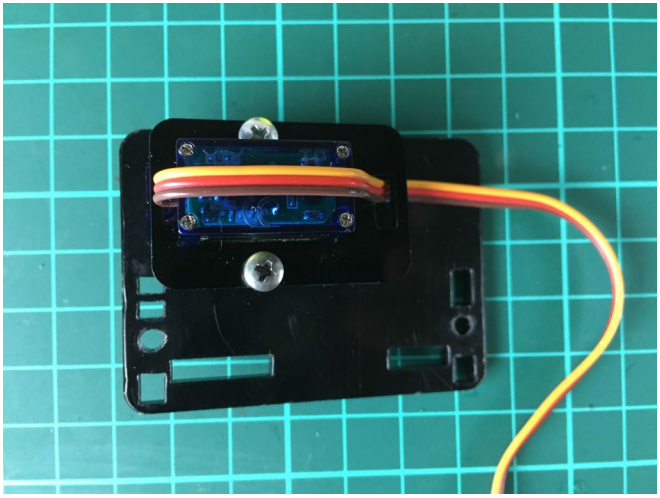


We place the piece that we assembled on the spacers that we fixed to our chassis. We will build our robot arm on this structure.



Left Side

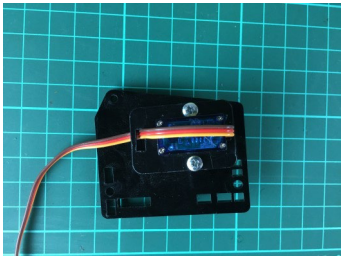
We will think of our robot arm as 3 separate parts and then assemble them. Let's create the left side first. Pass the servo motor through part 5 and pass the cable through the cable management hole. These holes will keep the cables more organized. Let's connect the bracelet to the part 4 using 8mm screws.



To assemble the last part of the left part, let's fix and screw the servo head to part 6 using the sharp screws that came out of the package of our servo motor.

Right Side

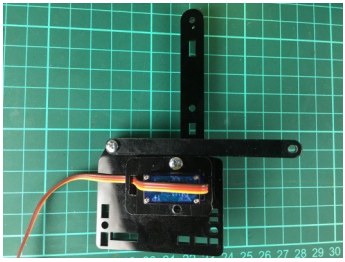
Let's set aside pieces 5, 12, 13, 17 with 8 and 6 mm screws and our right servo to create the right part.



Pass the servo motor through the sleeve and mount the cable to the side plate with 8mm screws as before.

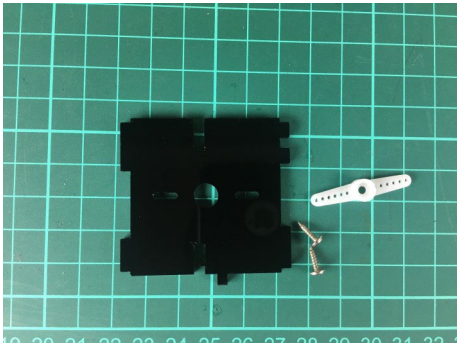
Assemble and assemble the servo apparatus to part 13 using sharp screws.

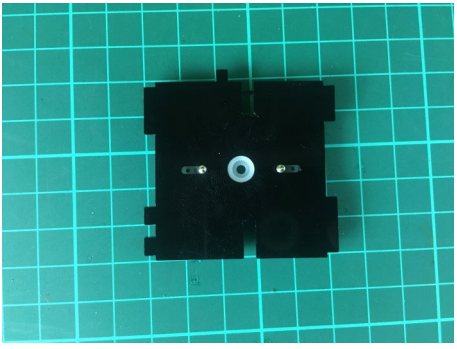
Secure the servo motor so that the arm is 90 degrees to the longest edge of the side plate.



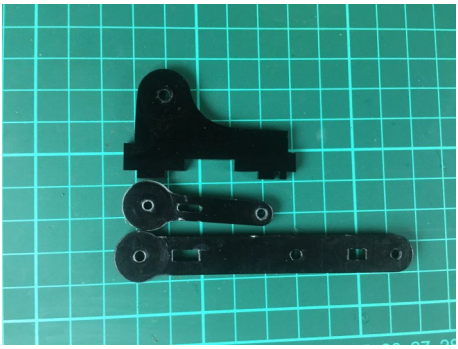
Let's fix part 17 with 6mm screw and assemble it as in the figure.

Middle Side
Let's build the structure that will form the balance mechanism of the left and right parts. Let's set aside piece 14 for the base and a servo fixing package. We can start the assembly.



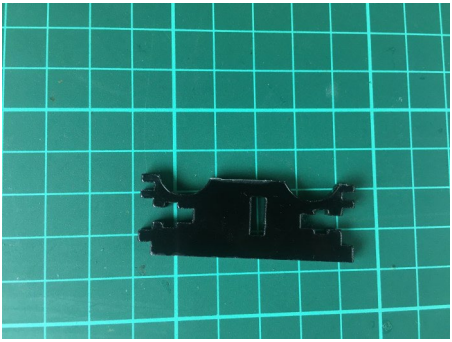


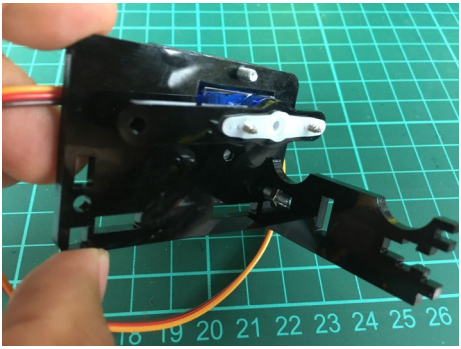
Let's set aside parts 8, 9, 10 and a 10mm screw for the shoulder. Let's put these parts together in the form of 9, 10, 8 in order and put the screw where the part number 8 is.



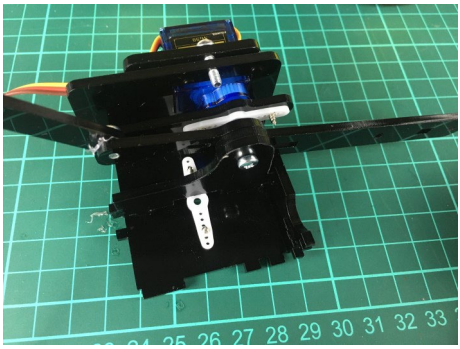
Left To Center

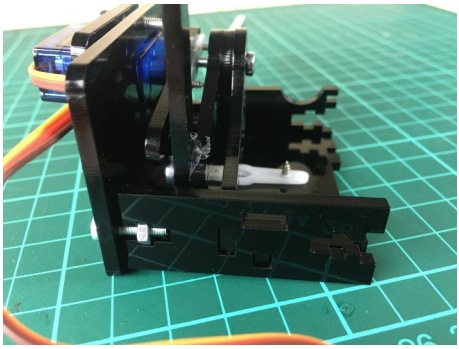
Now we will build a bridge for the left and right parts using the middle parts. First attach the left part to part 7 with a 12mm screw and nut. The easiest way to do this is to put the nut and support it with the tip of your finger, while turning the screw about half a turn, you can perform the tightening process after the nut is inside.





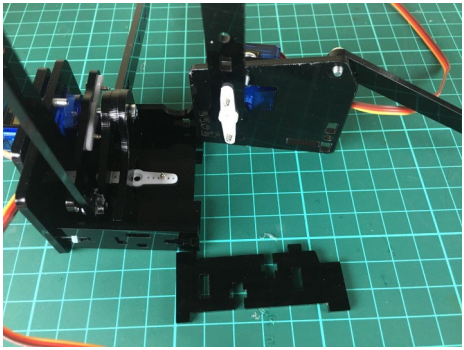
You should see the shoulder slot in part 7 (front brace). Insert the shoulder into the slot, then insert the base piece into the slots on the left assembly and lift upward to engage the slots in the shoulder.

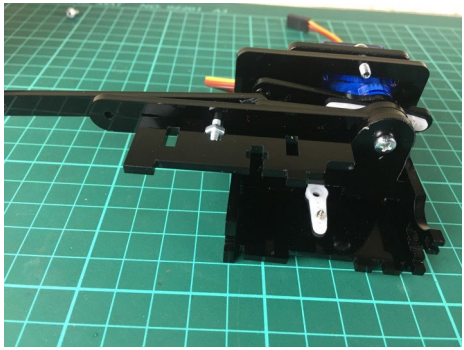


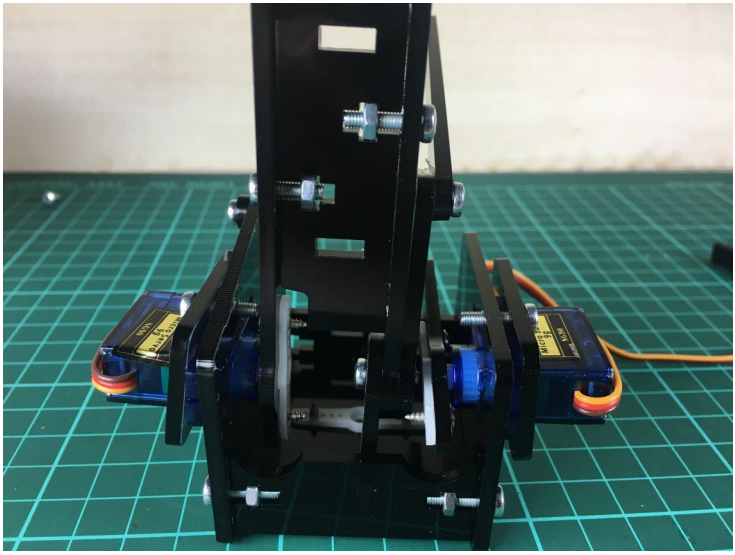


Attaching to the Right

We have combined the left part and the middle part. In order for the body part of our robot arm to become stronger, it must be mounted to the middle part on the right part. We attach piece 15 to piece 10 using 12 mm screws and nuts.



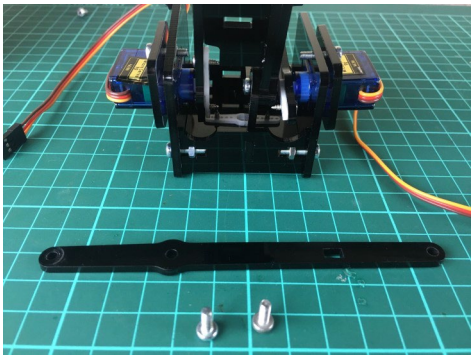


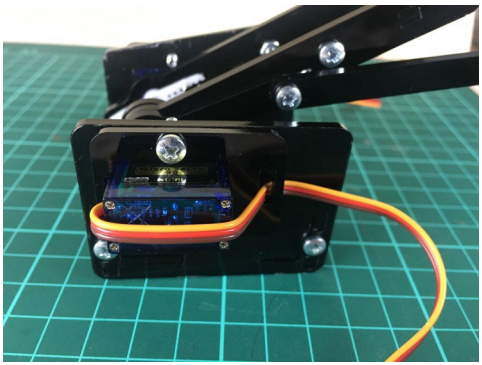


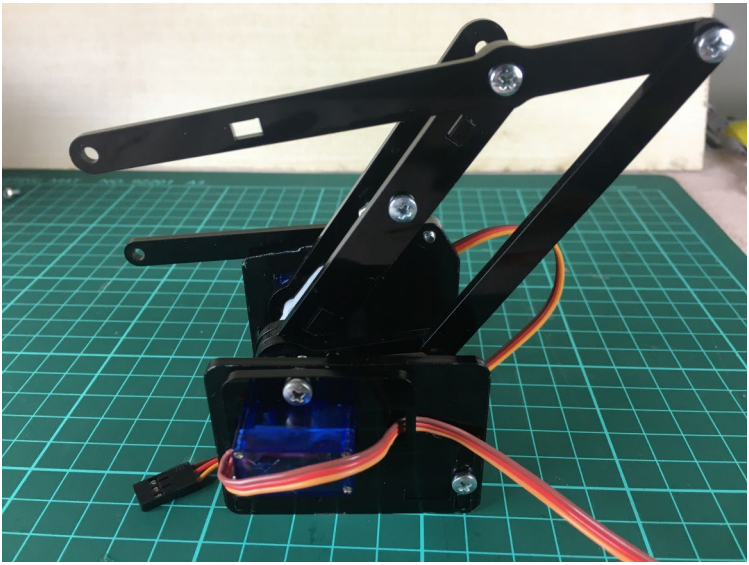
Left Forearm

Now we can attach the 16th piece using two 6mm screws. This part will be screwed to part 10 and 17. With this new part, you should be able to move the servo motor easily.

Never apply too much force to the servo motors, the plastic gears inside will be damaged and you may break the servo motor.

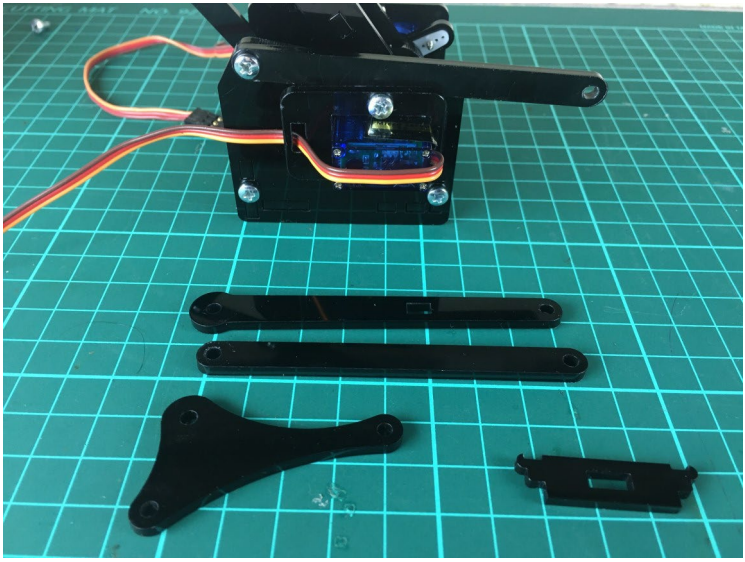






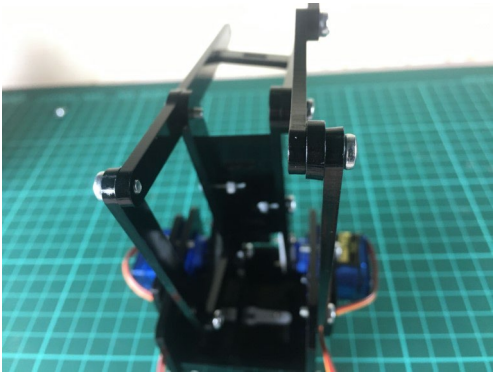
Right Forearm

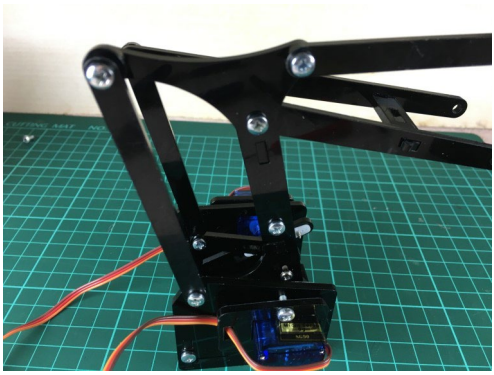
The first thing you need to do is hang piece 18 on the left forearm you just attached, and then hang piece 31 on the right forearm. In a way, the balance of the bridge we created we do, so it will ensure that it stands firm.



Attach triangle 19 to part 31 and part 13 with a 10mm screw. Do not over tighten as we need all these parts so that we can move freely.

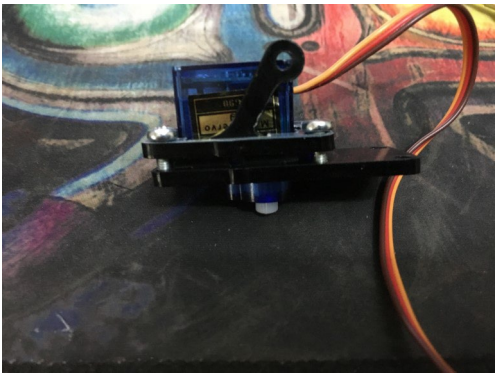
Next, attach the last remaining piece 17 to the front of piece 19 with a 6mm screw.

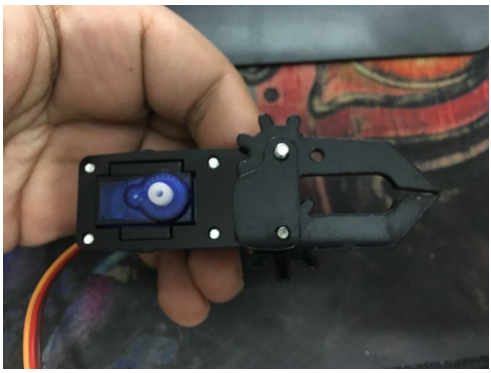




Join the claw.

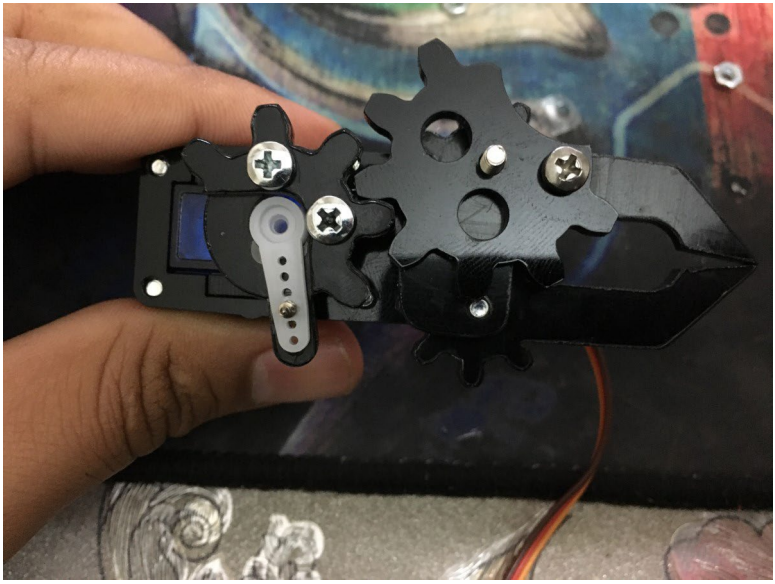
Thread the servo motor through part 21. Insert parts 22 and 23 into the side slots made by the servo motor and part 21, and then fasten them with four 8 mm nuts using part 24.





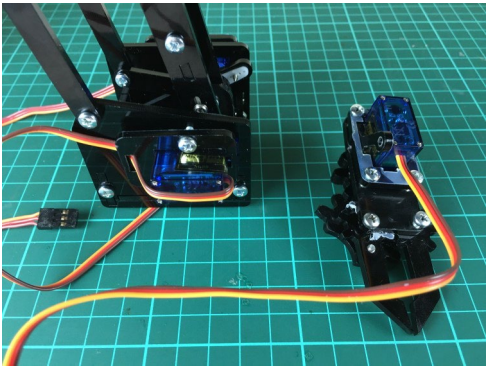
Attach a servo motor end to part 30 and secure it to the servo motor using a machine screw. Attach part 29 to part 30 using two 6 mm screws.

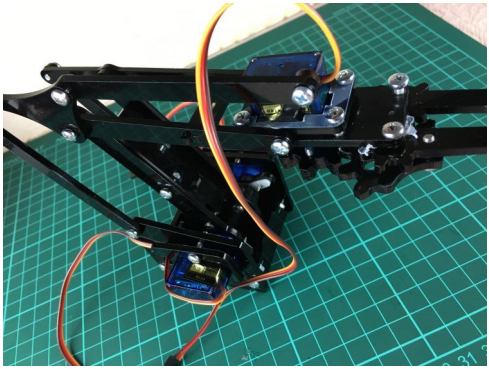
Now you can attach piece 26 to the loose 12mm screw and secure it to the extra hole in piece 27 with an 8mm screw.



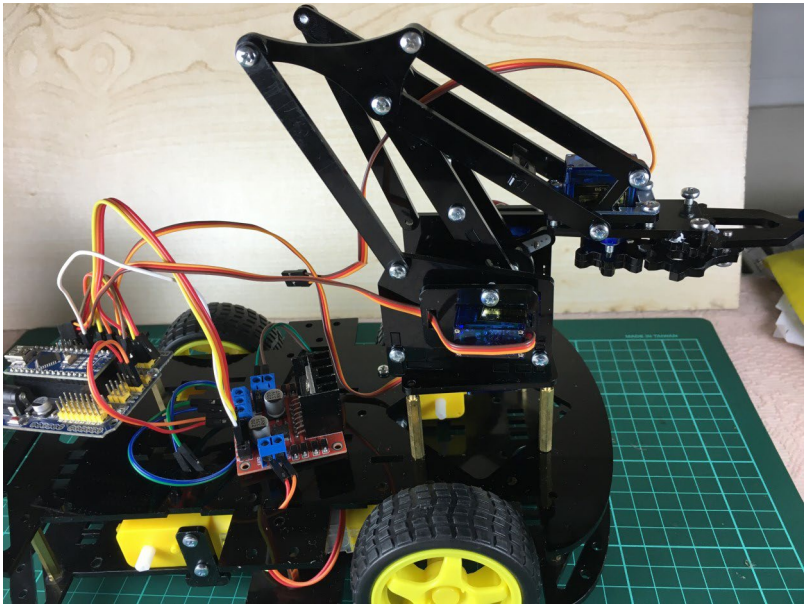
Merge Title

The assembly of the robot is almost finished. Let's fix it to parts 22 and 23 on the head with two 8 mm screws passing through the forearms.

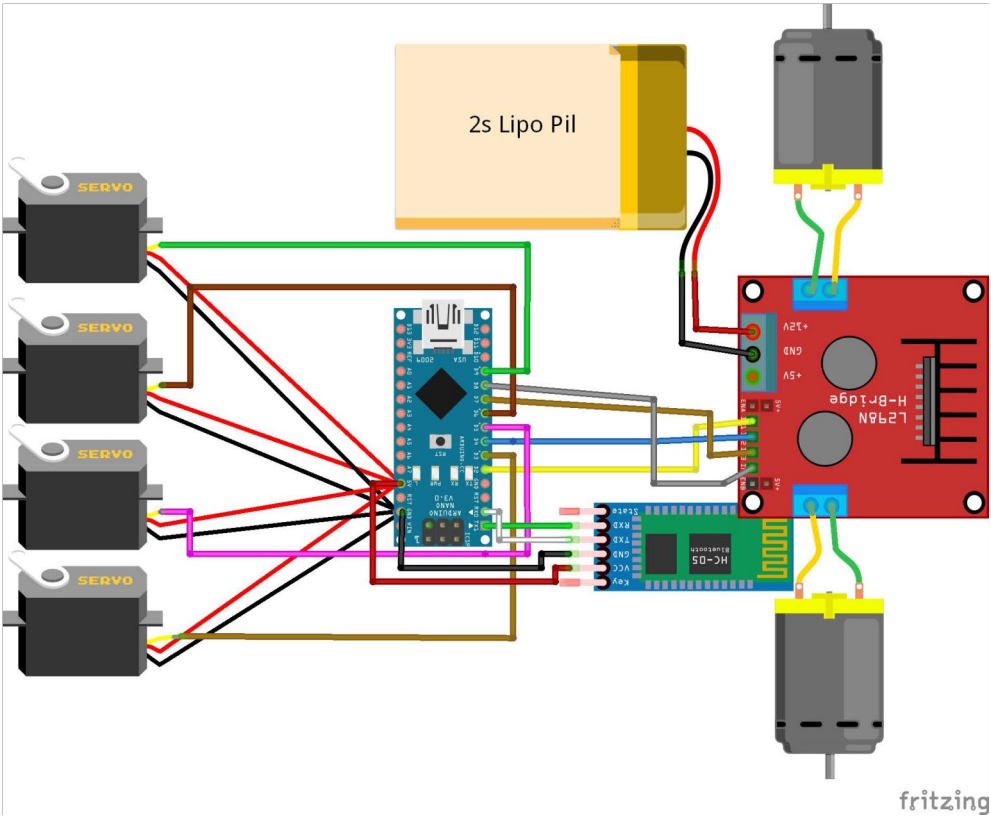




Now that we have completed the robot arm part, we place our robot arm on our servo motor, which will enable the robot arm on our vehicle to turn left and right.



Now that we've finished our assembly, we can start building the circuit.



Let's make the connection by looking at the diagram.

Motor Driver:
IN1 => 2
IN2 => 4
IN3 => 7
IN4 => 8

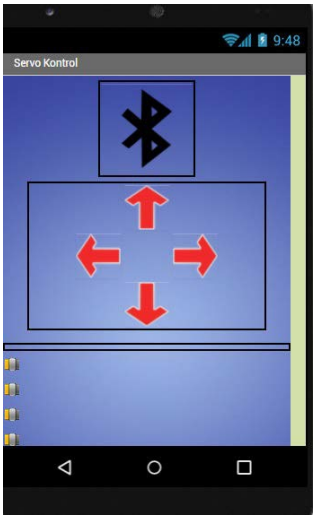
Servo Motors:
Servo1 => 3
Servo2 => 5
Servo3 => 6
Servo4 => 9

Let's make our own mobile application using App inventor to both use our vehicle and move the robot arm on it.

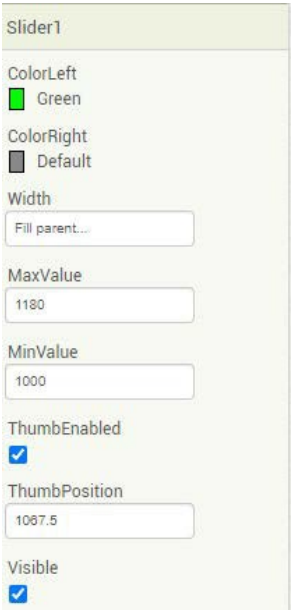
What is App Inventor?

It is an Android application development program developed by MIT and can be programmed with "drag-and-drop" logic with blocks. You do not need to have any knowledge of Android programming and download any program to our computer to use it. To briefly talk about the project, we first create an interface in an application development program called MIT App Inventor 2. Through the application we created, we pair our Android device with the Bluetooth module that we connect to Arduino. Thanks to this pairing, we can control our Robot via Android device.

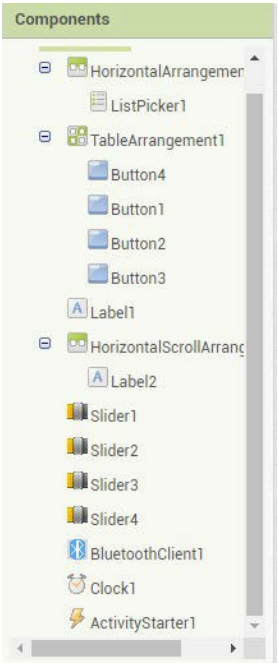
Let's create our app!



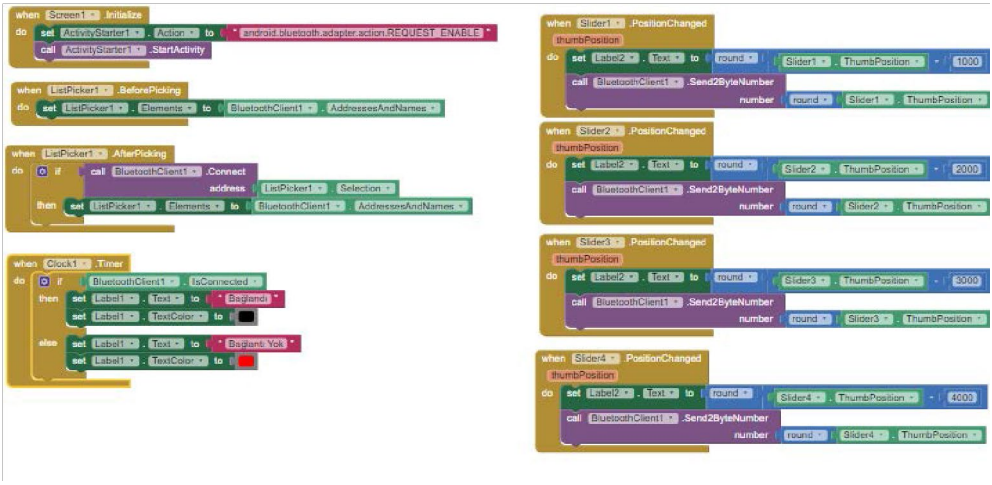
This is how I designed the interface of our application. You can do as you wish.



We enter the Slider values we use for our servo motors. Slider Max values are 1180, 2180, 3180, 4180 min values respectively 1000, 2000, 3000, 4000.



ThumbPasition on determines the starting position of the slider. If you wish, you can start from the leftmost (from the beginning) by entering the min value, or you can do max+min / 2 and take the average and start from the middle.



If you wish, you can make your own application or download the application I made from the link.
hps://www.kisa.link/OO3y

You can access the entire code via QR code or short link.
www.kisa.link/OO3y

```
#include <SoftwareSerial.h>
#include <Servo.h>
Servo myservo1, myservo2, myservo3, myservo4;
int bluetoothTx = 0;
int bluetoothRx = 1;

SoftwareSerial bluetooth(bluetoothTx, bluetoothRx);

int pinileri = 2; int pingeri = 4;  int pinsol = 7;   int pinsag = 8;
char dataIn = 'S'; char determinant; char det;

void setup()
{
  myservo1.attach(3);
  myservo2.attach(5);
  myservo3.attach(6);
  myservo4.attach(9);
  Serial.begin(9600); bluetooth.begin(9600);
}

void loop()
{
det = check(); // determinantı kontrol et
while (det == 'F') //İLERİ
{
digitalWrite(pinileri, HIGH);
digitalWrite(pinsol, HIGH);
det = check();
}
while (det == 'B') //GERİ
{
digitalWrite(pingeri, HIGH);
digitalWrite(pinsag, HIGH);
det = check();
}

while (det == 'L') //SOL
{
digitalWrite(pinileri, HIGH);
digitalWrite(pinsag, HIGH);
det = check();
}
while (det == 'R') //SAĞ
{
digitalWrite(pingeri, HIGH);
digitalWrite(pinsol, HIGH);
det = check();
}

while (det == 'S') //Telefondaki programda atanmış olan durma fonksiyonun harf eşdeğeri
```

```
66    if (realservo >= 1000 && realservo <1180) {
67      int servo1 = realservo;
68      servo1 = map(servo1, 1000, 1180, 0, 180);
69      myservo1.write(servo1);
70      Serial.println("Servo 1 ON");
71      delay(10);
72    }
73    if (realservo >= 2000 && realservo <2180) {
74      int servo2 = realservo;
75      servo2 = map(servo2, 2000, 2180, 0, 180);
76      myservo2.write(servo2);
77      Serial.println("Servo 2 ON");
78      delay(10);
79    }
80    if (realservo >= 3000 && realservo <3180) {
81      int servo3 = realservo;
82      servo3 = map(servo3, 3000, 3180, 0, 180);
83      myservo3.write(servo3);
84      Serial.println("Servo 3 ON");
85      delay(10);
86    }
87    if (realservo >= 4000 && realservo <4180) {
88      int servo4 = realservo;
89      servo4 = map(servo4, 4000, 4180, 0, 180);
90      myservo4.write(servo4);
```

```
if (dataIn == 'F')
{
determinant = 'F';
}
else if (dataIn == 'B')
{
determinant = 'B';
}
else if (dataIn == 'L')
{
determinant = 'L';
}
else if (dataIn == 'R')
{
determinant = 'R';
}

else if (dataIn == 'S')
{
determinant = 'S';
}

}
return determinant;
}
```

YouTube

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BLOG

robotistan

maker.robotistan.com

Robotistan Elektronik Ticaret AŞ

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