

## Lesson 7 Assembly of the Robotic Arm

Before assembling the Robotic Arm, we first need to adjust the 5 servos of the Robotic Arm by 90 degrees. See “Lesson 6 Precautions for Assembly”.

### 1. The basic assembly of the Robotic Arm

The basic assembly of the Robotic Arm is mainly divided into Four parts:

- ◆ Assemble the Pedestal
- ◆ Assemble the Mechanical Arm
- ◆ Assemble the Pedestal and the Mechanical Arm as a Basic Robotic Arm Combination.
- ◆ Assemble the Mechanical hand.

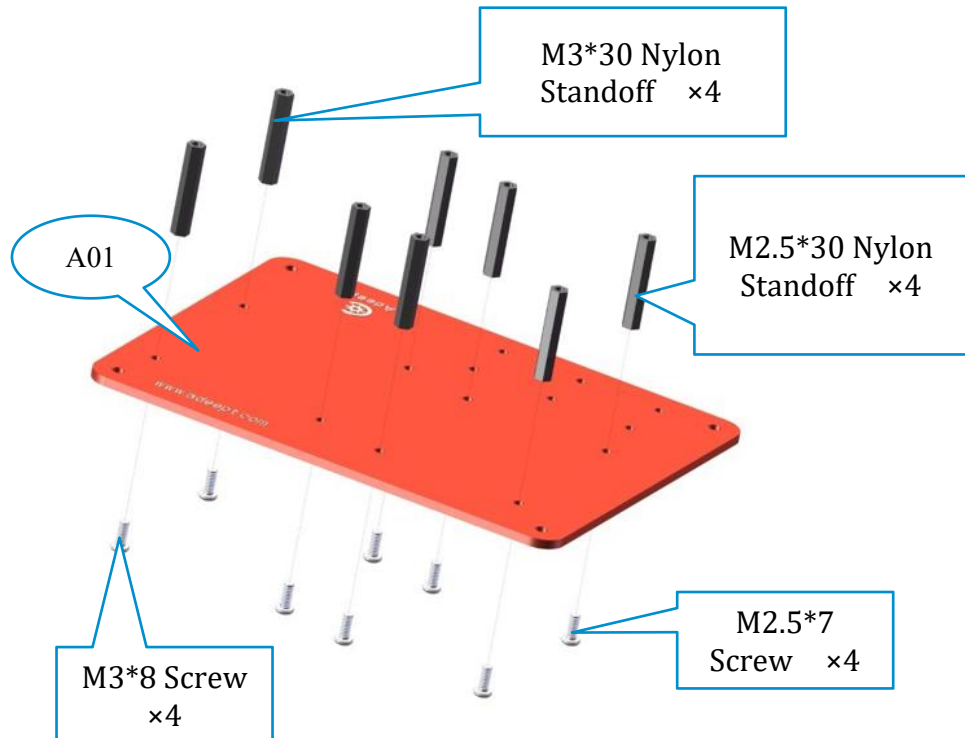
#### 1.1. Assemble the Pedestal

##### 1.1.1. Assemble the Substrate

1. Fix M2.5\*30 and M3\*30 Nylon Standoffs to A01.

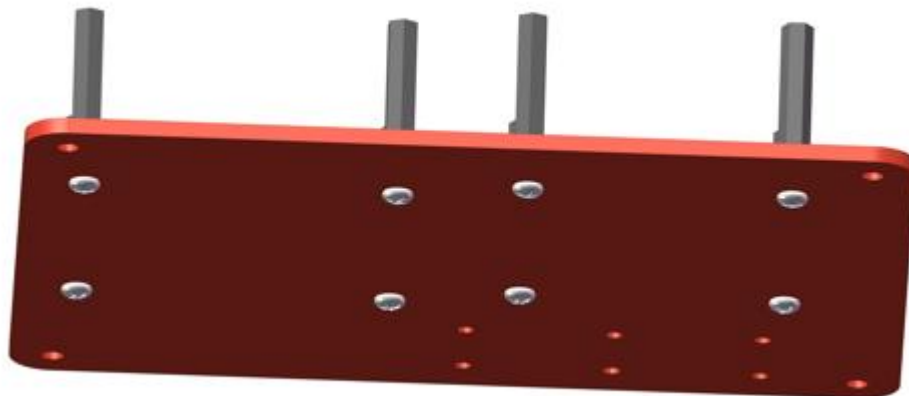
Assemble the following components

Use 4 M3\*30 Nylon Standoffs on the left and 4 M2.5\*30 Nylon Standoffs on the right.



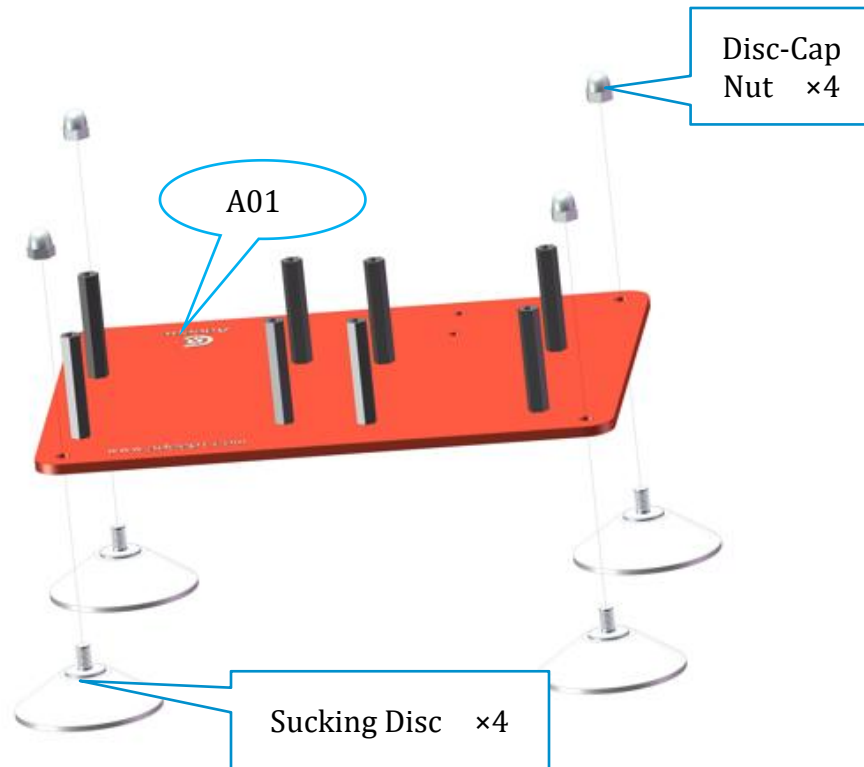
## Effect diagram after assembling

### *Model Diagram*



## 2. Use Disc-Cap Nut to fix Sucking Disc to A01

Assemble the following components



Effect diagram after assembling

*Model Diagram*

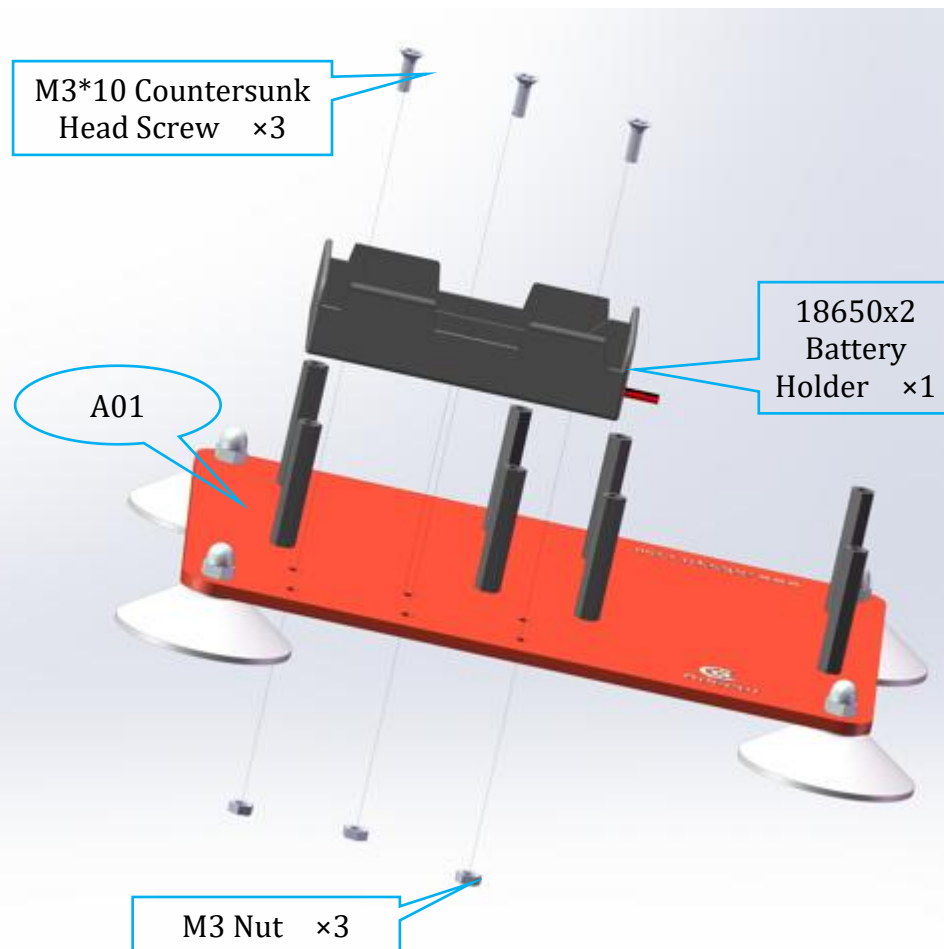


### 1.1.2. Assemble the Battery Holder

3. Use M3\*10 Countersunk Head Screw and M3 Nut to fix Battery Holder to A01

Assemble the following components

*Model Diagram*



## Effect diagram after assembling

*Model Diagram*



### 1.1.3. Assemble Raspberry Pi and Arm HAT

#### 4. Install Raspberry Pi with M2.5\*14+6 Copper Standoff.

Assemble the following components, Pay attention to the installation direction of the Raspberry Pi.

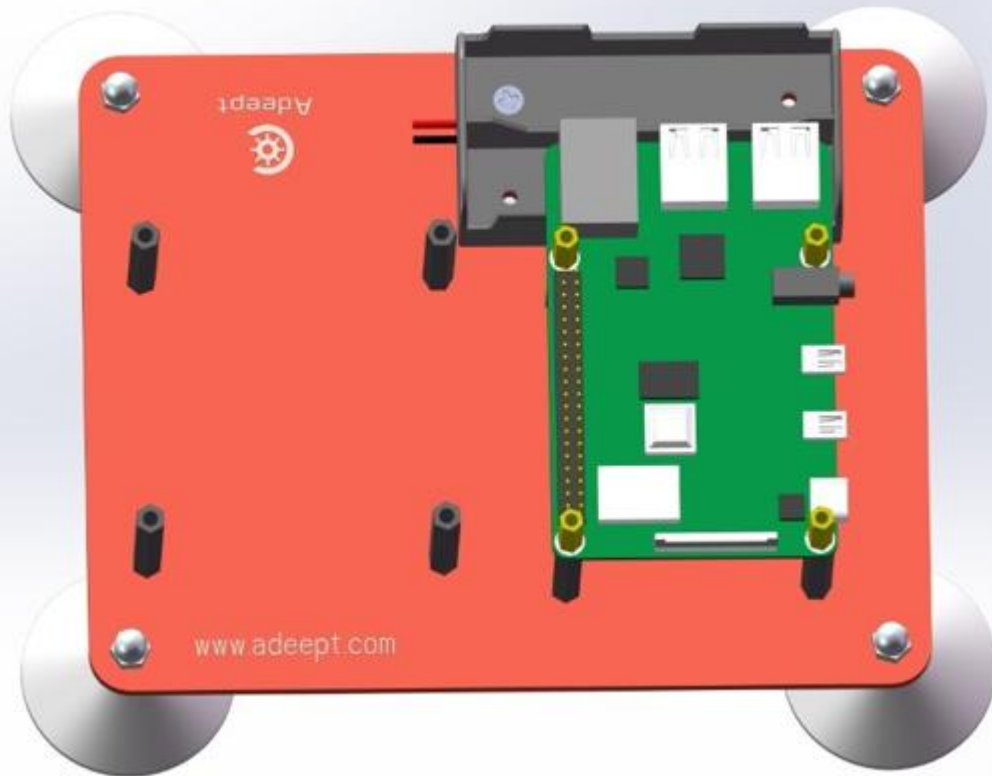
Raspberry Pi is not included in our product kit, users need to use their own Raspberry Pi.

Compatible Raspberry Pi models: 3B, 3B+, 4B.

*Model Diagram*

M2.5\*14+6 Copper Standoff x4

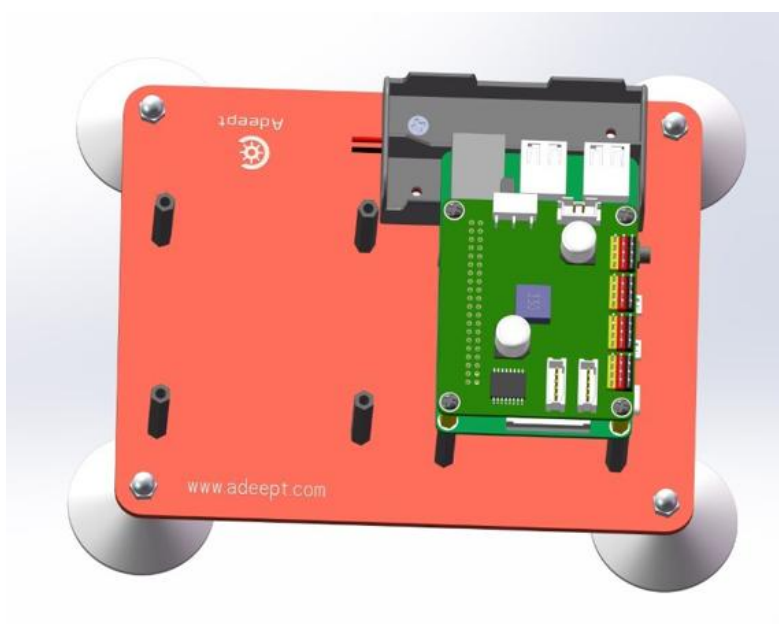
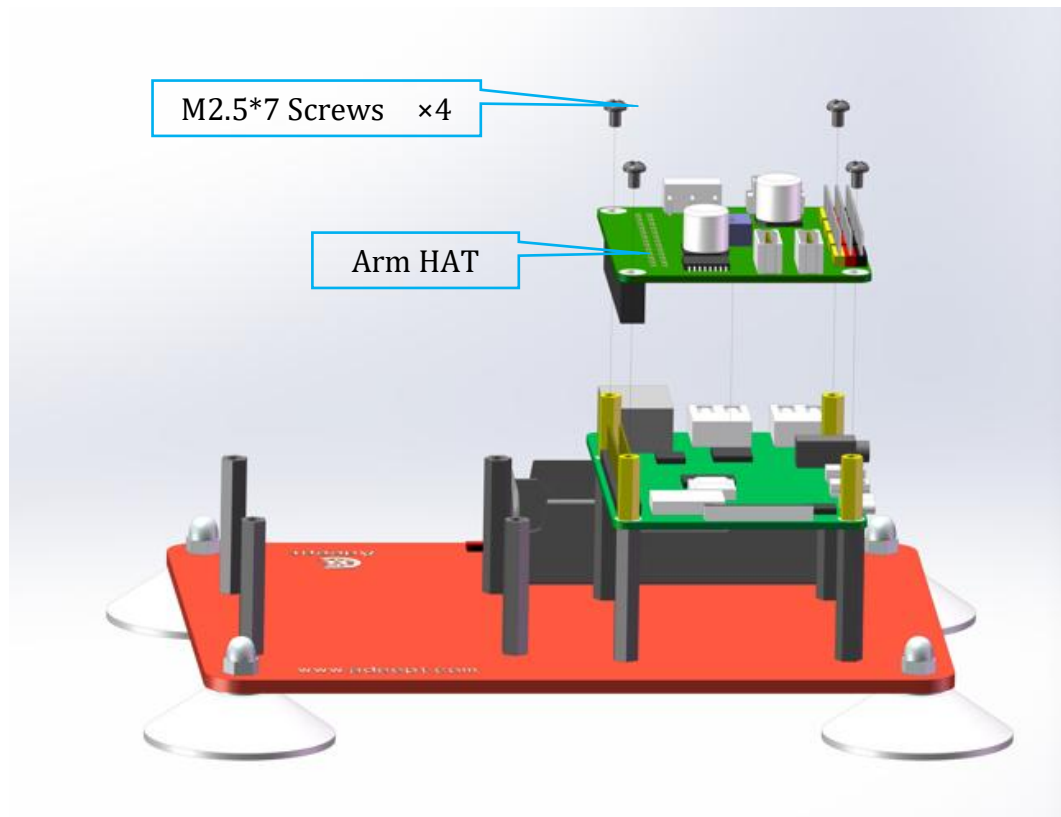
Raspberry Pi

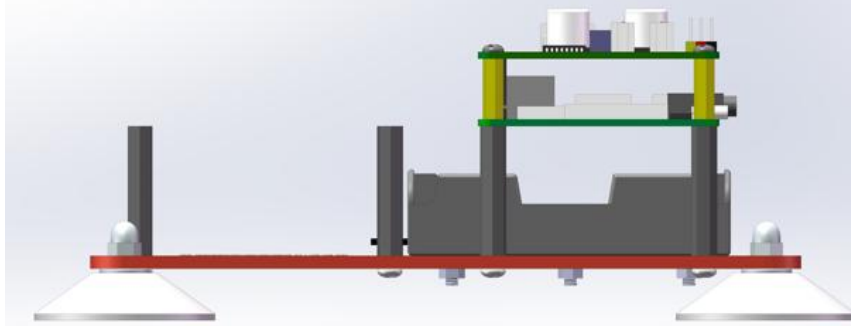


5. Install Arm HAT with M2.5\*7 Screws.

Effect diagram after assembling

*Model Diagram*



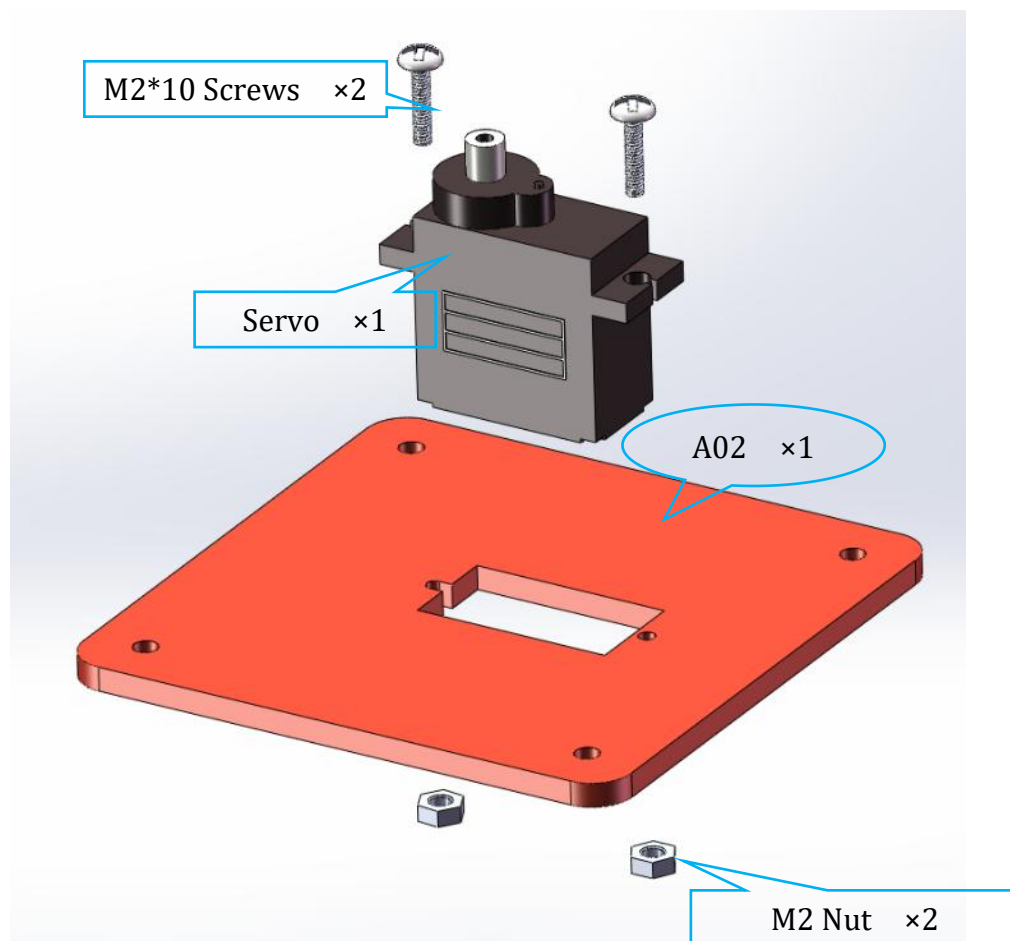


#### 1.1.4. Assemble Turntable-Structure-Matrix

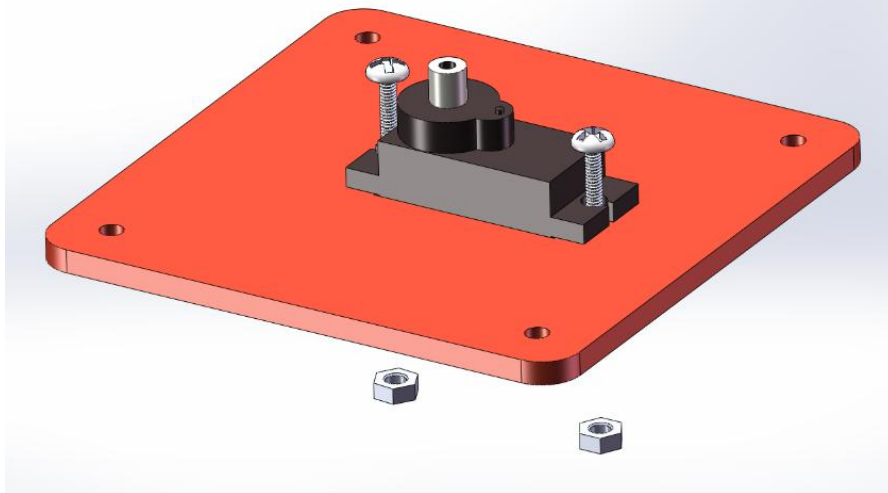
6. Fix the servo with M2\*10 screws and M2 nuts.

Assemble the following components

*Model Diagram*

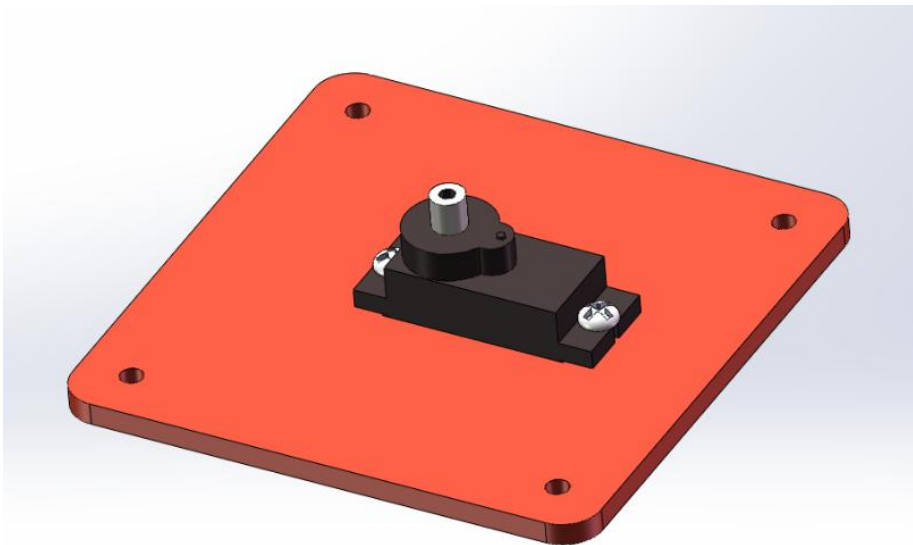


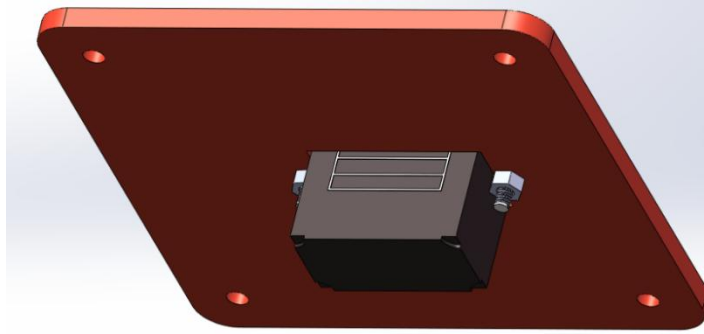




Assemble the following components

*Model Diagram*

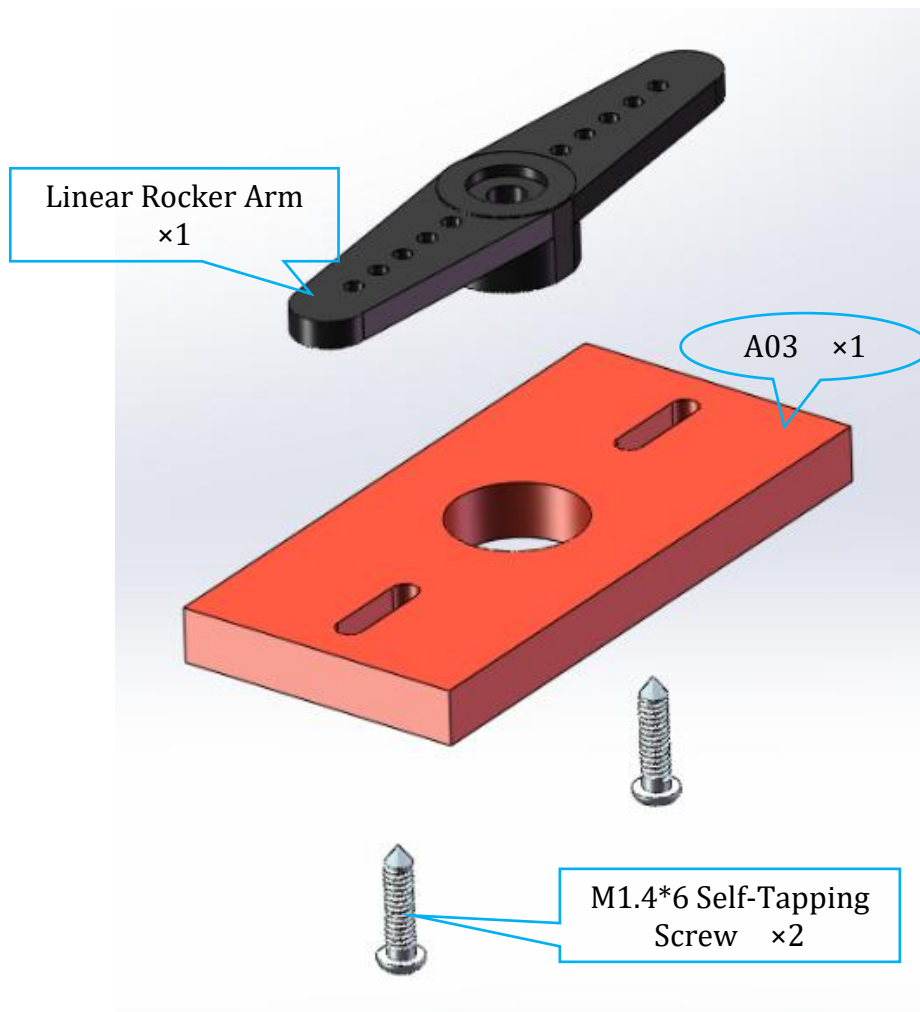


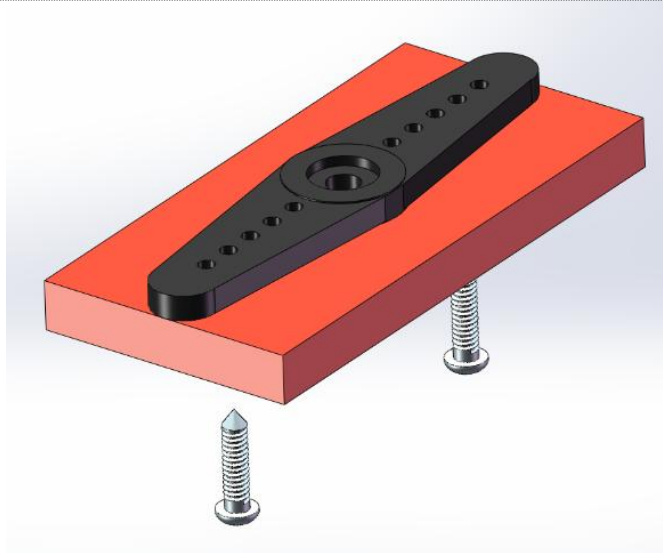


7. Fix the Linear Rocker Arm to the acrylic part of A03 with the M1.4\*6 Self-Tapping Screw .

Assemble the following components

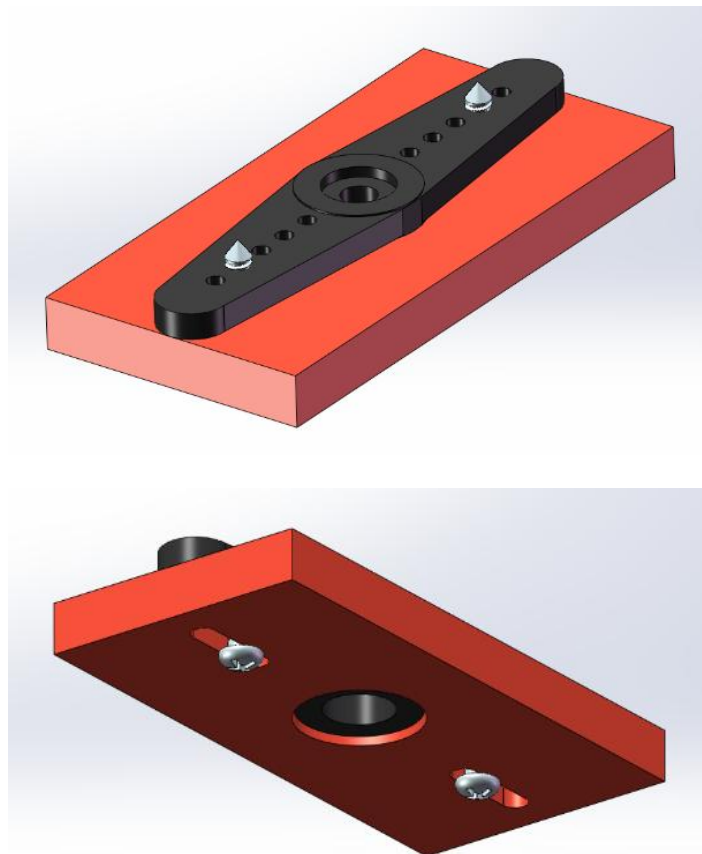
*Model Diagram*





Effect diagram after assembling

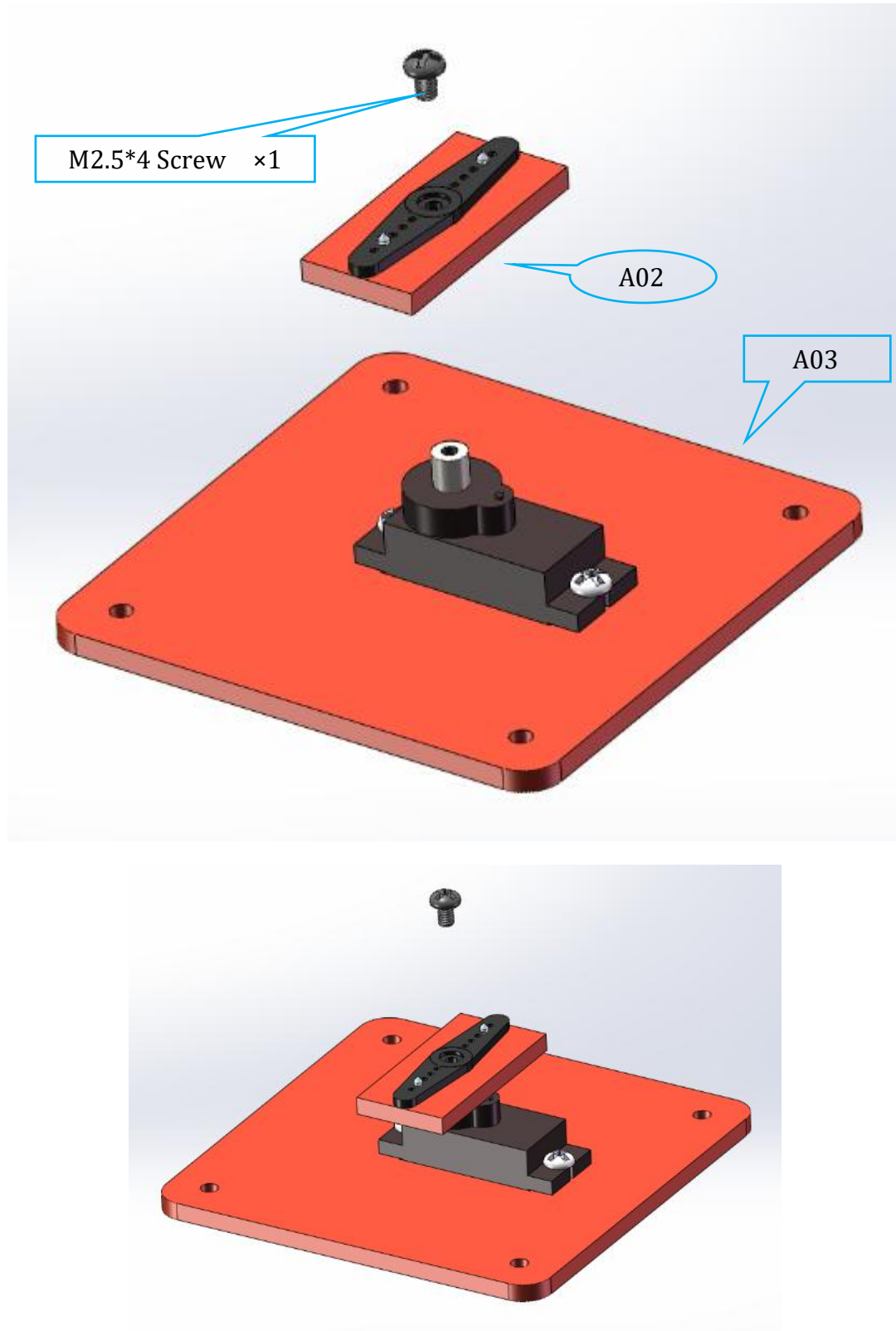
*Model Diagram*



8. Fix the Rocker Arm on A03 acrylic plate to the Servo in the A02 acrylic plate with the M2.5\*4 Screw (**M2.5\*4 Screw provided by the Servo bag**).

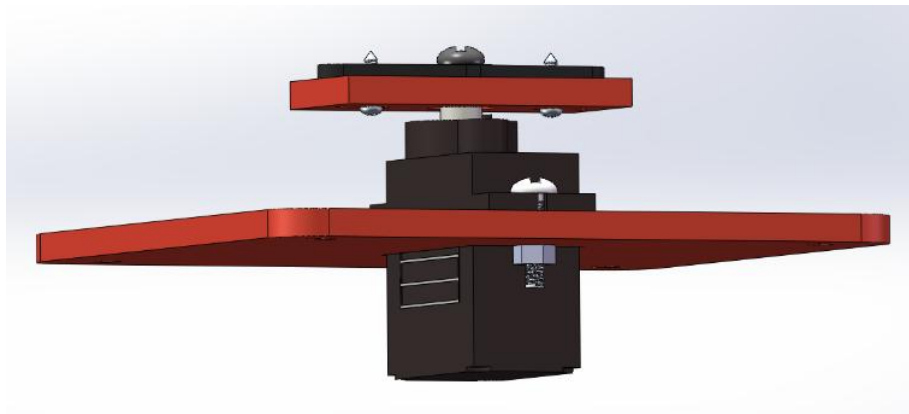
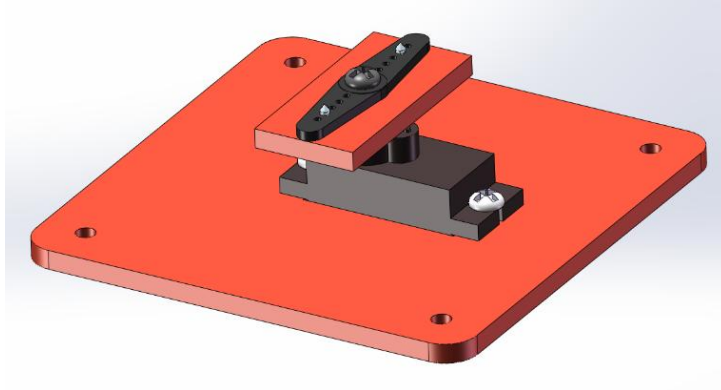
Assemble the following components

*Model Diagram*



### Effect diagram after assembling

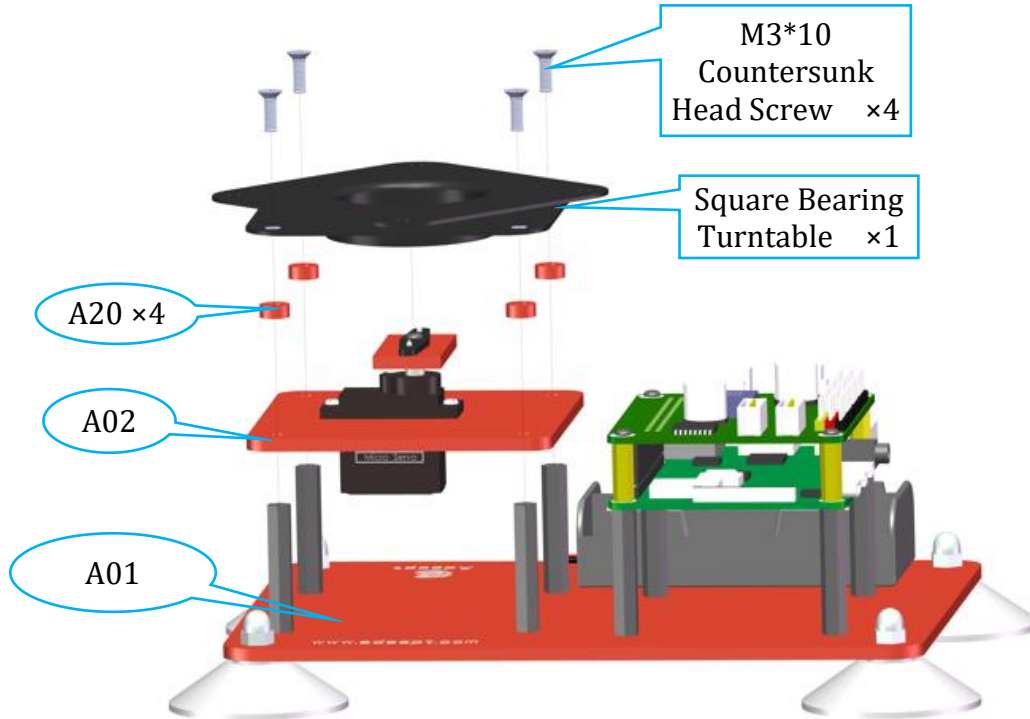
#### *Model Diagram*



9. Fix the A02 acrylic plate and Square Bearing Turntable to the nylon standoffs on A01 acrylic plate with the M3\*10 Countersunk Head Screw(Note the assembly position of A20).

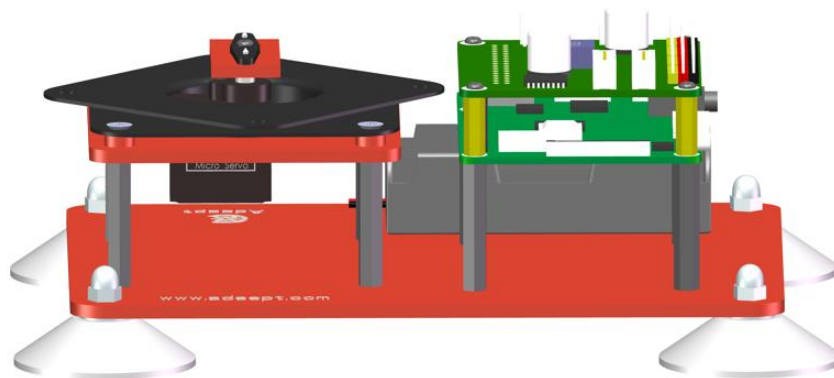
Assemble the following components

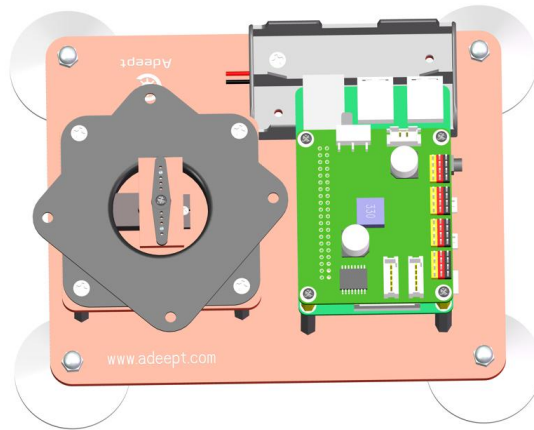
#### *Model Diagram*



Effect diagram after assembling

*Model Diagram*





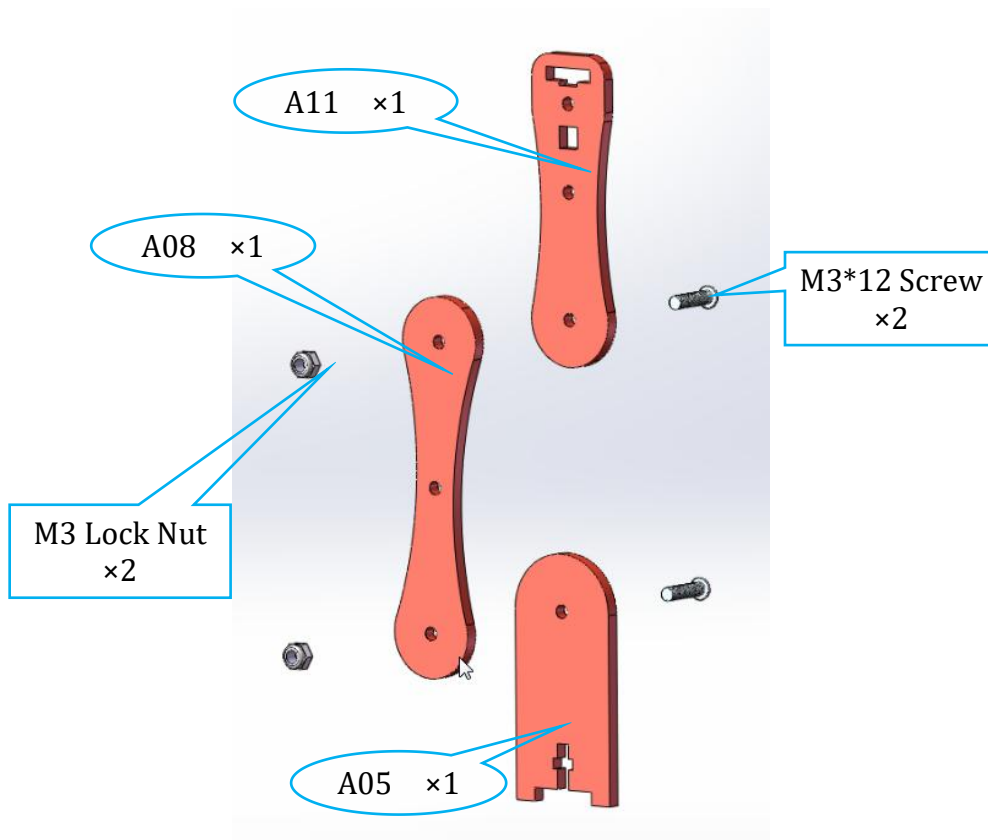
## 1.2. Assemble the Mechanical Arm

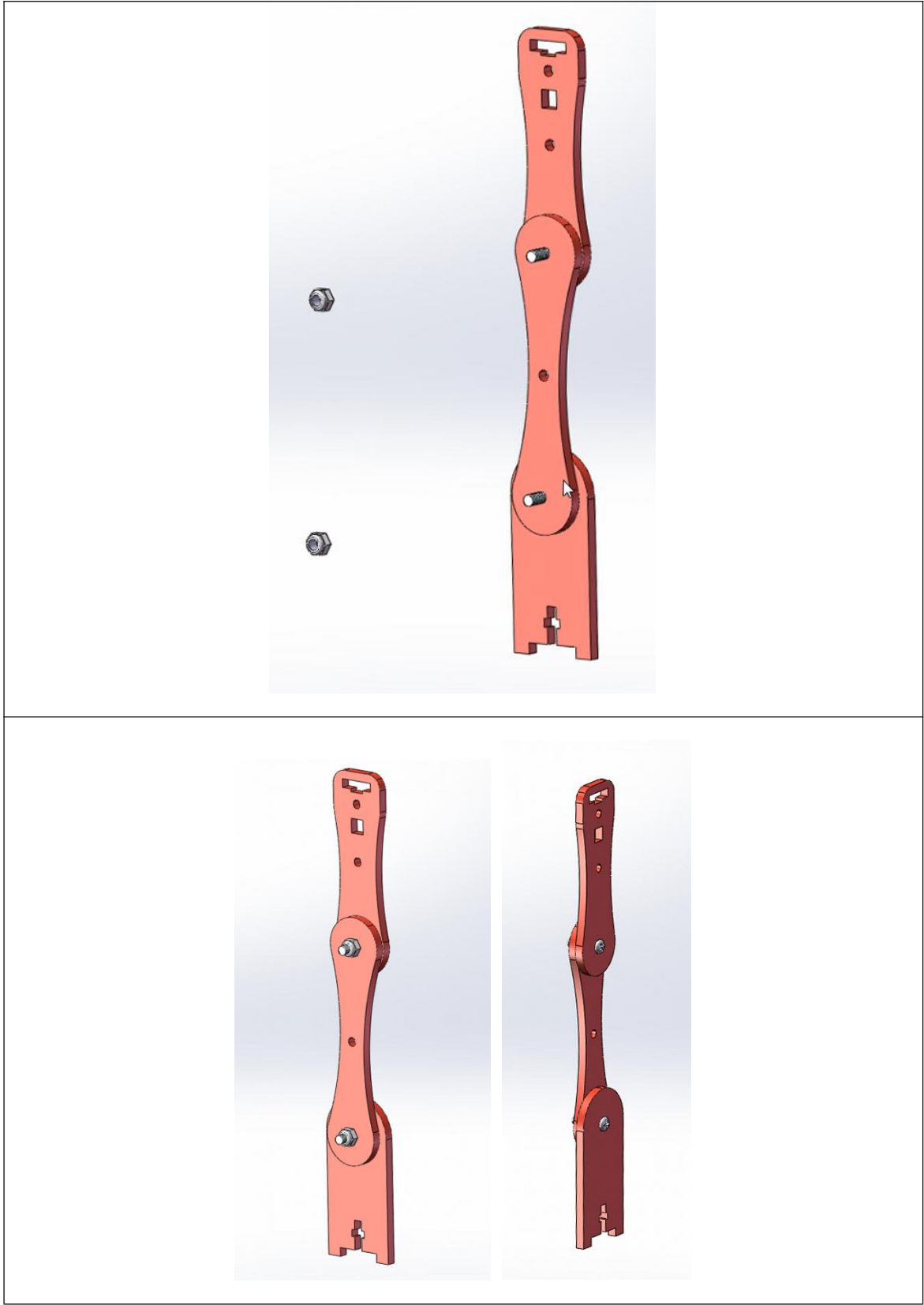
### 1.2.1. Assemble the Driven Mechanical Arm

1. Fix the A05 acrylic plate and A11 acrylic plate to A08 acrylic plate.

Assemble the following components

*Model Diagram*





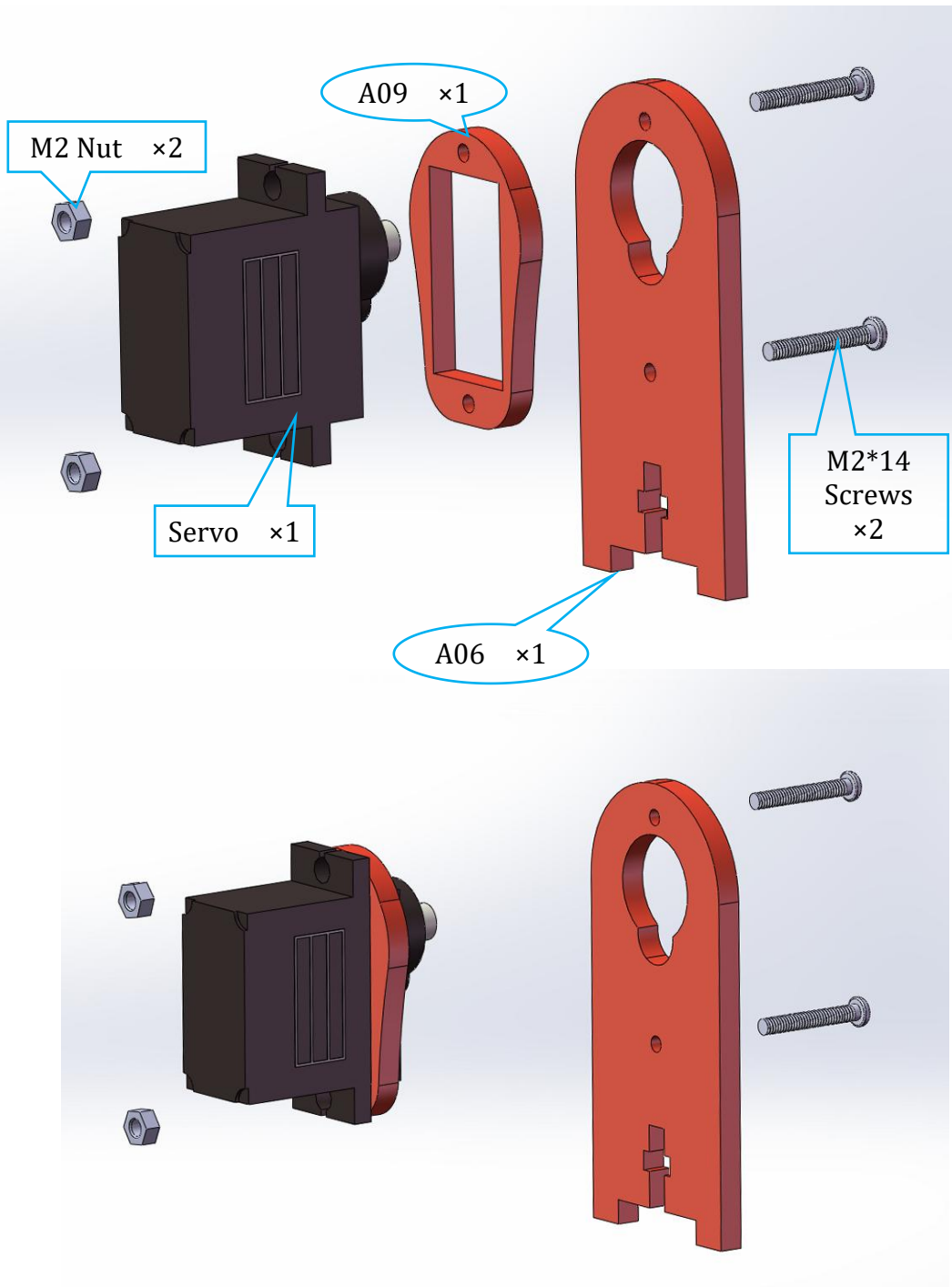


### 1.2.2. Assemble the Driving Mechanical Arm

2. Fix a servo to the A06 acrylic plate.

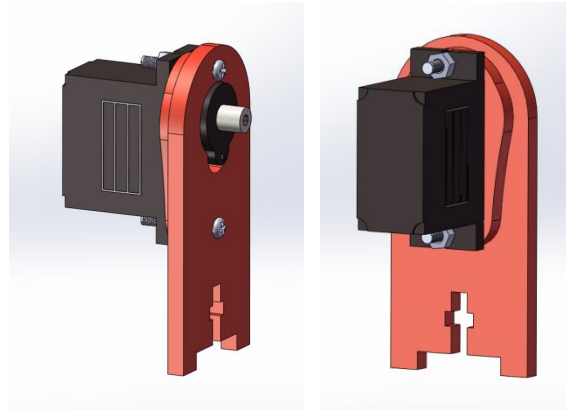
Assemble the following components

*Model Diagram*



### Effect diagram after assembling

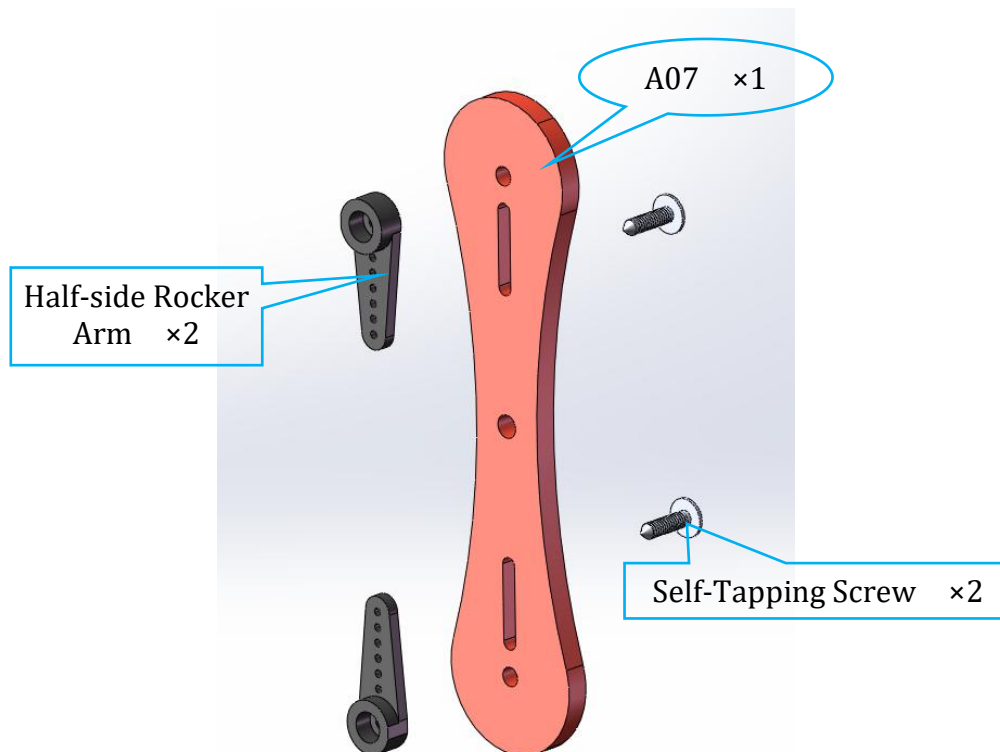
*Model Diagram*



3. Fix two Half-side rocker arms to the A07 acrylic plate with Self-Tapping Screw(Rocker Arm and Self-Tapping Screw provided by the Servo bag) .

### Assemble the following components

*Model Diagram*



## Effect diagram after assembling

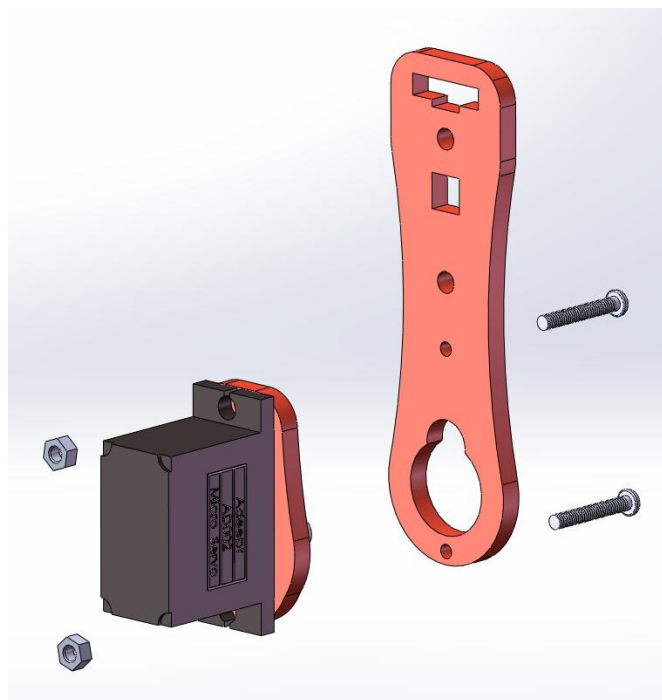
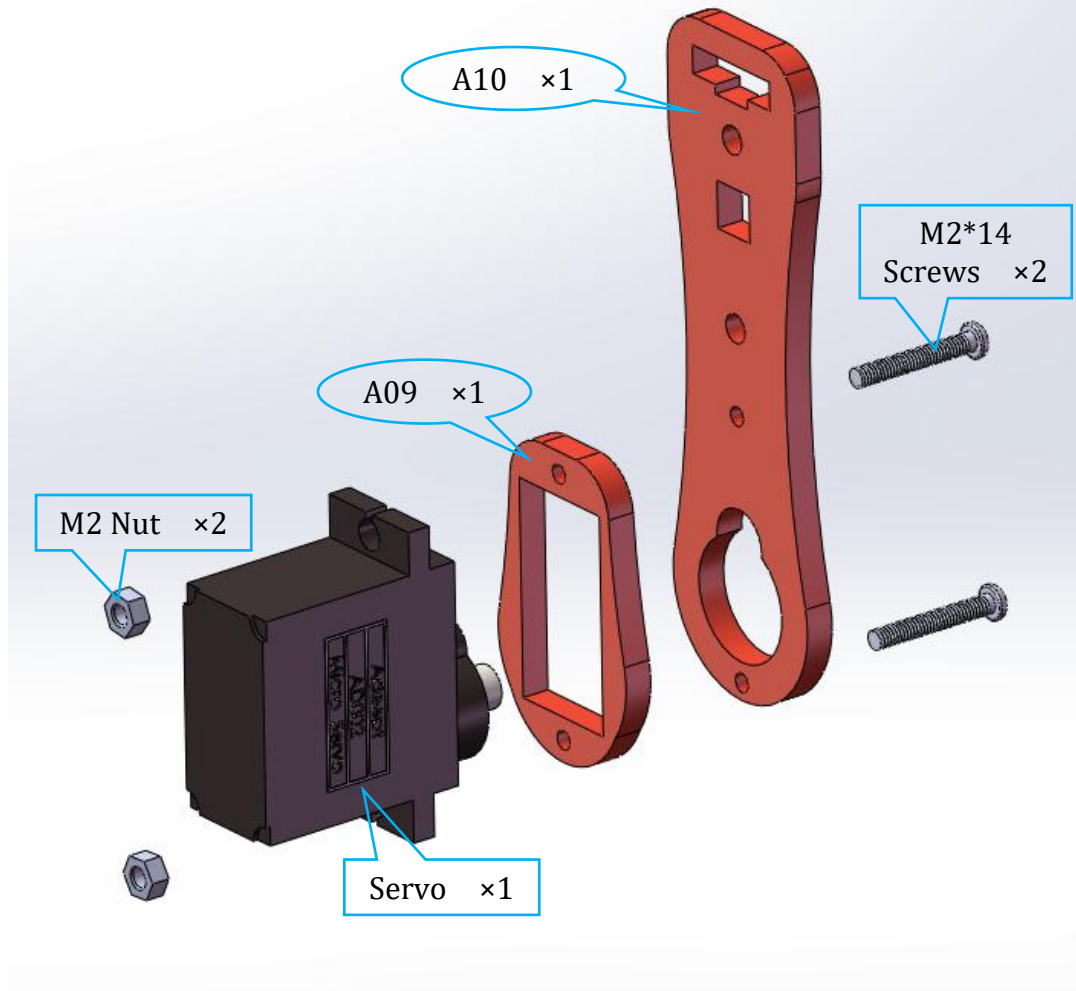
### *Model Diagram*



4. Fix a Servo to the A10 acrylic plate.

Assemble the following components

### *Model Diagram*



## Effect diagram after assembling

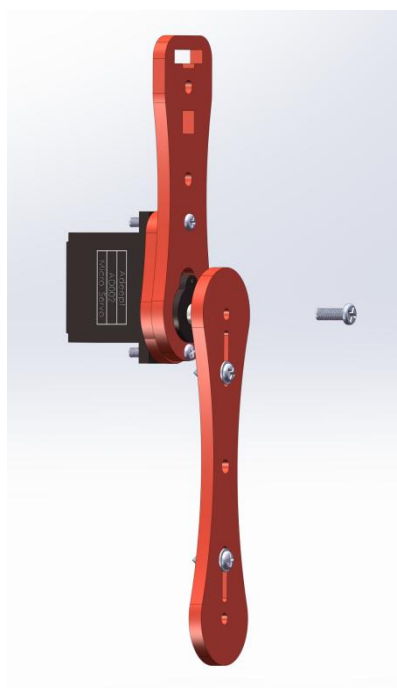
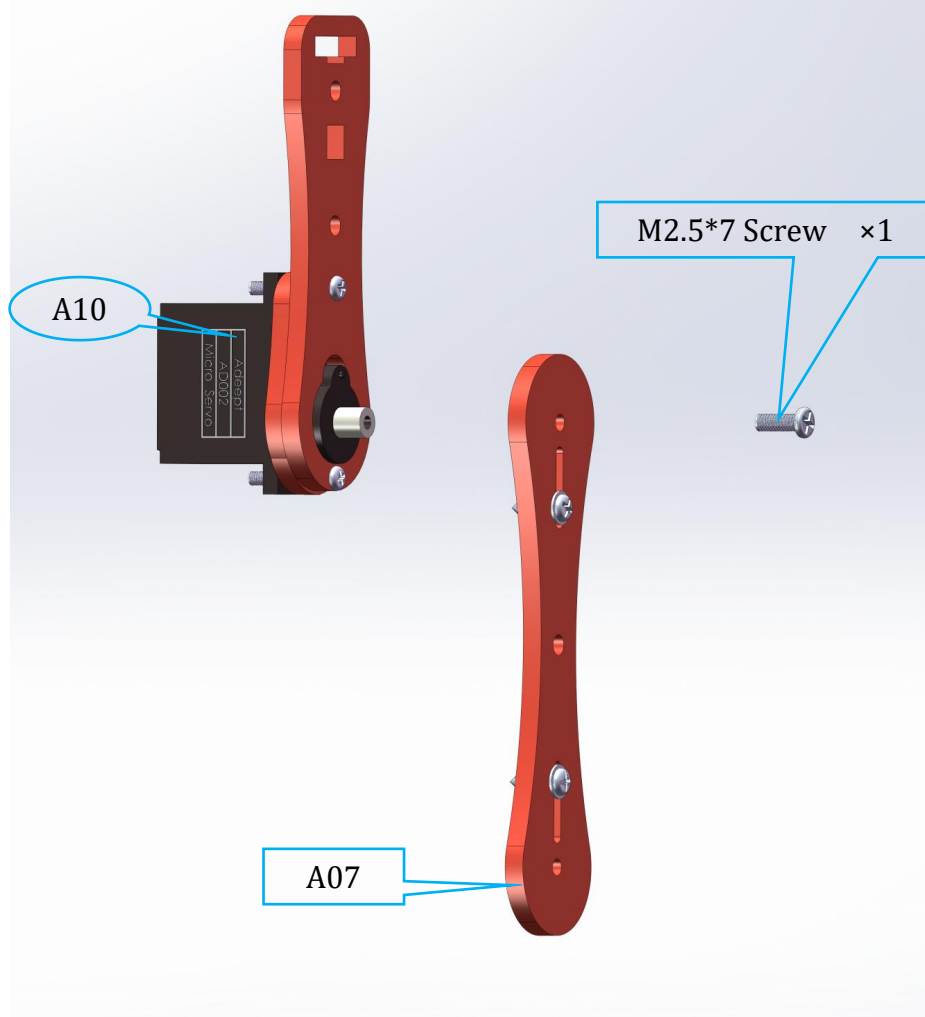
### Model Diagram



5. Assemble the A07 and the A10 combination as a whole.

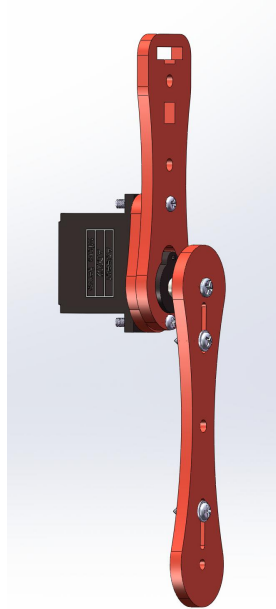
Assemble the following components

Model Diagram



## Effect diagram after assembling

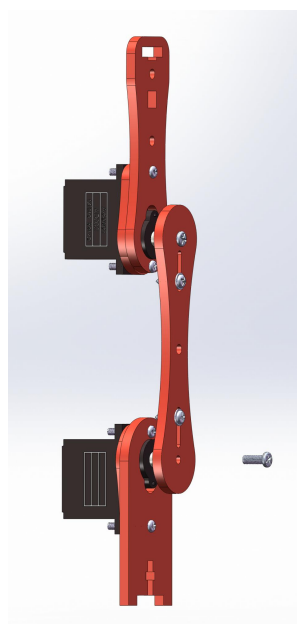
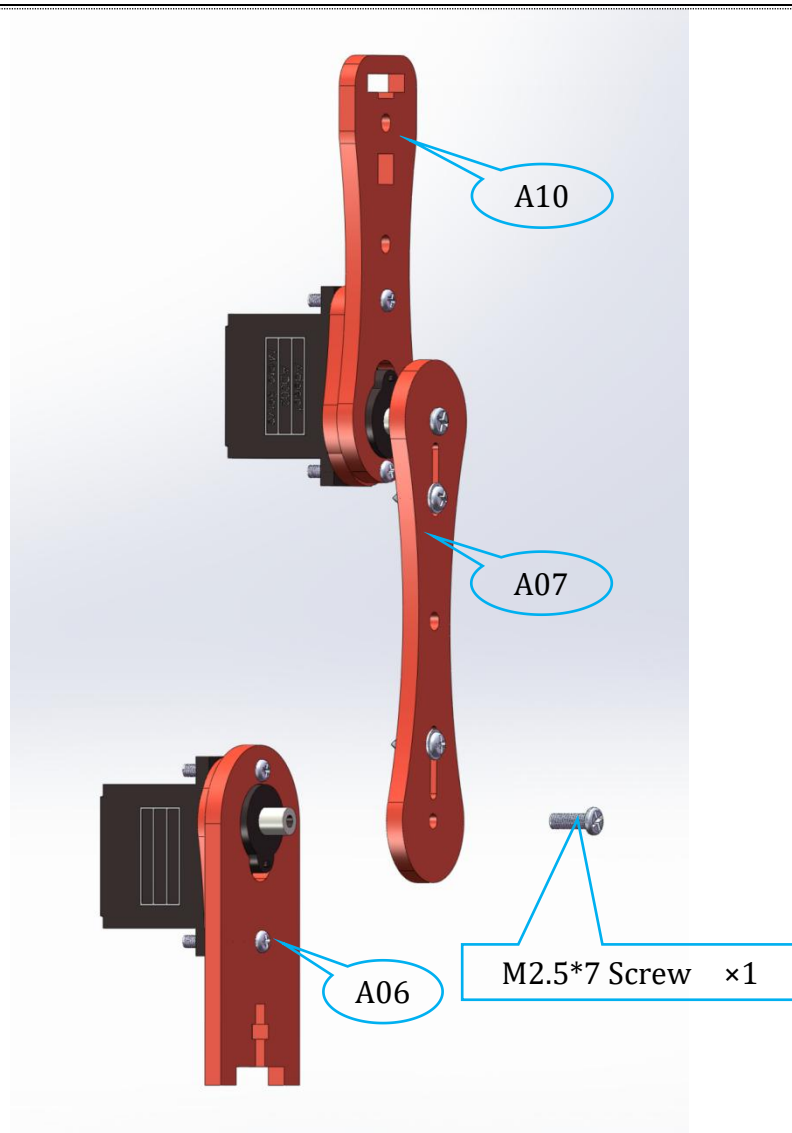
*Model Diagram*



6. Assemble A07, A10 combination and A06 combination as a whole.

Assemble the following components

*Model Diagram*





### Effect diagram after assembling

*Model Diagram*

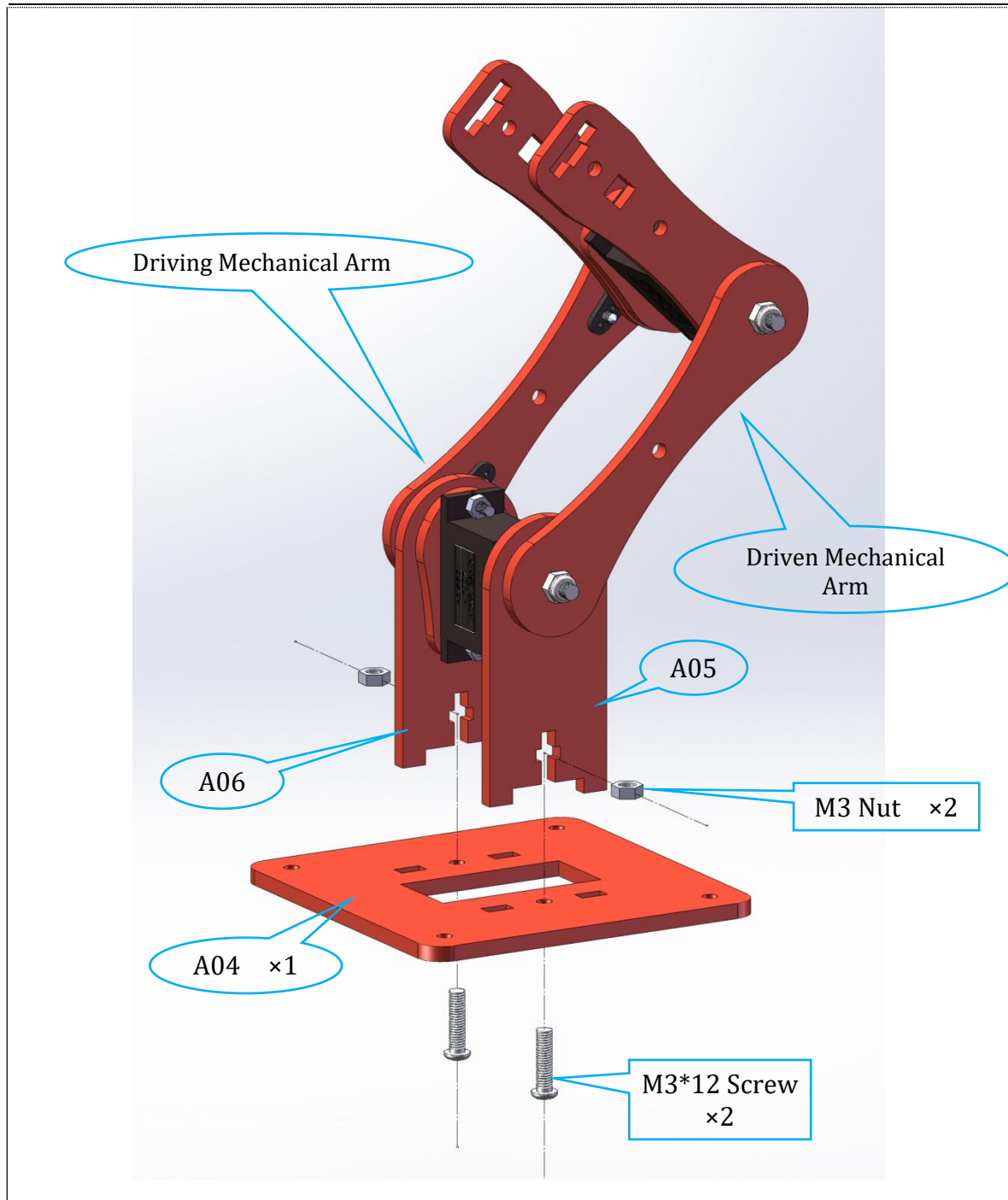


#### 1.2.3. Fix the **Driven Mechanical Arm** and the **Driving Mechanical Arm** to A04.

7. Fix the A05 acrylic plate of Driven Mechanical Arm and the A06 acrylic plate of Driving Mechanical Arm to the A04 acrylic plate with M3\*12 Screw and M3 Nut .

Assemble the following components

*Model Diagram*



Effect diagram after assembling

*Model Diagram*

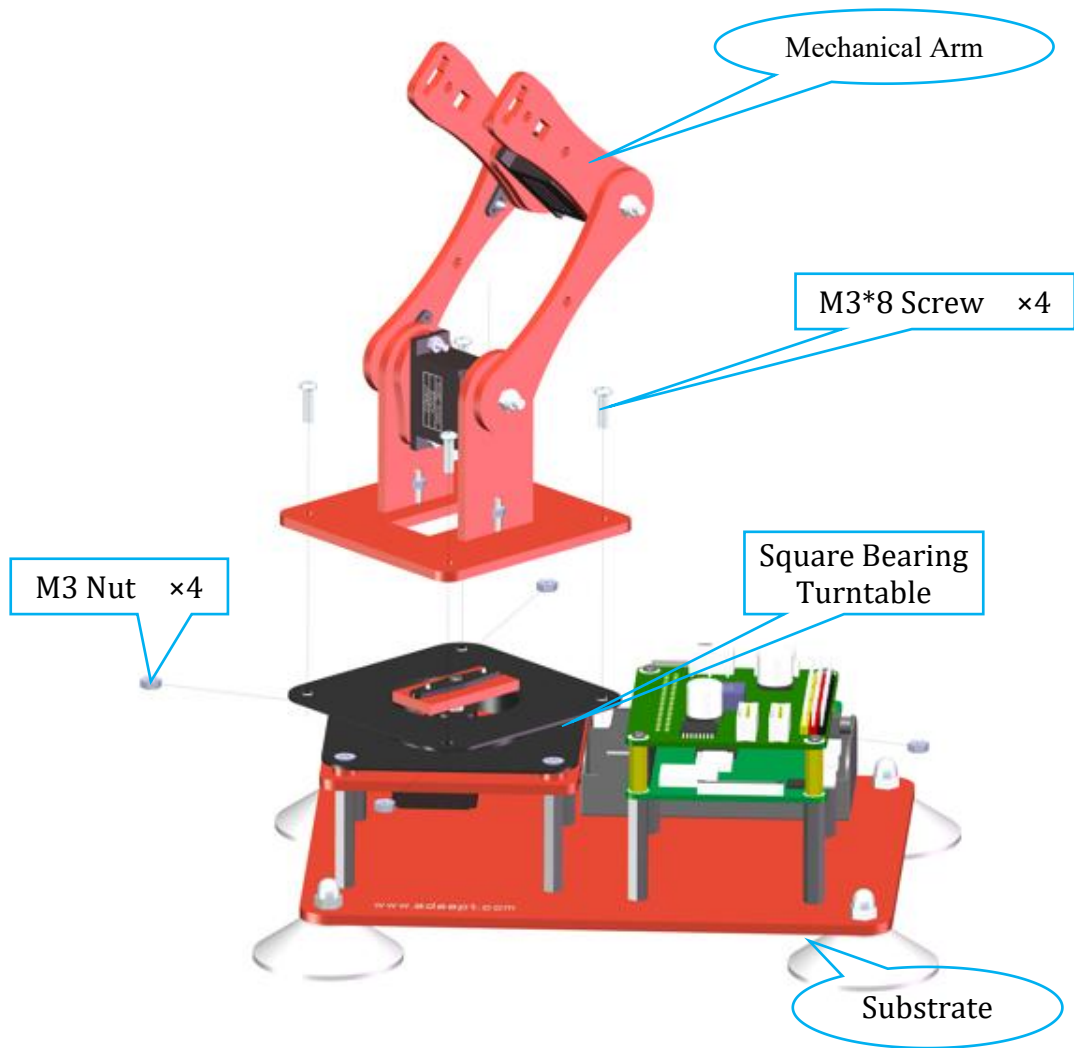


### 1.3. Assemble the Pedestal and the Mechanical Arm as a Basic Robotic Arm Combination.

Fix the Mechanical Arm to Upper cover of Square Bearing Turntable in the Substrate with Self-Tapping Screw.

Assemble the following components

*Model Diagram*



Effect diagram after assembling

*Model Diagram*





## 1.4. Assemble the Mechanical hand

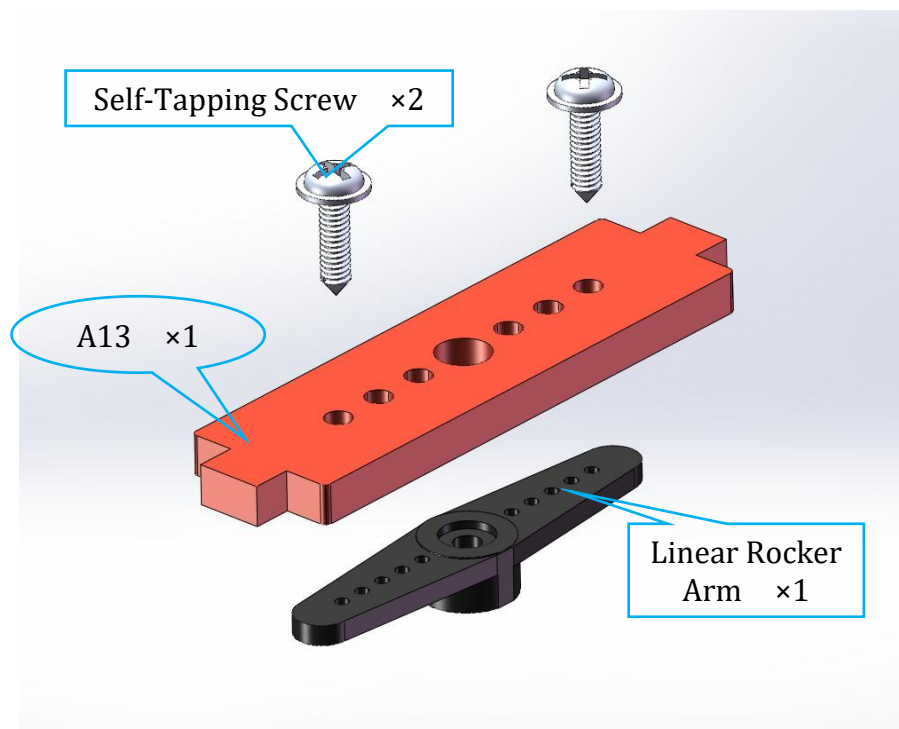
### 1.4.1. Assemble the Mechanical Wrist(Gripper)

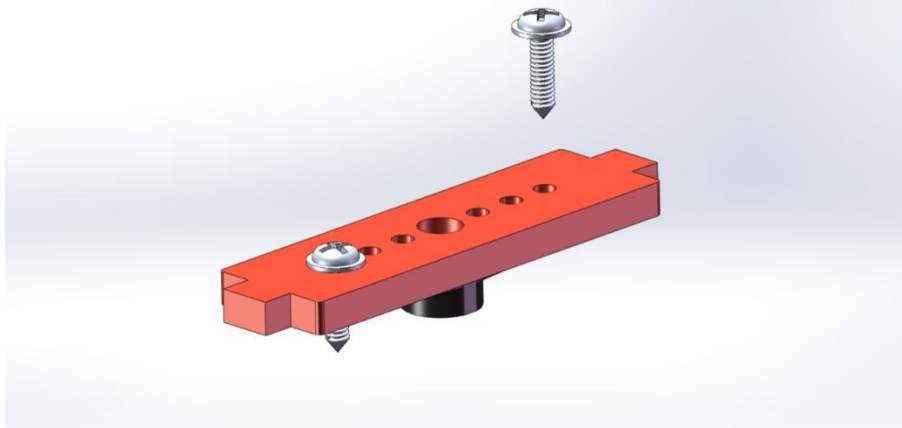
1. Fix the Linear Rocker Arm to the A13 acrylic plate with Self-Tapping Screw.

(Linear Rocker Arm and Self-Tapping Screw provided by the Servo bag)

Assemble the following components

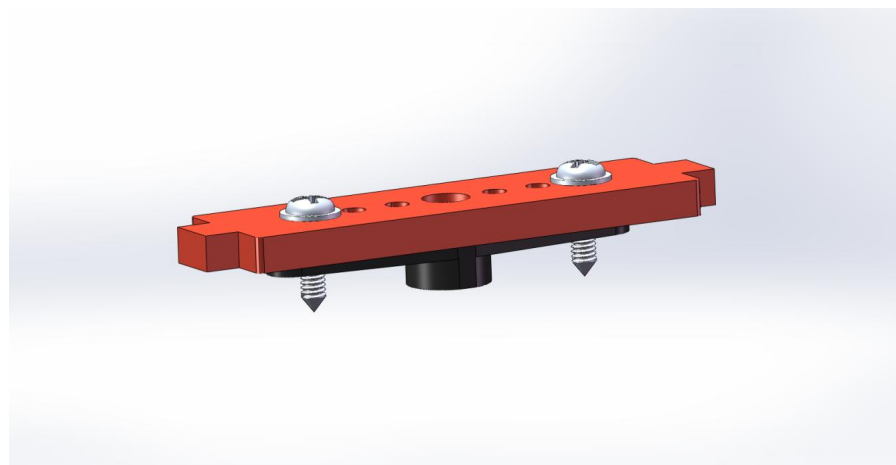
*Model Diagram*





Effect diagram after assembling

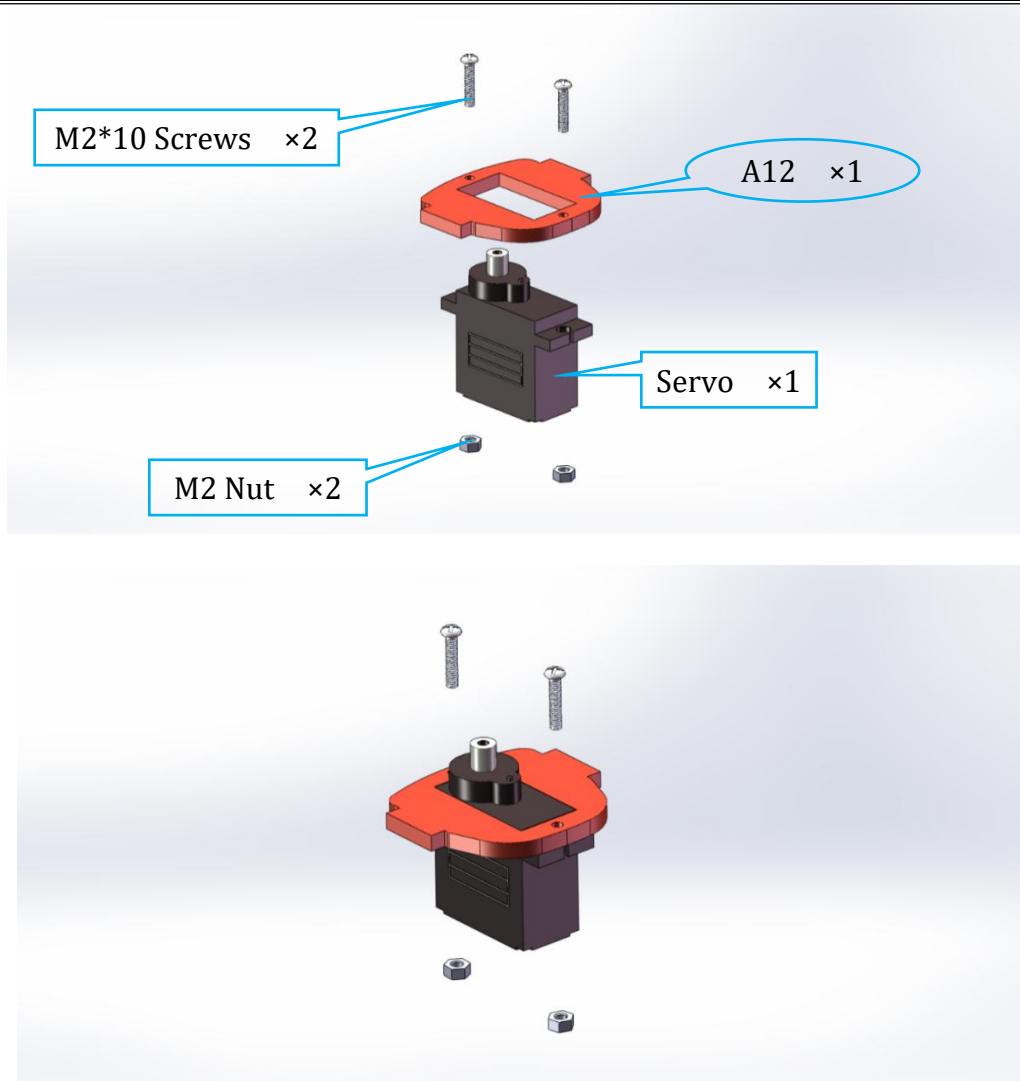
*Model Diagram*



2. Fix a Servo to the A12 acrylic plate.

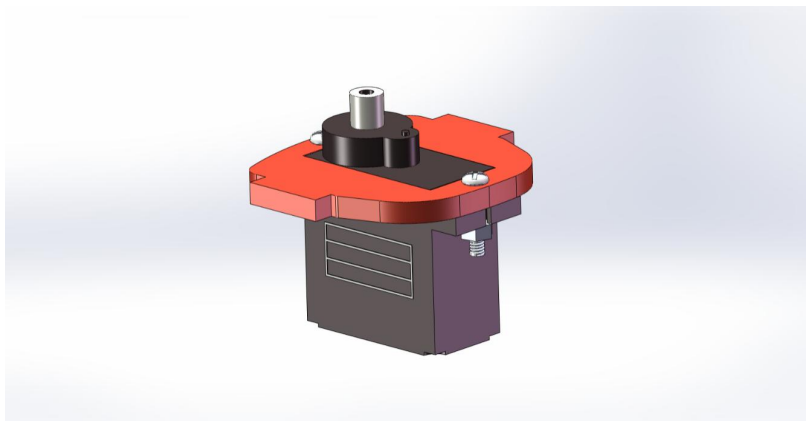
Assemble the following components

*Model Diagram*



Effect diagram after assembling

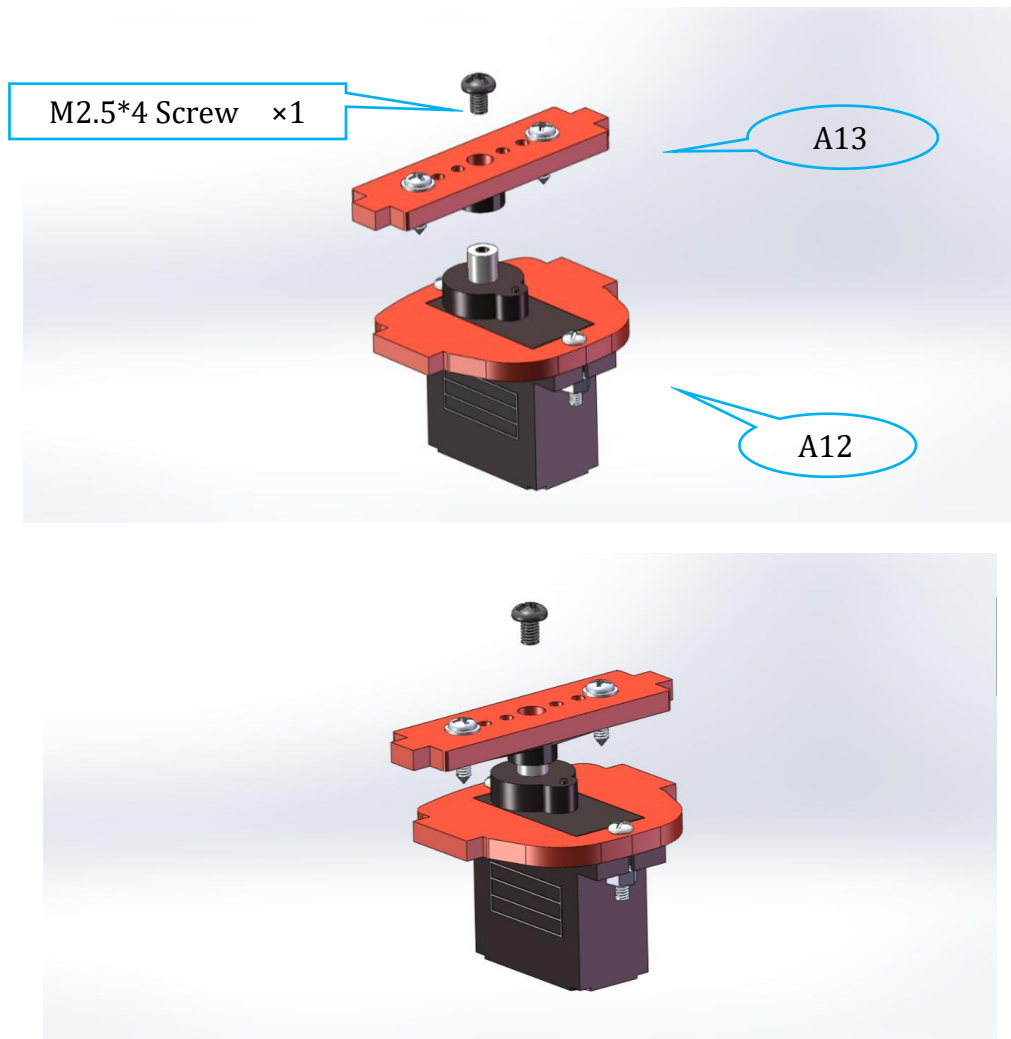
*Model Diagram*



3. Fix the A13 to the Servo in the A12 acrylic plate with the M2.5\*4 Screw (M2.5\*4 Screw provided by the Servo bag).

Assemble the following components

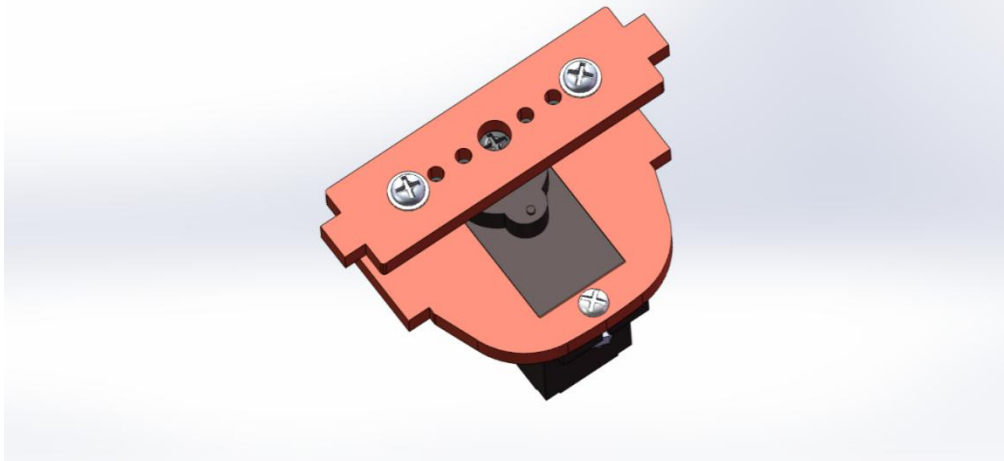
*Model Diagram*



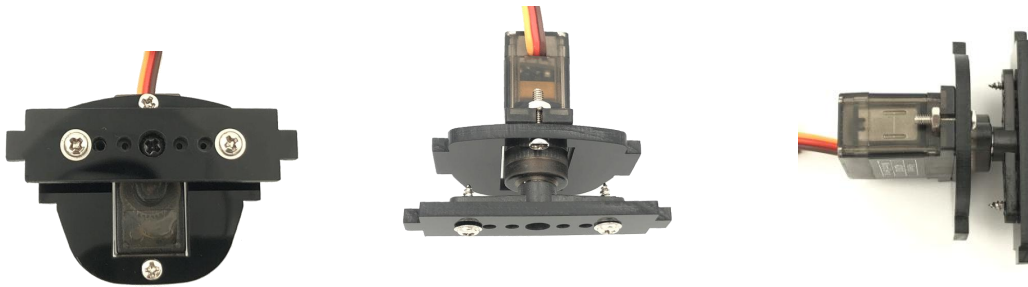
Effect diagram after assembling

*Model Diagram*





*Physical Diagram*

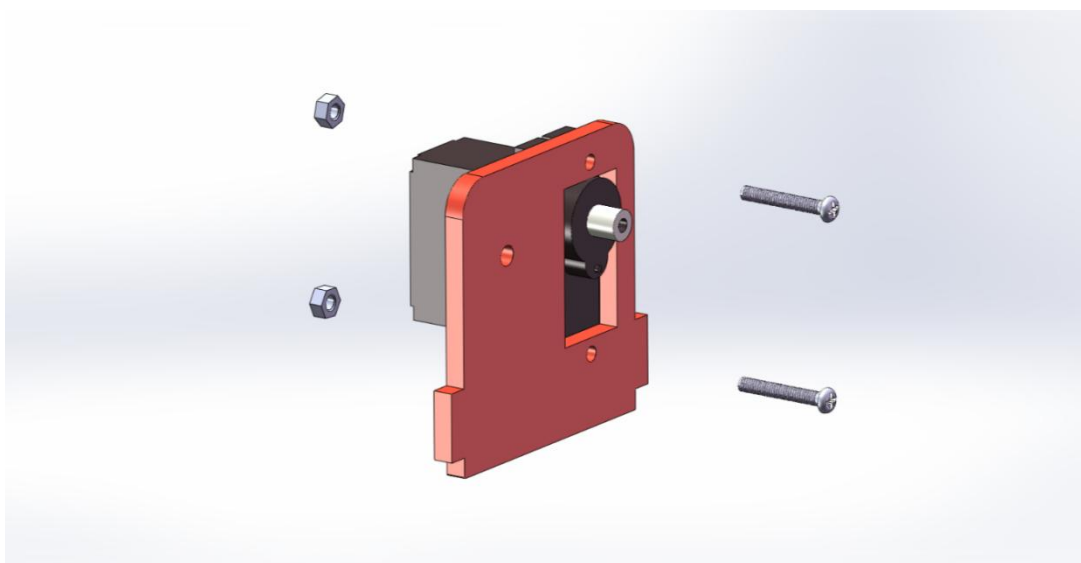
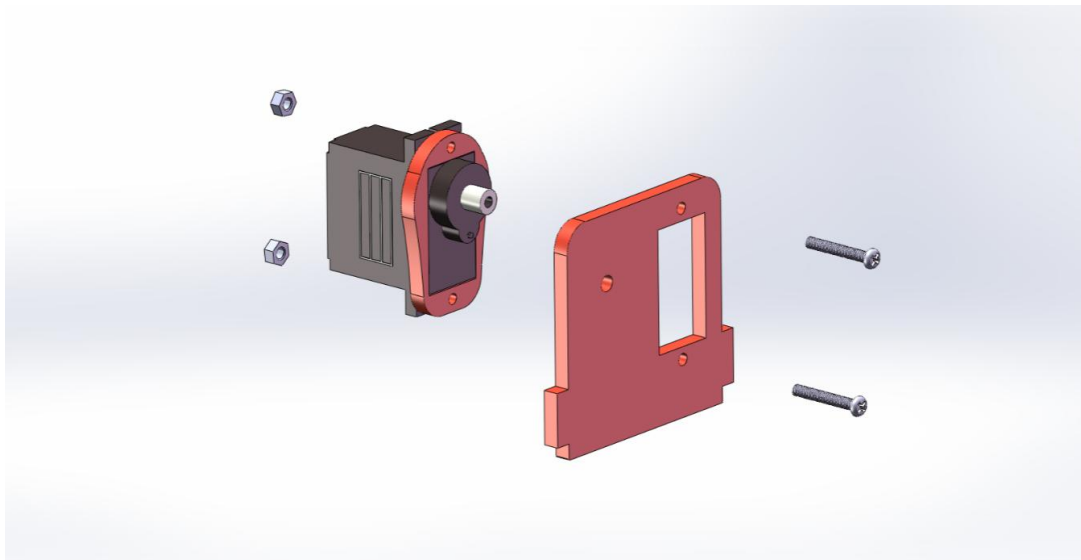
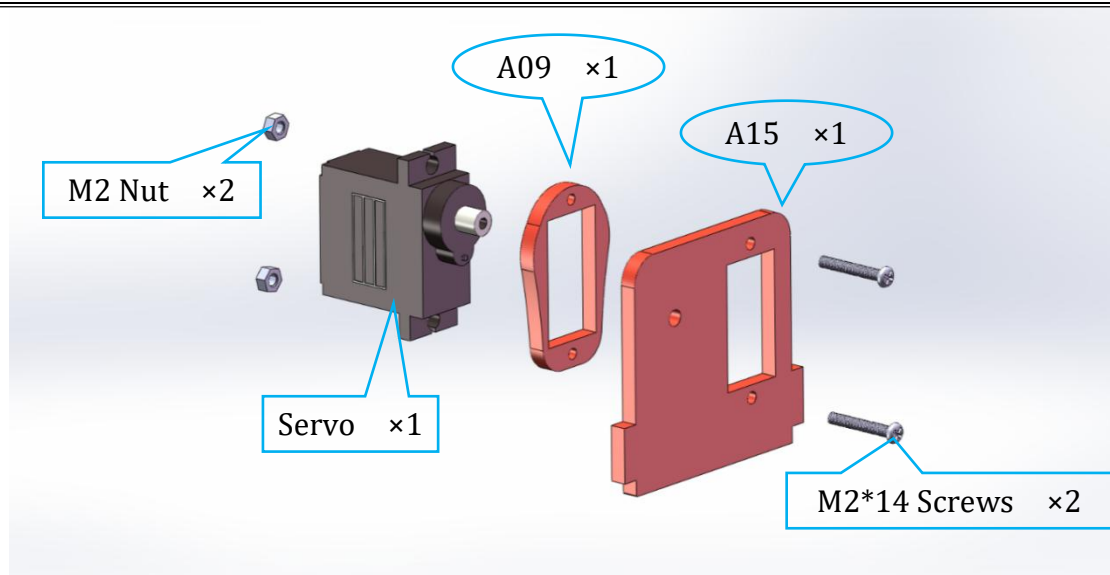


### 1.4.2. Assemble the Mechanical Gripper

4. Fix a Servo to the Servo in the A15 acrylic plate.

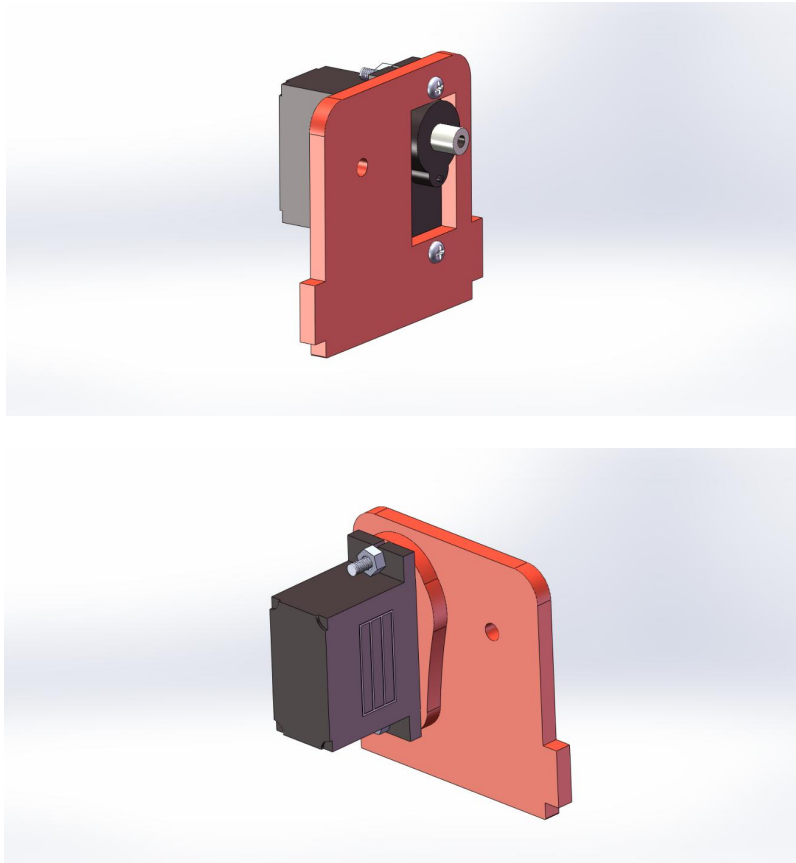
Assemble the following components

*Model Diagram*



## Effect diagram after assembling

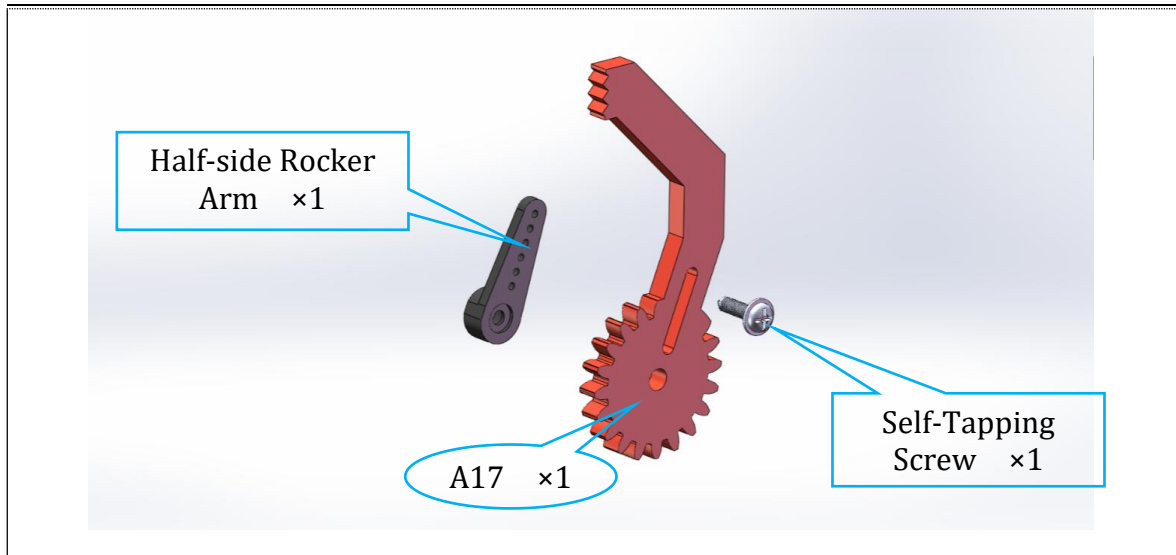
### *Model Diagram*



5. Fix a Half-side Rocker Arm to the A17 acrylic plate with Self-Tapping Screw( **Rocker Arm and Self-Tapping Screw provided by the Servo bag**) .

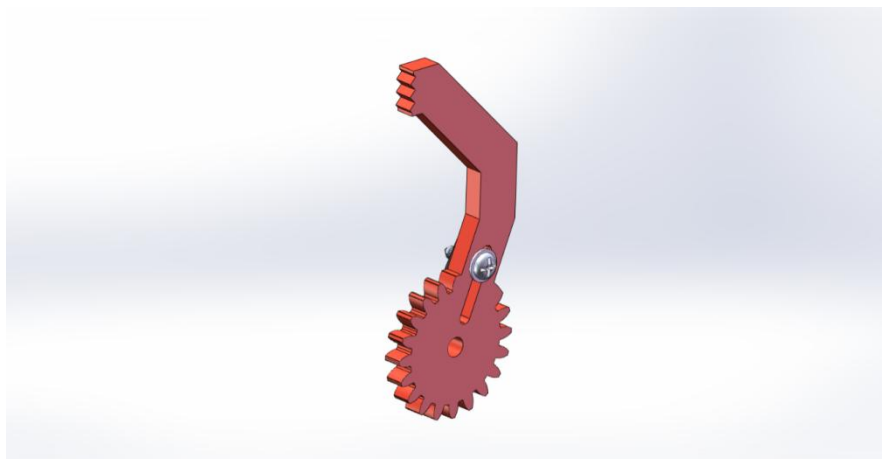
Assemble the following components

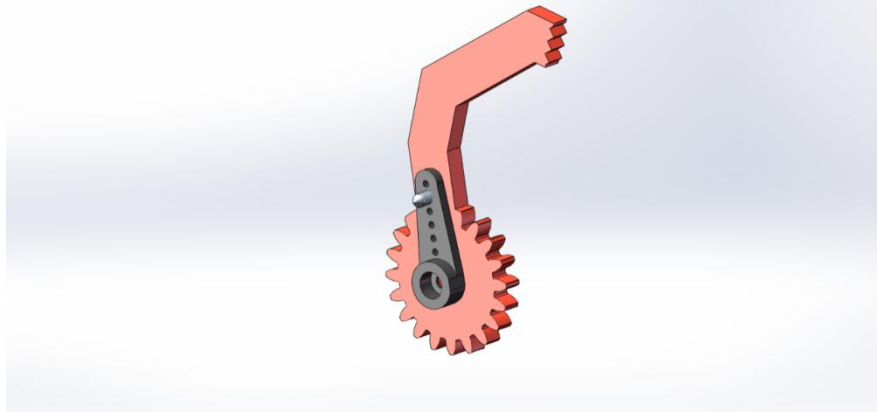
### *Model Diagram*



Effect diagram after assembling

*Model Diagram*

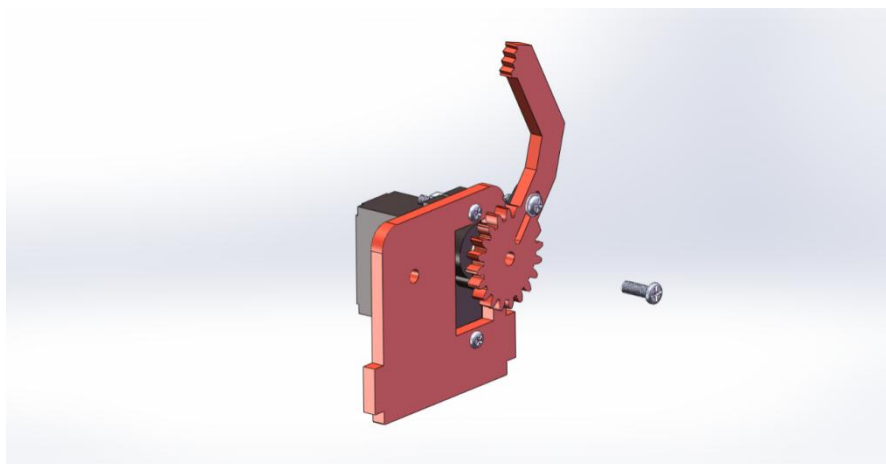
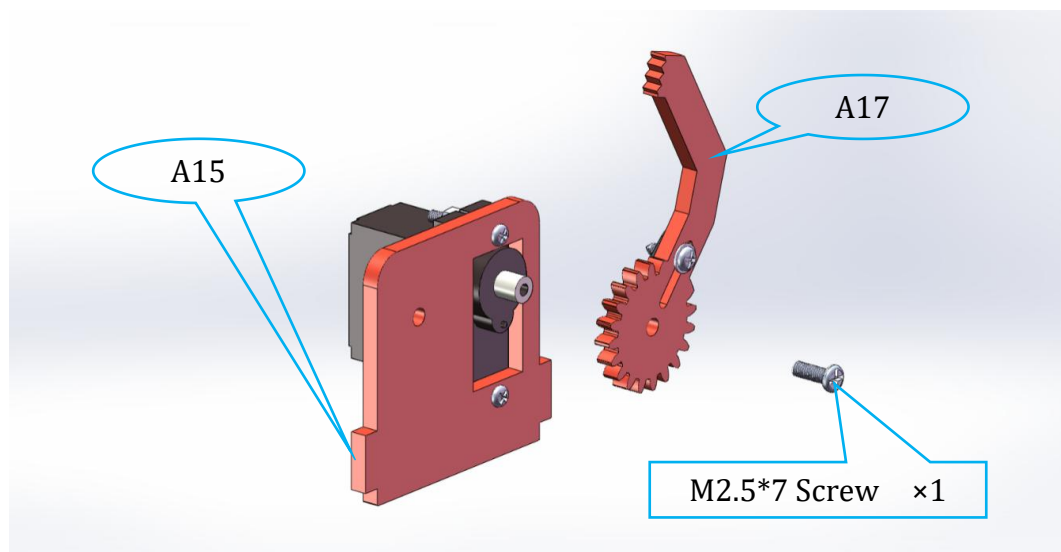




5. Fix the A17 to the Servo in the A15 acrylic plate.

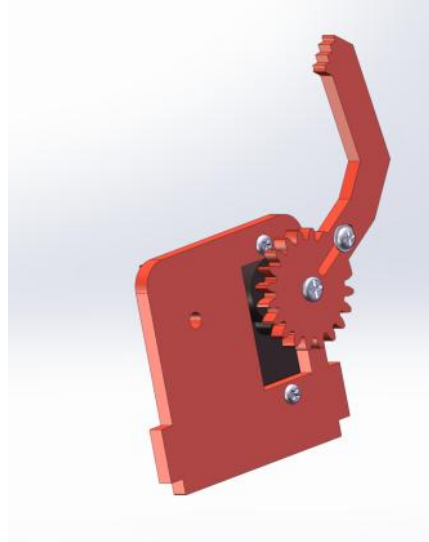
Assemble the following components

*Model Diagram*

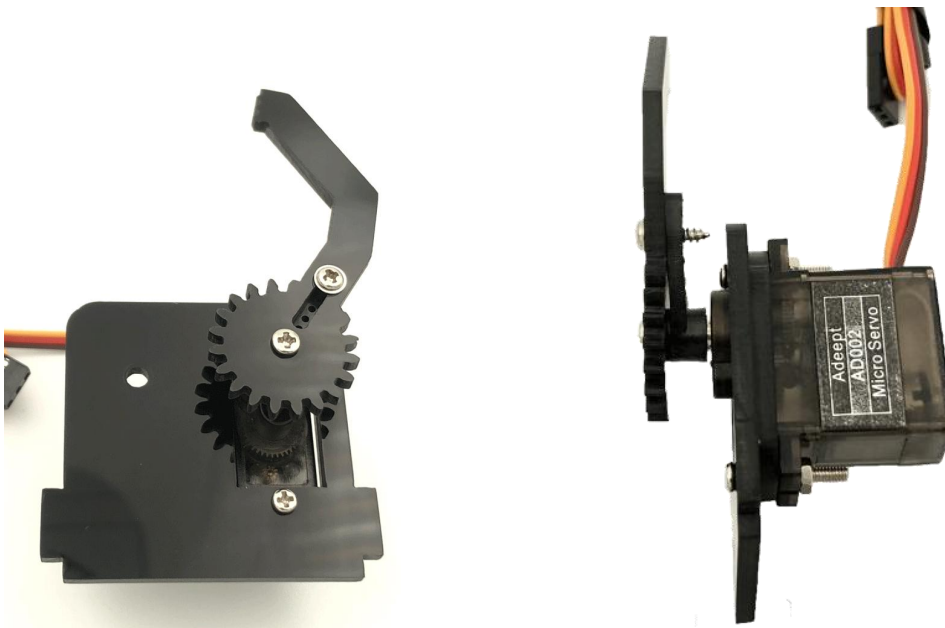


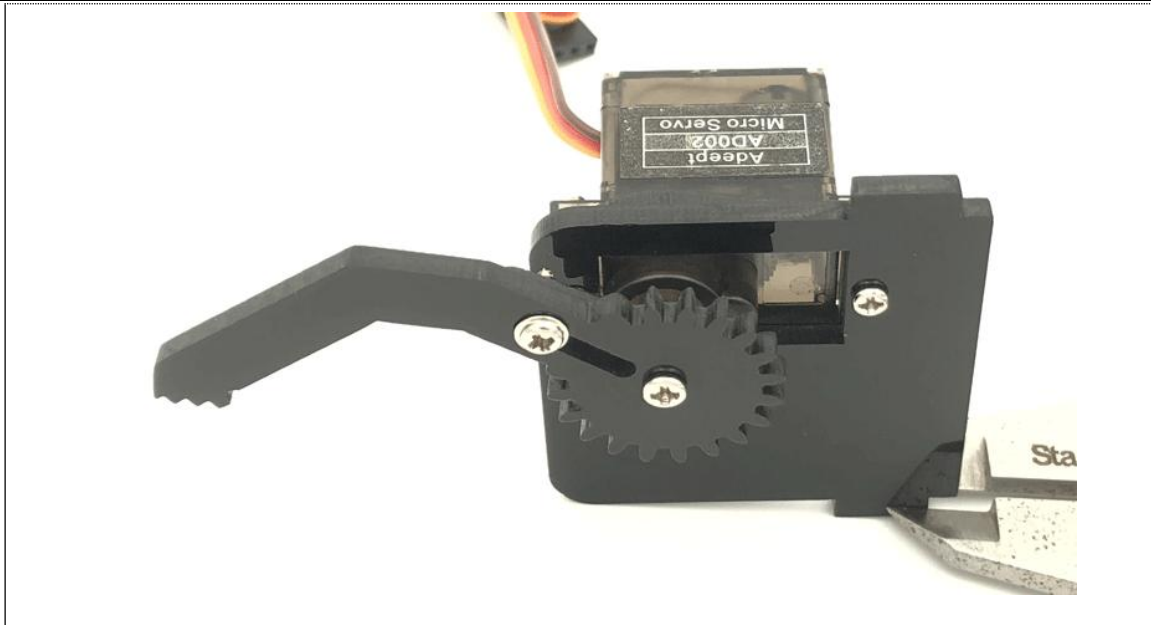
## Effect diagram after assembling

### *Model Diagram*



### *Physical Diagram*

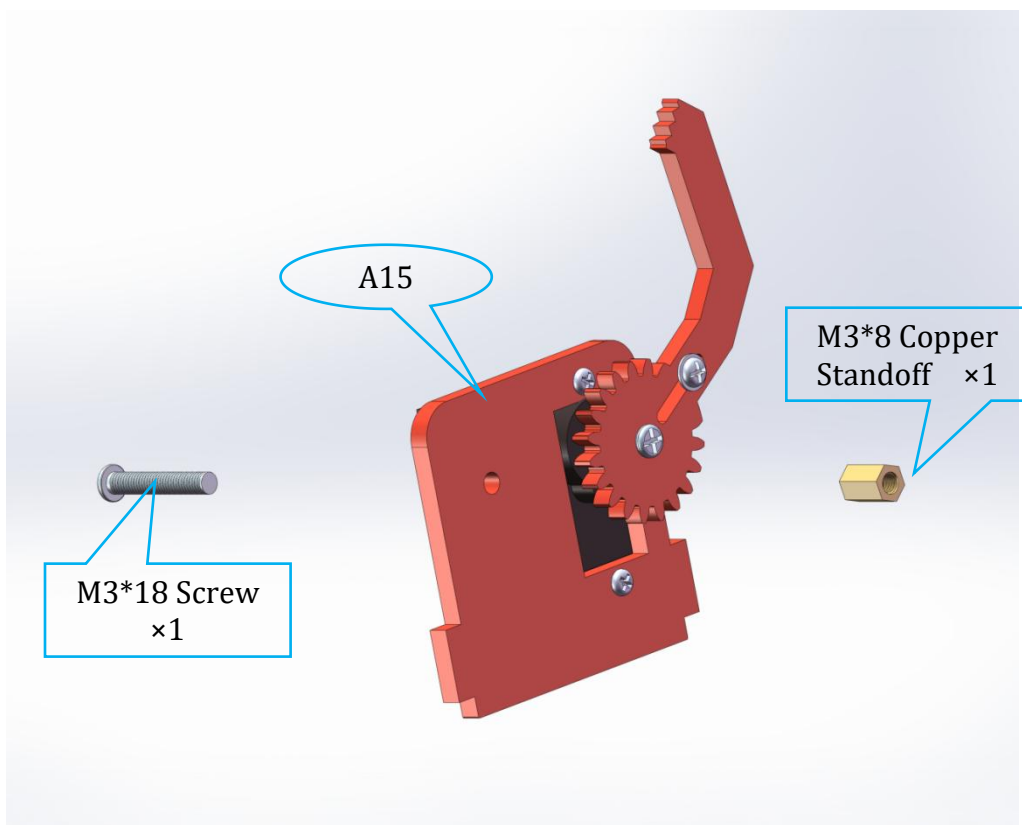




6. Fix a M3\*8 Copper Standoff to the Servo in the A15 acrylic plate with a M3\*18 Screw.

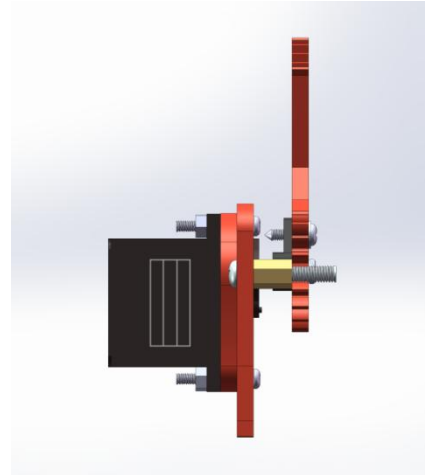
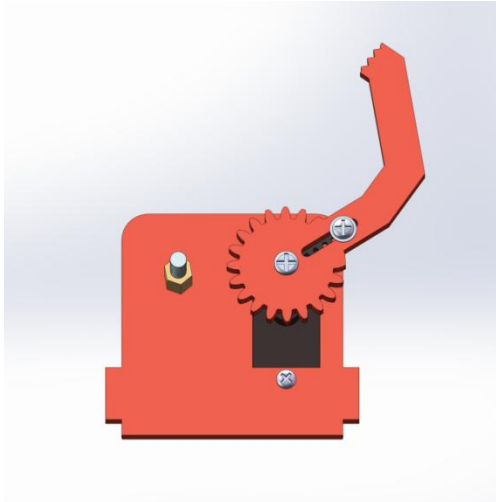
Assemble the following components

*Model Diagram*



## Effect diagram after assembling

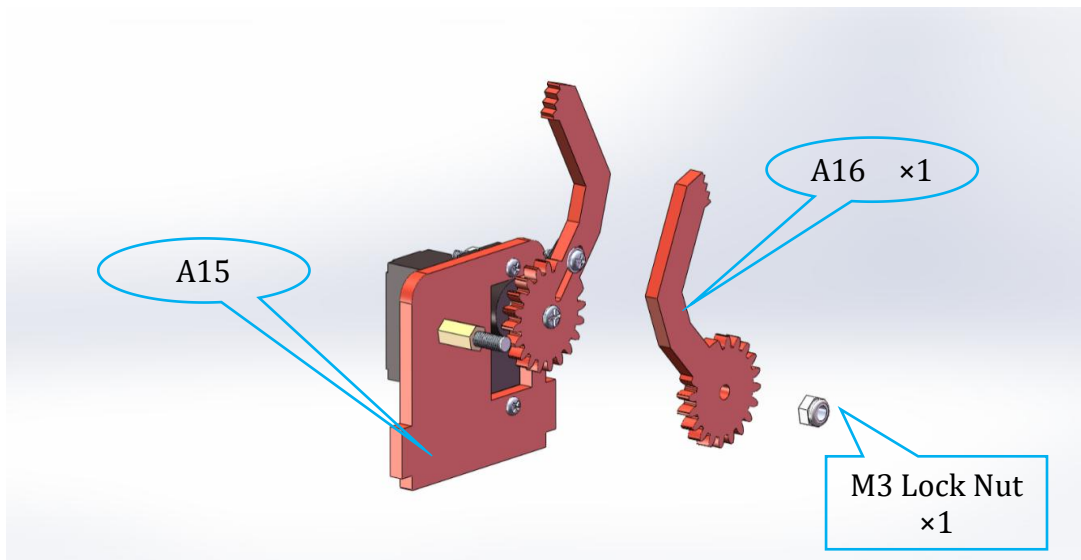
### Model Diagram



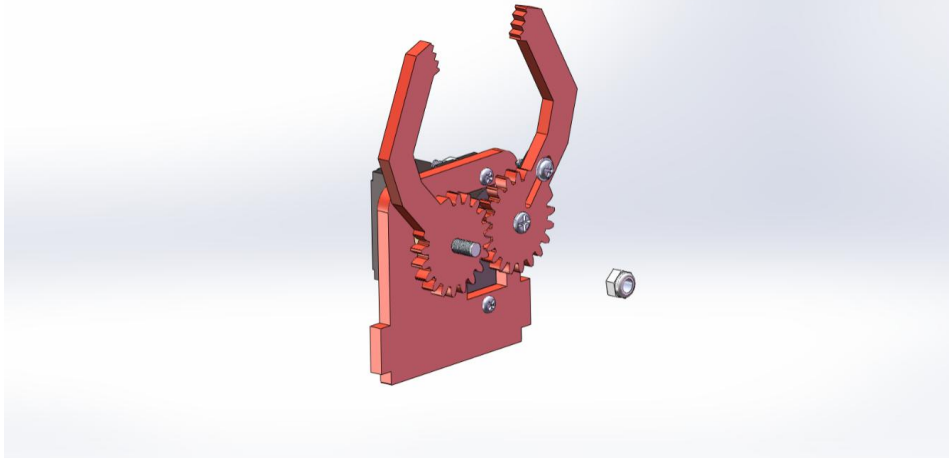
7. Fix a M3\*8 Copper Standoff to the Servo in the A15 acrylic plate with a M3\*18 Screw.

### Assemble the following components

#### Model Diagram

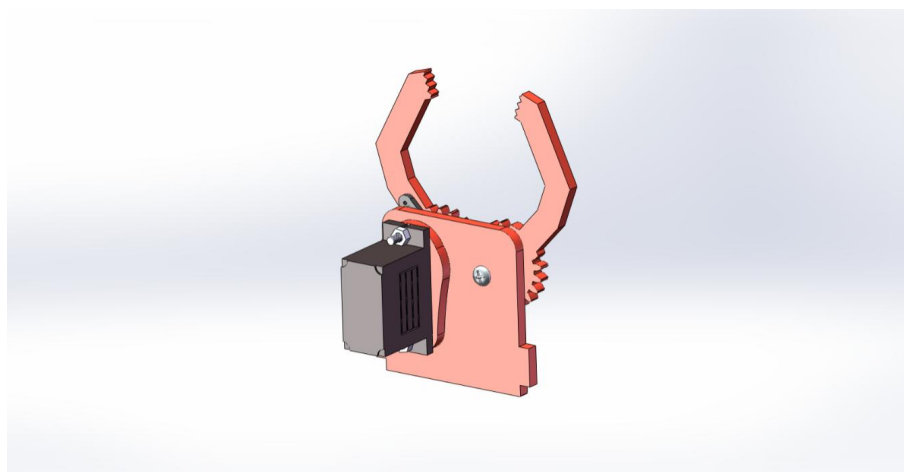
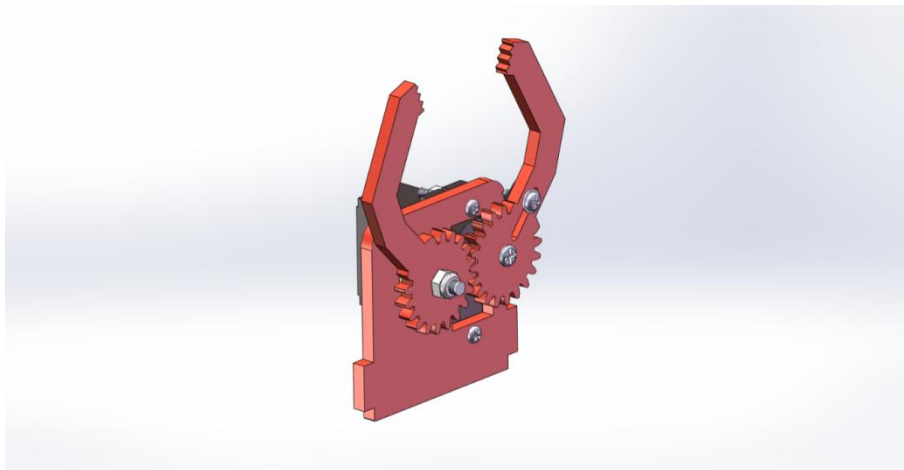




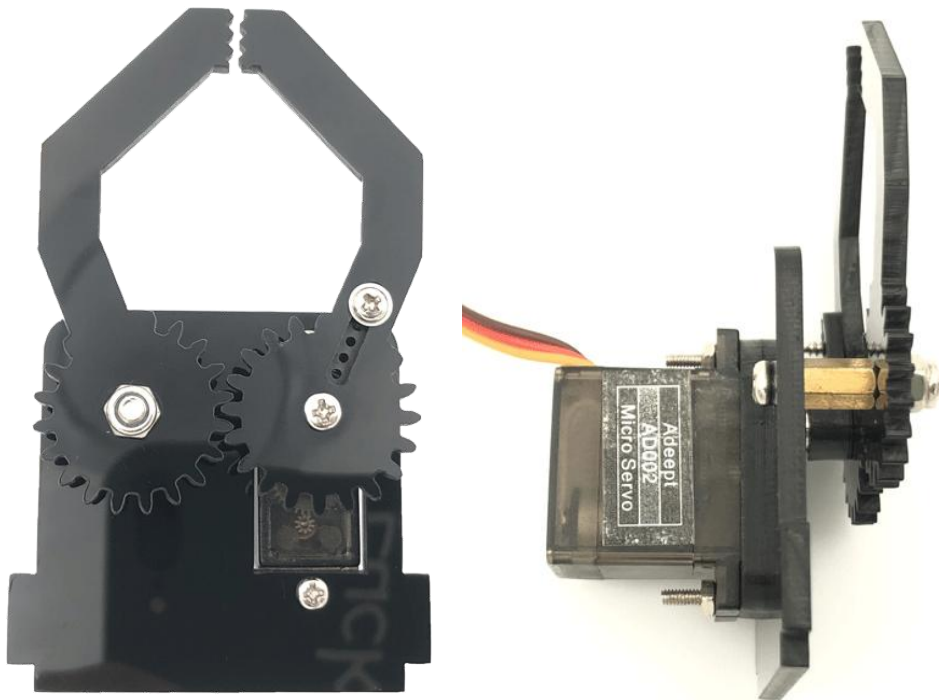


### Effect diagram after assembling

#### *Model Diagram*



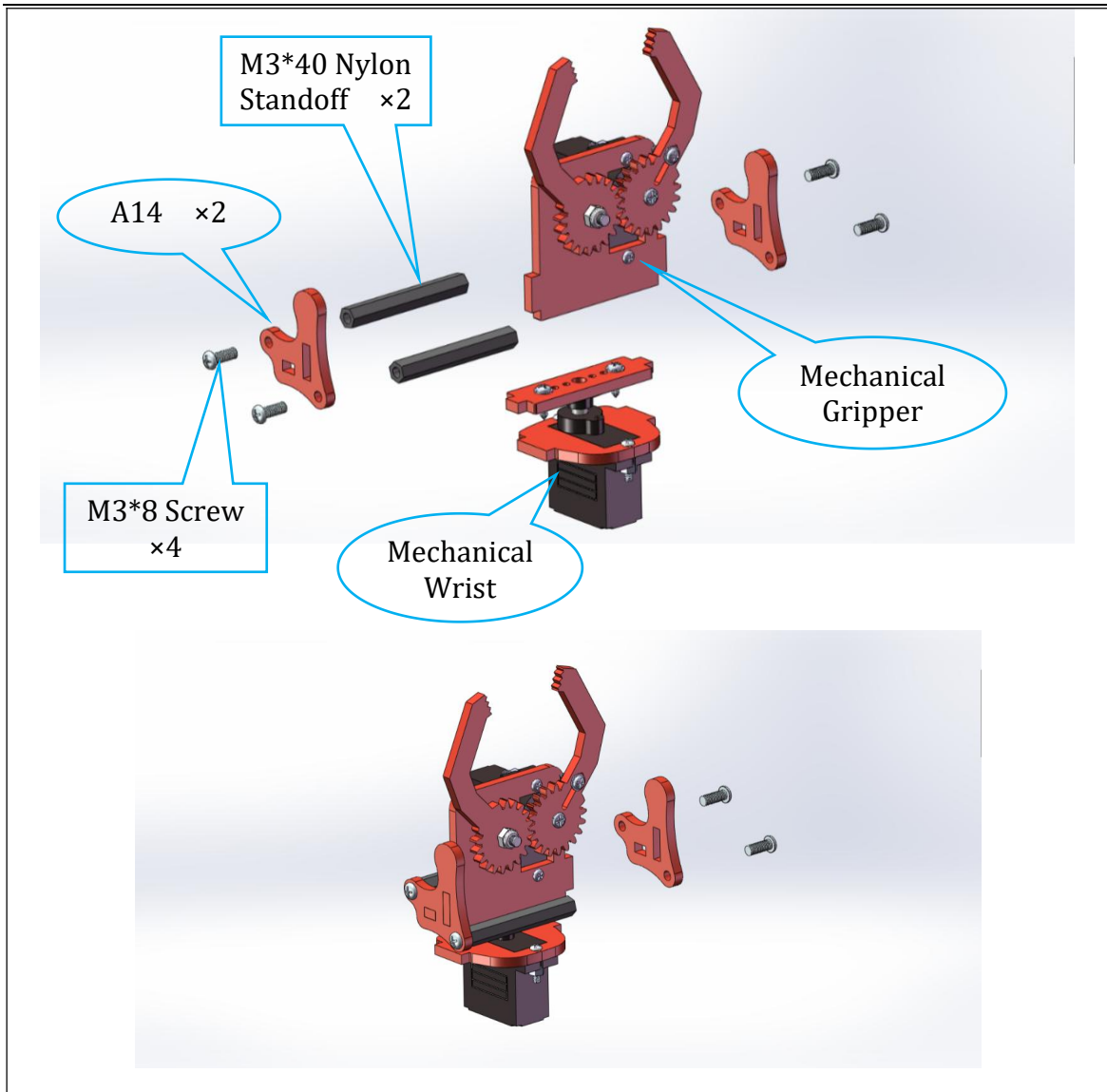
*Physical Diagram*



### 1.4.3. Assemble the Mechanical Wrist and the Mechanical Gripper as the Mechanical hand.

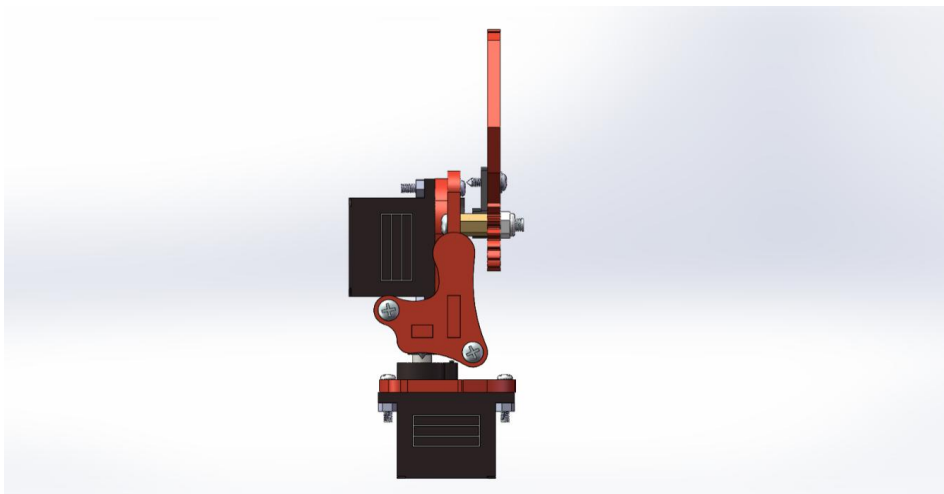
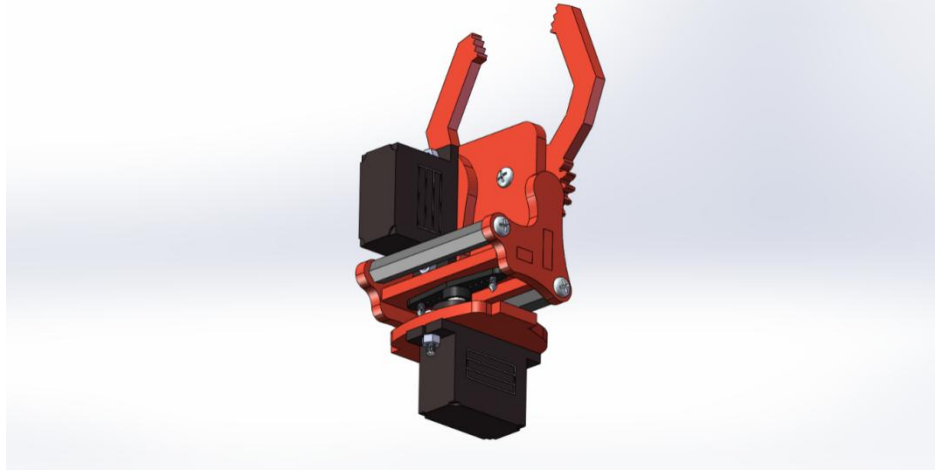
Assemble the following components

*Model Diagram*



Effect diagram after assembling

*Model Diagram*



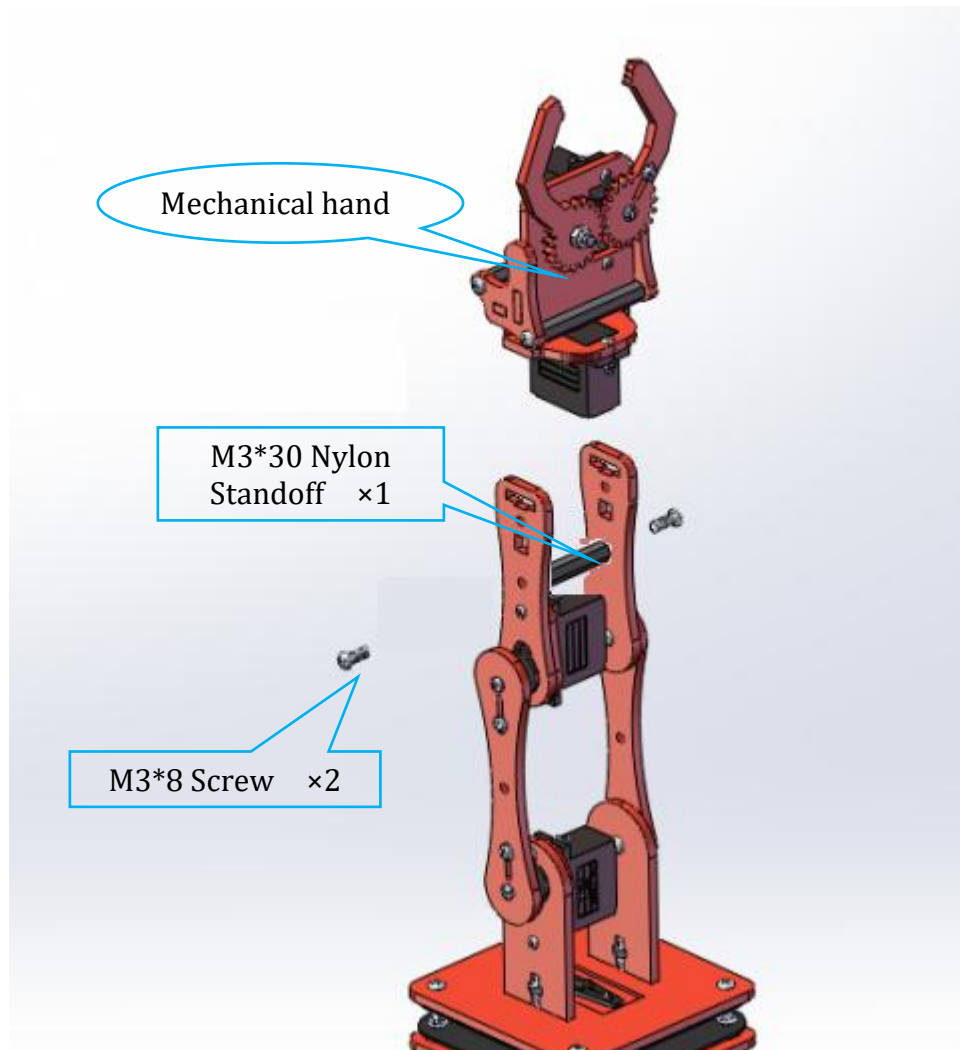
*Physical Diagram*



## 1.5 Fix the Mechanical hand to the robotic arm.

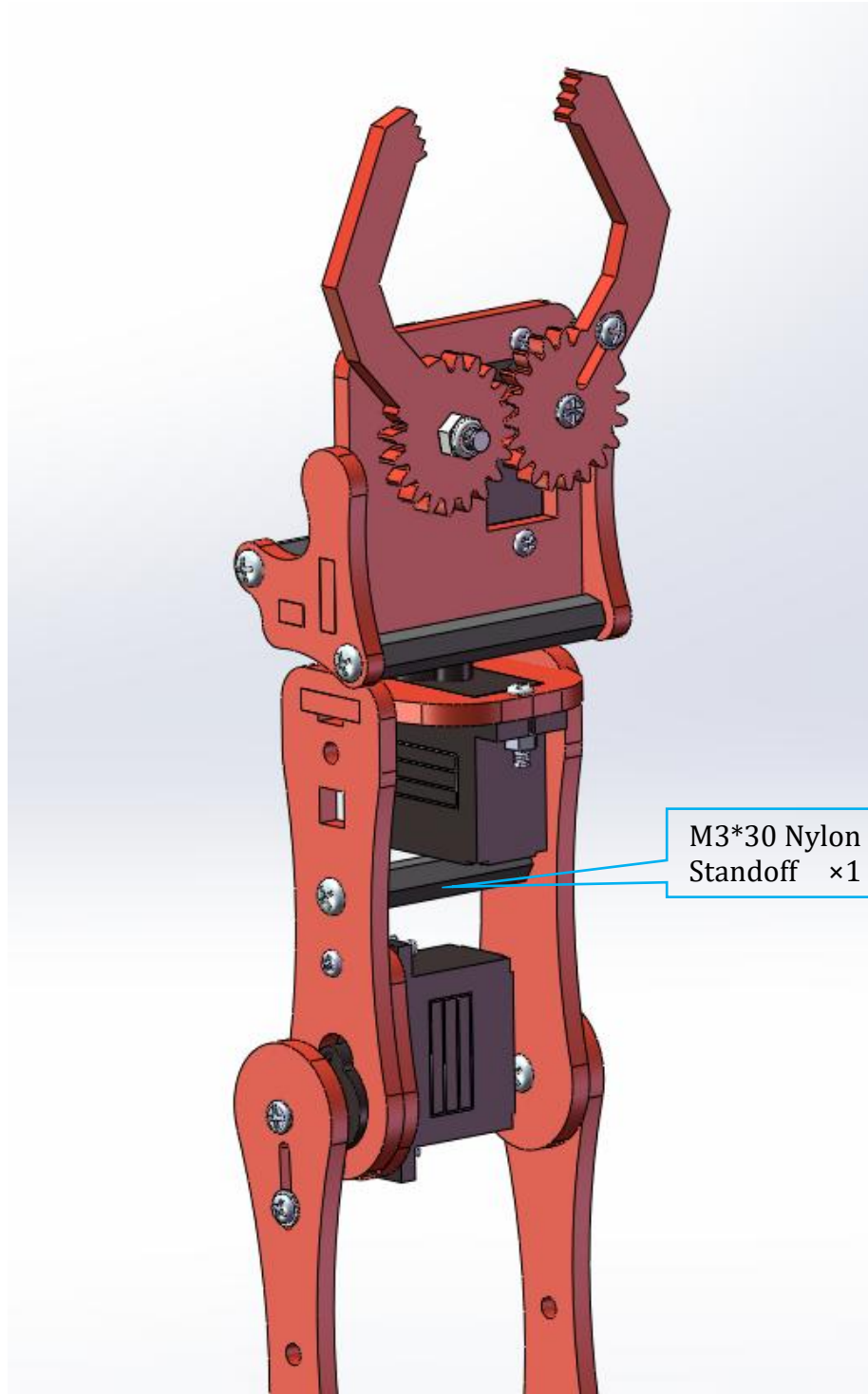
Assemble the following components

*Model Diagram*



## Effect diagram after assembling

### Model Diagram



### Physical Diagram

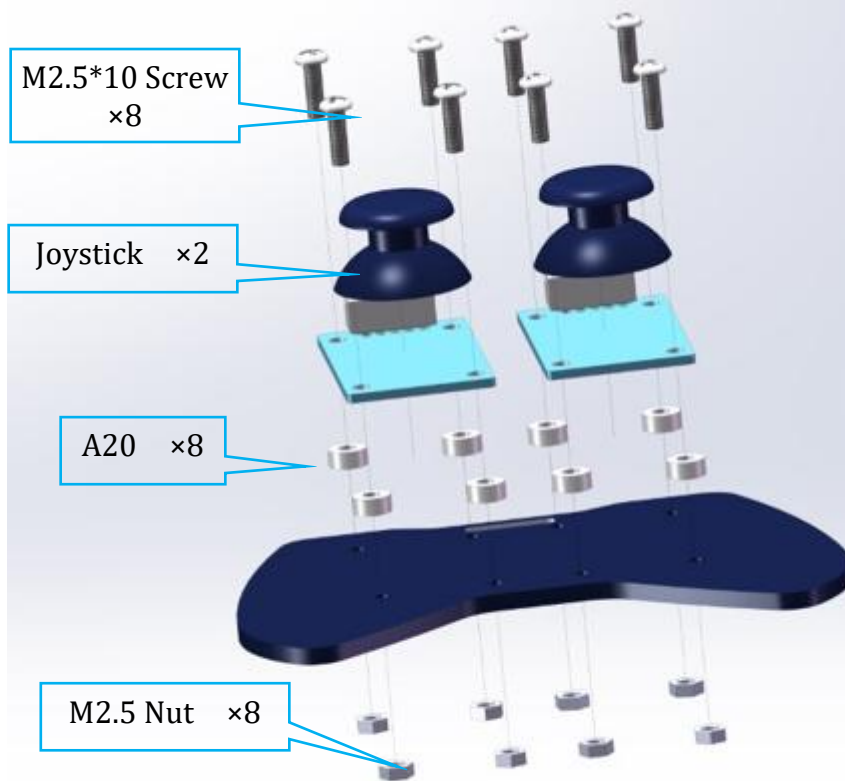
## Effect diagram after assembling



## 2. Assemble the Rocker

Assemble the following components

*Model Diagram*



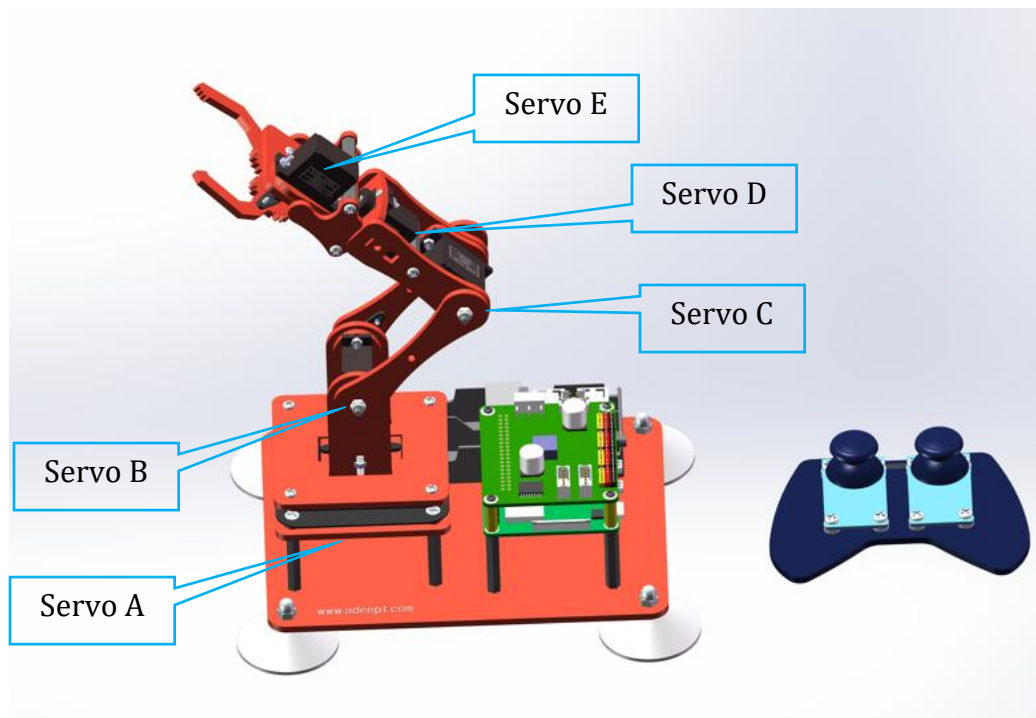


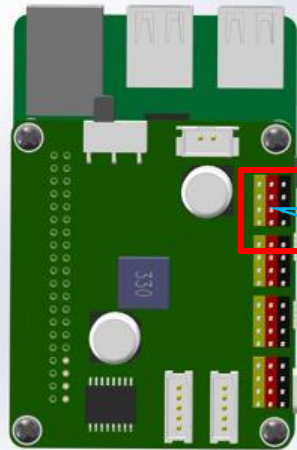


### 3. Circuit Connection

circuit connection

*Model Diagram*

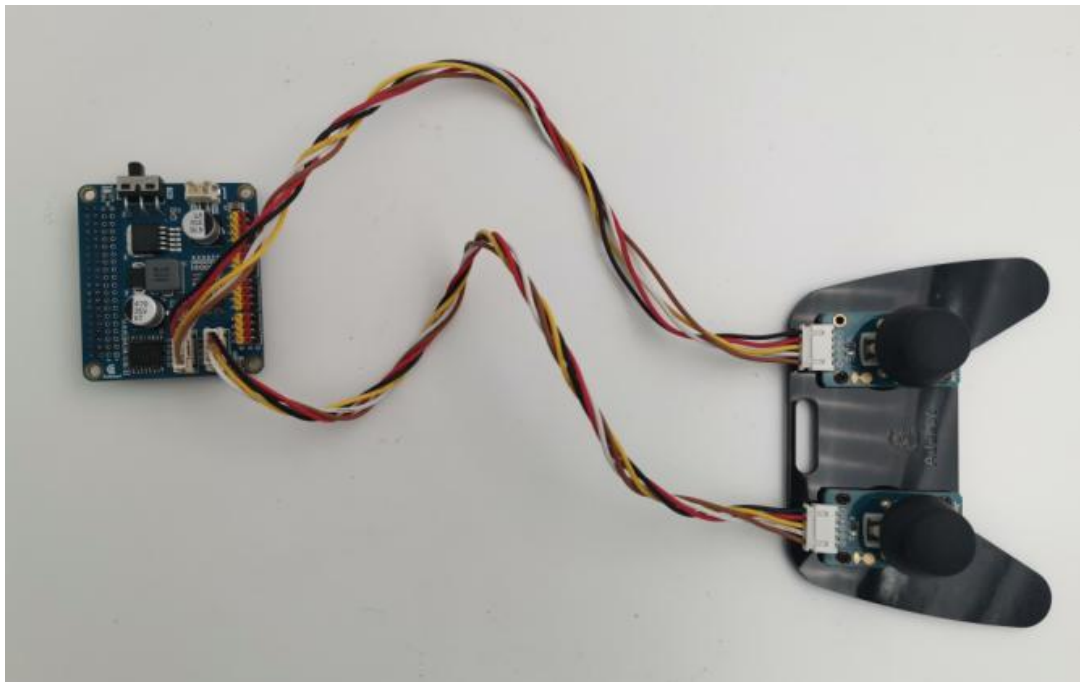
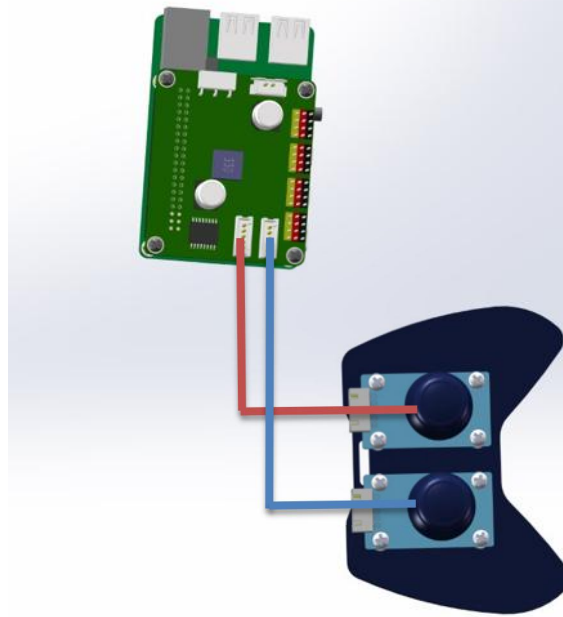




- 0: Servo A
- 1: Servo B
- 2: Servo C
- 3: Servo D
- 4: Servo E

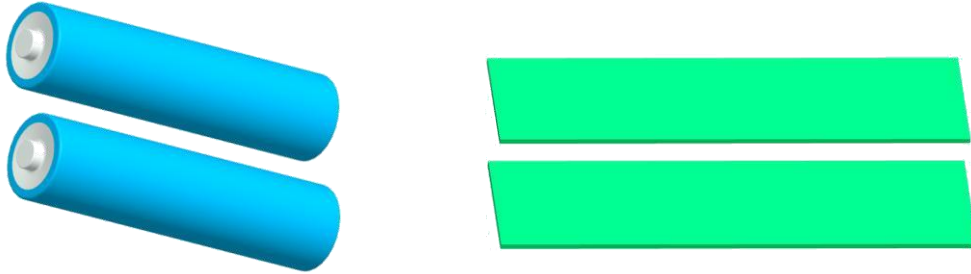
Note: Servo E is the farthest away from the Arm HAT and needs to use the "Servo Extension Cable".

Effect diagram after assembling



## 4. Assemble and Remove batteries

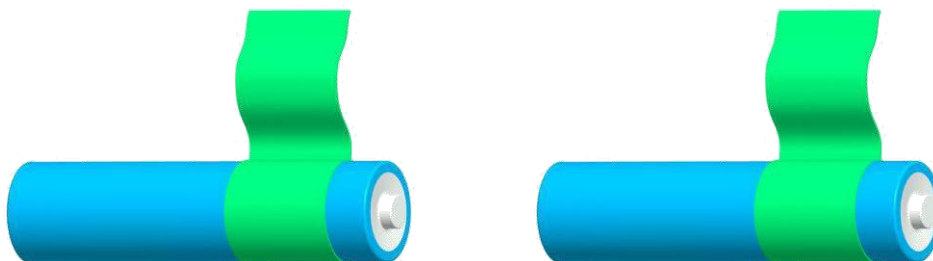
Take out 2 ribbons and 2 batteries.



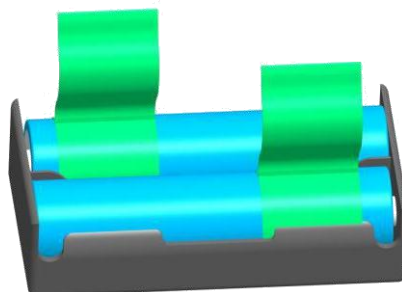
Roll one end of the ribbon to let through a battery and fix.



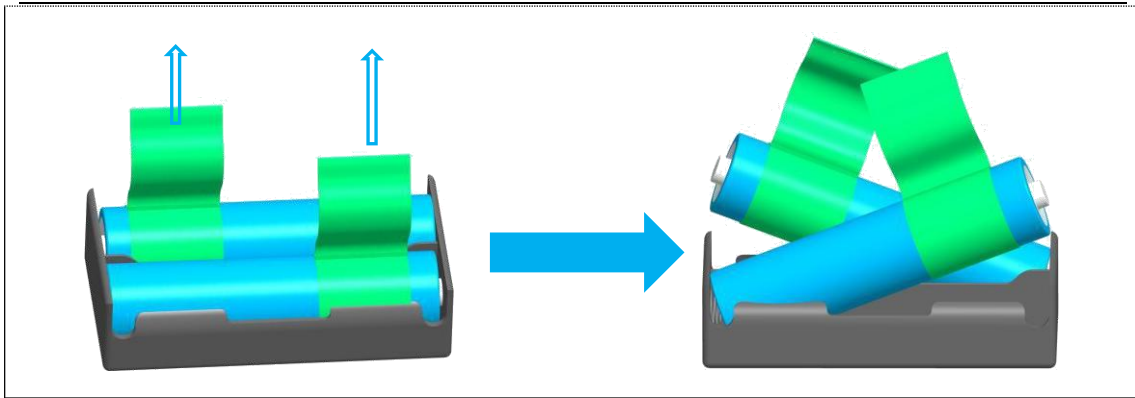
Insert the batteries into the rings-ribbon closer to the anode.



Install the batteries into the holder based on the pole.



To remove the batteries, just pull the ribbon and take them out.



## 5. Adjustment of the Robot Arm

Before starting to exert the function, we need to test whether there are problems with the assembly of the Robotic Arm.

After the Raspberry Pi successfully configures the operating environment, the WebServer.py program will automatically run. The initial position of the manipulator after running the program is shown in the figure below:



**【 If your Robot Arm is assembled and turned on, it is not what it looks like in the picture above, then how do you adjust it? 】**

Remove the incorrectly positioned servo, and adjust the initial position of the servo to 90 degrees according to "Lesson 6 Precautions for Assembly". Then assemble the servo to the robotic arm correctly.