






Lesson 7 Assembly

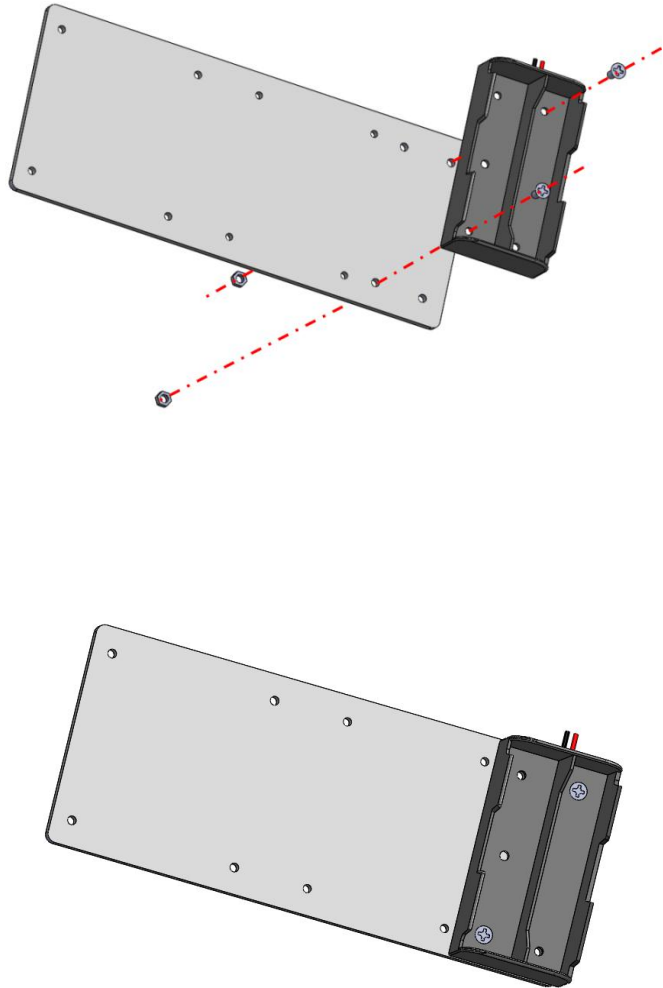
7.1 Robotic arm assembly

Before assembly, we need to use a screwdriver to peel off the acrylic sheet.

Step 1: Assembling the Battery Box		Tool: 
<u>Need to prepare:</u>		
acrylic plate A	1	
the Battery Box	1	
M3 * 8 countersunk head screw	2	
M3 nut	2	
<u>Demo:</u>		
Use M3 * 8 countersunk head screws and M3 nuts to install the		



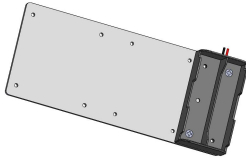
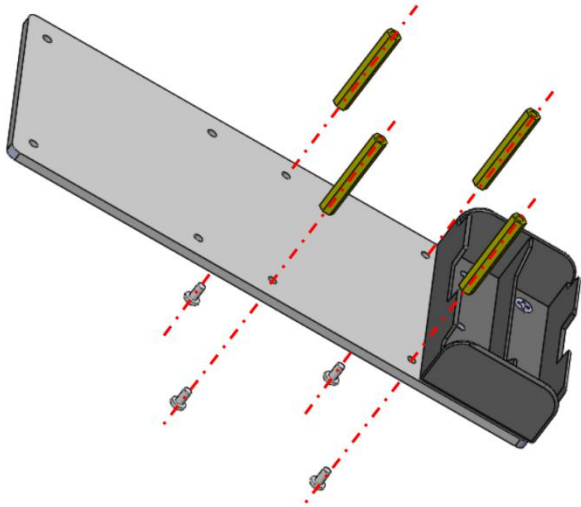
battery box on the structure A;

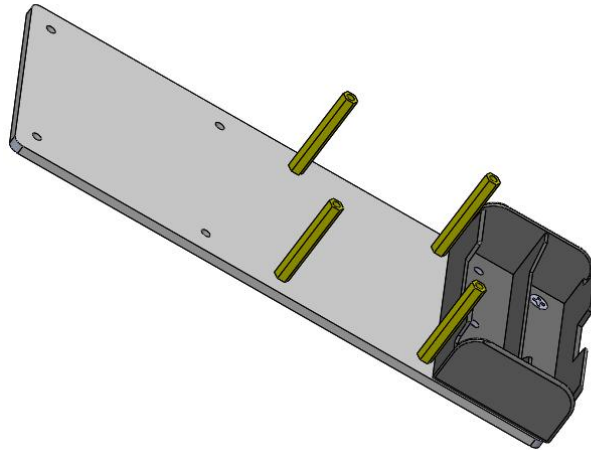
Pay attention to the installation
direction of the battery box;



**Step 2: Assembling the M2.5 *
30MM hexagon copper pillar**

Tool: 

<u>Need to prepare:</u>		
M2.5 * 30MM hexagon copper pillar	4	
M2.5*6 mm nut	4	
Step 1 structure	1	
<u>Demo:</u>		
<p>Use M2.5 * 6MM round head screws to install M2.5 * 30MM hexagonal copper pillars on structural member A;</p>		



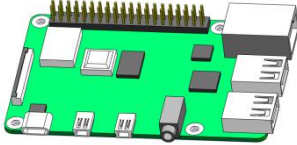
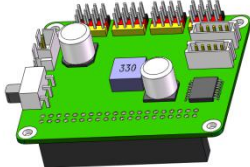


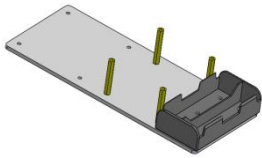
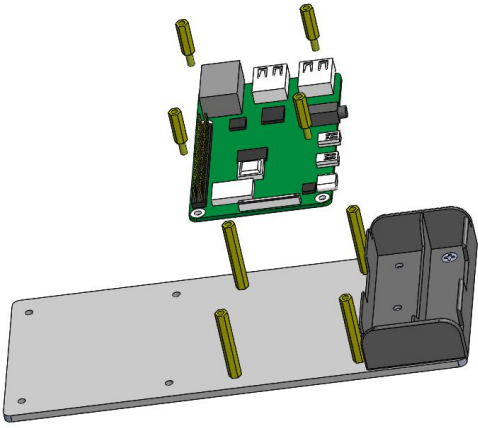
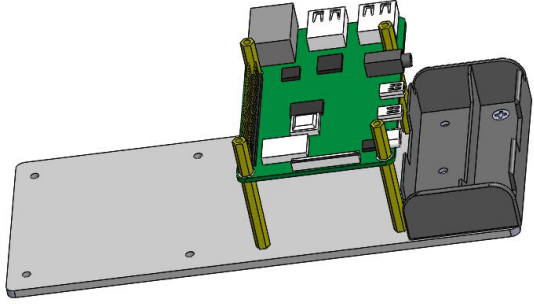
Step 3: Assembling Raspberry Pi and Arm HAT

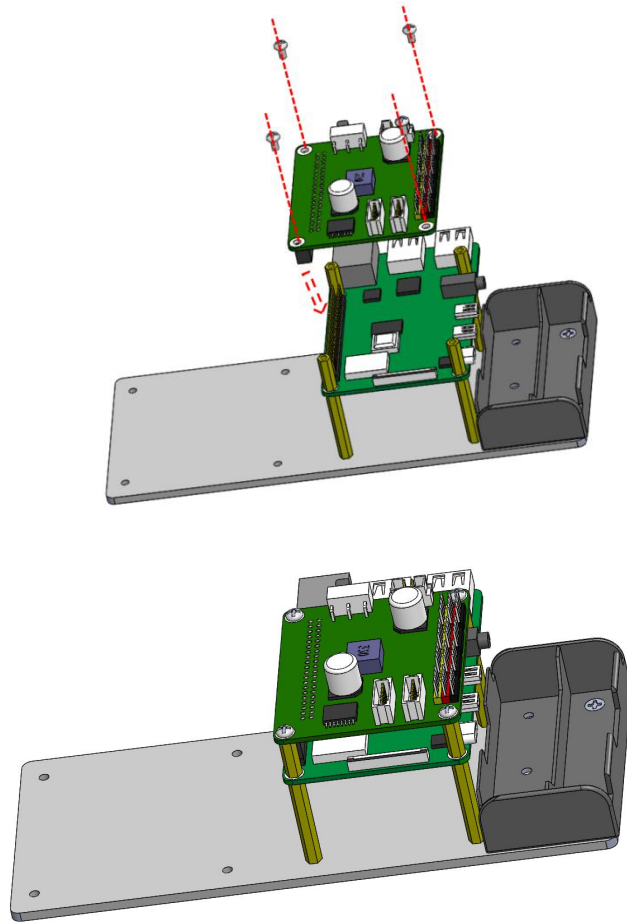
Tool:



Need to prepare:

M2.5*6mm round head screw	4	
M2.5*14+6mm hexagon copper pillar	4	
Raspberry Pi	1	
Arm HAT	1	

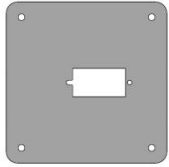

Step 2 structure	1	
<u>Demo:</u>		
<p>1. Use M2.5*14+6mm hexagon copper pillars to fix the Raspberry Pi motherboard to the structure in step 2;</p> <p>2. Insert the header of the expansion board into the header of the Raspberry Pi motherboard;</p> <p>3. Use M2.5*6 round head screws to fix the expansion board;</p> <p>Note: The installation direction of the Raspberry Pi motherboard and expansion board;</p>		 



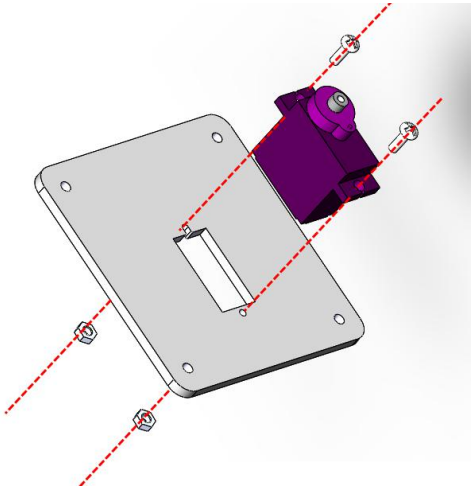
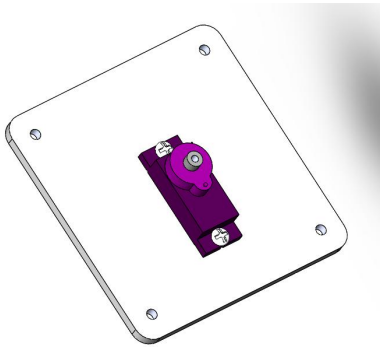



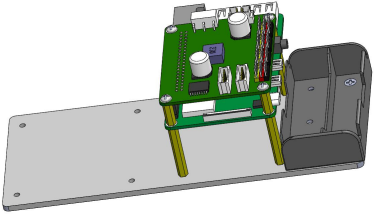
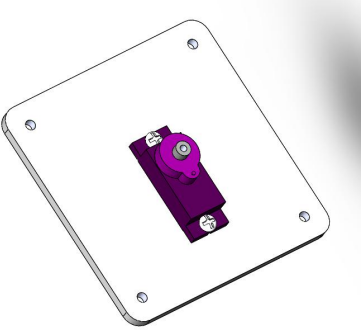





Step 4: Assembling the AD002 servo

Tool: 

Need to prepare:

Structure B	1	
AD002 servo	1	

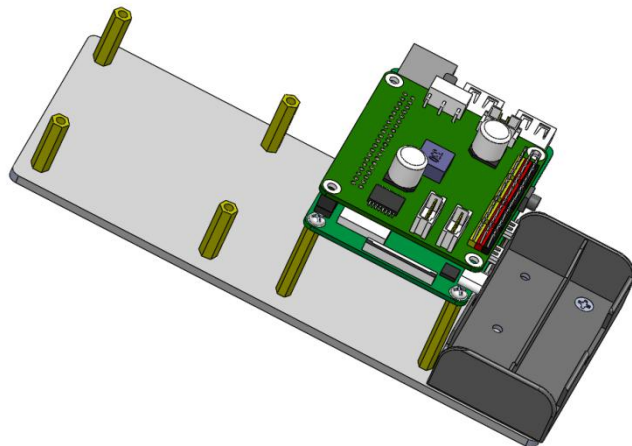
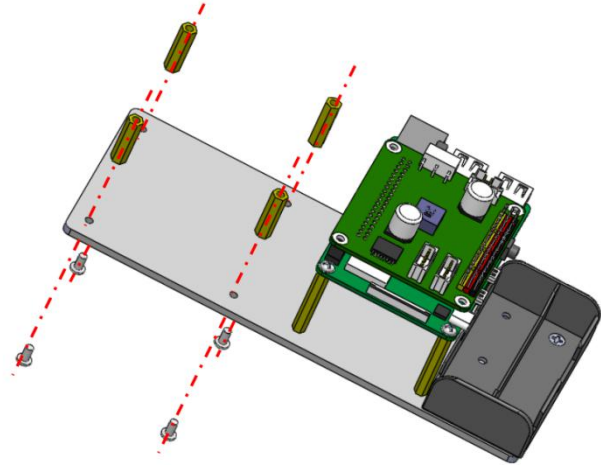
M2 mm nut	2	
M2*8 round head screw	2	
<u>Demo:</u>		
<p>Use M2 * 8MM round head screws and M2 nuts to install the AD002 servo on the structural member B;</p>  		
Step 5: Assembling the turntable, structure B, structure A		Tool: 
<u>Need to prepare:</u>		

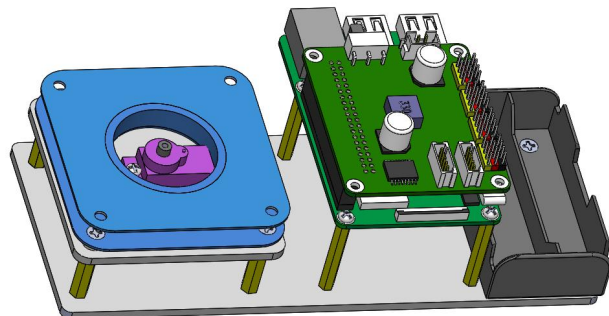
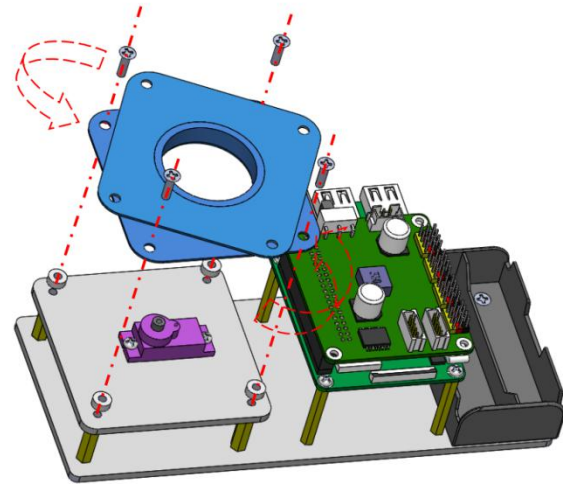
Step 3 structure	1	
Step 4 structure	1	
M3 * 20MM hexagon copper pillar	4	
M3*6mm round head screw	4	
turntable	1	
φ3*3mm nylon column	4	
M3*12mm countersunk head screw	4	
<u>Demo:</u>		

1. Use M3*6 round head screws to fix the M3*20 hexagonal copper column on the semi-finished product in step 3;

2. Use M3*12 countersunk screws to fix the semi-finished product, $\phi 3*3\text{mm}$ nylon column and turntable of step 4 on the semi-finished product of step 3;

Note: The screws only pass through the holes in the lower part of the turntable, and do not need to pass through the holes in the upper part.





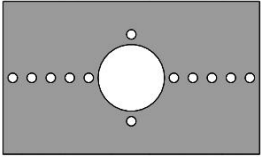


Step 6: Assembling the AD002

servo cross

Tool:

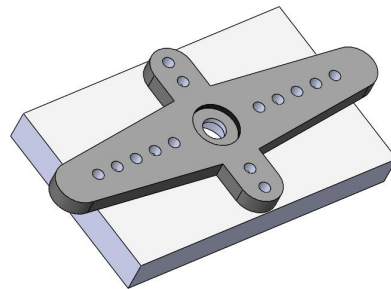
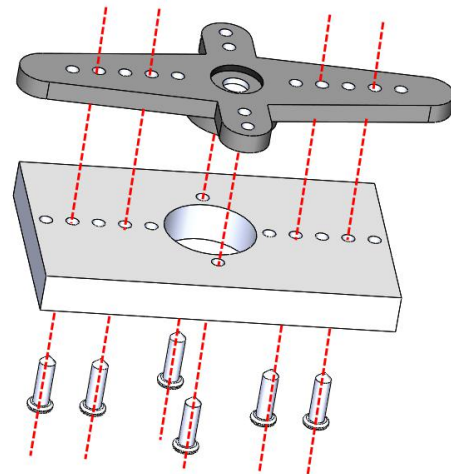


Need to prepare:

Structure S	1	
AD002 servo cross	1	
P1.2*4mm self-tapping screw	6	
<u>Demo:</u>		

Use M1.2 * 4 self-tapping screws to fix AD002 servo cross on structural member S;

Pay attention to the installation direction of AD002 servo cross.



Step 7: Assembling Structure D, Structure E and Structure C

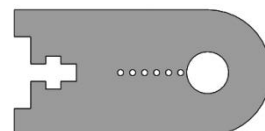
Tool:

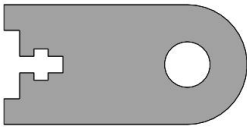
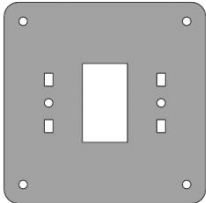




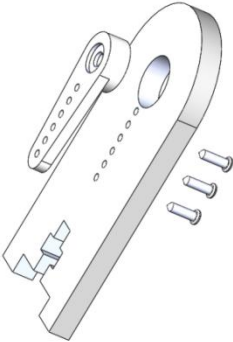


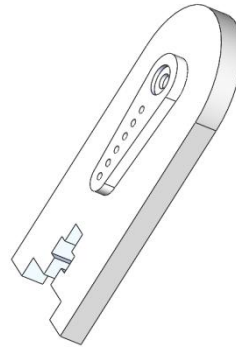
Need to prepare:

Structure D

1

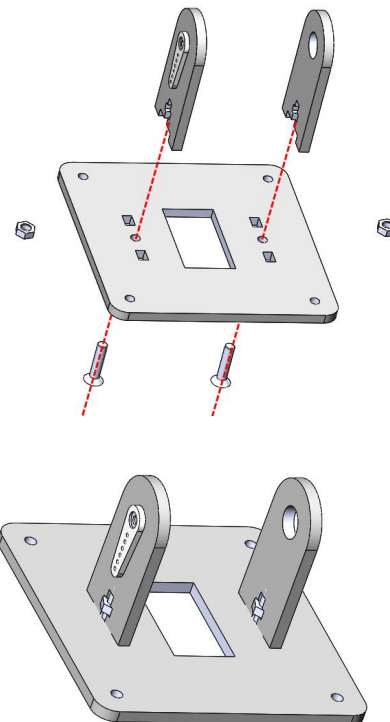


Structure E	1	
Structure C	1	
M3*10mm countersunk head screw	2	
P1.2*4mm self-tapping screw	3	
M3 nut	2	
SG90 Servo arm	1	
<u>Demo:</u>		
<p>Use M1.2 * 4MM self-tapping screws to fix the servo arm on the structure D;</p> <p>Pay attention to the direction of servo arm.</p>		



Use M3 * 10MM countersunk head screws and M3 nuts to fix structure D and structure E to structure C;

Pay attention to the installation direction of structure D and E;

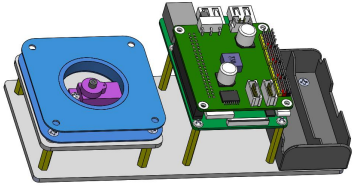
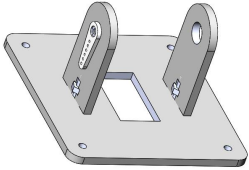


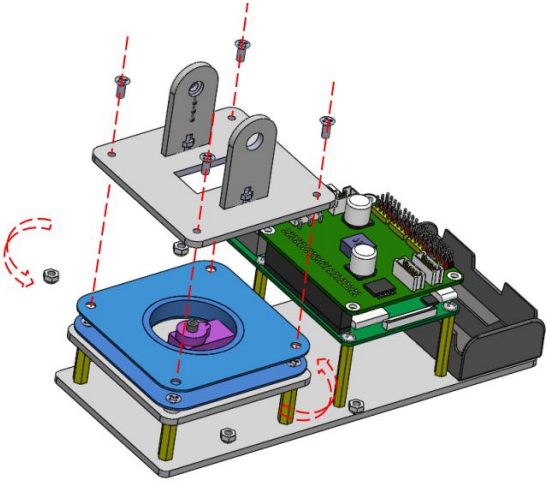


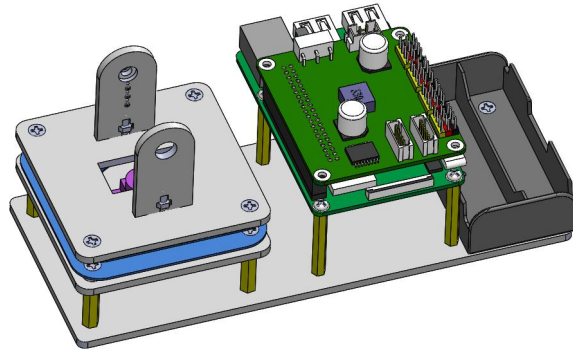
**Step 8: Assembling Step 7
Structure and Step 5 Structure**

Tool:



Need to prepare:

Step 5 Structure	1	
Step 7 Structure	1	
M3 * 8 countersunk head screws	4	
M3 self-locking nut	4	
<u>Demo:</u>		
<p>Use M3*8 countersunk screws and M3 self-locking nuts to install the step 7 structural parts on the step 5 structural parts;</p> <p>Note: When installing the self-locking nut, you can rotate the shaft on the structure of step 5 to facilitate installation;</p>		



**Step 9: Assembling Structure C
and turntable**

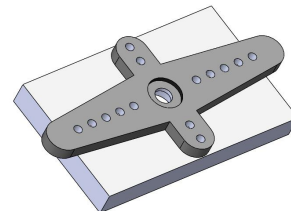
Tool:



Need to prepare:

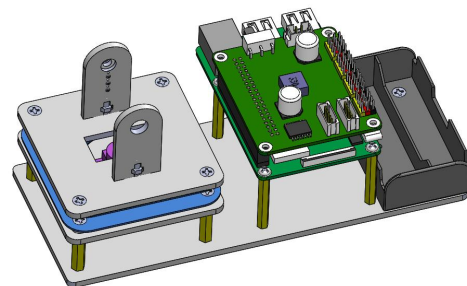
Step 6 Structure

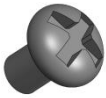
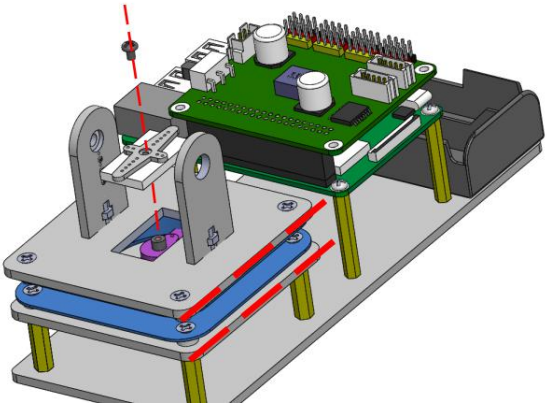
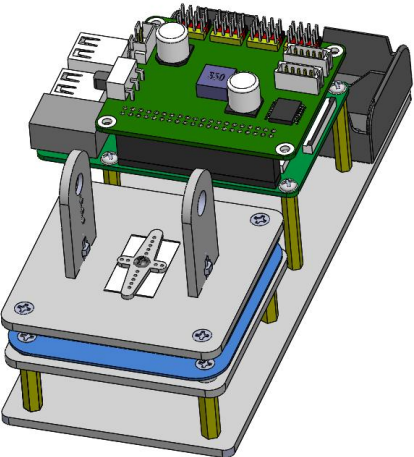

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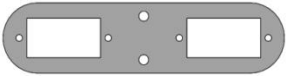



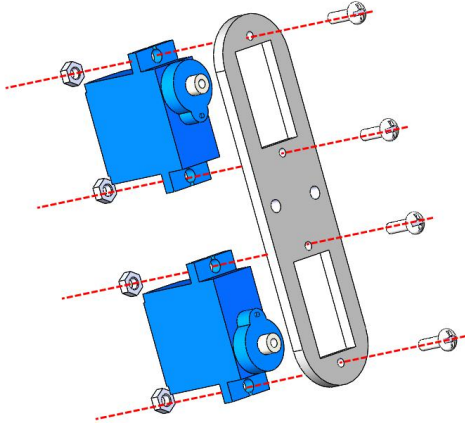


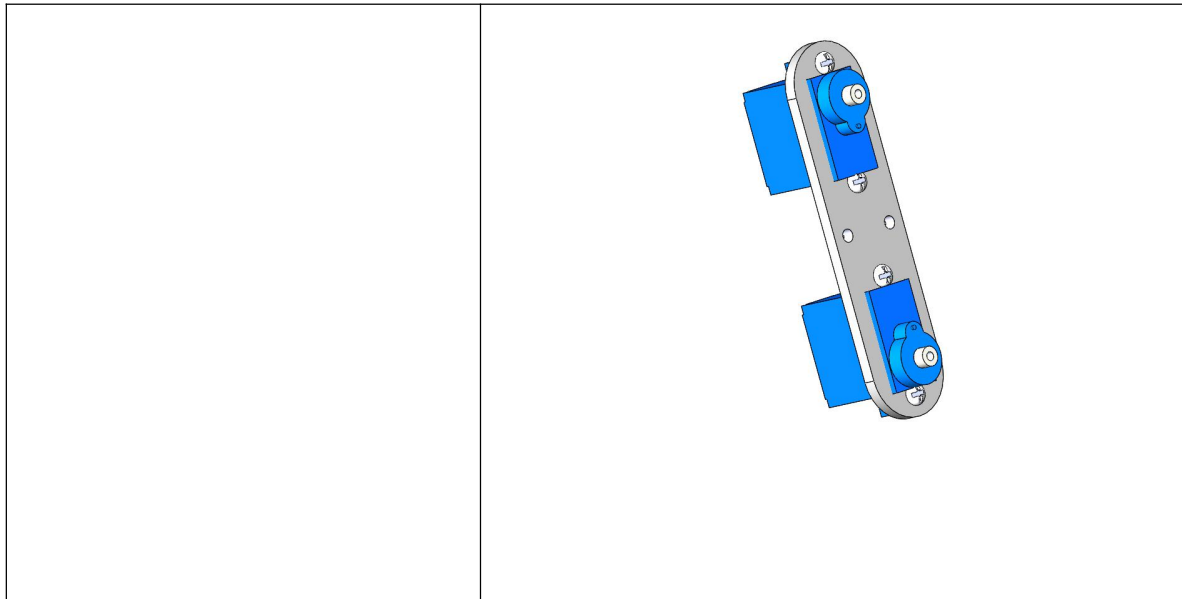
Step 8 Structure

1



AD002 Servo Screw	1	
<u>Demo:</u>		
<p>1. First, make sure that the AD002 servo has been adjusted to the middle position;</p> <p>2. Ensure that the side of structural member B is parallel to the side of structural member C; (the thick dotted line in the figure)</p> <p>3. Use the M2.5 self-tapping screw that comes with the AD002 steering gear to fix the structure of step 6 to the steering gear on the structure of step 8;</p> <p>Note: Acrylic with servo arm is on the same side as the Raspberry Pi USB interface.</p>	 	
Step 10: Assembling Structure F and SG92 Servo		Tool: 

<u>Need to prepare:</u>		
Structure F	1	
M2*8mm round head screw	4	
M2 nut	4	
servo	2	
<u>Demo:</u>		
<p>Use M2 * 8MM round head screws and M2 nuts to install the servo on the structural part F;</p> <p>Note the install direction of the servo;</p>		



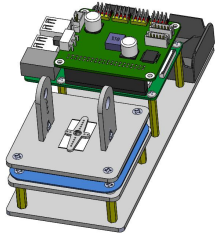





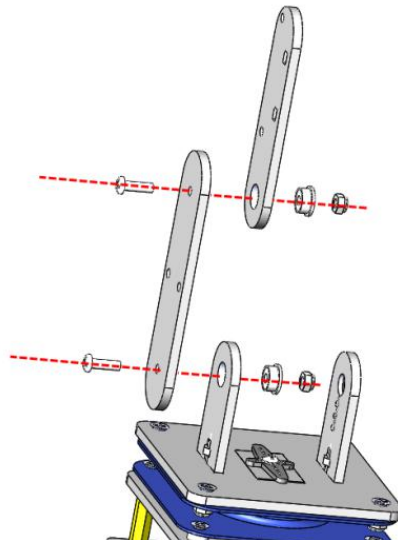
Step 11: Assembling Structure G and Structure H

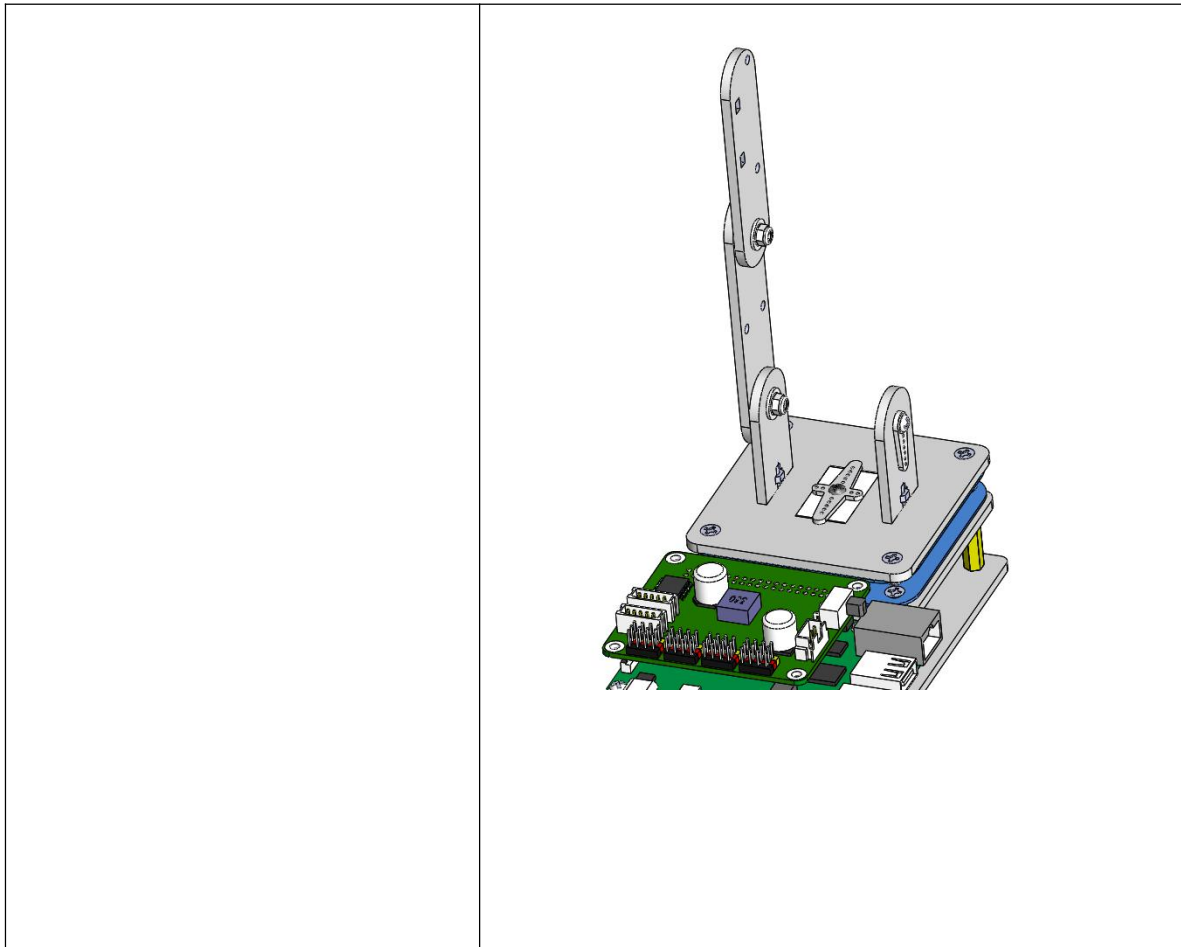
Tool:



Need to prepare:

Structure G	1	
Structure H	1	
Step 9 Structure	1	
φ3*8*4 flange bearing	2	

F693ZZ		
M3 mm self-locking screw	2	
M3*10mm round head screw	2	
<u>Demo:</u>		
<p>Use M3 * 10MM round head screws and M3 self-locking nuts to fix structure G, structure H and bearing;</p> <p>Pay attention to the installation order of structure G, structure H, and bearings;</p>		



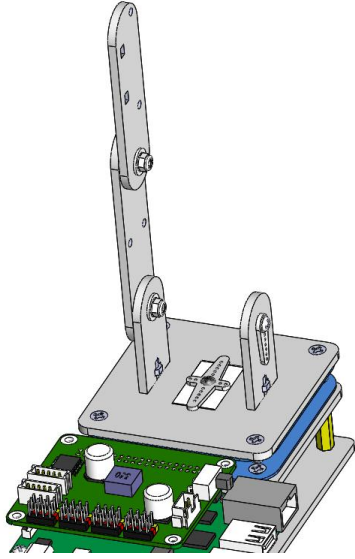
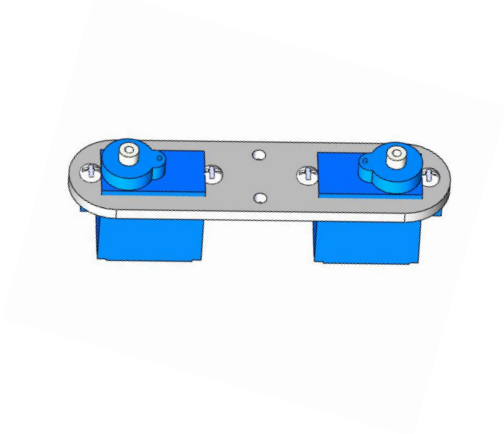

**Step 12: Assembling Step 11
Structure and Step 10 Structure**

Tool:

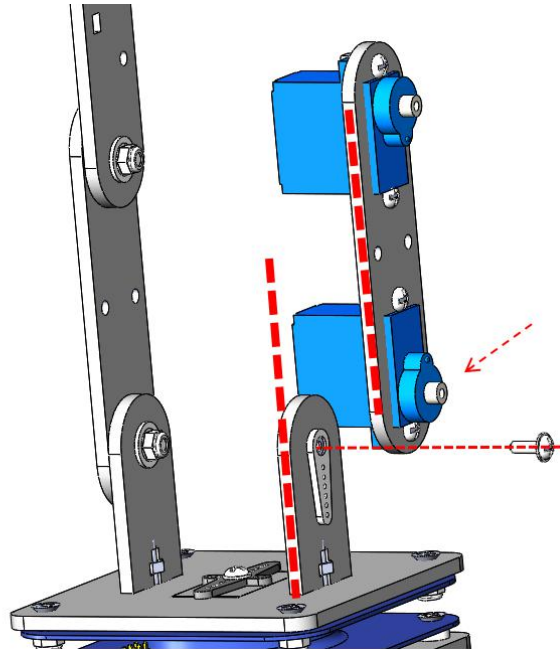


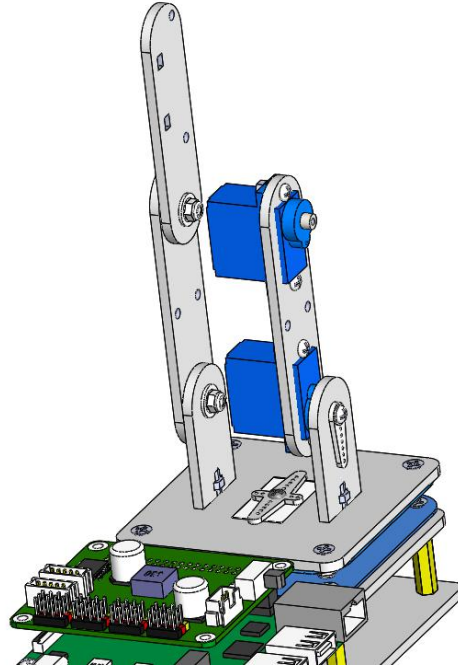
Need to prepare:

Step 11 Structure	1	
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Step 10 Structure	1	
SG90 servo screw	1	
<u>Demo:</u>		

Keep structure D and structure F parallel, shown by the red dotted line;





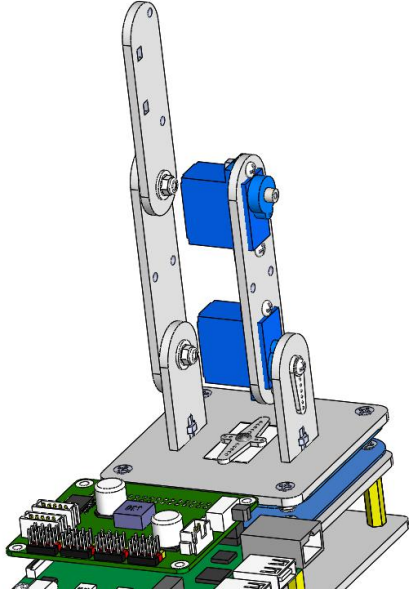


**Step 13: Assembling M3*30MM
aluminium column**

Tool:



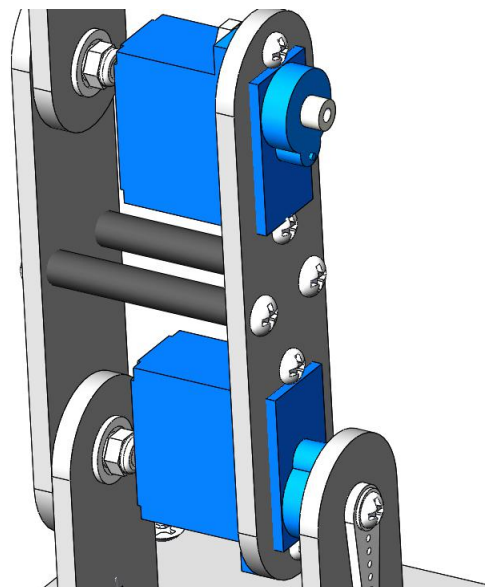
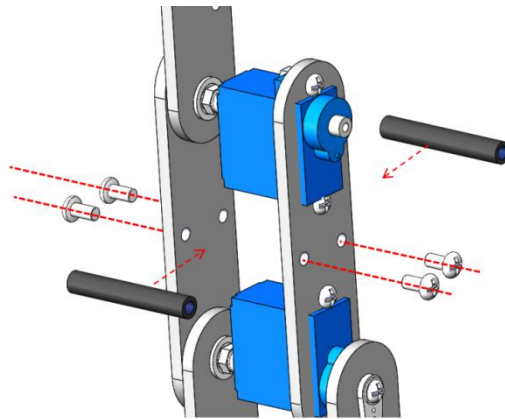
Need to prepare:

Step 12 Structure	1	
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M3*30MM aluminium column	2	
M3*6mm round head screw	4	

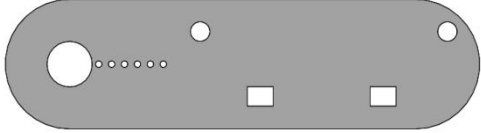


Demo:

Use M3 * 6 round head screws to install the M3*30MM aluminium column on the step 12 Structure ;

**Step 14: Assembling Structure K**

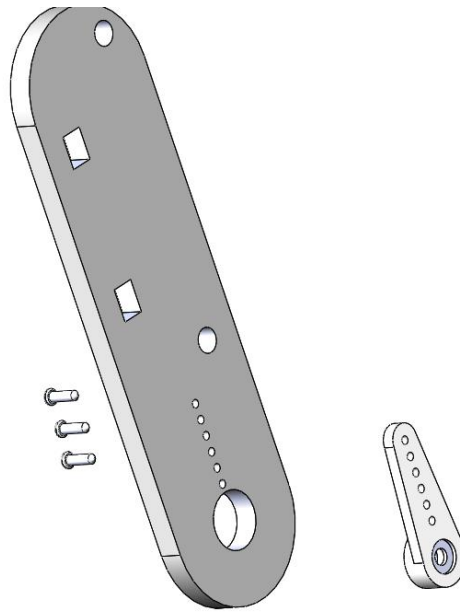
Tool:

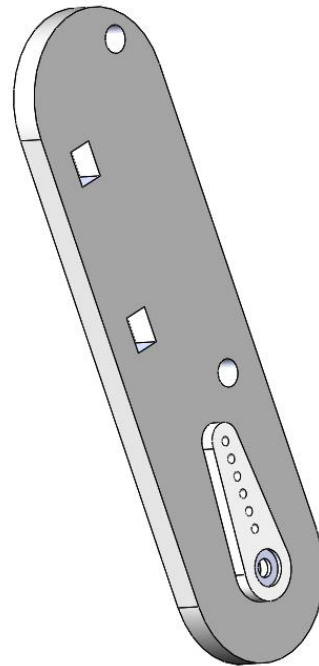


and servo arm		
<u>Need to prepare:</u>		
Structure K	1	
P1.2*4mm self-tapping screw	3	
servo arm	1	
<u>Demo:</u>		

Use M1.2 * 4 self-tapping screws to fix the servo arm on the structure K;

Pay attention to the mounting direction of the servo arm.





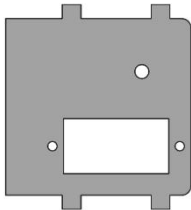



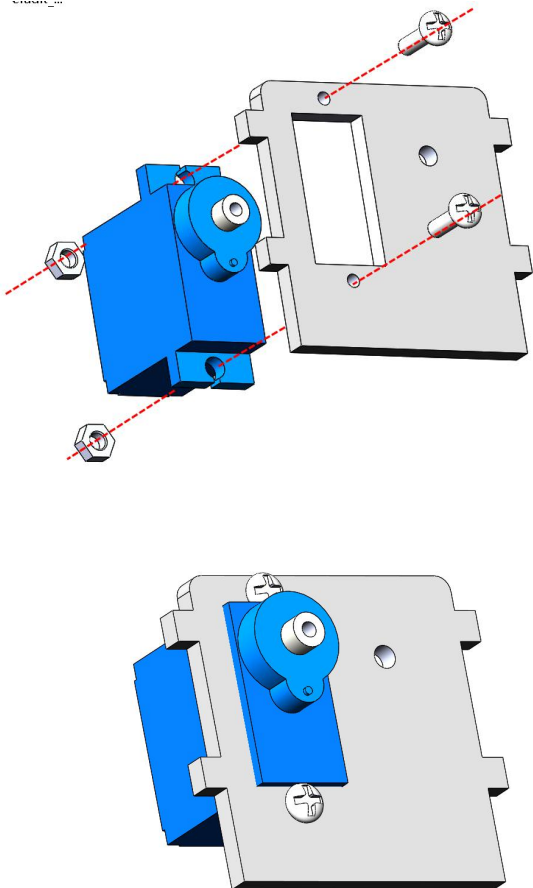
Step 15: Assembling Structure

M and servo

Tool:



Need to prepare:

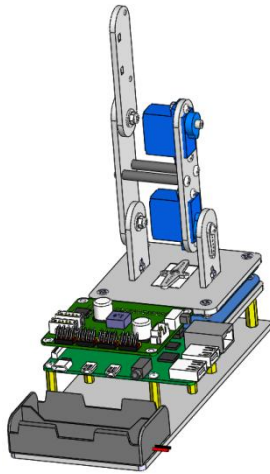
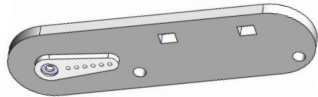
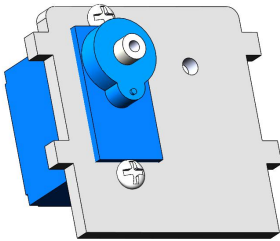
Structure M	1	
SG90 Servo	1	
M2*8mm round head screw	2	
M2 nut	2	
<u>Demo:</u>		
<p>Use M2 * 8MM round head screws and M2 nuts to install the servo on the structure M;</p> <p>Pay attention to the installation direction of the servo;</p>		




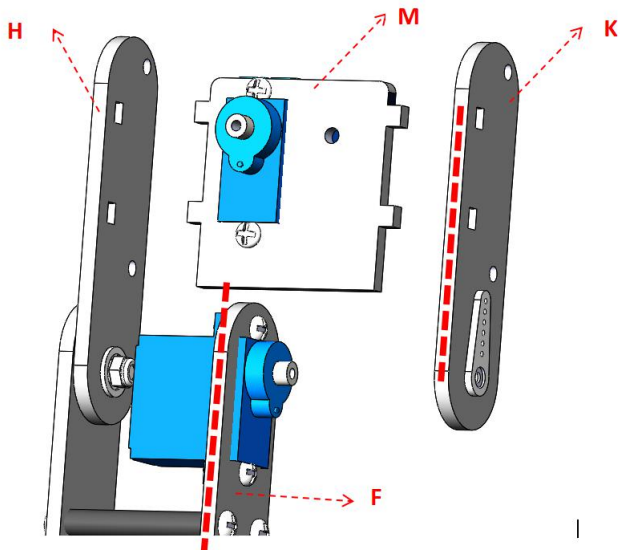
Step 16: Assembling Step 13

Structure, Step 14 Structure and
Step 15 Structure

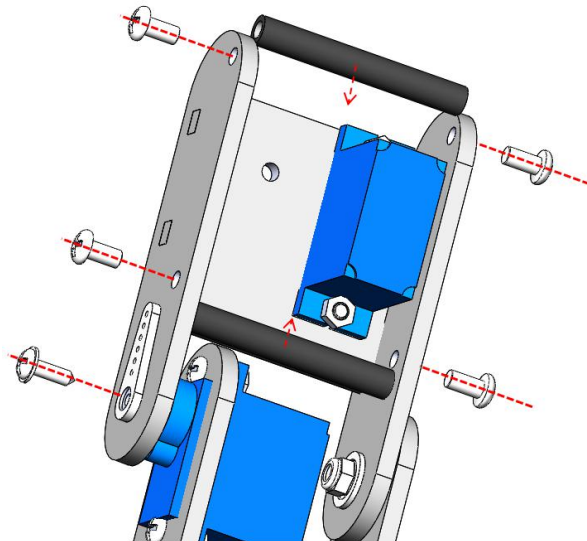
Tool:

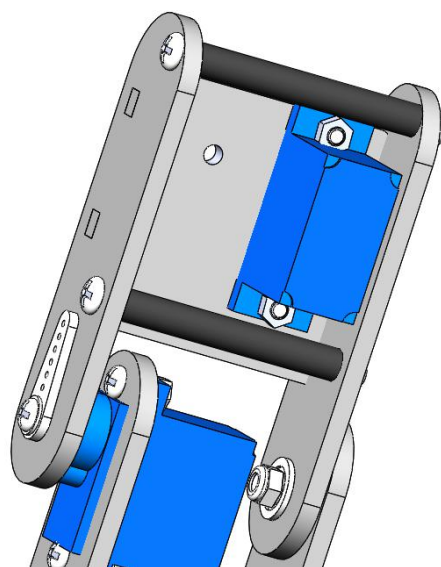
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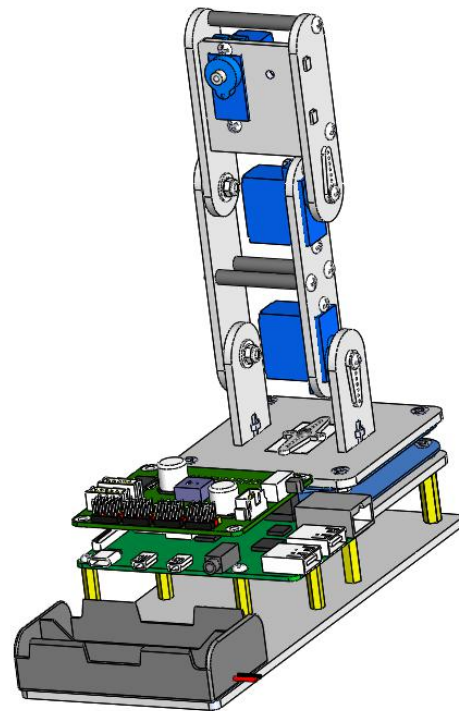
Step 13 Structure	1	
Step 14 Structure	1	
Step 15 Structure	1	

M3*37MM Aluminium column	2	
M3*6mm round head screw	4	
Servo screw	1	
<u>Demo:</u>		
<p>1. Install structural part M and structural part H;</p> <p>2. The side of structural member K and the side of structural member F are kept parallel (the red thick dashed line is shown in the figure);</p> <p>3. Install the single arm of the steering gear on the structure K with the steering gear shaft on the structure F, and install the structure M and the structure K at the same time;</p> <p>4. Use M3*6 screws to install the aluminum column between the structural part H and the structural part K;</p> <p>5. Use the self-tapping screws of</p>		

the steering gear to fix the single arm of the steering gear and the steering gear shaft (the screw fixing force needs to be moderate)







**Step 17: Assembling the left
finger of the hand**

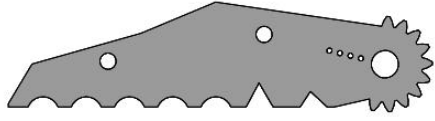
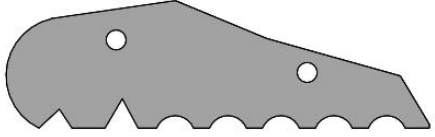
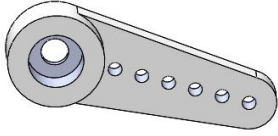


Tool:


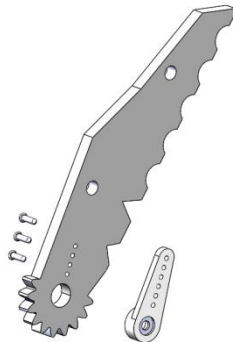
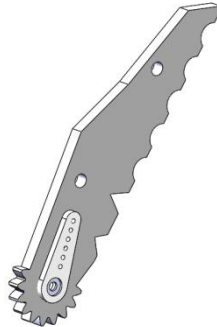


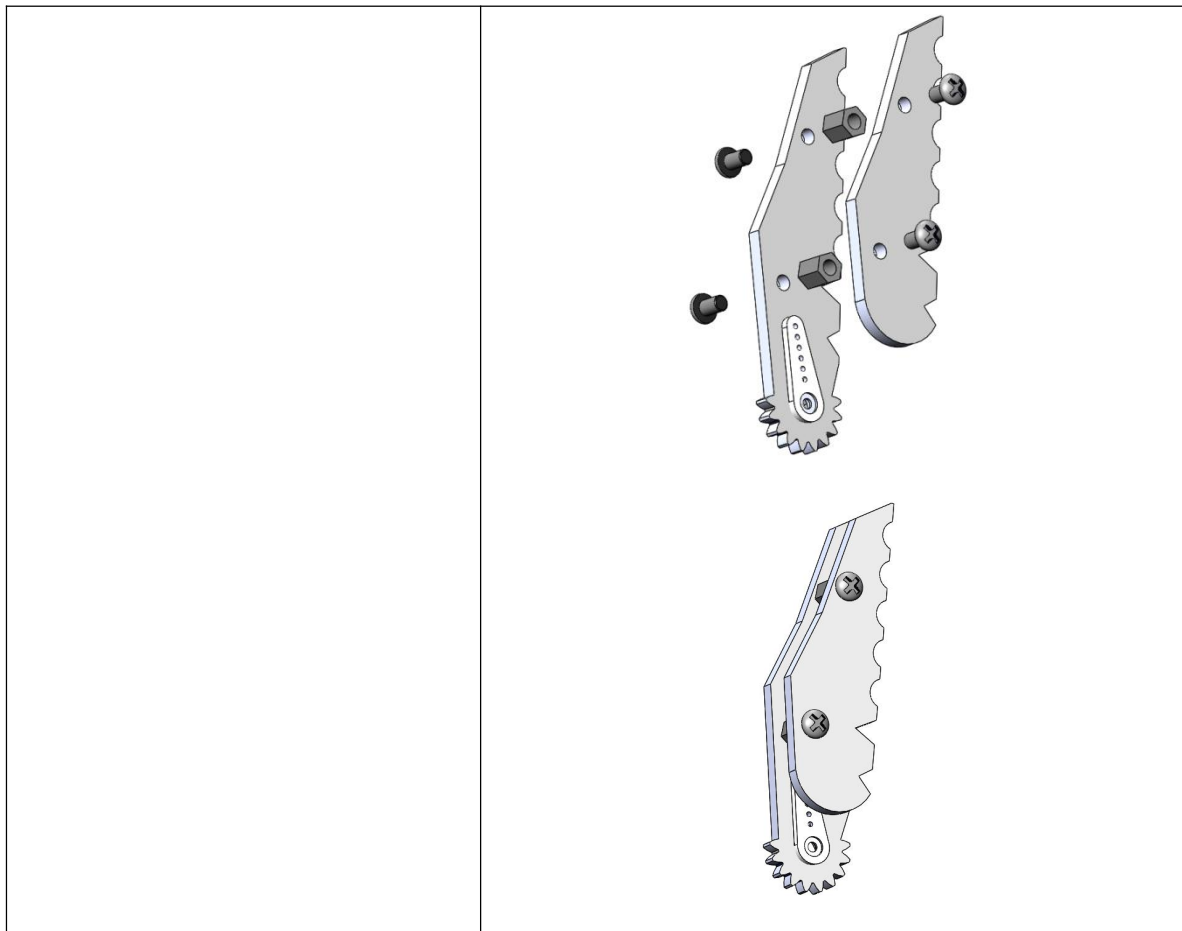
Need to prepare:

Structure N

1

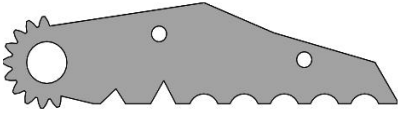
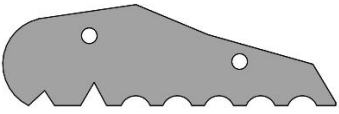
		
Structure L	1	
Servo arm	1	
P1.2*4mm self-tapping screw	3	
M3*6 black nylon stud	2	



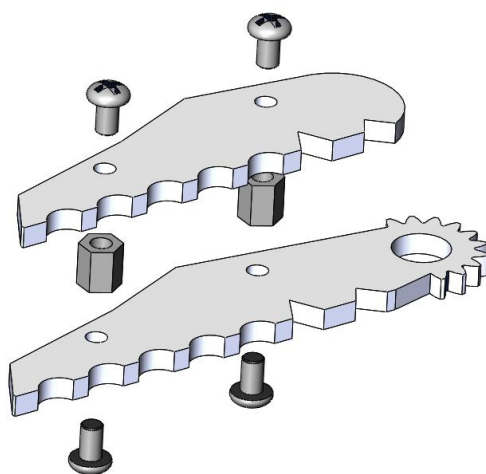
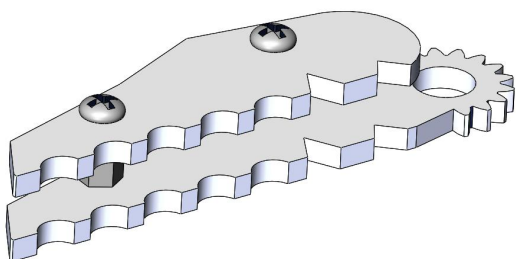

M3*5 black nylon screw	4	
<u>Demo:</u>		
<p>1. Use M1.2*4 self-tapping screws to fix the single arm of the steering gear on the structure N; (pay attention to the direction)</p> <p>2. Use M3*5 nylon screws to fix the nylon column, structural part N, and structural part L; (note the direction)</p>		 

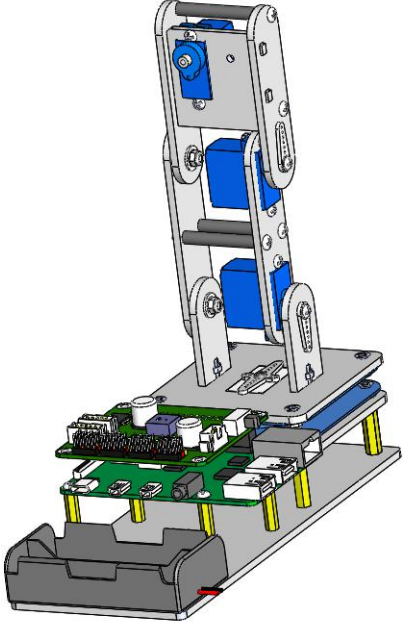
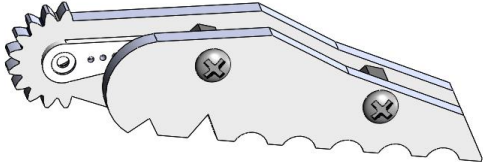
**Step 18: Assembling right finger
of the hand**

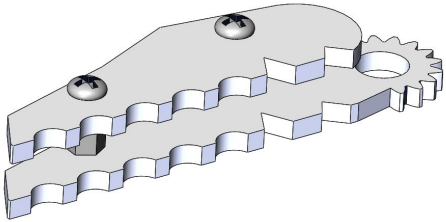





Tool:

**Need to prepare:**

Structure X	1	
Structure L	1	

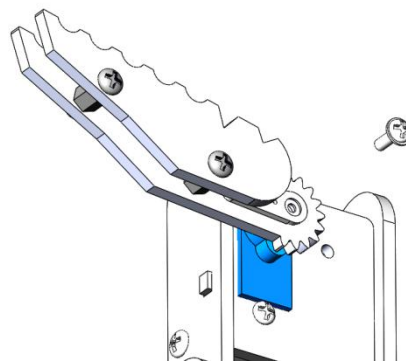
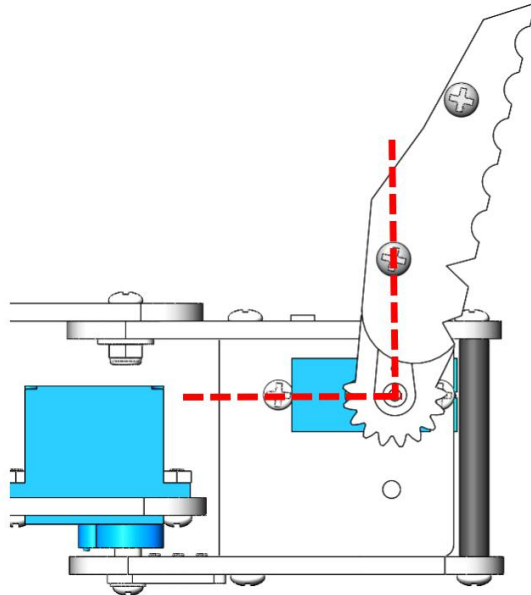
M3*6 black nylon stud	2	
M3*5 black nylon screw	4	
<u>Demo:</u>		
Use nylon screws and nylon studs to fix the structure L on the structure X;	 	
Step 19: Assembling Step 16 Structure and robot finger		Tool: 
<u>Need to prepare:</u>		

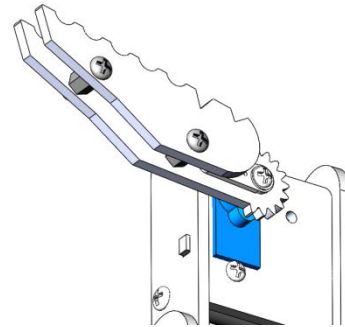
Step 16 Structure	1	
Left finger	1	
Right finger	1	

		
Structure P	1	
φ3*8*4 flange bearing F693ZZ	2	
M3 Flat pad	3	
M3*18mm countersunk head screw	1	
M3 mm self-locking screw	1	
<u>Demo:</u>		

1. The left part of the claw and the steering gear shaft on the structural member M are installed at 90 degrees; (as shown in the figure)

2. Use the screws provided with the steering gear to fix the single arm of the steering gear and the steering gear shaft;

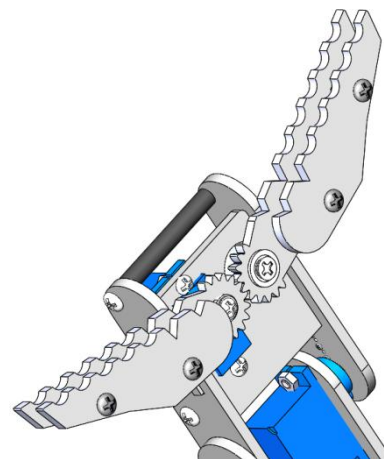
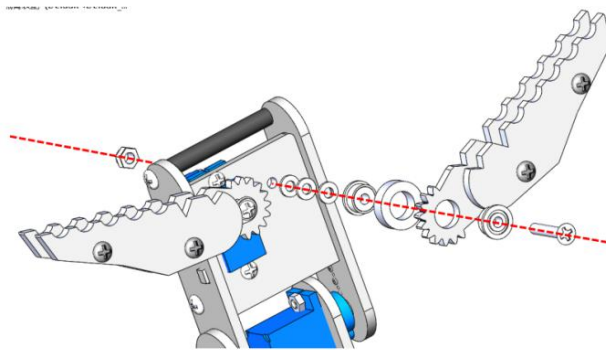




Use M3 * 18 countersunk head screws and M3 self-locking nuts to fix the bearing, right finger, structure N, and Flat pad on structural part J

Note:


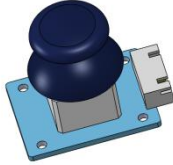



1. Install in order;
2. Be careful not to damage the gear;



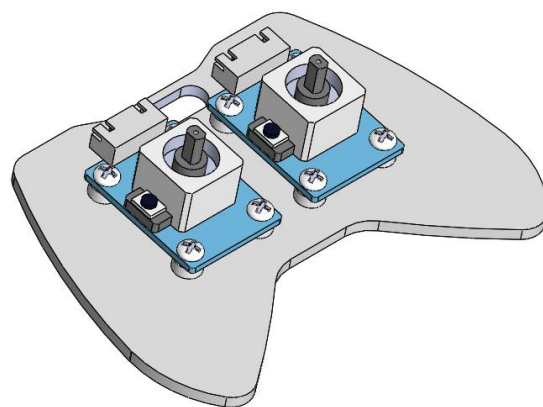
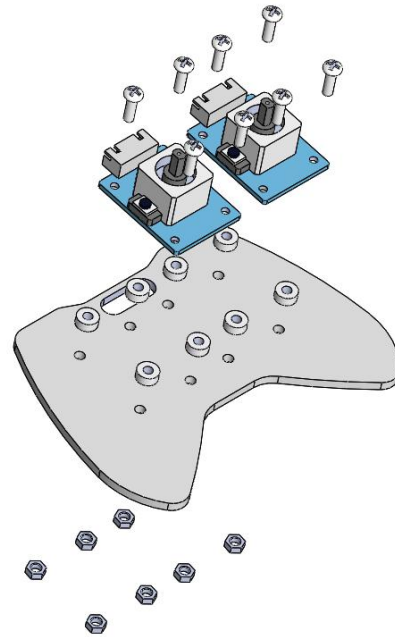
Step 20: Assembling the joystick

Tool:



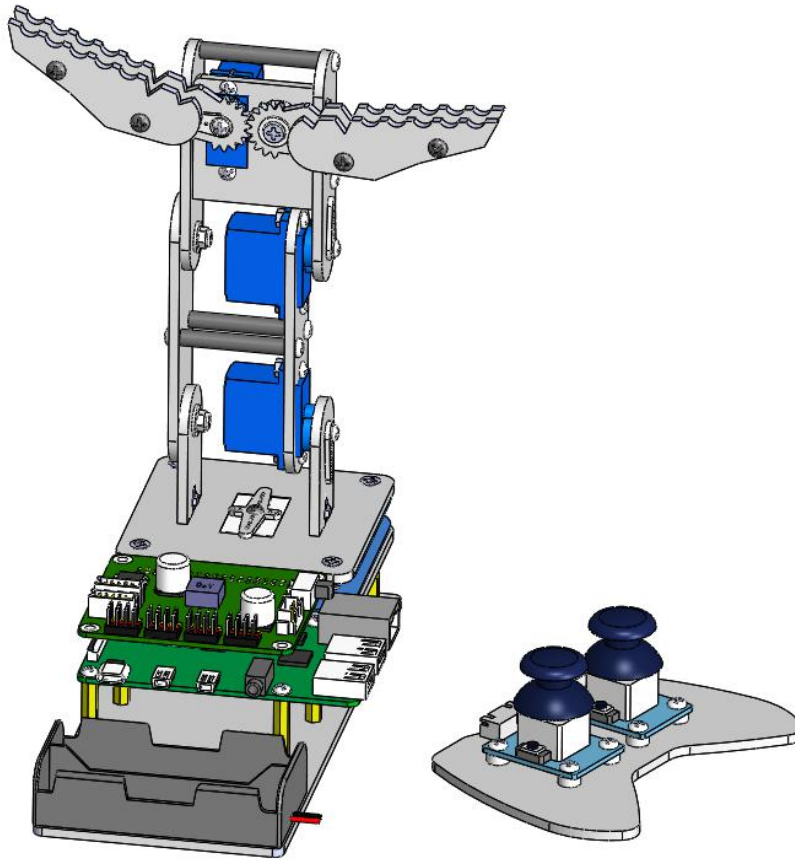
controller		
<u>Need to prepare:</u>		
Structure K	1	
Structure L	2	
M2.5*10mm round head screw	8	
M2.5 nut	8	
φ3*3mm nylon column	8	
<u>Demo:</u>		

Pay attention to the mounting
direction of the servo arm;

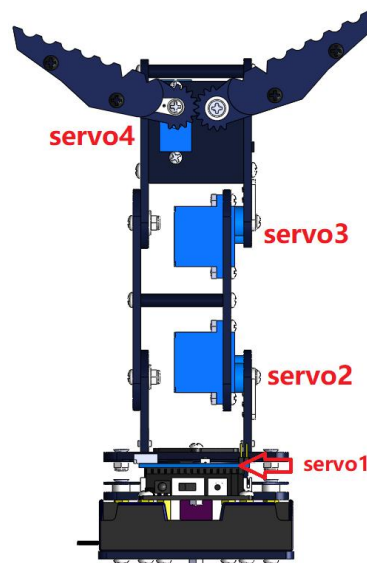


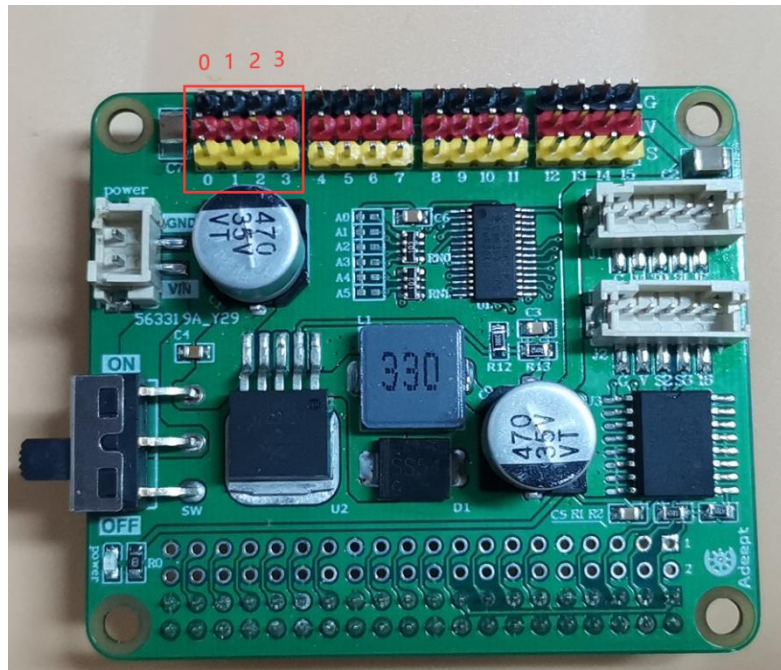


7.2 Congratulations, a cool robot is done



7.3 Wiring diagram





Servo	Port
Servo1	Arm HAT Port 0
Servo2	Arm HAT Port 1
Servo3	Arm HAT Port 2
Servo4	Arm HAT Port 3

The left stick is connected to the upper interface of the Arm HAT, and the right stick is connected to the lower interface of the Arm HAT.

