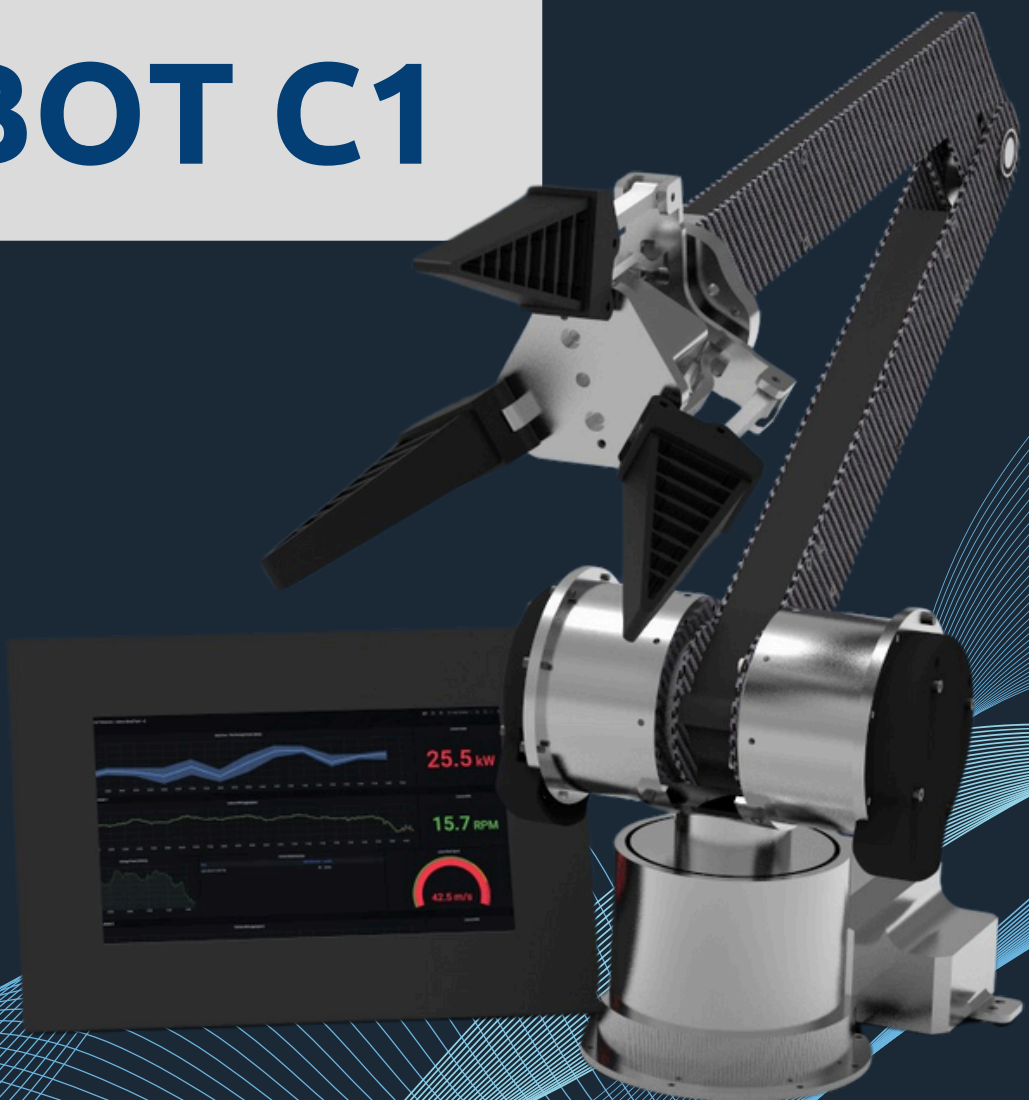
xTerra Robotics

PRODUCT USER MANUAL

v2024.0.1

COBOT C1

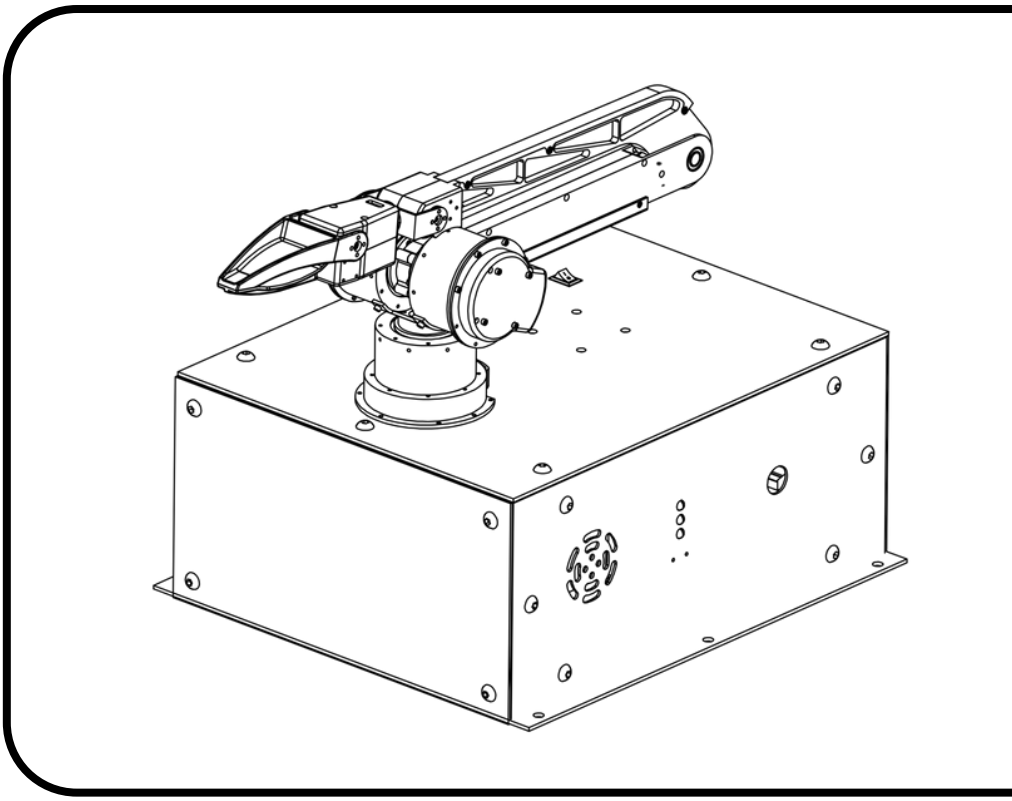


FOREWORD

Welcome to the world of robotic automation!

Thank you for purchasing the Cobot C1, a state-of-the-art robotic arm designed and developed by xTerra Robotics. We look forward to our collaboration and are here to provide support whenever needed.

This user manual provides essential information to help you operate, maintain, and understand your robotic arm. Before you get started, please read this manual carefully to ensure the safe and effective use of your Cobot C1.



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Terms and Conditions

Acceptance of Terms:
By using the xTerra Robotics robot Cobot C1, you agree to comply with and be bound by these terms and conditions.

License:
xTerra Robotics grants you a limited, non-exclusive, non-transferable license to use the robot for its intended purpose, subject to these terms.

Use of the Robot:
You agree to use the robot in accordance with applicable laws and regulations. You shall not use the robot for any illegal, unethical, or unauthorized purpose.

Ownership:
The robot and all associated intellectual property rights are owned by xTerra Robotics. You acknowledge that no transfer of ownership or rights is granted except as expressly stated in these terms.

Limitations of Liability:
xTerra Robotics shall not be liable for any direct, indirect, incidental, special, or consequential damages arising out of or in connection with the use of the robot, even if advised of the possibility of such damages.

Maintenance and Support:
xTerra Robotics may provide maintenance and support for the robot at its discretion. Updates and improvements may be made to enhance the functionality and performance of the robot.

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Privacy:
xTerra Robotics respects your privacy. Data collected by the robot will be handled in accordance with our privacy policy, available on our website.

Termination:
xTerra Robotics reserves the right to terminate or suspend your access to the Robot at any time for any reason, without notice.

Governing Law:
These terms and conditions shall be governed by and construed in accordance with the laws of India. Any disputes arising from or relating to these terms shall be subject to the exclusive jurisdiction of the courts in India.

Changes to Terms:
xTerra Robotics reserves the right to update or modify these terms and conditions at any time. You are responsible for reviewing these terms periodically.

Contact Information:
For questions or concerns regarding these terms and conditions, please contact xTerra Robotics at support@xterrarobotics.com.

By using the robot, you acknowledge that you have read, understood, and agreed to these terms and conditions.

Last updated: October 15, 2024
xTerra Robotics Pvt. Ltd.

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Safety Precautions

1. Read this user manual thoroughly before operating the robot.
2. Keep the robot away from water, fire, and extreme temperatures.
3. Ensure that the robot operates in a controlled environment and is supervised during use.
4. Ensure the workspace is clear of unnecessary objects.
5. Ensure the WiFi connection to the robot is strong throughout its operation.
6. Do not tamper with the robot's hardware or software, especially electronic boards, and safety switches.
7. Keep the robot out of reach of children and pets.

To ensure safe operation, follow these guidelines:

Operational Safety

1. Never enter the working envelope of the robotic arm while it is in motion.
2. Use the emergency stop button in case of unintended movements.
3. Regularly inspect the arm for signs of wear or damage.

Electrical Safety

1. Ensure the power supply meets the specified requirements.
2. Avoid exposing the robotic arm to water or moisture.
3. Disconnect the power supply before performing maintenance.

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Package Contents

The package contains following items:

1. Manipulator
2. Additional Gripper
3. Robot Base: Electronics & Power supply
4. Product User Manual

The robot comes with the following electronic components:

1. RPi 4B
2. Pi3Hat
3. Power Distribution Board
4. Bus Servo Adapter
5. Voltage Regulator

The robot comes with the following installed sensors:

1. Joint Encoders
2. Inertial Measurement Unit (IMU)

Note: The robot does not come with any installed camera.

While unpacking, please ensure to take care of the following:

1. Carefully unpack all components and check for any visible damage.
2. Follow the assembly instructions provided in the accompanying documentation.
3. Ensure all connections are made properly and securely.

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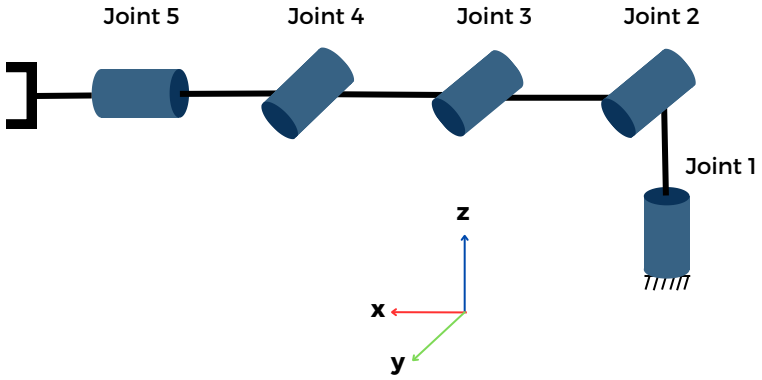
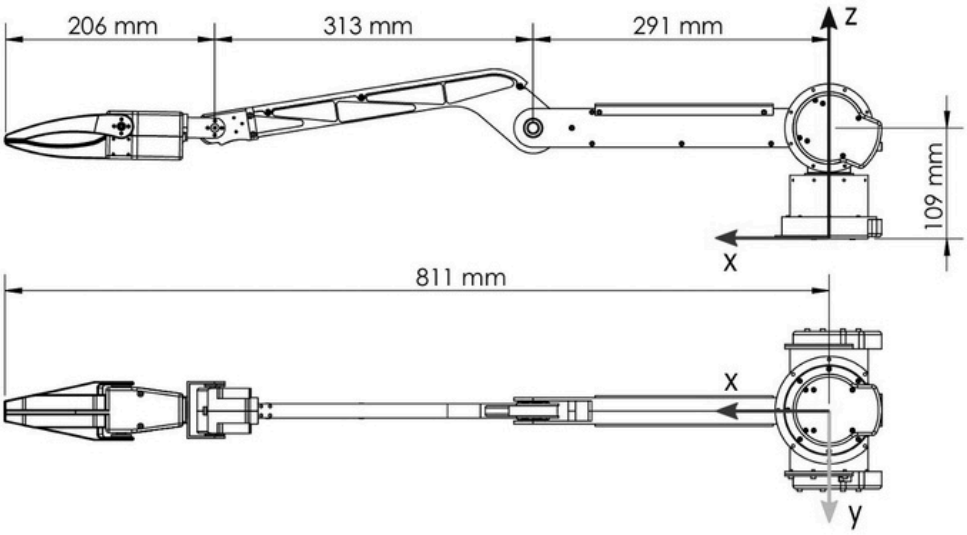
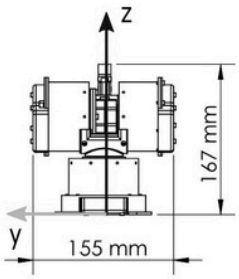
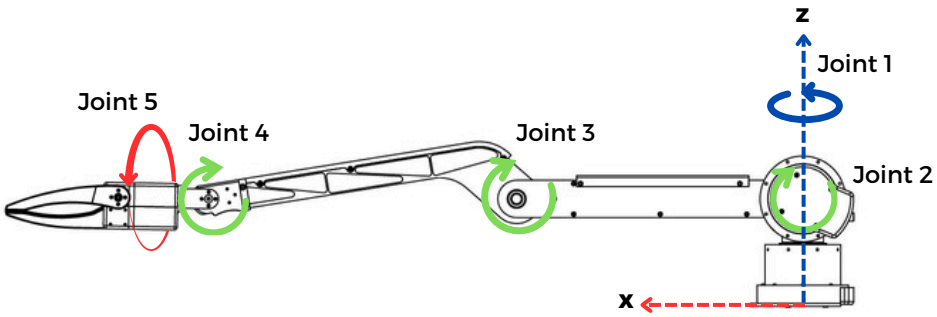
Cobot C1 Product Description

Svan M2 Robot Hardware Overview









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Cobot C1 Technical Specifications

Technical Data

Number of axes	5 + Gripper
Maximum Reach	81 cm
Weight	2.3 kg
Payload	400g
Mounting Position	Floor/Desired angle
Workspace	

Link Lengths

Link 1 length	11 cm
Link 2 length	29 cm
Link 3 length	31 cm
Link 4 length	20 cm
Link 5 length	0 cm

Joint Axis Data

Joint 1	-180° to 180 °
Joint 2	-180° to 180 °
Joint 3	-135 ° to 165 °
Joint 4	-165 ° to 170 °
Joint 5	-180 ° to 180 °

Operating Conditions

Operating Temperature	-5°C to 40°C
peak current	20A
voltage	24

Actuator Data

Onboard Computer	RPi 4B with 8GB RAM and 64GB SD card supported Supports Ubuntu 20.04 and ROS middleware
Actuators	QDD A2: Custom QDD actuator with 8:1 reduction + Serial BUS servo 25 kg-cm
Controller	FOC
Peak Actuator Torque	12 Nm

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Setting Up Cobot C1

Unpacking

1. Carefully remove the robotic arm and all accessories from the packaging.
2. Inspect for any visible damage during transit.
3. Verify the presence of all components as per the checklist.

Installation

1. Attach the Gripper
2. Mount the robotic arm securely on a stable surface using the provided mounting kit.
3. Connect the power supply to the designated port

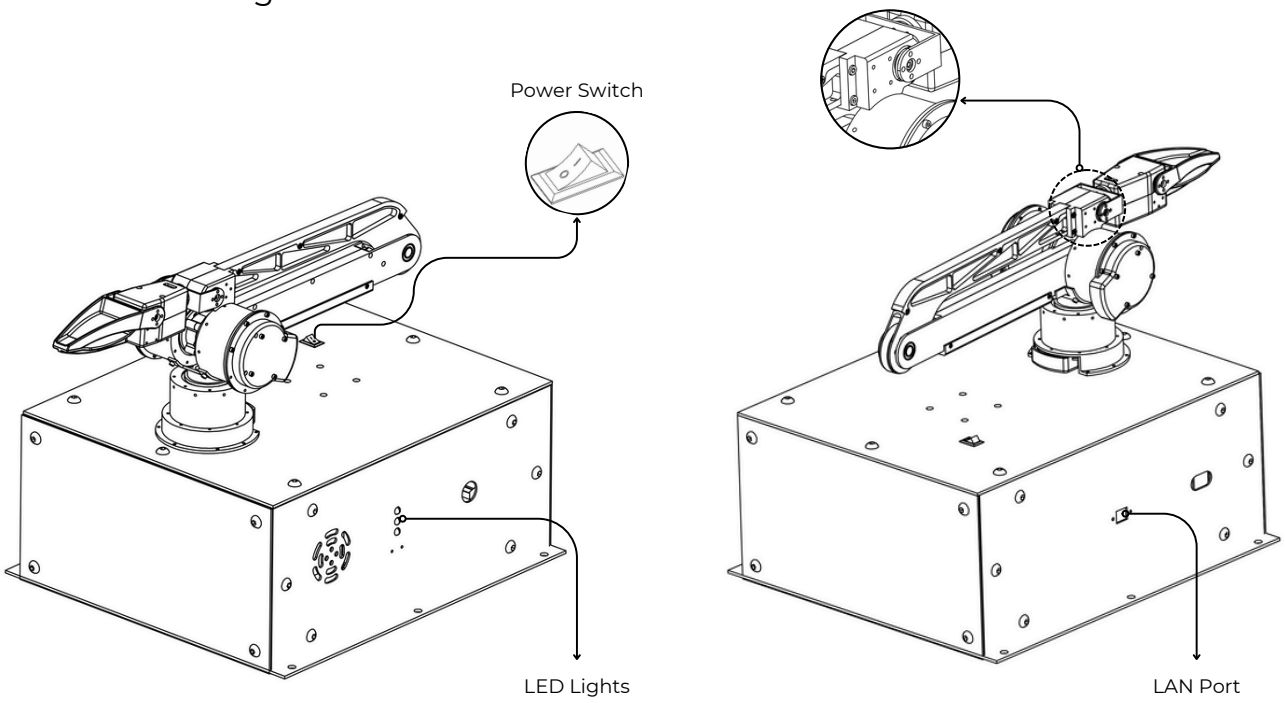
Initial Setup

1. **Power on** the robotic arm using the main switch.
2. Set the robot in its **sleep offset** position.
3. Follow the software setup instructions to calibrate and control the robot

software setup instructions : <<<github link>>>

After use

1. To turn off , shutdown the software, then press the power button or disconnect the power supply.
2. Always turn off the robot when not in use to conserve power and prevent overheating.



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Basic Operations

Point-to-point control (end-effector or joint space)

1. Run the code to specify the beginning and ending points
2. Select the path shape
3. Execute the code
4. Follow waypoints by using a multipoint tracking code

Input types ->

Keyboard Teleoperation

1. Run the tele-operation code
2. Control the arm using the keyboard
3. Look for control keys in the documentation (Pg number)

Pick and Place

1. Establish the pick-and-place placements in advance (2 points)
2. Execute the code for Pick and Place.
3. Change the code's parameters to improve performance (picking angle, holding force) -> In simulation only, not being tested

Using the Teach Pendant (To be done)

1. Run the Teach pendant code.
2. Use the keyboard or manually move the robotic arm to the desired positions/path.
3. Save positions/path as waypoints for program execution

Impedance Control

Gravity-compensation

APIs and Advanced Control

For advanced users, the Cobot C1 offers APIs compatible with Python, ROS, and C++ for custom programming.

Code Customization

1. To carry out customized operations, use the Cobot class for standard functions like forward kinematics, inverse kinematics, Jacobin, etc.
2. To gain a better grasp of the implementation, look at the example code.

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Teleoperation

Keyboard control operation

Refer to software setup instructions for initialization

Btn. No.	Operation	Keys
1	Stance	
2	Push-ups	
3	Twirl	
11	Torso pitch and roll	
12	Step front and side	
14	Close planner	
15	Yaw right	
16	Yaw left	
17	C-type charging port	

Note: This joystick mapping is for running the robot with the file *mcp.py*.

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Multiple Robot Grippers

supports a variety of grippers to enhance its versatility. These include:

1. Adaptive Gripper: Ideal for general-purpose applications such as picking and placing objects.
2. Fixed Jaw Gripper: Suitable for handling flat, non-porous objects such as sheets and panels.
3. Custom Gripper: Designed for ...

Operating Grippers

1. Select the appropriate gripper based on your application requirements.
2. Attach the gripper to the robotic arm using the quick-connect mechanism.
3. Configure the gripper settings in the GUI or through the teach pendant.
4. Use the gripper control options in the GUI to open, close, or adjust the gripping force.

Maintenance of Grippers

1. Regularly clean the gripper to remove dust and debris.
2. Check for wear and tear on gripping surfaces or seals.
3. Lubricate moving parts of mechanical grippers as needed.

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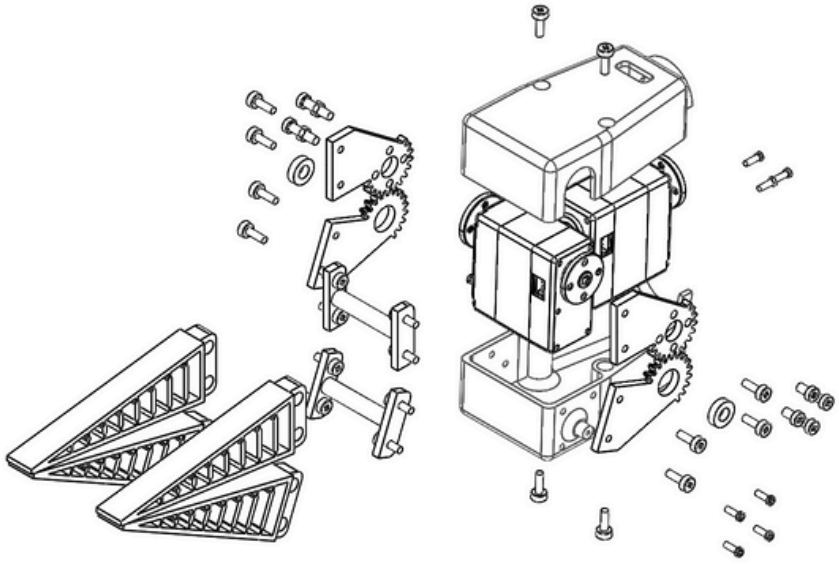
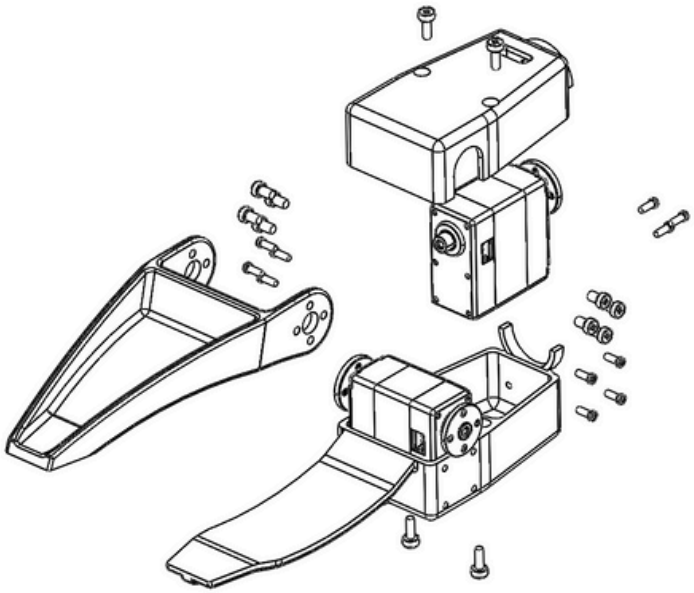
Replace Gripper

Follow the below instructions:

1. Take off the servo mount.
2. Unplug the wire after removing the right servo cover.
3. In order to replace the gripper, assemble it (servo motor + 3D printed parts) .
4. Connect the servo cover and wire.
5. Attach the servo mount.





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Maintenance and Troubleshooting

Regular Maintenance

1. Clean the robotic arm with a dry cloth to remove dust.
2. Lubricate joints and moving parts every 6 months.
3. Check for firmware updates and install them.

Issue	Possible Cause	Solution
Arm not powering on	Loose power connection	Check and secure power plug
Unexpected movements	Sensor calibration error	Recalibrate the arm
Connectivity issues	Network interference	Restart the robot

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Warning and Customer Support

1. Check the warranty information provided with your robot for details on coverage and duration.
2. If you experience any issues or have questions, contact the manufacturer's customer support for assistance.
3. Register your robot to ensure you receive updates, service, and support.
4. Remember, the specific instructions and features may vary based on your robot model.
5. Always refer to the manufacturer's documentation for the most accurate and up-to-date information.
6. Enjoy exploring and experimenting with your robotic arm while keeping safety in mind.

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MORE INFORMATION ABOUT US

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THANK YOU !