RoArm-M1

From Waveshare Wiki
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Introduction

RoArm-M1

(https://www.waveshare.com/roarm-m1.htm)

TTL serial bus servo control interface, UART

RoArm-M1 is a mechanical arm based on the ESP32 series structure, including the clamping freedom of the gripper. This product has a total of 5 degrees of freedom, all of which are driven by a 30kg.cm high-torque ST3215 serial bus servo. Each servo can feed back the current joint voltage, position, current, temperature, load, and other information. And the big arm adopts a 1:3 reduction group with timing pulleys, which greatly improves the effective torque of the mechanical arm on the one hand, and can be used to avoid damage to structural parts caused by excessive loads on the other hand.

Onboard WIFI, OLED screen, RGB-LED lights, and open source all product-related codes, including the underlying serial bus servo control function library, serial communication control functions, cross-platform WEB control functions, inverse kinematics, ROS 2 demos, URDF models, etc.

The demo contains a variety of control methods: angle control mode, inverse kinematics coordinate control mode, recording action and replaying action, and leading-following control mode based on ESP-NOW communication protocol.

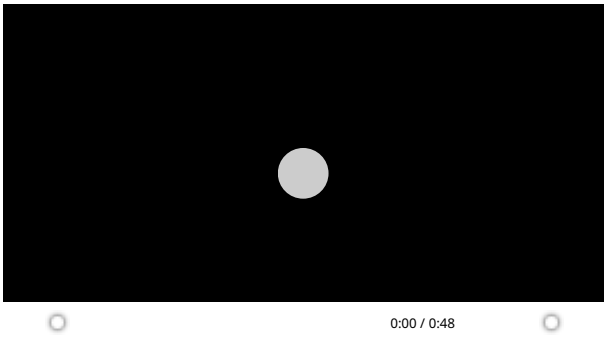
RoArm-M1 can support a variety of host computers, as long as it is connected to the host computer via a USB cable. The host computer can be a PC, Raspberry Pi, Jetson Nano, or other devices, and the data in JSON format can be sent and received via the USB serial port to control the robotic arm or get feedback from a robotic arm.

Features

- RoArm-M1 is a serial robotic arm with 5-DOF in total, including the clamping freedom of the gripper.
- Open-source demo includes angle control and coordinates control.
- The lower computer demo contains open source inverse kinematics algorithm.
- Supports leading-following mode based on ESP-NOW.
- Supports motion recording and replaying control mode.
- Based on ESP32, supports WIFI and UART communication.
- The open-source demos include WEB applications that can be used across platforms. You only need to install a browser to use mobile phones, tablets, and computers to control the robotic arm.
- Supports multiple host computers, and provides ROS 2 demo and other rich learning resources.
- Cameras can be installed on the gripper of the robotic arm.
- All codes are open-source, and we provide rich online development documents and tutorials.

Video

- RoArm-M1 show:



RoArm-M1 Tutorial Directory

Please be sure to understand the following before use:

1. This product has been assembled before leaving the factory, but due to the use of a large number of servos, once it is disassembled and then reassembled, it must be assembled and calibrated according to the product assembly tutorial.
2. The torque of the servos used in this product is relatively large, so it may bring potential risks. When using it, keep sensitive parts such as eyes away from the range of motion of the servos, and keep them away from children to avoid injury.
3. Some joints use green nitrile rubber O-rings to eliminate the virtual position error and vibration of the joints. It is normal for some rubber debris to fall off during use, and it will not continue to shed debris after it is run in.
4. For the sake of safety, the robot arm of the default demo runs at a relatively slow speed. You can refer to the secondary development tutorial to change this speed. Too low speed may cause the robot arm to vibrate when it moves to some specific positions.

- RoArm-M1 Tutorial I: How To Use (/wiki/RoArm-M1_Tutorial_I:_How_To_Use)
- RoArm-M1 Tutorial II: Secondary Development Tutorial (/wiki/RoArm-M1_Tutorial_II:_Secondary_Development_Tutorial)
- RoArm-M1 Tutorial III: VMware ROS2 Getting Started Tutorial (/wiki/RoArm-M1_Tutorial_III:_VMware_ROS2_Getting_Started_Tutorial)
- RoArm-M1 Tutorial IV: URDF Model Tutorial (/wiki/RoArm-M1_Tutorial_IV:_URDF_Model_Tutorial)
- RoArm-M1 Tutorial V: ROS2 Serial Communication Node (/wiki/RoArm-M1_Tutorial_V:_ROS2_Serial_Communication_Node)
- RoArm-M1 Tutorial VI: How to assemble RoArm-M1 (/wiki/RoArm-M1_Tutorial_VI:_How_to_assemble_RoArm-M1)
- RoArm-M1 Tutorial VII: Assembly Graphics Tutorial (/wiki/RoArm-M1_Tutorial_VII:_Assembly_Graphics_Tutorial)
- RoArm-M1 Tutorial VIII: Use of rqt in ROS2 (/wiki/RoArm-M1_Tutorial_VIII:_Use_of_rqt_in_ROS2)

- RoArm-M1 Tutorial IV: URDF Model Tutorial (/wiki/RoArm-M1_Tutorial_IV:_URDF_Model_Tutorial)
- RoArm-M1 Main Page

Resource

Drawing

- Dimensions (https://files.waveshare.com/upload/b/bf/RoArm-M1_%E5%B0%BA%E5%AF%B8%E5%9B%BE.pdf)

VirtualBox ROS2 Image

- VirtualBox ROS2 Image (https://drive.google.com/file/d/1F0D1201YaLkf1q8jxy54Am72PAcw8-Qp/view?usp=sharing)
- Password: roarm

URDF Open Source Model

- URDF Open Source Model (https://files.waveshare.com/upload/1/1b/Roarm_urdf.zip)

STEP Model

- STEP Model (https://files.waveshare.com/upload/4/4a/RoArm-M1_STEP.zip)

ROS2 Package

- ROS2 Package (https://files.waveshare.com/upload/f/fb/Roarm_ws.zip)

Slave Device Open-source Demo

- Slave Device Open-source Demo (https://files.waveshare.com/upload/4/4a/RoArm-M1-ESP32.zip)

Open-source Resource

- 0.91inch OLED Module Schematic (https://files.waveshare.com/upload/2/2a/0.91inch_OLED_Module_Schematic.pdf)

FAQ

Question:1. During the installation process of ROS2, there are many dependent libraries that cannot be downloaded?

Answer:
You can refer to our tutorial to download the image file that has been configured with ROS2.

Question:2. Logitech mouse wheel not working in a virtual machine?

Answer:
Open the Logitech mouse software and turn off smooth scrolling.

Question:3. RViz2 display abnormal?

Answer:
Turn off VMware's 3D graphics acceleration function.

Question:4. After the virtual machine is powered on, there is only a terminal interface without a graphical interface?

Answer:
Run sudo apt install ubuntu-desktop in the terminal, and sudo reboot to restart the virtual machine after the installation is complete.

Support