LinkerHand O7 Product Manual V1.1

Linker Hand O7 Product Manual

1. Product Overview

1.1 Product Introduction

Linker Hand O7 is a high-performance dexterous hand with 7 degrees of freedom. It adopts connecting rod transmission and self-developed motor drive, which ensures basic stretching and operation capabilities while reducing costs, meeting various application needs.

O7 provides ROS plug-ins and supports secondary development. It is suitable for basic application scenarios such as education and scientific research, assisted grasping, and intelligent interaction, providing an efficient and dexterous hand solution for the robot system.

1.2 Main Features

1. Compact and flexible: The compact structure design not only reduces the overall load of the equipment, but also improves flexibility and can be arranged in a compact environment.

   It can also achieve precise grasping and flexible operation

2. High durability: The main body is made of aluminum alloy, which is lightweight and highly wear-resistant, ensuring long-term stable operation and suitable for various types of intelligent

   Training scenario

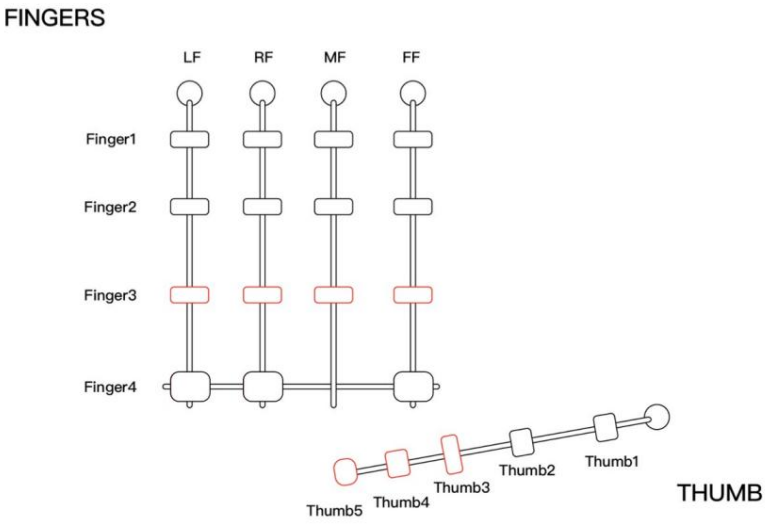
3. End-to-end integration: Innovative end-to-end integration technology can be quickly deployed through the skill library cloud service without the need for users to write code, achieving high efficiency.

   Customized operations to reduce the difficulty of use

2. Product display

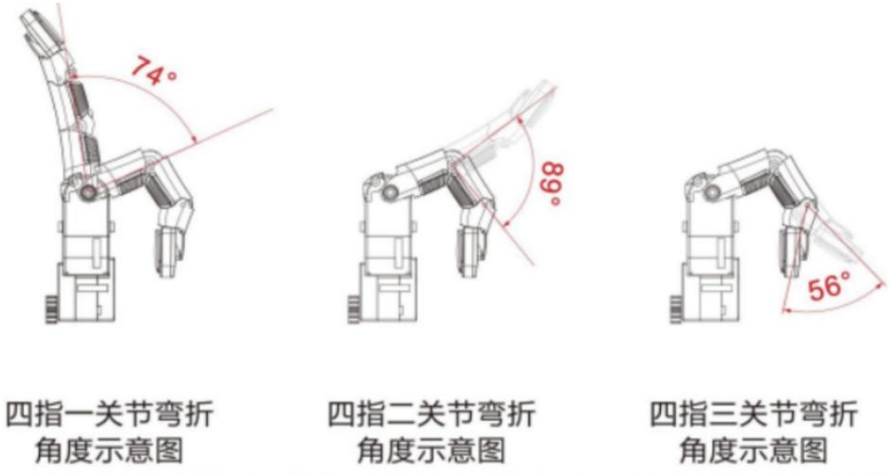
3. Example of freedom

O7 (7 active freedoms, 10 passive freedoms)

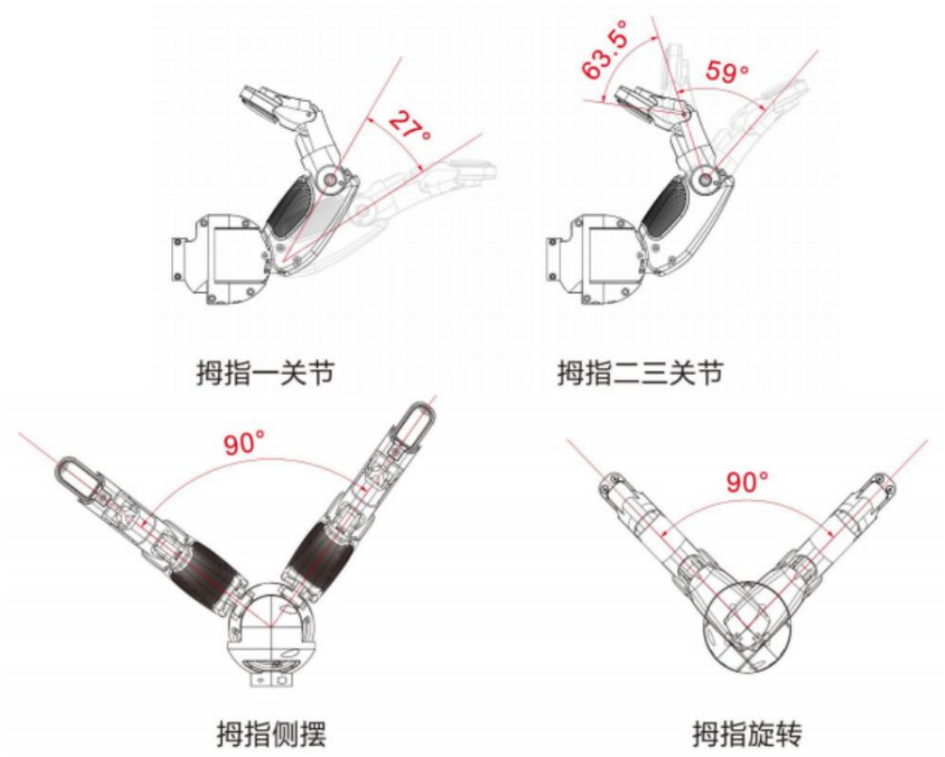


4. Range of motion

4.1 Four-finger structure



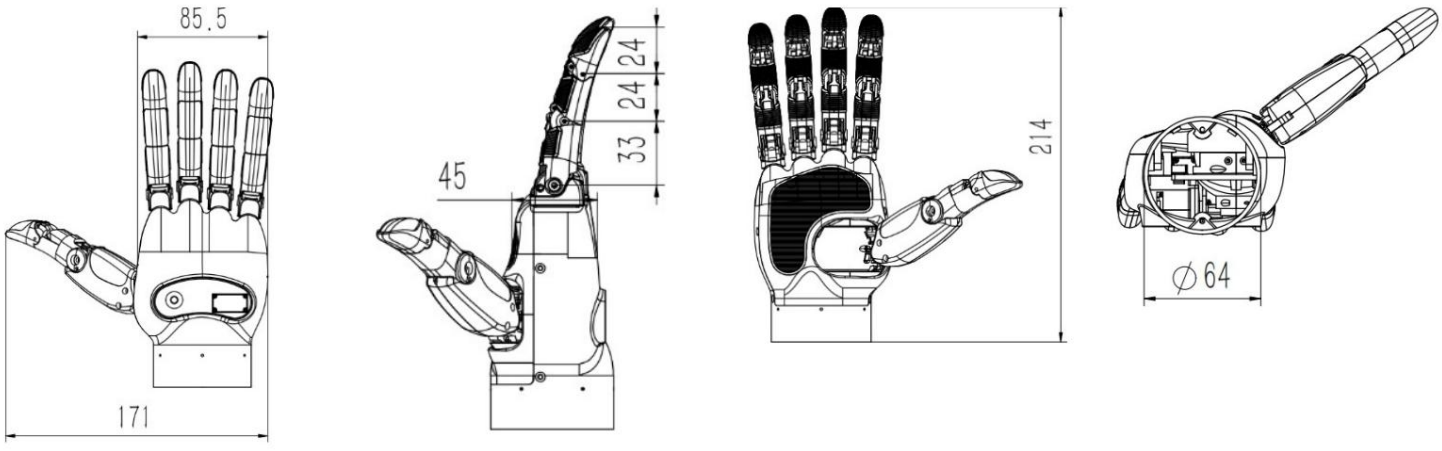
4.2 Thumb structure



5. Product parameters

产品	Linker Hand O7版
自由度	7
关节数	7个主动. 10个被动
传动方式	连杆驱动
驱动方式	自研关节模块
控制接口	CAN/RS485
重量	700g
最大负载	5kg
工作电压	DC24V±10%
静态电流	0.2A
空载运动平均电流	0.5A
最大电流	2A
重复定位精度	±0.20mm
拇指最大抓握力	12N
四指最大抓握力	12N
拇指横向旋转范围	1.65rad （95°）
四指弯曲角度	1.57rad （90°）
拇指侧摆速度	2.35rad/s135°/s）
四指弯曲速度	2.60rad/s （150°/s）
拇指弯曲速度	2.6rad/s （150°/s）

6. Appearance and size



7. Sensors

7.1 Touch

Equipped with fingertip sensors, it can predict and sense the presence and distance of objects; when in contact, it can accurately capture three-dimensional force and identify surface textures and Temperature changes.

7.1.1 Piezoresistive sensor (standard)

parameter	Specifications
Piezoresistive array	6*12
Sensing area	7.20*14.40mm
Trigger force	5g
Range	20N
life	100,000 times
Communication frame rate	200FPS
Numerical range	0~4095

7.1.2 Capacitive sensor (optional)

Equipped with fingertip sensors, it uses highly sensitive sensing technology to predict and sense the presence and distance of objects; when in contact, it can accurately capture Capture three-dimensional forces and identify surface texture and temperature changes.

Fingertip tactile sensor

parameter	Specifications
Sampling frequency	ÿ50Hz
Measuring range	0-20N
Measurement resolution	0.1N
Measurement resolution	0.5%FS
Measurement accuracy	2%FS
Measurement resolution	0.25N
Direction resolution	45°

In-finger micro 3D force sensor

parameter	Specifications
Measuring range	0-50N
Maximum force	200N
Measurement resolution	0.2N
Fastest measurement rate	1KHz

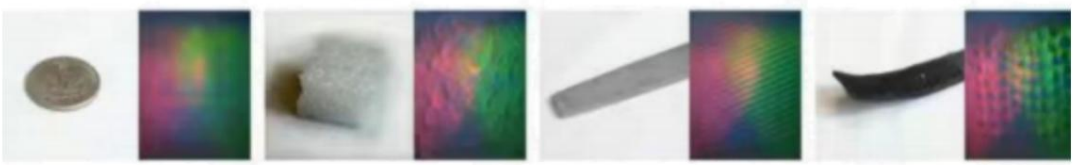
7.2 Vision (optional)

The design method of high-sensitivity fingertip camera + palm camera + wrist is adopted to perform multi-vision fusion perception, and the minimum teleoperation system is equipped with a depth camera on the arm.

7.3 Visual and tactile perception (optional)

It has a visual-tactile perception mode, and its essence is to adopt a combination of vision + deep learning big model. The principle of this technical solution is to use a high-precision camera to shoot the deformation of variable flexible materials. When subjected to force, the grid shape deforms, and our miniature binocular camera records the deformation. Then, based on the trained deep learning big model, it maps out the depth information and movement trend of the object.

Momentum.



8. Communication method

All versions of Smart Hand support the use of CAN bus debug port or EtherCAT.

EtherCAT (Ethernet Control Automation Technology) is a fieldbus based on 100Mbps Ethernet. It is currently used in many systems, and the latest version of Linker Hand is very compatible with EtherCAT and ROS systems. EtherCAT or CAN with ROS requires a high-performance multi-core PC or our AI-Box device, and a standard Ethernet port. The EtherCAT protocol used by LinkerHand mainly relies on the upper host or AI-Box to complete the work.

Supported features

1. Enabling and disabling location control
2. Change the PID value of torque control
3. Perform restrictive operations, such as cutting off force, current, temperature, etc.
4. Reset the motor

5. Adjust the data transmission rate of the motor and tactile sensor
6. Track errors and status indicators in components
7. Download the latest firmware to the motor module
8. Download the latest Skill function module to your controller
9. Get data from visual sensors

Control strategy

Using the default configuration, EtherCAT can implement position control strategies with the help of a host computer or AI-Box. More complex control algorithms can be used, which can fuse information from joints and tactile sensors, and even visual signals through ROS. The torque loop inside the motor unit is closed at a frequency of 5kHz. The PID settings of this loop can be changed in real time. If a different control strategy is needed, existing control strategies can be purchased from the Skill Store cloud service and used directly without programming. It also supports downloading new firmware to the motor.

Microcontroller

Linker Hand uses self-developed microcontrollers for the embedding of the entire robot system. All microcontrollers are connected to the internal CAN bus and can be accessed through the EtherCAT interface.