Product Introduction

Read with AI

This manual covers a Beta 1 prototype. Its parameters and behavior don't represent the final product.

1. Overview

Wuji Hand 2 is WUJI TECH's second-generation biomimetic dexterous hand with 20 active degrees of freedom, built for research, robot integration, human-machine interaction, and other scenarios.

In Beta 1, the product provides:

- A 20-DoF biomimetic five-finger body in which each active joint drives independently and the thumb supports opposition
- MIT force-position hybrid control with user-tunable parameters
- A factory-standard wrist flange with wrist mounting drawings included
- A joint-level Wuji SDK (Python) interface for device discovery, state reading, and command output

It also includes a Wuji Glove–based teleoperation (teleop) demo and simulation models (skeleton only, in URDF, MJCF, and USD formats). The models load in simulators such as MuJoCo and Isaac Sim without hardware—see the Wuji Description model guide for downloads and loading steps.

2. Specifications

The core specifications below cover structure, dimensions and weight, drive and control, and electrical characteristics —for product selection, simulation modeling, and integration.

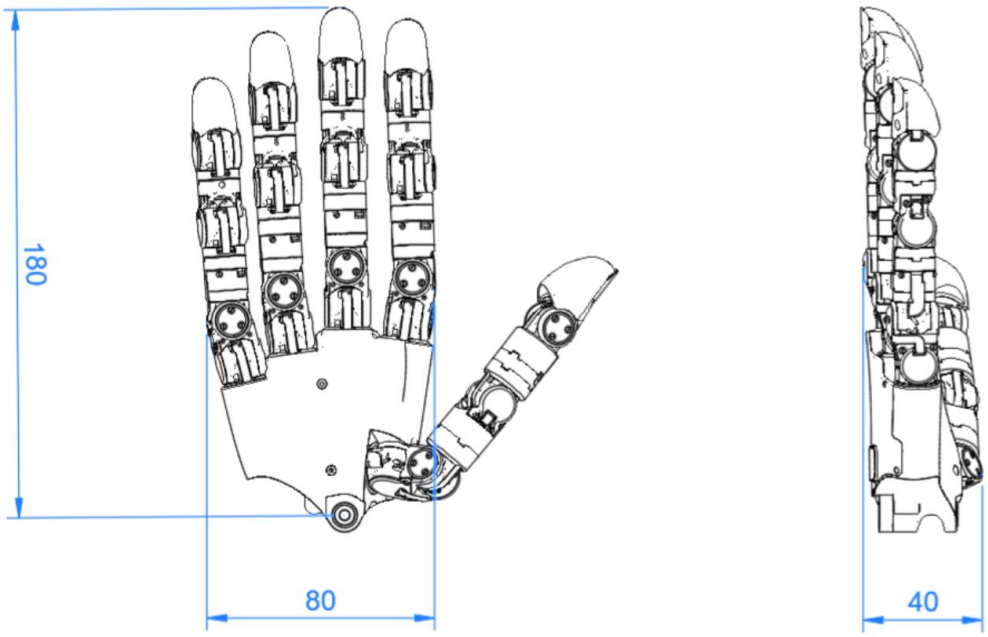
Category	Parameter	Typical value or description
Structure & DoF	Active DoF	20 (4 per finger)
	Joint count	20 (4 per finger)
	Grasp configuration	Full opposition, with lateral abduction supported
	Kinematic configuration	Serial direct-drive rotary joints, no nonlinear kinematic coupling
	Min grasp diameter	0 mm
Dimensions & Weight	Weight (with soft body, excl. cables)	745 ± 10 g
	Dimensions	180 mm × 80 mm × 40 mm
Drive	Drive type	Back-drivable direct-drive rotary joints
	Control algorithm	FOC vector control
Control & Communication	Control frequency	1000 Hz × 20 axes
	Communication interface	Ethernet
	Control mode	MIT force-position hybrid control
	Communication protocol	Ethernet
Electrical	Operating voltage	12 V DC
	Power adapter	12 V 20 A (included)

3. Mechanical Structure

This section describes the overall structure, the communication and power interface layout, and the naming and motion parameters of each degree of freedom, to help you understand the mechanical structure and how to use it.

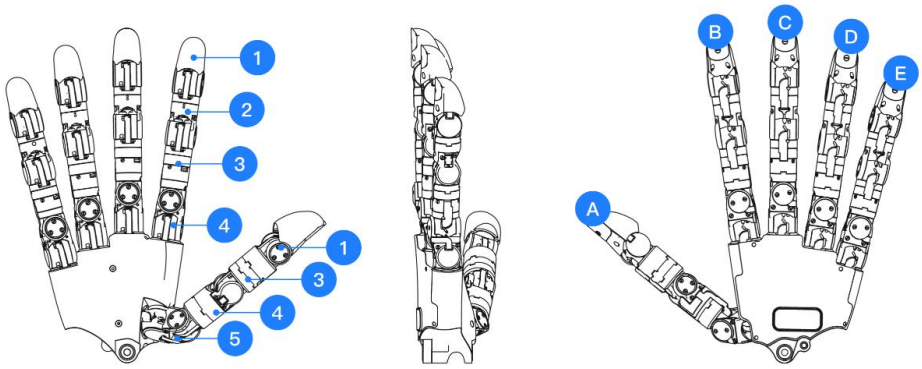
3.1 Overall Dimensions

The figure below shows the overall dimensions of Wuji Hand 2 with all five fingers fully extended and together, for workspace planning and mounting design.



Dimensions in mm: length 180, width 80, thickness 40.

3.2 Structure Diagram



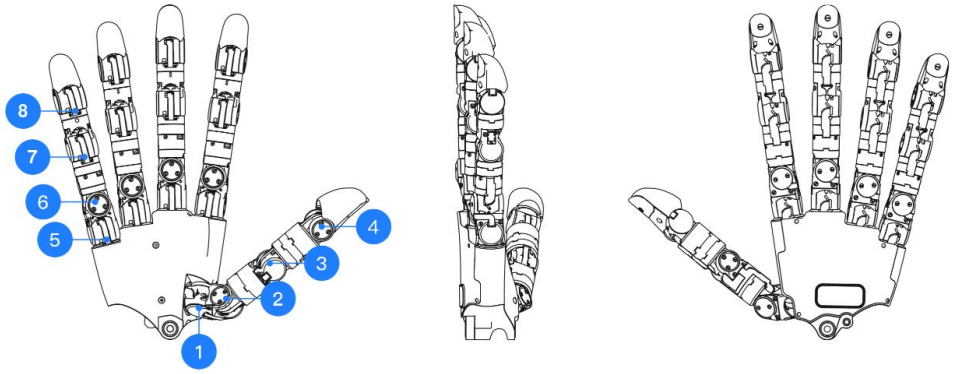
A–E correspond to the five fingers:

No.	Finger
A	Thumb
B	Index
C	Middle
D	Ring
E	Little

1–5 correspond to common anatomical regions of the hand:

No.	Region
1	Distal phalanges
2	Intermediate phalanges
3	Proximal phalanges
4	Metacarpals
5	Carpals

3.3 Degree-of-Freedom Configuration

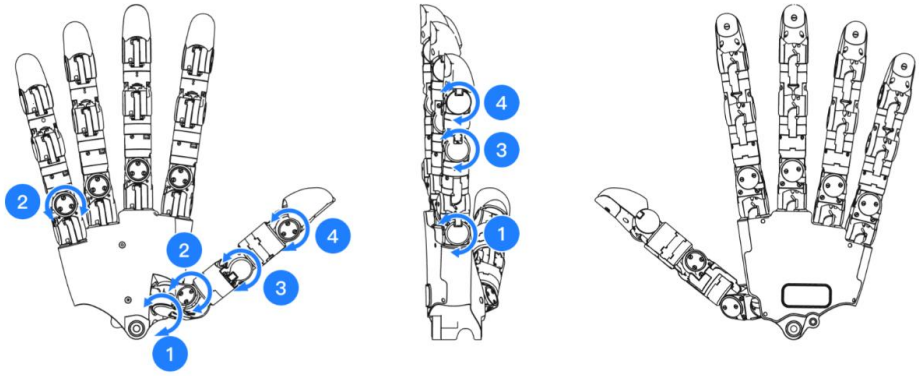


1–8 correspond to:

No.	Joint
1	thumb_cmc_flex
2	thumb_cmc_abd
3	thumb_mcp
4	thumb_ip
5	mcp_flex
6	mcp_abd
7	pip
8	dip

3.4 Joint Motion Direction and Range

The index, middle, and ring fingers share the same structure, each about 137 mm long. The little finger is slightly shorter, about 134 mm. The thumb module differs slightly, about 140 mm. The figure below uses the thumb and little finger as examples to show each DoF's motion direction and angle range:



Thumb

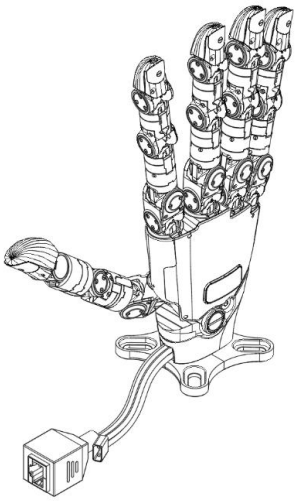
Joint	Motion	Range
1	Base abduction/adduction	-68° ~ 74°
2	Base lateral swing	-85° ~ 40°
3	Flexion/extension	-60° ~ 90°
4	Flexion/extension	-60° ~ 90°

Little finger

Joint	Motion	Range
1	Flexion/extension	-60° ~ 90°
2	Lateral swing	-40° ~ 40°
3	Flexion/extension	-60° ~ 120°
4	Flexion/extension	-60° ~ 90°

3.5 Communication and Power Interface

Wuji Hand 2 communicates with the host over an RJ45 interface and supports external power. The figure below shows the location and connection of the communication and power interfaces:



Use the original supplied cables to ensure communication stability and power safety.

In Beta 1, the external interface form will change in later versions (no longer the XT30 + RJ45 two-cable direct layout). Leave room in your integration design.

3.6 Three-Layer Structure: Skeleton, Soft Body, Skin

Wuji Hand 2 has three layers, each handling load-bearing, contact compliance, and surface protection:

Layer	Name	Role
Inner	Skeleton	Core mechanical structure that carries the joints, transmission, and motors, and determines whole-hand kinematics and load capacity
Middle	Soft body	Biomimetic soft tissue over the skeleton, mimicking the hardness and compression travel of human soft tissue for anthropomorphic contact and cushioning
Outer	Skin	Passive protective layer over the soft body that provides surface friction, wear resistance, and appearance protection, with no sensing user-removable and replaceable

In Beta 1, fingertip soft-body hardness is still being tuned and the skin design isn't finalized. The current prototype's feel, appearance, and soft-body life don't represent the final product.

4. Electrical Characteristics

The pinout uses a standard RJ45 port and supports 100BASE-TX.

5. Package Contents

For the hand body itself—its structure, specifications, and interfaces—see the earlier sections. Besides the hand, the package includes the following:

Image	Name	Qty	Description
	Power adapter	1	Rated 12 V 20 A
	Power adapter AC cable	1	China-standard 3-prong plug
	RJ45 cable	1	Shielded Cat5e, 2 m
	XT30 male-to-female extension cable	1	14 AWG, 2 m
	Adapter mount	1	—
	Adapter flange	1	—