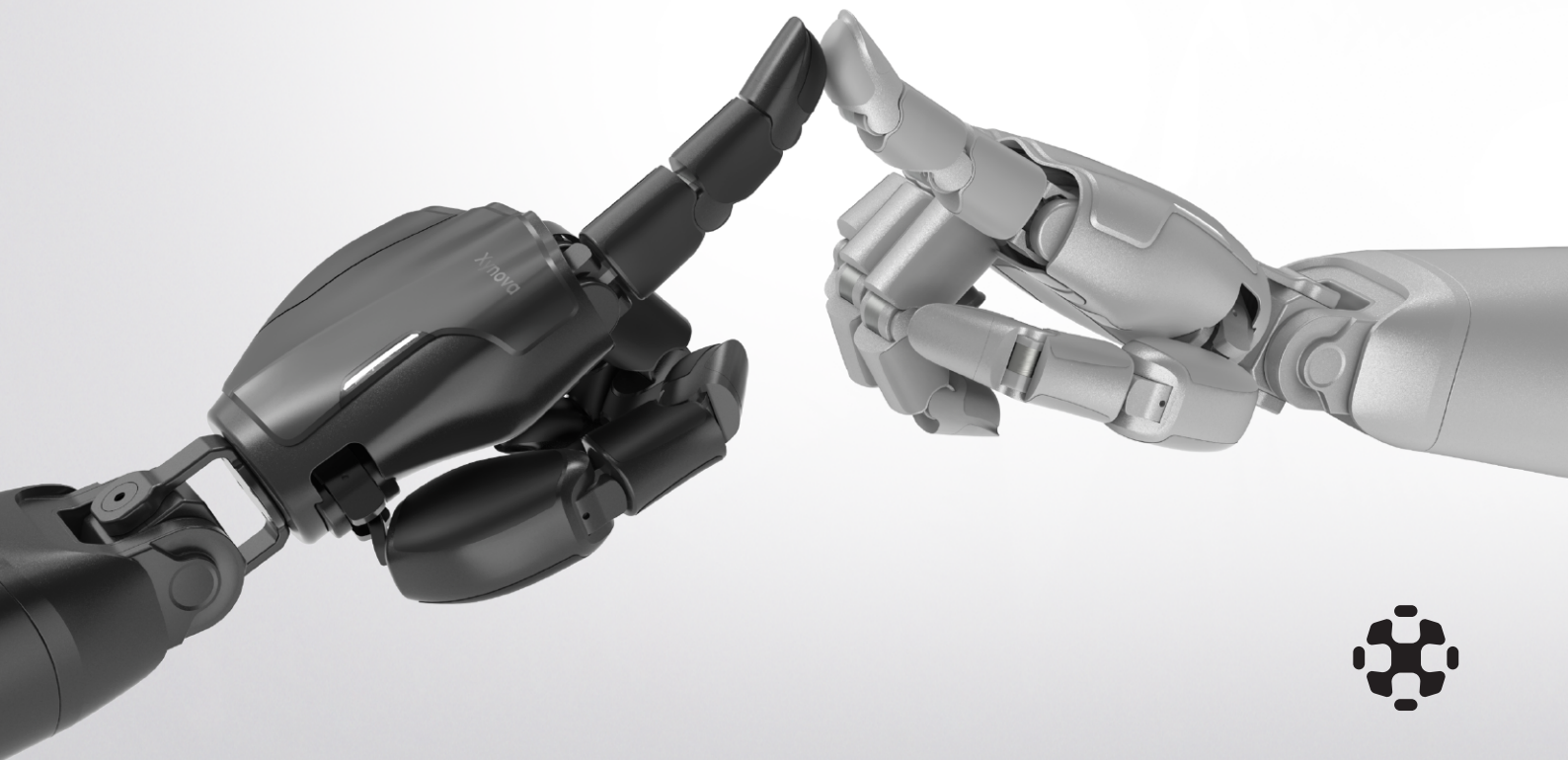
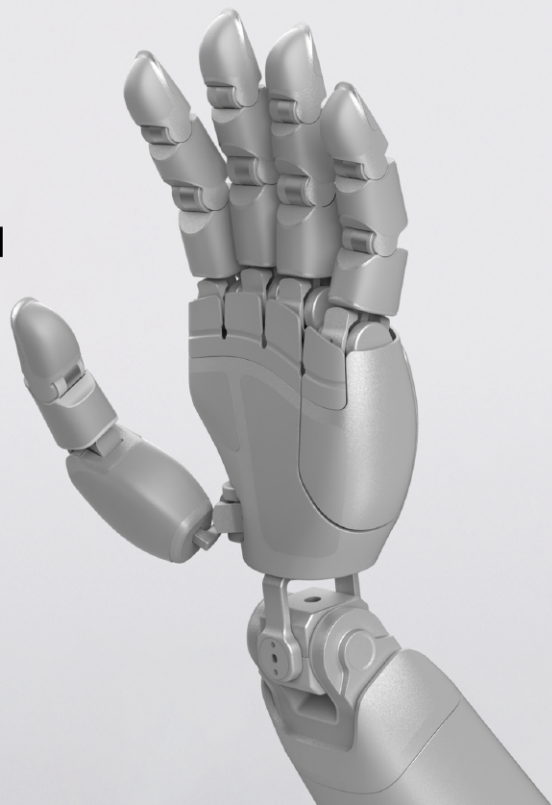


Xynova Prima 1

Direct-Drive Transparency, Perceptive Infinity.







Xynova



Xynova Prima 1 adopts a **full-joint direct-drive** architecture, designed as a dexterous hand for high-precision force-controlled operations and cutting-edge embodied AI research. It integrates ultra-compact direct-drive motor modules, micro-gear reduction mechanisms, and visuo-tactile sensing modules, enabling precise closed-loop control from perception to execution. Featuring an advanced thermal management design, it is the ideal choice for unlocking complex delicate tasks and reinforcement learning training.



Strong

Ultra-high payload-to-weight ratio, with **15N** fingertip force.



Measurable

Ultimate force transparency, lossless transmission with **millisecond**-level response.



Agile

Fully direct-drive with zero backlash, instantaneous opening and closing at **0.08s/cycle**.



Receptive

Keen **visuo-tactile perception across five fingers**, sensing without boundaries



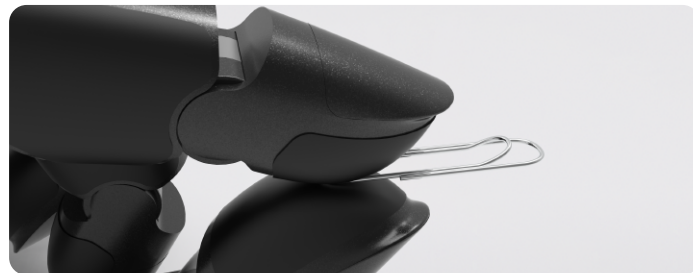
Tractable

22 DoF biomimetic configuration, ultra-low backdrive for safe interaction.



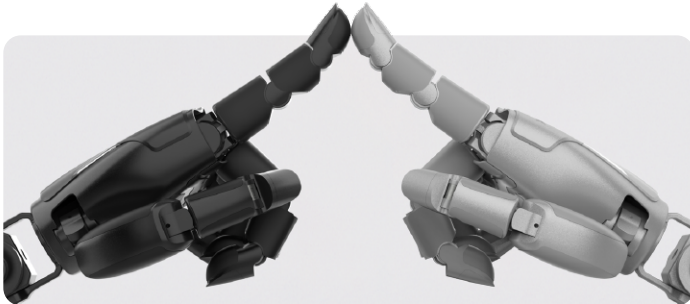
Ultimate Force Transparency – Redefining Control Intuition

Independent joint closed-loop control: **<10ms** response, **$\pm 0.2^\circ$** joint repeatability, fully decoupled – force follows intent, without compensation.



Visuo-Tactile Perception Fusion – Surpassing Human Sensing

Fingertip Visuo-tactile: Ultimate 3D perception at the end-effector, **0.1N** sensitivity, minimal trigger from contact to cognition.



AI-Friendly, Out-of-the-Box Training Platform

Standard protocols to mainstream ecosystem, high-frequency feedback, plug-and-play, zero tuning, **MIT control supported** – ideal for RL and embodied AI training.



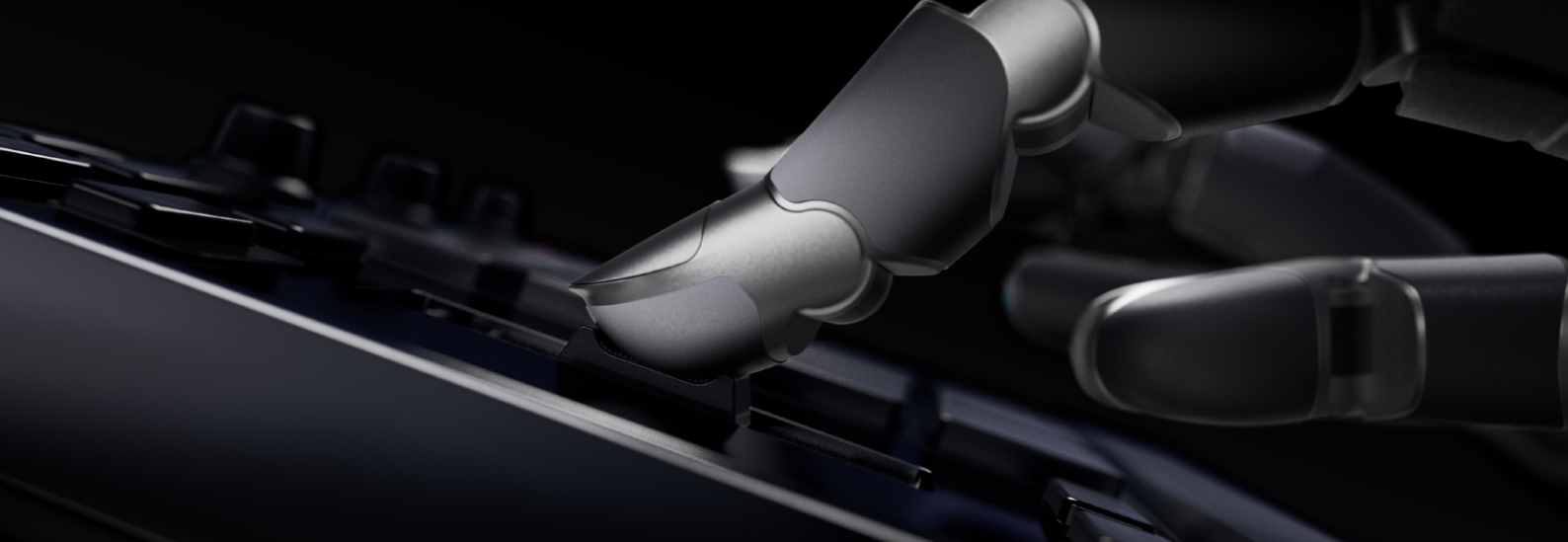
Bionic Form with Industrial-Grade Power

1:1 fully bionic appearance with a payload-to-weight ratio **exceeding 20:1** and a non-thumb fingertip force $\geq 15N$ – resembling a human hand, yet stronger.

Xynova Prima 1 Product Standard Parameters

Electrical Parameters	Rated Voltage	24V	Performance Parameters	Grip Time	0.08s/times
	Rated Current	5A		Max. Fingertip Force	15N
Structural Characteristics	Degrees of Freedom	22		Vertical Payload ¹	20kg
	Transmission Mode	Direct-drive		Horizontal Payload ²	10kg
	Hand Weight	850g		Force Control Accuracy	0.5N
	Hand Size	190 × 90.5 × 44mm		Repeatability	0.5mm
	Grip Diameter Range	φ10~220mm		Min. Backdrive Force	0.2N
				Tactile Sensor Type	Visuo-tactile (fingertip-3D)
				Min. Trigger Force	0.1N
				Tactile Sensor Resolution	0.1N
Software Support	Secondary Development	SDK provided, compatible with ROS 1 & ROS 2, URDF models included	Range of Motion	Thumb Pitch/ Rotation Angle	-10°~90°/ 0°~100°
	Simulation Environment	MuJoCo and Isaac Lab supported		Non-thumb Pitch/ Yaw Angle	-30°~105°/ -20°~20°
	Operational Support	Built-in kinematics library and reinforcement learning examples	Control and Communication	Communication Mode	CAN FD/ EtherCAT
	OTA Update	Supported		Control Mode	Multimodal perception intelligent control
¹ With vertical wrist and bent fingers					
² With horizontal wrist and straight fingers					

¹ With vertical wrist and bent fingers
² With horizontal wrist and straight fingers



High-Density Data Output with Visuo-Tactile Multidimensional Perception

Fingertips capture **3D force** distribution, morphology, texture, and more. Superhuman tactile feedback provides high-density sensory input for intelligent decision-making.

0.1N Force Resolution with Highly Sensitive 3D Force Detection

Normal and tangential trigger force as low as **0.1N**, accuracy **<5% FS**. Real-time 3D force direction sensing reconstructs contact force vectors for precise control.

Micron-Level Spatial Resolution with High-Density Sensing Array

640 × 360 sampling points with micron-level element spacing. Ultra-high-density array precisely captures contact force distribution and detects microscopic variations.

Long-Term Industrial Reliability with 2-Million-Cycle Visuo-Tactile Lifespan

Temperature drift and zero drift as low as **1% FS**. Stable operation from **-10°C–50°C**. visuo-tactile sensing module **>2 million** effective press cycles for demanding industrial environments.

Xynova Prima 1 Sensing Module Parameters

Sensing Mode	Visuo-tactile (for fingertips)
Taxel Pitch	Micrometer-level
Trigger Force	0.1N
Resolution	0.1N
Range	0.1N~20N
Accuracy	<5% FS
Sampling Resolution	640 × 360
Temperature Drift	1% FS
Zero Drift	1% FS
Repeatability	3% FS

Noise	0.5% FS
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Size/ Effective Sensing Area	> 90% of the fingertip area
Module Thickness	13mm
Response Time	40ms
Linearity	5% FS
Sampling Rate	60Hz
Operating Temperature	-10°C~50°C
Effective Press Cycles	2 Million
Max. Overload Force	40N
Operating Voltage	5V
Operating Current	80mA

Communication Mode	USB 2.0
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YouTube



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