Xynova Flex 2

Bionic Versatility, Intelligent Stability.



V1.2


Xynova

Xynova



Xynova Flex 2 is an arm-hand integrated dexterous hand that adopts a **hybrid-drive** solution combining tendons and direct-drive motors, engineered based on the first principles of human biology. High-density miniature electric cylinders are arranged within the forearm, transmitting force to the palm via tendons for powerful grasping, while motor modules integrated inside the palm handle fine manipulation tasks. Equipped with multimodal sensing capabilities including full-palm tactile sensing, wrist-mounted vision, and palm proximity sensing, fully covered with skin-friendly flexible fabric, and featuring million-cycle durability, the Flex 2 meets the demands of both industrial and consumer applications.



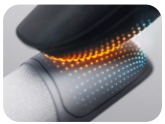
Agility

23 DOF Bionic Design, Millisecond Dynamic Response



Precision

Repeatability of **≤±0.2mm**



Intelligence

Multimodal Perception Perceptive, Reactive, Integrable



Power

Press & Grip with Substantial Force, Finger Force **≥20 N**



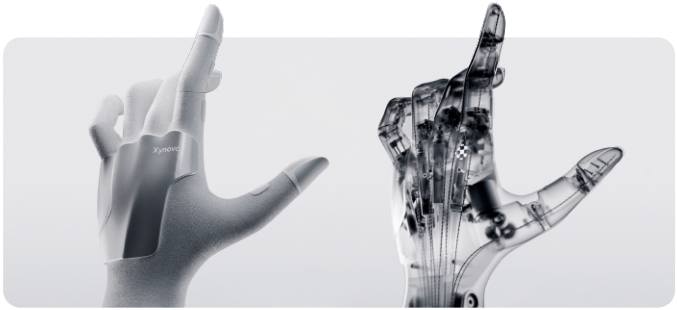
Aesthetics

Redefining **Aesthetics** from Vision to Tactility



Reliability

1 Million Grip Cycles, Full Thermal Control, Built to Last



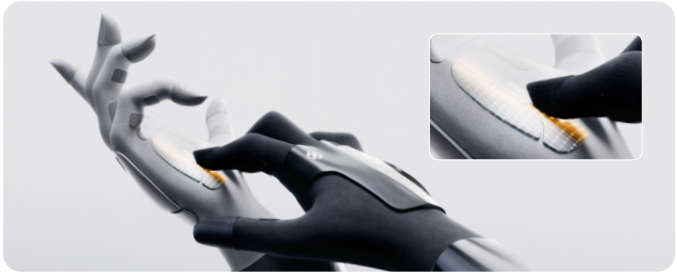
Ultimate Biomimetic Design

Featuring **19 active & 4 passive DoFs** in human-hand proportions. The dual-drive synergy of forearm micro-cylinders and in-palm motors balances high payload with delicate manipulation.



Rigidity Meets Compliance

A **multi-material build** achieves an optimal balance of structural strength, compliance, thermal efficiency, and industrial aesthetics within a compact footprint.



Multimodal Perception

Integrates **piezoresistive tactile**, **ToF proximity**, and **3D vision**. This tri-modal fusion ensures precise, safe, and effortless closed-loop grasping.



Built for Endurance

Active and passive cooling mechanisms prevent thermal throttling, ensuring sustained high-payload performance and industrial-grade reliability.

Xynova Flex 2 Product Standard Parameters

Electrical Parameters	Rated Voltage	48V
	Rated Current	3A
Structural Characteristics	Degrees of Freedom	23
	Transmission Mode	Hybrid-drive (tendon+direct)
	Drive Module	Self-developed electric linear actuator and coreless motor
	Hand Weight	400g
	Hand Size	204 x 82.5 x 42mm
	Integrated Arm-Hand Length	406mm
	Max. Arm Circumference	Φ82.5mm
Software Support	Secondary Development	SDK provided, compatible with ROS 1 & ROS 2, URDF models included
	Simulation Environment	Supports MuJoCo and Isaac Lab
	Operational Support	Built-in kinematics library and reinforcement learning examples
	OTA Update	Supported

[1] With vertical wrist and bent fingers
[2] With horizontal wirst and straight fingers

Performance Parameters	Grip Time	0.25s/times
	Max. Fingertip Force	20N
	Vertical Payload [1]	20kg
	Horizontal Payload [2]	10kg
	Repeatability	≤±0.2mm
	Tactile Sensor Type	Piezoresistive Fingertip, Palm (3D) Finger Pads (1D)
	Min. Trigger Force	0.1N
	Tactile Sensor Resolution	0.1N
Range of Motion	Thumb Pitch/ Rotation Angle	0°~90°/ 0°~100°
	Four-Finger Pitch/ Yaw Angle	0°~90°/ -20°~20°
	Wrist Pitch/ Yaw Angle	-70°~50°/ -40°~40°
Control and Communication	Communication Mode	CAN FD/ EtherCAT
	Control Mode	Multimodal perception intelligent control



3D Stereo Vision with Pixel-Aligned Depth – Seeing Is Believing

True RGB fidelity and **up to 100cm depth** generate millimeter-level 3D point clouds. The stereo parallax algorithm delivers robust spatial awareness-authentic and reliable.

Wrist-Embedded Integration – Unobstructed Operation in Confined Spaces

Fully embedded with no increase in wrist rotation diameter, **hand-eye integrated design** reduces end-effector inertia. Enables real-time dynamicgazing during pitch and yaw rotations.

Dual Wide-Angle High-Resolution Optics – Full Workspace without Blind Spots

94° horizontal and **68°** vertical FOV provide real-time, full-domain environmental detection. Ensures first-attempt grasp/place success while reducing path planning load.

Out-of-the-Box Readiness with Efficient Thermal Management

Requires at most **one-time extrinsic calibration** before use. Self-cooling and simulation-optimized thermal management eliminate cooling pauses-ensuring sustained stability.

Xynova Flex 2 Parameter of Dual-lens Camera in Wrist

Size		33.9 x 32.5 x 13.5mm (height partially adjustable)
Depth Working Range		4~100cm
Depth Camera	Depth Accuracy	≤±1.8% (1280 x 800 @ 50 cm & 90% x 90% ROI) 4cm~15cm <1mm 4cm~30cm <5.4mm 4cm~50cm <9mm
	FoV	H: 88°/ V: 65°
	Resolution	1280 x 800 @ 30 fps, 848 x 530 @ 60 fps
Color Camera	FoV	H: 94°/ V: 68°
	Resolution	1280 x 800 @ 60 fps
Depth / RGB Alignment		Supported
Power Consumption		≤2.0W
Weight		68g



Precise Core-Area 3D Force Detection with Hierarchical Full-Palm Tactile Layout

3D-force sensors on fingertips and pads capture force direction and magnitude. High-density normal-force arrays on finger pads and bases build a 3D tactile map for robots to detect fine-grained contact-force distribution.

Ultra-Precise Force Quantification with High-Density Sensing Points

Array pitch **≤1mm**. It delivers **0.1N** sensitivity and **5% FS** accuracy under standard conditions. Customizable ranges (normal: 0.1N~20N, tangential: 0.5N~15N) support dexterous manipulation and safe interaction.

Seamless Integration and Visualization with Intelligent Edge Processing

The tactile sensor module integrates **on-edge chips** for real-time data processing, offloading the main controller. It supports real-time data reading and thermal-map visualization via SDK. Paired with joint torque sensors, it delivers **0.5N**-level force-control closed-loop capability.

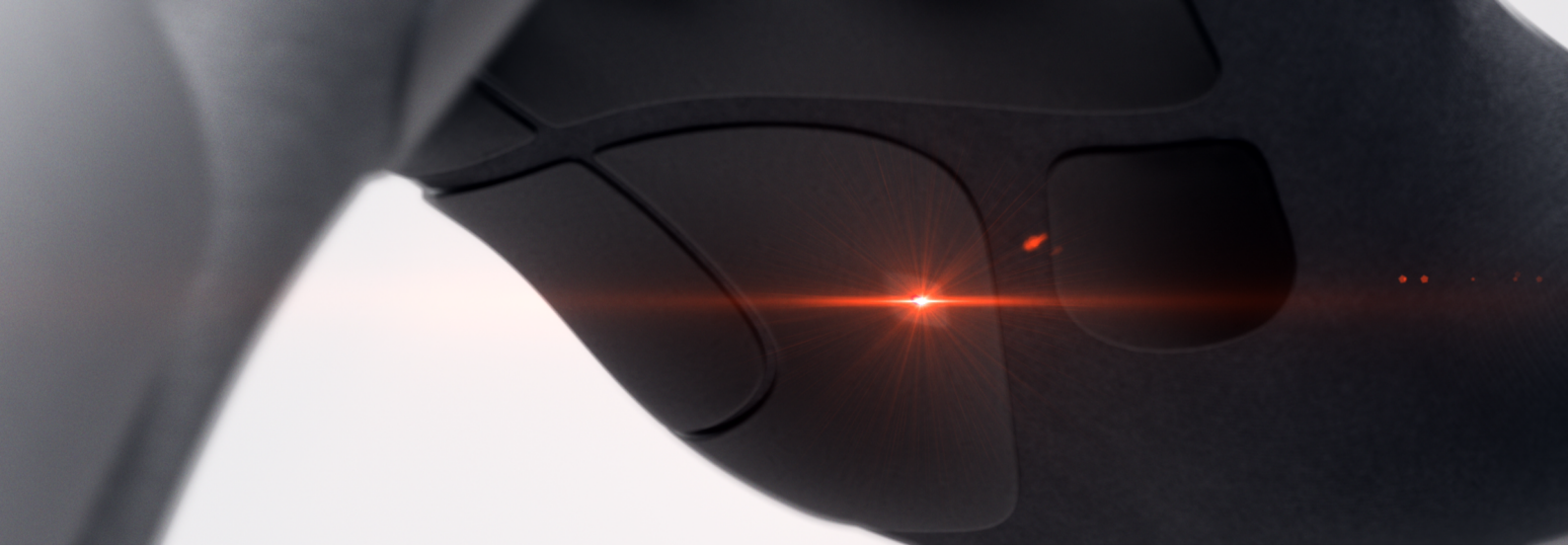
Low-Maintenance Reliability with Overload-Resistant Longevity

Withstands **100N** overload against accidental impact. Rated for **1million** effective press cycles, it maintains stable performance under frequent operation and lowers maintenance-replacement costs.

Xynova Flex 2　Sensing Module Parameters

Sensing Mode		Piezoresistive
Taxel Pitch		1mm
Normal	Trigger Force	0.1N
	Resolution	0.1N
	Range	0.1N~20N
	Accuracy	<5% FS
Tangential	Trigger Force	0.5N
	Resolution	0.5N
	Angular Resolution	1°
	Range	0.5N~15N
	Accuracy	<5% FS

Size/ Effective Sensing Area	Customizable
Module Thickness	4mm
Response Time	10ms
Linearity	5% FS
Sampling Rate	60Hz
Operating Temperature	-20°C~85°C
Effective Press Cycles	1 Million
Max. Overload Force	100N
Operating Voltage	5V
Operating Current	93mA
Communication Mode	UART/ IIC (Customizable)



8×8 Matrix Perception – a "Distance Map" in the Palm

64 zones output a regional **depth map**, capturing distance and contour before contact for pre-grasp posture estimation — from blind grasping to **intelligent alignment**.

High-Frequency and Wide-FoV Dynamic Capture – Real-Time Approach Tracking

Maximum **60Hz** refresh and **65°** FoV update palm-front environment and track target motion, enabling **predictive response** during approach — not just reaction after contact.

Bridging Vision and Touch – Completing the Three-Stage Perception Chain

Fills the gap between wrist vision and palm touch, realizing high-frequency distance tracking in the **4-50cm** zone, to close the loop of vision → proximity → touch → force control.

Miniaturized Embedded Design with Smart Low-Power Wake-Up

Ultra-compact **6.4 x 3.0 x 1.5mm** package fits the palm seamlessly; **11mW** standby with programmable threshold wake-up activates instantly in near-field, optimizing thermal management.

Xynova Flex 2 Palm Proximity Sensing Module Parameters

Ranging Zone	4x4 / 8x8 independent zones
Low-Power Mode	Supported, with programmable interrupt threshold for host wake-up
Max. Ranging Distance	400cm
Multi-Object Detection	Supported, for multi-target detection and ranging
Output Frame Rate	Max. 60Hz
Cover Glass Crosstalk Suppression	Built-in histogram processing and algorithmic compensation to reduce/eliminate cover glass crosstalk
Target Motion Detection	Motion indicator in each zone to report target movement status
Field of View (FoV)	65° diagonal square
Size	6.4 x 3.0 x 1.5mm
Cover Glass Compatibility	Compatible with various cover glass materials

Xynova

YouTube X

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