

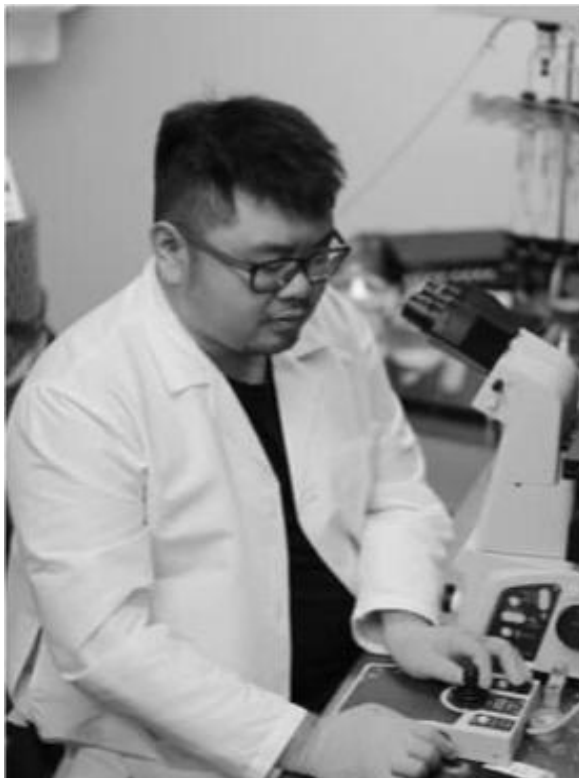
# BrainCo Dexterous Hand

Zhejiang Qiangnao Techonology Co., Ltd (BrainCo)





**BrainCo was founded at Harvard University in 2015**





Founded in 2015, BrainCo is the first Chinese team incubated by Harvard Innovation Lab and has emerged as a global leader in **non-invasive brain-computer interface (BCI)** technology. It is also the **first “unicorn”** in China’s BCI industry.

Guided by the mission of “Brain-machine technology: unlocking new possibilities for human life,” BrainCo has spent the past decade transforming cutting-edge lab research into impactful real-world applications. Its research and development team consists of leading scientists, with over 70% being alumni of world-renowned institutions such as Harvard, MIT, Tsinghua University, Peking University, and other top-tier universities. The company holds a robust portfolio of over 660 patent applications and over 420 granted patents, including more than 230 core invention patents, ranking it among the global leaders in the BCI industry.

📍 Boston

📍 Austin

📍 Shenzhen

📍 Hangzhou





# Build a world-class team of scientists



BrainCo's founding team members are mainly from Harvard and MIT. BrainCo also brings together experts in robotics, mechanical engineering, electrical engineering, software development, and manufacturing from all over the world.



## Dr. Han Bicheng

PhD student at Harvard University Brain Science Center. Published high impact factor academic papers in important international academic journals like Life



## Morteza Sarafyazd, PhD

Ph.D. in Systems, Computational, and Cognitive Neuroscience from MIT. As first author, together with their advisor, published a paper in the top-tier journal Science, in addition to over ten papers in other core journals.



## Dr. Yang Jincheng

Autism Project Research Scientist, postdoctoral fellow, Institute of Psychology, Chinese Academy of Sciences. Massachusetts General Hospital Scientists at the University of California, Davis



## Adis

Master of Mechanical Engineering, Massachusetts Institute of Technology. Previously worked at IBM Watson Medical First place in the 2014 MIT Visual Recognition Competition



## Dr. Shan Sicong

Doctor of Engineering, Harvard University. Published a total of 16 important articles in top journals in the fields of materials science and 3D printing including 1 US patent and several domestic patents!



## Dr. Zhou Jun

Doctor of Biomedical Engineering, Department of Zhejiang University. Participated in multiple national 863 projects, published 20 papers, authored 3 books, and held 8 patents



## Dr. Dingyihang

Ph.D. in Precision Instruments Department, Tsinghua University / Visiting Harvard Medical School. Published a total of 6 papers in collaborative SG journals. Academic rookie and outstanding doctoral graduate from Beijing



## Dr. Xingle

PhD in Electronic and Electrical Engineering from the University of Manchester. Formerly worked at the UK National Advanced Materials Research Institute.



## Dr. Yao Pan

PhD in Electronic Science and Technology from the Chinese Academy of Sciences. Jointly-trained PhD at the University of Oxford under a CSC scholarship.



# Breakthrough in **Non-invasive BCI** Technologies



Innovative Electrode Materials  
Breakthrough in **large-scale, precise EEG signal acquisition** challenges



Advancing EEG Computing  
Transitioning from traditional algorithms to a new era of **artificial intelligence algorithms**



US 20180184936A1

(19) **United States**

(12) **Patent Application Publication**

HAN et al.

(10) Pub. No.: **US 2018/0184936 A1**

(43) Pub. Date: **Jul. 5, 2018**

(54) **SYSTEMS AND METHODS FOR  
NEURO-FEEDBACK TRAINING USING  
VIDEO GAMES**

(71) Applicant: **BrainCo Inc.**, Somerville, MA (US)

(72) Inventors: **BICHENG HAN**, SOMERVILLE, MA (US); **TIANHE WANG**, REVERE, MA (US); **MAX NEWTON**, ALLSTON, MA (US); **JOANNE WYLIE**, ALLSTON, MA (US); **CHENGHANG ZHOU**, ZHANGQIU (CN); **JIANLIN ZHOU**, EVERETT, MA (US); **XIANG YU**, BRIGHTON, MA (US); **BOWEI HUANG**, LUZHOU (CN); **ZHAOYI YANG**, BOSTON, MA (US); **Xipeng Guo**, East Hampton, NY (US); **Shui Zou**, Cambridge, MA (US); **Siwei Yao**, Cambridge, MA (US)

## Publication Classification

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*A61B 5/00* (2006.01)  
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*A63F 13/28* (2006.01)  
*A63F 13/25* (2006.01)  
(52) U.S. Cl.  
CPC ..... *A61B 5/0482* (2013.01); *A61B 5/048* (2013.01); *A63F 13/25* (2014.09); *A63F 13/46* (2014.09); *A63F 13/28* (2014.09); *A61B 5/6803* (2013.01)

## ABSTRACT

(57) A method and system for neuro-feedback training are disclosed. According to certain embodiments, the method may include receiving, by a processor via a communication network, a brainwave signal measured by at least one sensor attached to a user. The method may also include determin-

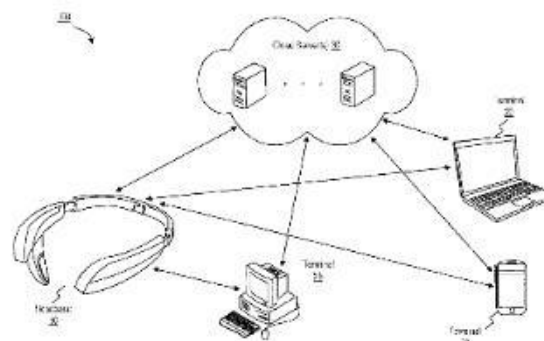
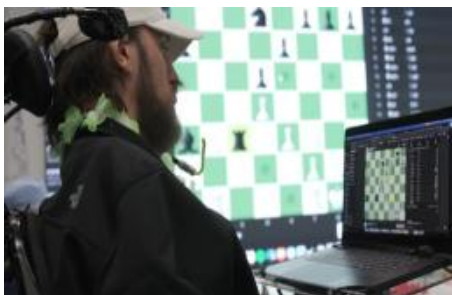


Fig. 2

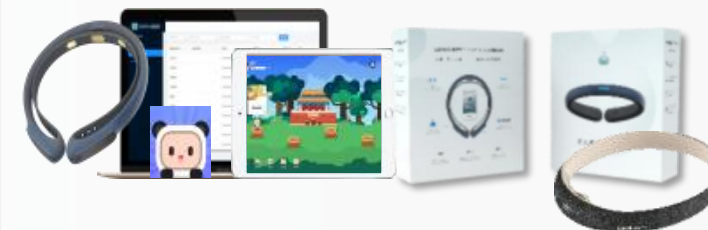
In 2018, the application for a **portable brain-machine interface neurofeedback training system** comprehensively covered key technologies in this field, securing the company' s leading position in brain-machine interface development.



# Leading company in **Non-Invasive BCI** Industry



|                     |                                                                                                                       |                                                                                                                                                                          |
|---------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Founded             | <br>2016                            | <br>2015                                                                              |
| Technology Path     | Invasive                                                                                                              | Non-invasive                                                                                                                                                             |
| Product Development | Invasive brain-machine interface technologies such as flexible electrodes and neurosurgical robots                    | Non-invasive brain-machine interface technologies, rehabilitation, neuro-modulation, consumer electronics products                                                       |
| Application         | Focuses on brain-related diseases, providing solutions for groups with epilepsy, severe depression, Parkinson's, etc. | Focuses on rehabilitation, general health, human-computer interaction, providing solutions for people with disabilities, autism, ADHD, sleep disorders, and other groups |



Where did we start?

- **Prosthetic Hand**





BrainCo

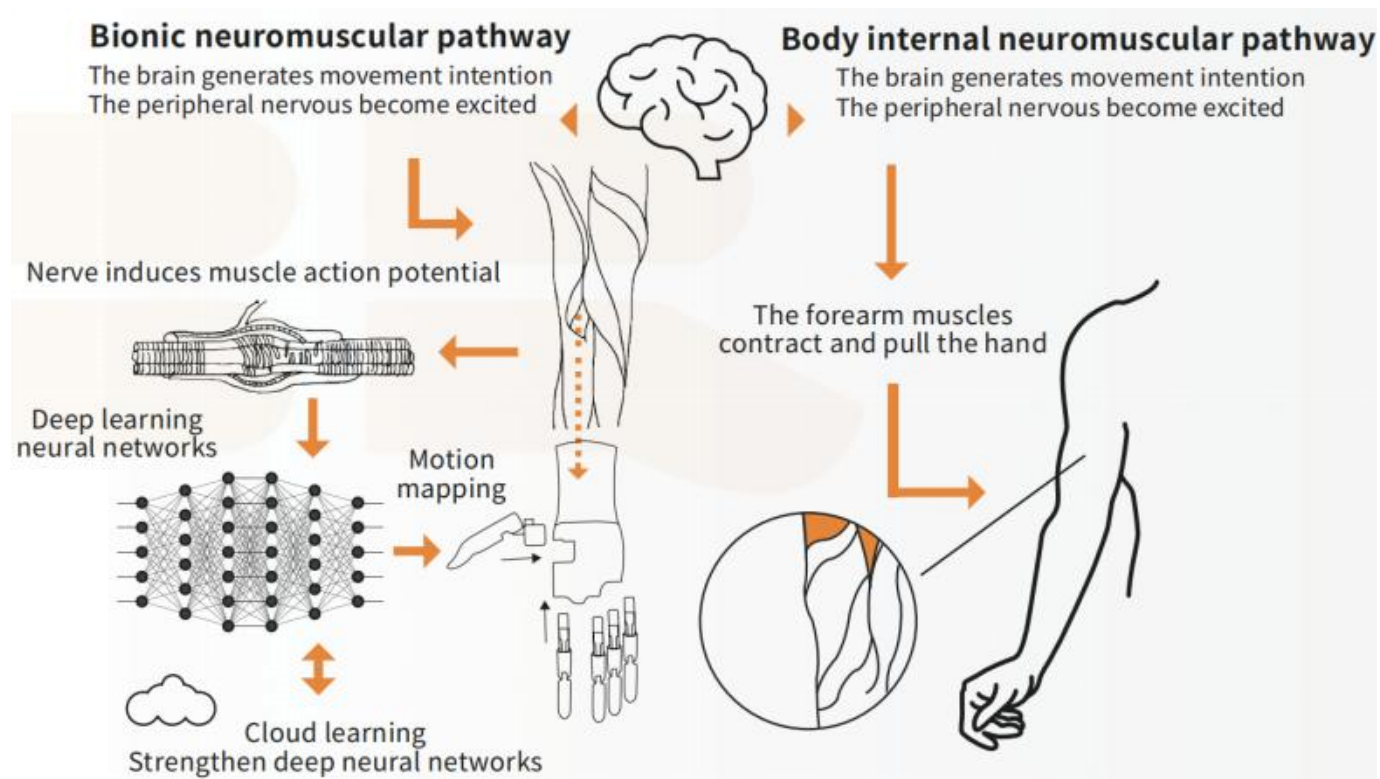
Launched in Jan, 2019, BrainCo Prosthetic hand was awarded as "The 100 Best Inventions of 2019"

by Time Magazine at the same year with product image on the cover





## Artificial intelligence recognition algorithms process muscle nerve signals to achieve **bionic neural pathway reconstruction**





# Torch bearer with BrainCo Prosthetic Hand @ 4th Asian Paralympic Games

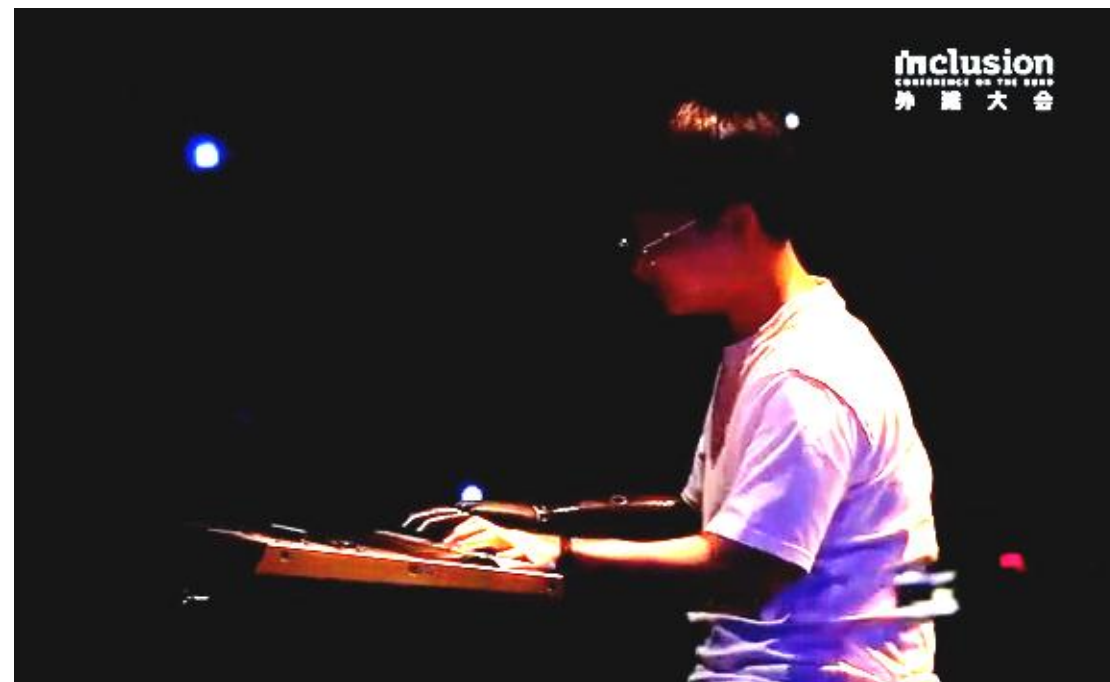




## Integration of **visual, auditory, and motor functions** Users play the piano effortlessly



A girl played the piano with Panioist Langlang  
in Y2018



A boy played the piano with in Inclusion in Shanghai  
in Y2024



# Multiple Amputees Users for years

Agile and stable

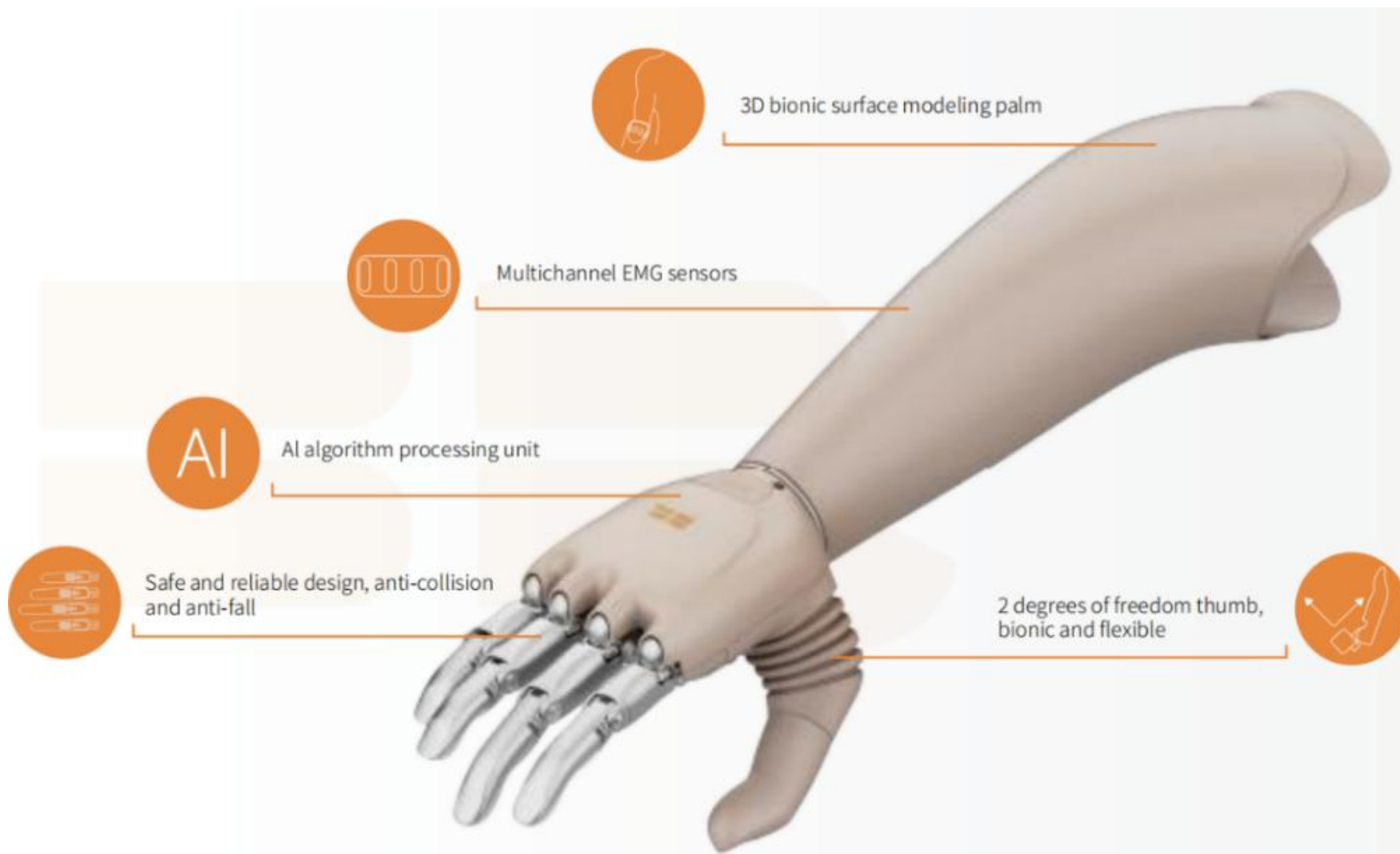


Durable and reliable





# Comprehensive solution for prosthetics





|                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                            |                            |                    |                  |                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------|------------------|-----------------|
| <h1 style="text-align: center;">Declaration of Conformity</h1> <h1 style="text-align: center;">CE</h1>                                                                                                                                                                                                                                                        |                                                                                                                                                                                            |                            |                    |                  |                 |
| <p><i>Manufacturer Information:</i></p> <p><b>Name:</b> <u>GrainCo</u></p> <p><b>Address:</b> <u>120 Weaver St, Suite 850, Somerville, MA 02148</u></p> <p><b>Phone/Fax no:</b> <u>(617) 637-4388</u></p>                                                                                                                                                     |                                                                                                                                                                                            |                            |                    |                  |                 |
| <p><i>Declares that the product:</i></p> <p><b>EUT Description:</b> <u>Myoelectric Prosthetic Hand</u></p> <p><b>Model Number:</b> <u>N/A</u></p>                                                                                                                                                                                                             |                                                                                                                                                                                            |                            |                    |                  |                 |
| <p><i>Conforms to the following technical standard:</i></p> <p><b>EN 50483</b></p>                                                                                                                                                                                                                                                                            |                                                                                                                                                                                            |                            |                    |                  |                 |
| <p><i>Identification of Product:</i></p> <p>This device complies with European Union Medical Directive 93/42/EEC.</p> <p>The following test reports are subject to this declaration:</p> <table border="0"> <tr> <td><b>Test Report Number:</b></td> <td><b>Issue Date:</b></td> </tr> <tr> <td><u>3006-2131</u></td> <td><u>1/7/2021</u></td> </tr> </table> |                                                                                                                                                                                            | <b>Test Report Number:</b> | <b>Issue Date:</b> | <u>3006-2131</u> | <u>1/7/2021</u> |
| <b>Test Report Number:</b>                                                                                                                                                                                                                                                                                                                                    | <b>Issue Date:</b>                                                                                                                                                                         |                            |                    |                  |                 |
| <u>3006-2131</u>                                                                                                                                                                                                                                                                                                                                              | <u>1/7/2021</u>                                                                                                                                                                            |                            |                    |                  |                 |
| <p><b>Prepared By:</b></p>  <p>165 State Street, 8th Floor, Suite 100, Boston, MA 02109<br/>         Ph: (781) 552-0100 Fax: (781) 552-0100<br/> <a href="http://www.keystonegroup.com">www.keystonegroup.com</a></p>                                                      | <p><b>The manufacturer is responsible for this declaration:</b></p> <p><b>Name/Title:</b> <u>Geng Zhu</u></p> <p><b>Date:</b> <u>1/7/2021</u></p> <p><b>Signature:</b> <u>Geng Zhu</u></p> |                            |                    |                  |                 |

[illegible]

U.S. FOOD & DRUG  
ADMINISTRATION

Build Correspondence

Convert to PDF

September 9, 2022

Zhejiang Qianqiao Technology Co., Ltd.  
% Camille Lee  
Official Correspondent  
Shun Info (Guangzhou) Medical Consultant Ltd.  
No. 1918-1928, Building D3, Minjie Plaza, Minjie Road  
Huangpu District  
Guangzhou, Guangdong 510000  
China

Re: K220002

Trade/Device Name: Dexun Protection System (Model: MSLL1, MSRL1)  
Regulation Number: 21 CFR 862.1320  
Regulatory Name: Cutaneous electrode  
Regulatory Class: Class II  
Product Code: GNY, IJZ  
Dated: June 8, 2022  
Received: June 15, 2022

Dear Camille Lee:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at <https://www.accessdata.fda.gov/submissions/electronic/device-submissions.cfm> identifies combination product submissions. The general controls provisions of the Act include requirements for control registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CEHBI does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 900; in addition, FDA may publish further announcements concerning your device in the *Federal Register*.

U.S. Food & Drug Administration  
2020T-0000-0000-0000-0000  
Dated: Spring, 2022  
unclassified



# Awards and Prizes for prosthetics



Nearly **50** invention patents  
**29** core invention patents

CES 2019  
Innovation  
Awards

《Time》The 100 best  
inventions of 2019



reddot winner 2020  
best of the best



In 2022, supported the  
Paralympic Torch Relay



The Gold Prize at  
the China Design  
Intelligence Award of 2023

Red Dot Winner  
2020  
Best of the best

Patent number: 20182101287.4  
Patent number: 201822061260.6  
Patent number: 201822061344.X  
Patent number: 201920065466.8  
Patent number: 201920222670.6  
Patent number: 201922501397.3  
Patent number: 202020066013.X  
Patent number: 202020101936.4

Patent number: 202020102466.3  
Patent number: 202030054968.9  
Patent number: 202111337725.6  
Patent number: 202111482265.6  
Patent number: 202111516063.9  
Patent number: 202111562781.X  
Patent number: 202111562493.4  
Patent number: 202111576932.7

Patent number: 202111586820.X  
Patent number: 202111590701.1  
Patent number: 202111587617.4  
Patent number: 202111610295.0  
Patent number: 202111608161.5  
Patent number: 202220259055.4  
Patent number: 202210132466.1  
Patent number: 202210132468.0

Patent number: 202210170633.1  
Patent number: 202230195970.7  
Patent number: 202210526015.6  
Patent number: 202230294642.2  
Patent number: 202210612029.X  
Patent number: 202210613072.8  
Patent number: 202210582024.7  
Patent number: 202210575280.3

Patent number: 202210581345.5  
Patent number: 202210581267.9  
Patent number: 202211038156.X  
Patent number: 202211044100.5  
Patent number: 202211075911.1  
Patent number: 202211095379.X  
Patent number: 202211104136.8  
Patent number: 202211115244.5

Patent number: 202211147639.3  
Patent number: 202211244556.6  
Patent number: 202311038111.7



New Era for Robots:

## **Dexterous Hand**





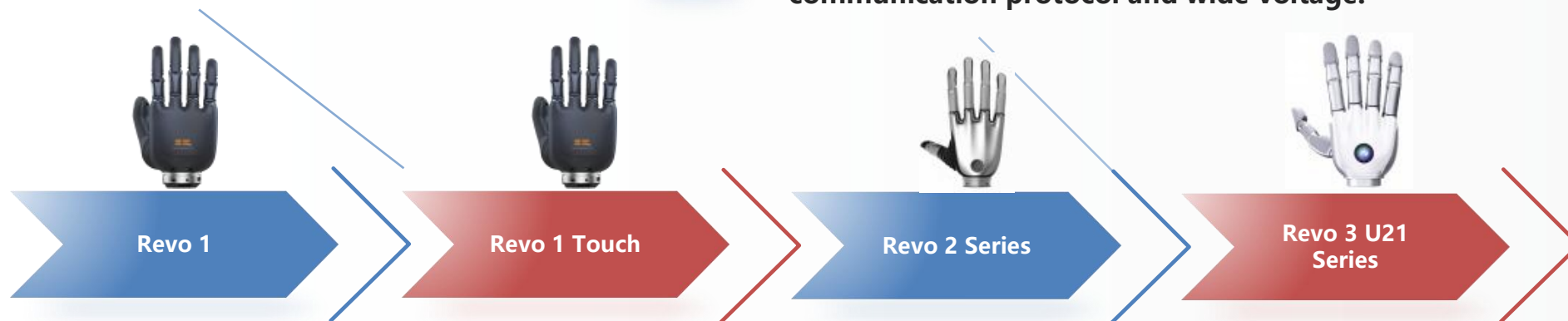
# Roadmap of BrainCo Dexterous Hand



March 2024, Launch of the first-generation dexterous hand Revo 1, starting applications on humanoid robots.



April 2025, Launch of the second-generation dexterous hand Revo 2 series, as the smallest and lightest dexterous hand with multiple communication protocol and wide voltage.



August 2024, Launch of the Tactile Version of Revo 1, integrating multiple tactile sensing solutions such as pressure, vibration, force direction, and contact distance.



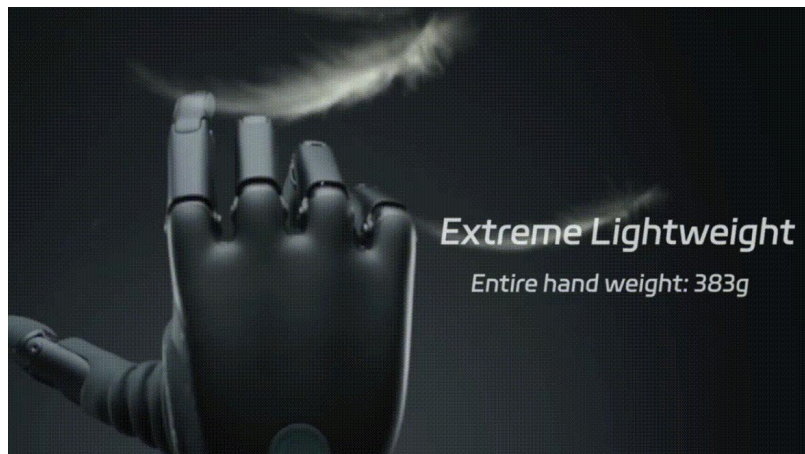
April 2026, Launch of the third-generation dexterous hand Revo 3 series with 21 DoF, full directdrive and backdrivable with full palm tactile sensors and finger vision based sensors.



*BrainCo*  
*Dexterous Hand Revo 2*



## Revo 2 Dexterous Hand



Single-hand weight  
383 grams

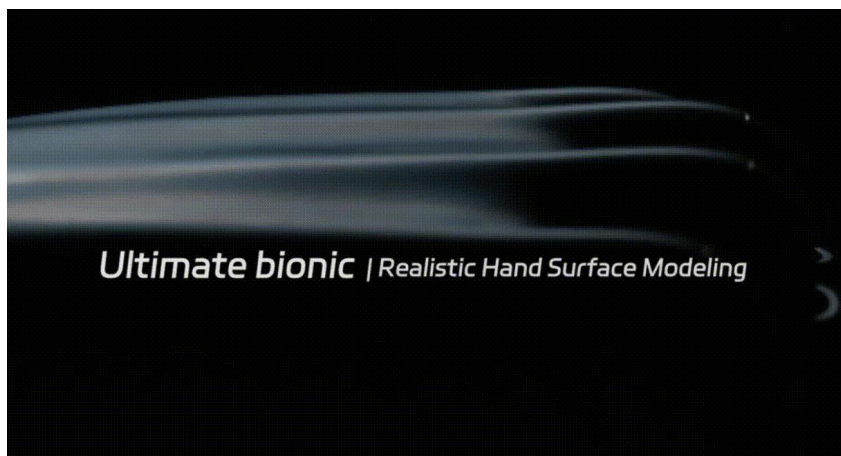


Single-hand size:  
16cm\*7.6cm

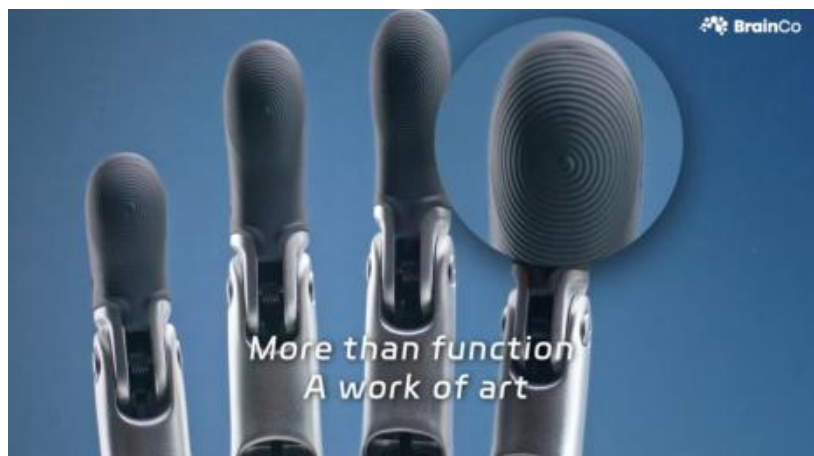


# Revo 2 Dexterous Hand Specification

## Ergonomic **Bionics** (Appearance + Function)



Simulated human-hand  
curved surface



Highly realistic  
fingerprints

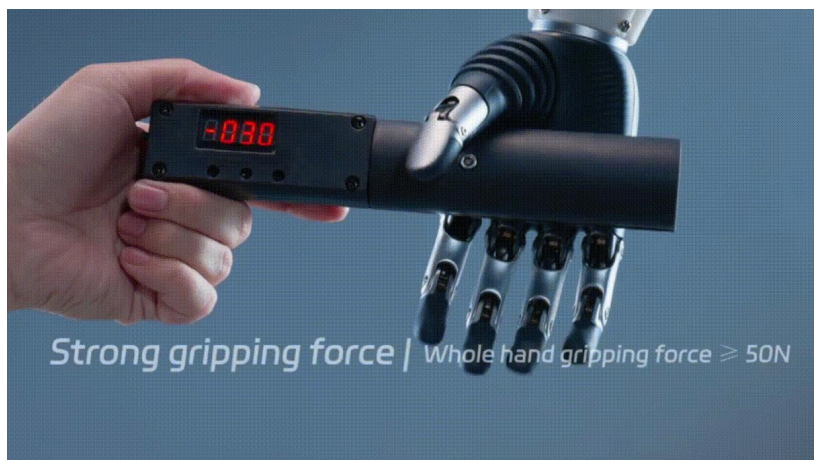


Envelope Grasping

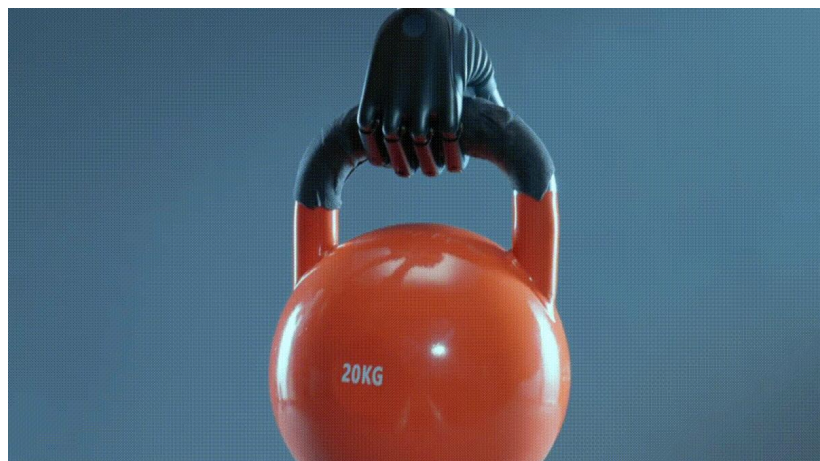


## Revo 2 Dexterous Hand Specification

High gripping force, **weight/lifting Ratio 53** (20KG/0.38KG)



Whole hand grip  
strength  $\geq 50N$



Single-hand load capacity 20KG,  
grip weight ratio 53



Support the robotic arm's  
extreme reach grasp

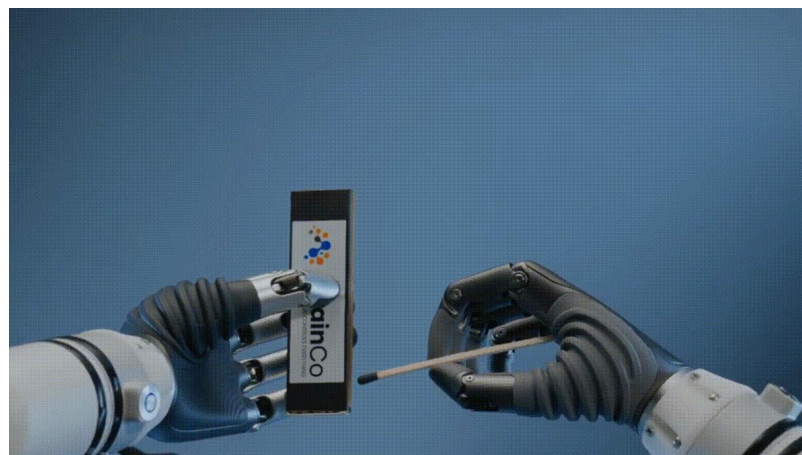


# Revo 2 Dexterous Hand Specification

## Submillimeter-level operational precision



Operating precision 0.1mm



Dexterous operation

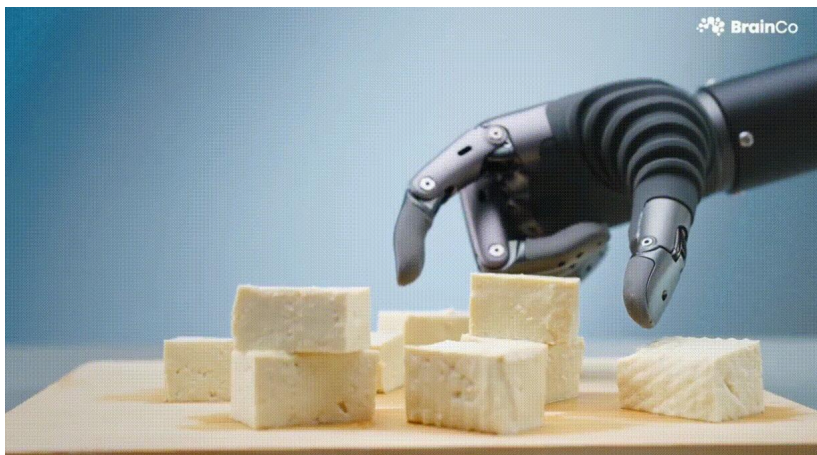


Precise control



# Revo 2 Dexterous Hand Specification

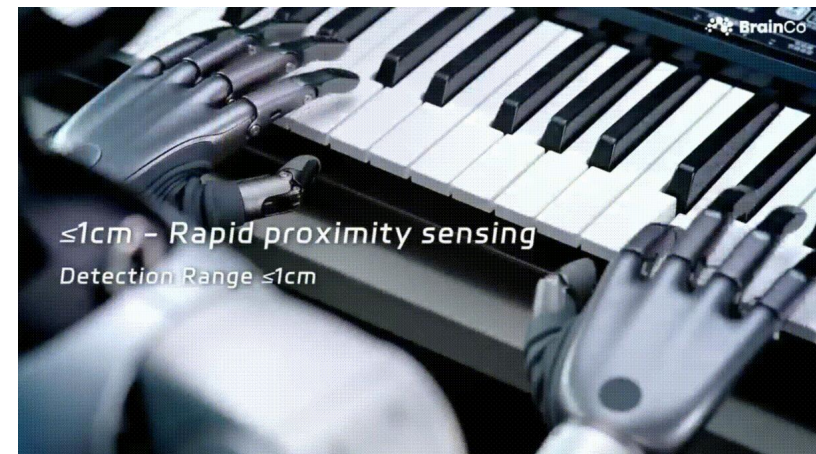
## High sensitivity and resolution



Force Sensitive  $\leq 0.05$  N



Sliding perception time  $\leq 0.05$  S

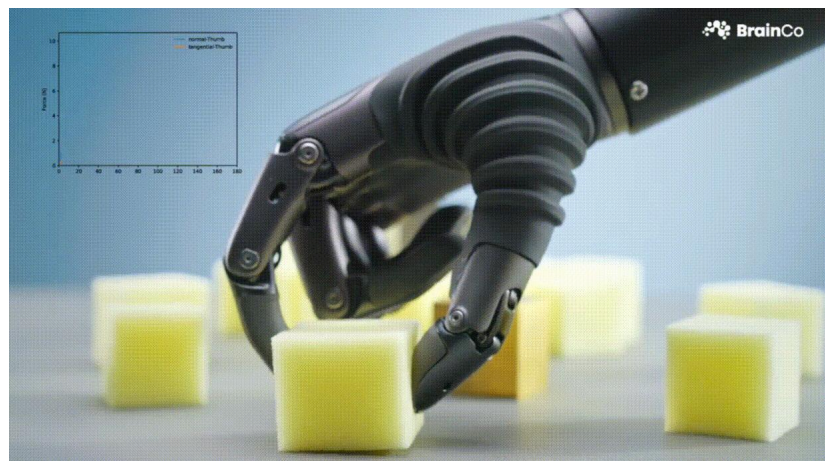


Rapid approaching feedback  
(dielectric constant)



# Revo 2 Dexterous Hand Specification

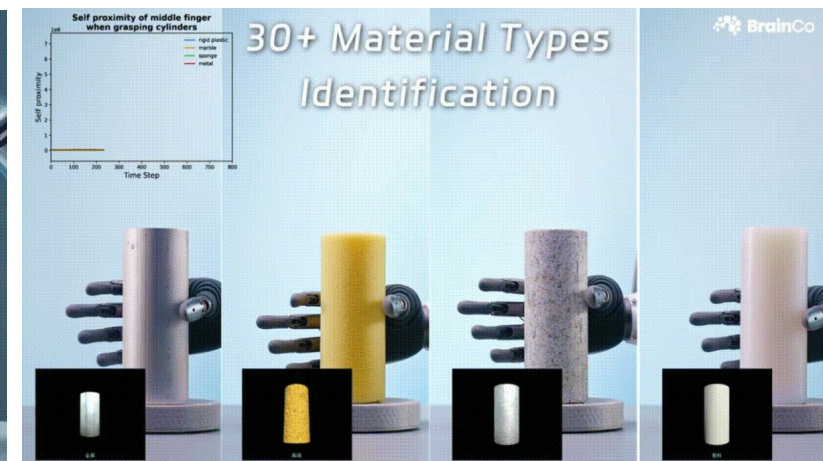
Adaptive grasping algorithm, real-time controlling



Continuous grasping  
of objects in different  
weight/material



Precise adjustment of  
force magnitude



Recognition of 30+ types  
of materials



# Revo 2 Dexterous Hand Specification

## High-speed real-time communication



Multiple communication protocols:  
485/CANfd/EtherCAT MAX 1000 HZ



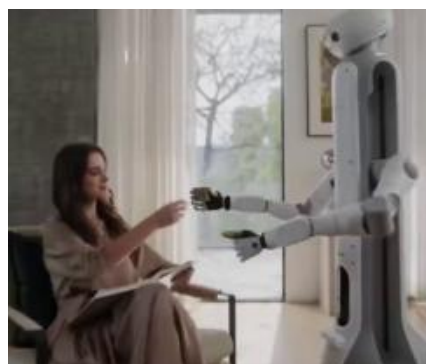
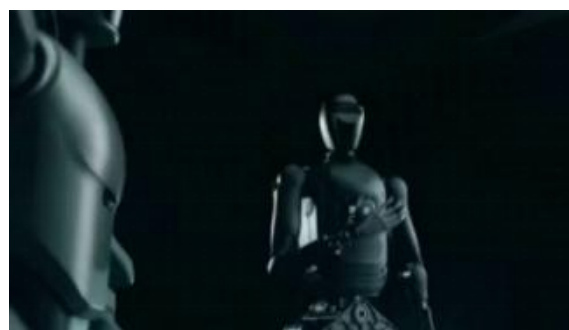
Wide voltage 12-64V



Secondary programming Available  
Python/C/C++  
Linux/Windows/ROS



# Revo 2 Dexterous Hands with robots

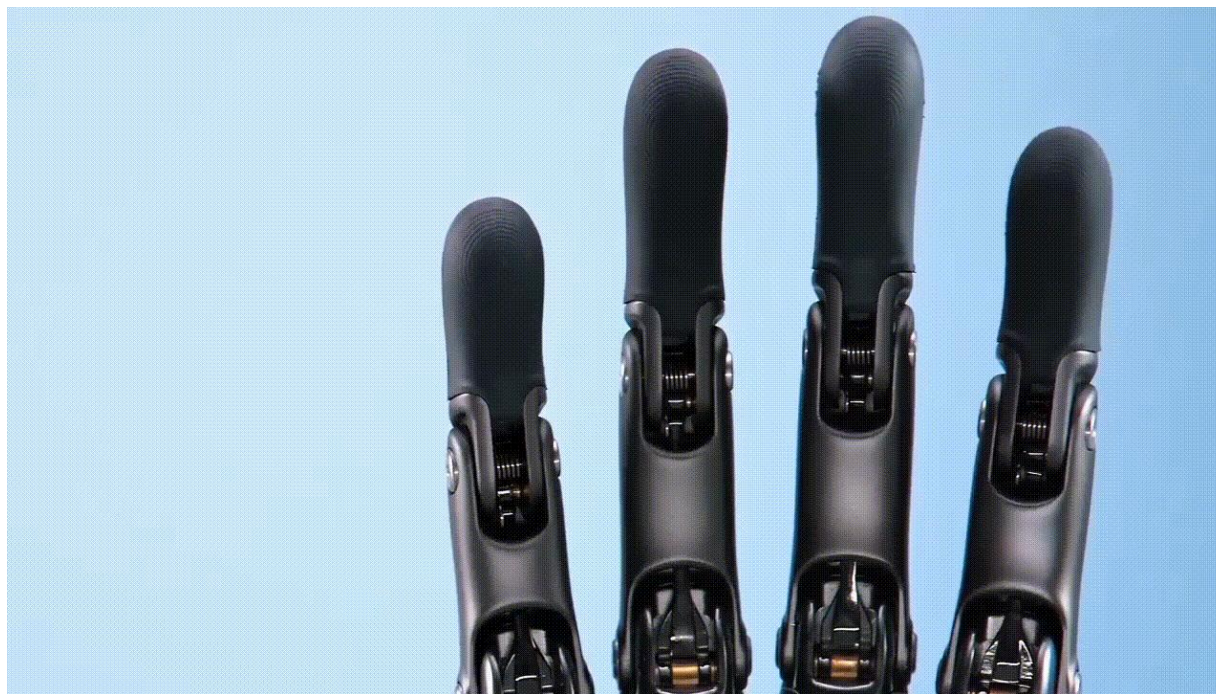




## Self developed Micro Drive Module and Differentiated Transmission Solution



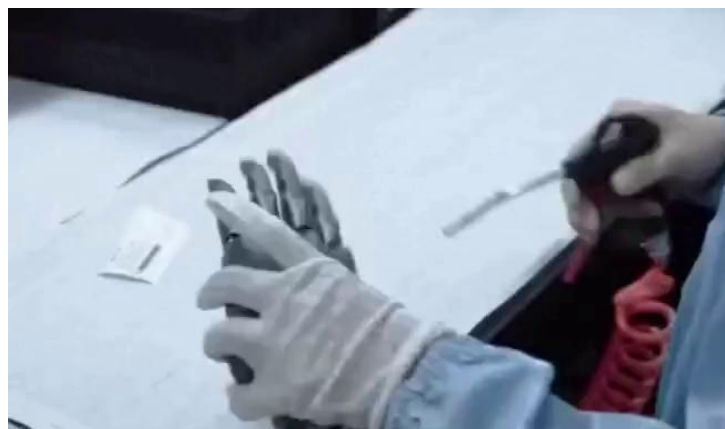
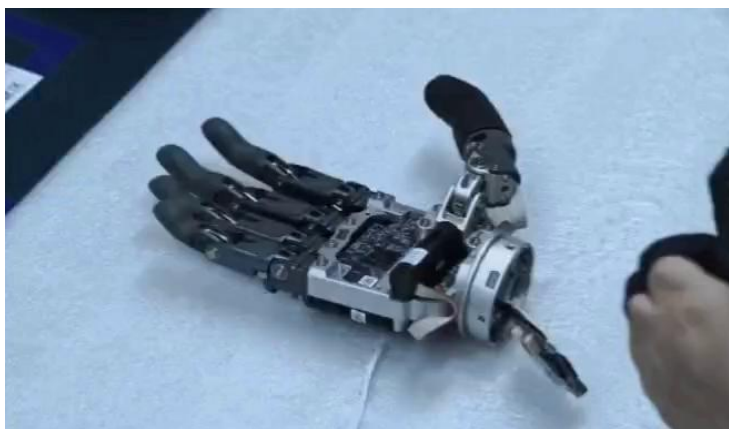
主动自由度\*6  
被动自由度\*5



The four fingers adopt a worm gear scheme to achieve self-locking and anti-collision balance;  
The thumb side swing joint adopts a compact direct drive scheme, while the flexion extension joint adopts a multi head screw transmission



# Professional Production Lines with Strict Quality Control



**The ultimate pursuit of product quality and stability.**





# Key Robots Customers with BrainCo Dexterous Hand

Vedio Clip of BrainCo hand with Robots

UNITREE



XPENG

A ROBOT

GALBOT



DroidUp

HUMANOID

NOETIX 松延



onero



赛力斯



CASBOT



# What kind of Dexterous Hand is needed in Y2026?

When placing the dexterous hand back into the context of “adapting to embodied large models” , what truly affects efficiency during model training and deployment is:

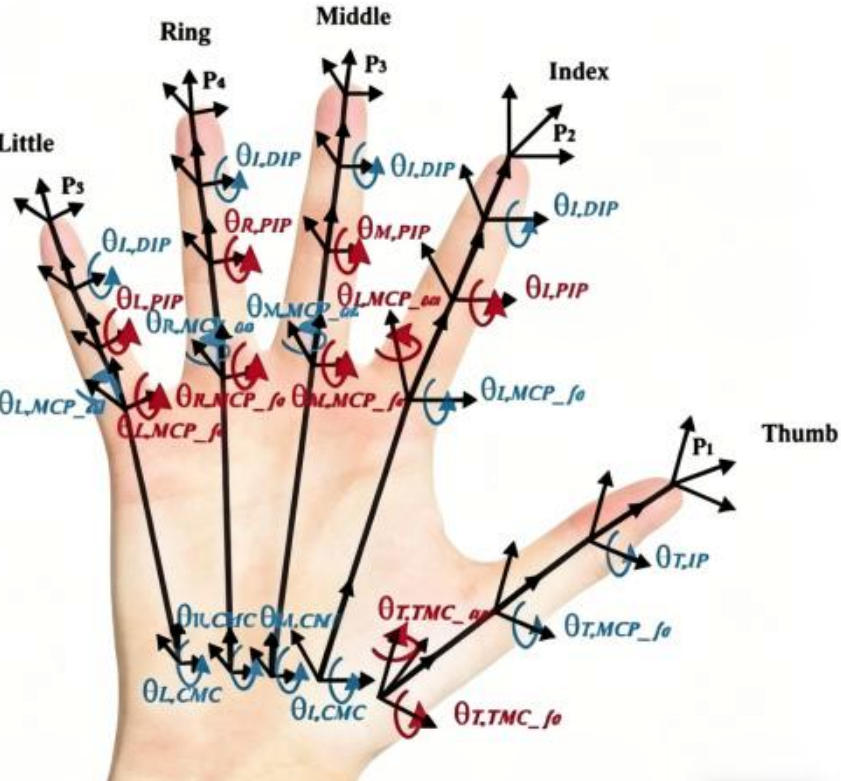
- **whether the structure can align with the human hand,**
- **whether the control can stably reproduce actions,**
- **and whether the data can be effectively learned by the model.**

# **BrainCo** *Next-Gen Dexterous Hand*



## Challenge in Large Model Training:

If a dexterous hand's structure deviates from the human hand, human demonstration data cannot be directly reused. The model requires extra adaptation to bridge the gap, prolonging training and compromising motion stability.

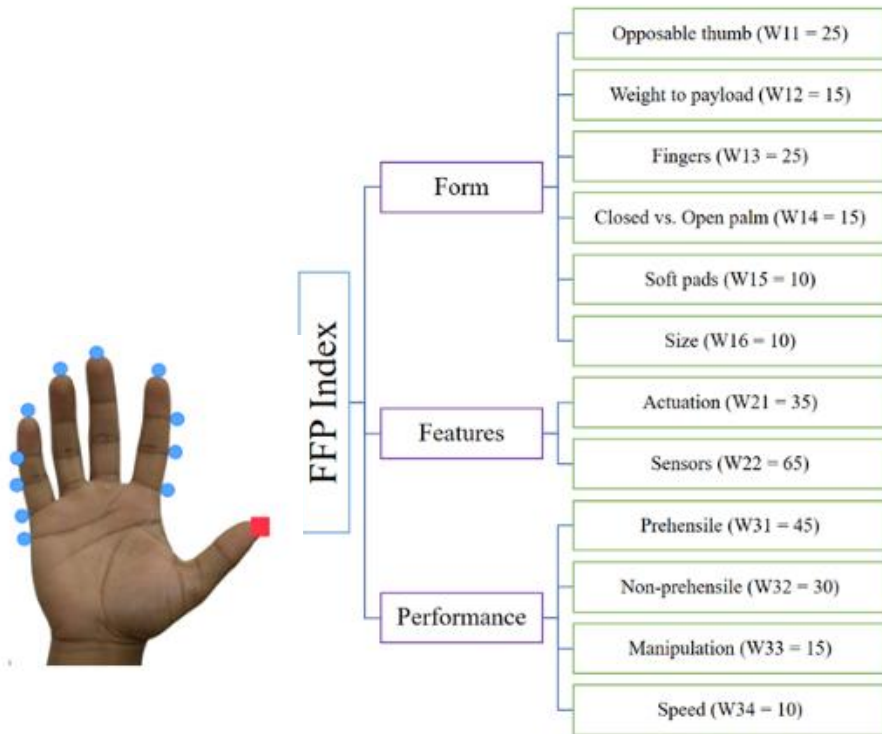


**Revo 3:** Exactly matches the human hand's 21 DoF: 4 DoF per finger, 5 DoF for the thumb. Its full kinematic alignment enables direct imitation learning, significantly shortening the training path.

# Range of Motion: Opposition Mobility – Exceeds Kapandji Benchmark

## Kapandji test

### Thumb and hand dexterity

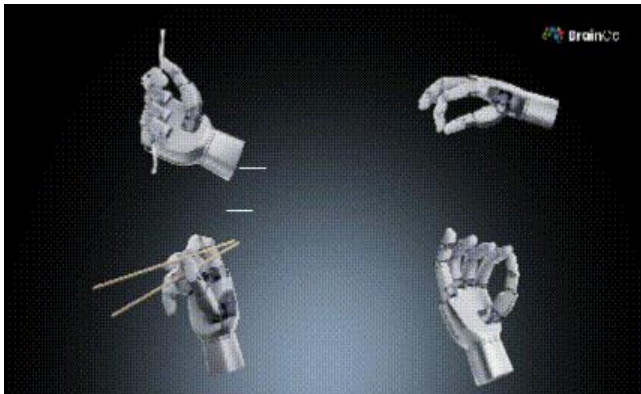


Note: The Kapandji test (Kapandji score) is a standardized hand function assessment that quantifies thumb opposition range of motion. Proposed by French hand surgeon Adalbert Kapandji in 1986, it is applied in clinical rehabilitation and dexterous hand research.

## Revo 3

- Based on overall structural design and high-precision integrated motors, surpasses Kapandji test requirements.
- Achieves all 10 specific contact points between the thumb and the other fingers, plus 2 additional contact points





Based on human hand kinematic analysis, a standard set of 33 functional gestures (e.g., cylindrical grasp, tip pinch, lateral pinch, hook grip, multi-finger spread, etc.) is defined.

The 21-DoF fully direct-drive system, featuring backlash-free direct drive and back-drivability, makes every gesture achievable and repeatable with 100% coverage—no missing or interfering postures.

# High-Performance Micro Transmission

## Direct-Drive Joint

The direct-drive joint uses a transmission-free structure where the motor is directly connected to the joint. This enables more accurate reflection of control commands, making the "same input → same action" relationship more stable, thereby improving the convergence efficiency of imitation learning.

## Back-Drivable Structure

Back-drivability allows the joint to be moved by external forces. The system directly adjusts output force via current, enabling compliant control. The control approach more closely resembles that of the human hand, allowing dynamic adjustments based on real-time feedback during contact, squeezing, sliding, and other interactions—rather than relying on preset fixed trajectories

### More Stable Reinforcement Learning

Compliant control accelerates RL training and simulation deployment, narrowing the Sim2Real gap

### Shortened Imitation Learning Path

Subtle variations in human demonstration are faithfully reproduced, allowing the model to directly learn the manipulation itself.



Reduce Training Cost & Lower Deployment Cost, enabling the path from model training to real-world deployment more directly.

# Self-Developed Integrated Motor & Adaptive Integration Technolog



**3HZ**  
Open/close speed



**20N/70N**  
Single-finger/5-finger  
Grasping Force



EtherCAT/CANfd/RS485  
Wide Voltage **12-80V**

# High-Performance Multimodal Tactile Solution

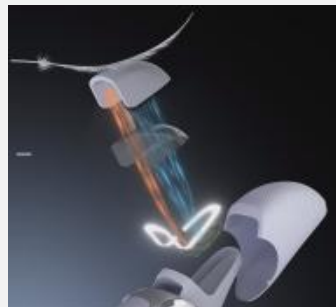
## User-expected hand tactile system

- Reliability (robust, not easy to break)
- Consistency (data acquisition precision remains stable)
- Fast response (low-latency acquisition and transmission)
- High sensitivity (resolve subtle contact force changes)
- High resolution (capturing fine contact details such as contour and texture)
- Multi- dimensional force data
- Whole hand coverage of tactile sensors

## BrainCo's full-hand tactile solution



Full-Palm Tactile Sensing



Fingertip Vision-Based Tactile Sensing

## Revo 3:

## Breakthroughs in Compliance and Tactile Sensing

01

### Improved Finger Softness

Softer, more adaptable fingertips increase contact area and friction, enabling perception of small deformations and friction, and stable grasping of objects with various shapes and sizes.

02

### Full-Palm Tactile Solution

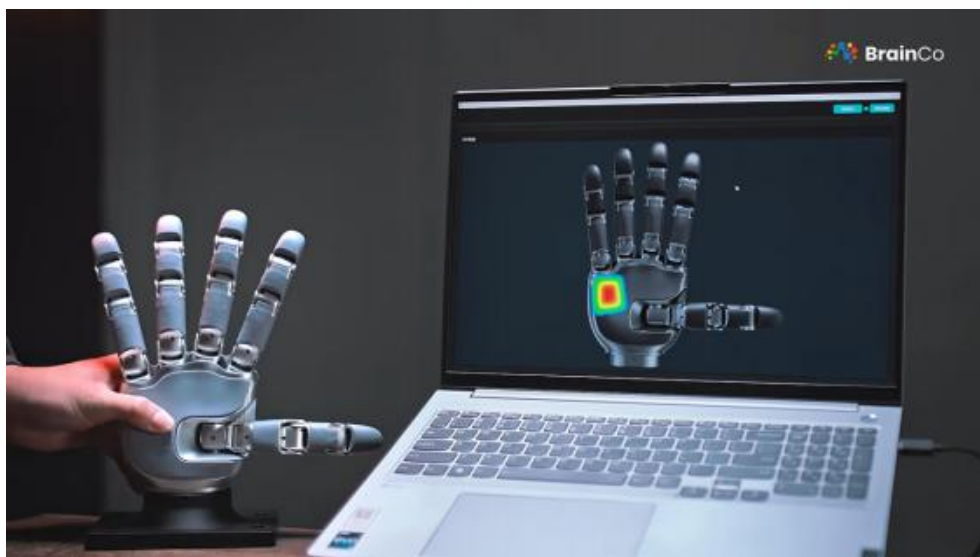
Self-developed full- palm tactile sensing based on arrayed piezoresistive technology. Covers fingertips, finger pads, and palm, providing large- area contact pressure distribution information with a resolution as high as 0.1 N. Achieves extreme durability, long- term reliability, and high- fidelity perception.

03

### Fingertip Vision-Based Tactile Sensing

Tactile signals are derived by imaging the deformation of an elastomer inside the fingertip. Minimum detectable deformation: 130  $\mu\text{m}$ . Capable of measuring shear force, subtle contact torque, and texture recognition – suitable for precision manipulation tasks.

# Full-Palm Distributed Tactile Sensing



- Achieves full-palm tactile perception covering fingertips, fingers, and palm.
- Adopts a distributed flexible tactile array design, balancing sensitivity and coverage.
- Supports multi-zone tactile cooperative sensing, enabling recognition of complex contact states.

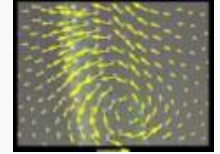
| Items                                            | Parameters |
|--------------------------------------------------|------------|
| Total number of tactile points                   | 389        |
| Fingertip tactile points (thumb / four fingers)  | 22 / 21    |
| Finger pad tactile points (thumb / four fingers) | 51 / 49    |
| Palm tactile points                              | 36         |
| Force Range                                      | 0-20N      |
| Resolution                                       | 0.1N       |
| Sampling rate                                    | 100Hz      |

# High-Resolution Fingertip Vision-Based Tactile Sensing

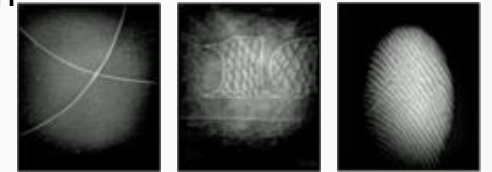


| 指标                          | 参数                 |
|-----------------------------|--------------------|
| Minimum visible deformation | 130μm              |
| Tactile sensing area        | 670mm <sup>2</sup> |
| Force Range                 | 0-20N              |
| Frame rate                  | 100FPS             |

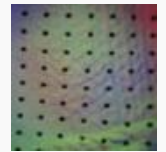
- Based on visuotactile imaging principles, it captures normal and shear force information of the contact area, enabling high-resolution perception of 3D contact force variations.



- Through high-resolution image acquisition and deformation analysis, it achieves fine perception of surface microstructure and texture features down to sub-millimeter resolution



- Supports recognition of multiple contact states including contact, slip, and tiny displacement, providing critical sensory feedback for stable grasping and dexterous manipulation.



- The visuotactile module adopts a modular fingertip-integrated structure with good structural adaptability and scalability, supporting multi-finger collaborative tactile sensing deployment.



# Developer-friendly environment with open-source

## How to Scale:

- Closed-source → poor reproducibility, trial- and- error dependent
- Inconsistent standards → design divergence, rapid iteration
- Protocol engineering split → protocol, training, deployment siloed → weak ecosystem integration

BrainCo Solution: Full stack open source - ready to use, one click deploy.



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## Hardware

3D drawing、URDF

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## Software:

SDK, Demo Algorithm

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## Eco-system

Contact sensing + simulation training

|  <b>Revo Intelligent Dexterous Hand</b><br>Industrial-grade dexterous hand for robotic manipulation.<br><a href="#">Documentation</a> |                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>Dexterous Hand — Open Source Projects</b>                                                                                         |                                                                                                                                                                                          |
| Category                                                                                                                                                                                                                 | Project                                                                                                                                                                                  |
| SDK Examples                                                                                                                                                                                                             | <a href="#">Revo Hand SDK Examples</a><br>Python & C++ examples for Revo 2 / Revo 1, Control Glove, and EMG Armband.                                                                     |
| Firmware                                                                                                                                                                                                                 | <a href="#">Revo Hand Firmware</a><br>Firmware releases for Revo 2 (Basic / Advanced / Tactile). Protocol support varies by variant: RS-485, CAN 2.0, CANfd, EtherCAT.                   |
| URDF                                                                                                                                                                                                                     | <a href="#">Revo 2 URDF (ROS 2)</a><br>Revo 2 URDF description package for ROS 2 and simulation platforms (Isaac Sim, Mujoco, etc).                                                      |
|                                                                                                                                                                                                                          | <a href="#">Revo 2 URDF (ROS 1)</a><br>Revo 2 URDF description package for ROS 1.                                                                                                        |
| ROS                                                                                                                                                                                                                      | <a href="#">Revo Hand ROS 2 Driver</a><br>ROS 2 driver for Revo Hand control.                                                                                                            |
|                                                                                                                                                                                                                          | <a href="#">ROS 2 Control Demos</a><br>ROS 2 Control demos for Revo Hand.                                                                                                                |
|                                                                                                                                                                                                                          | <a href="#">EtherCAT ROS 2 Examples</a><br>EtherCAT driver examples for ROS 2, enabling high-frequency real-time control.                                                                |
| Ecosystem                                                                                                                                                                                                                | <a href="#">Unitree G1 + Revo Hand</a><br>Revo 2 integration with Unitree G1 humanoid (23-DoF Edu and 29-DoF Advanced). Dual-arm and dual-hand ROS 2 control with IK solver.             |
|                                                                                                                                                                                                                          | <a href="#">Unitree G1 Guides: Demo · Tutorial · FAQ</a><br><a href="#">Robot Arm: Revo 2 + 6-DoF Arm · Revo 1 + 6-DoF Arm</a><br>Video demos and example code for hand-arm integration. |
|                                                                                                                                                                                                                          | <a href="#">Teleoperation: EMG Armband · BrainCo Glove · Manus Glove</a><br>Teleoperation via EMG armband, motion capture glove, or Manus data glove.                                    |

# Ecosystem-friendly deployment environment



MuJoCo



ROS

- Revo dexterous hand: full compatibility with mainstream embodied AI ecosystems.
- Simulators: IsaacLab, MuJoCo, ManiSkill — ready-to-use code & assets for Sim2Real , RL and VLA evaluation.
- Deployment: ROS 2 + native SDK, adapts to your stack, no pipeline rewrite.

# Teleoperation ecosystem

## Dexterous Hand MoCap



- ✓ IMU motion capture glove
- ✓ Exoskeleton motion capture glove

## Body Motion Capture



- ✓ Full-body mocap ready
- ✓ Wrist mocap ready

## Robot Integration



- ✓ Compatible with 6/7-DOF collaborative arms/robot arms
- ✓ Compatible with different robot bodies

Growing Ecosystem

# Teleoperation Algorithm Support

## Real-time Teleoperation Demo



Full-stack proprietary algorithms ·  
Continuously updated

### Arm

#### Real-time arm IK solving

Precise pose tracking · Low latency  
Smooth, responsive, no jumping

- ✓ Supports inverse kinematics solving for redundant manipulators
- ✓ Dual mode: Cartesian space / Joint space

### Finger

#### Precise finger retargeting

21-DOF accurate mapping · Intuitive operation  
Precise opposition grip, fine manipulation

- ✓ Millimeter-level fingertip mapping accuracy
- ✓ Adaptive calibration for hand shape variations

Based on ROS 2, supports mainstream simulation platforms such as  
MuJoCo · Isaac Sim

# Revo 3 U21 Series Parameters



| Catalog                    | Items                          | Revo 3 U21                                                        | Revo 3 U21T                      | Revo 3 U21VT                     |
|----------------------------|--------------------------------|-------------------------------------------------------------------|----------------------------------|----------------------------------|
| <b>DoF</b>                 | Total DoF                      | 21 (Fully direct-drive (backdrivable))                            |                                  |                                  |
|                            | DoF Distribution               | Four fingers: 4x4DoFs, Thumb:5DoFs                                |                                  |                                  |
| <b>Size</b>                | Height                         | 220x105x50mm                                                      |                                  |                                  |
| <b>Working Parameters</b>  | Voltage                        | 12-80V                                                            |                                  |                                  |
|                            | Max Current                    | 10A(24V)                                                          |                                  |                                  |
|                            | Active grip force              | >70N                                                              |                                  |                                  |
|                            | Maximumx Fingertip pinch force | >20N                                                              |                                  |                                  |
|                            | Whole hand Load capacity       | 20kg                                                              |                                  |                                  |
|                            | Four fingers Load capacity     | 5kg                                                               |                                  |                                  |
|                            | Repetitive motion accuracy     | 0.1°                                                              |                                  |                                  |
|                            | Joint opening/closing speed    | 3Hz                                                               |                                  |                                  |
| <b>Movement Range</b>      | Five finger pinch              | Four Fingers / Thumb can reach palm (Full score of Kapandij test) |                                  |                                  |
|                            | Minimum grasping diameter      | 10mm                                                              |                                  |                                  |
|                            | Maximum grasping diameter      | 150mm                                                             |                                  |                                  |
| <b>Software Deployment</b> | Communication interface        | EtherCAT / CANfd /RS485                                           |                                  |                                  |
|                            | Communication frequency        | 500Hz                                                             |                                  |                                  |
|                            | Sensors                        | IMU(Mainboard), Temperature(Mainboard)                            |                                  |                                  |
|                            | Control modes                  | Position, MIT force position, Admittance, Zero torque mode        |                                  |                                  |
| <b>Tactile</b>             | Tactile Sensors                | /                                                                 | Full- palm array tactile sensing | Full- palm array tactile sensing |
|                            | Force Range                    | /                                                                 | 0-25N                            | 0-25N                            |
|                            | Resolution                     | /                                                                 | 0.01N                            | 0.01N                            |
|                            | Minimum visible deformation    | /                                                                 | /                                | 130μm                            |

*Born for dexterity,  
destined for the future.*

