Core Technology

Joint Torque Sensor

Pioneering self-developed joint torque sensors, the first robotics company to integrate MEMSsensing technology into robotic arm joints.

10x Sensitivity
MEMS sensor for ultra-precise force detection

4x Stability
Silicon micromelting technology for superior performance

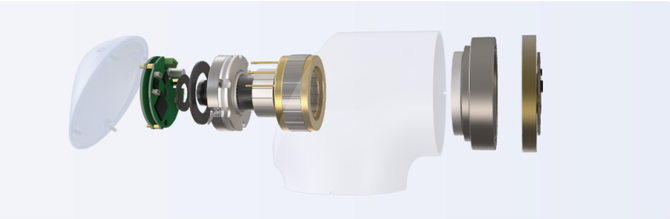
2x Rigidity
Special steel structure design for enhanced durability



Lightweight Integrated Joint Module

Modular design enables rapid and efficient arm assembly.

Lightweight structure makes it the lightest force-controlled module in its payload class.
Built-in EtherCAT communication driver with four-loop control(position, velocity, torque, and current loops), supporting 8kHztorque closed-loop control directly on the driver.
Integrated dual absolute encoders for full closed-loop control, supporting battery-free zero-point recording.
Built-in friction brake holder ensures no drift when powered off and no jitter when powered on.



Impedance Control DynamicTracking Algorithm

With full-body force control and impedance technology, the robot explores the world like a human.

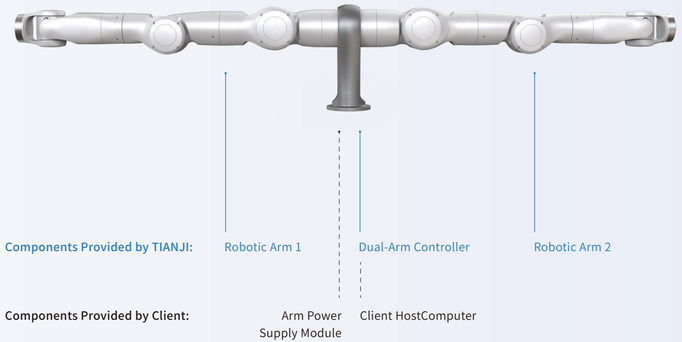
In human-robot interaction scenarios: The robot exhibits natural compliance when interacting with humansreducing impact forces and enhancing both comfort and safety during use.

In operations within unknown environments:Impedance control helps the robot better adapt to environmental changesminimizing oscillations and instability caused by external disturbances. This improves task execution efficiency and reliability.

In scenarios requiring precise force and position control (e.g., precision flexible assembly):Impedance controlensures the robot can adjust flexibly upon encountering obstacles, preventing damage to the object beinghandled or to the robot itself.

Recommended Solution

TIANJI Dual-Arm Controller:



- A single controller operates both arms, featuring a compact design for easy deployment.
- It offers secondary development interfaces that encapsulate complex arm functionalities into APIsenabling users to quickly utilize control features without delving into low-level development. Thissignificantly lowers the development threshold for the Tianji robotic arm and facilitates efficientapplication development.
- Marvin.SDK provides demo examples for typical arm applications, including environment setup, keyfunctions, and code explanations. These resources serve as valuable references to assist developersin building their applications.

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MARVIN

Humanoid Dual-Arm Robot



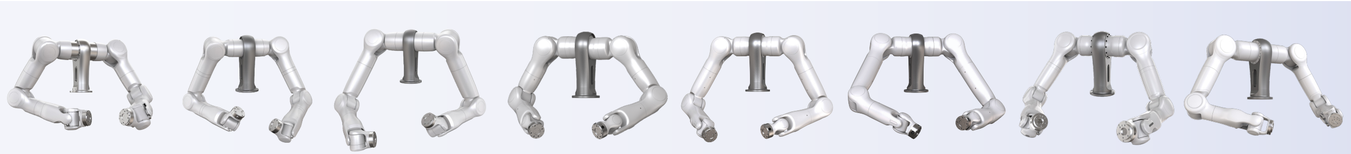
Anthropomorphic Design · Lightweight · Compliant Force Control

Industrial-grade · User-friendly

——Premier Platform for Embodied Intelligence

SHENZHEN TIANJI INTELLIGENCE SYSTEM CO.,LTD.

Body specification



Arm Specifications		Marvin M6S CCS-696	Marvin M6S CCS-809	Marvin M3S Long CCS-920	Marvin M6S Lite CCS-615	Marvin M6S Lite CCS-680	Marvin M6S Lite CCS-750	Marvin M12S CCS-810	Marvin M20S CCS-1050
Number of Joints (per arm)		7							
Rated Payload (per arm)		6 kg	5 kg	3 kg	5 kg	4 kg	3 kg	12 kg	20 kg
Wrist Configuration		Cross-type intersecting-axis							
Working Radius (J2 axis to end flange)		696 mm	809 mm	920 mm	615 mm	680 mm	751 mm	810 mm	1050 mm
Arm Weight (per arm)		12.45 kg	12.7 kg	13.1 kg	8.45 kg	8.65 kg	8.8 kg	19.2 kg	35.6 kg
Max. TCP Speed		2 m/s	2 m/s	2 m/s	1.5 m/s	1.5 m/s	1.5 m/s	2 m/s	2 m/s
Pose Repeatability		±0.03 mm	±0.04 mm	±0.04 mm	±0.03 mm	±0.04 mm	±0.04 mm	±0.05 mm	±0.1 mm
Joint Torque Sensors		Standard on all axes							
Force Repeatability		⩽0.15 N, ⩽0.05 N·m							
6-Axis Force/Torque Sensor (End-Effector)		Optional							
Range of Motion	J1	±178°	±178°	±178°	±173°	±173°	±173°	±170°	±170°
	J2	±120°	±120°	±120°	±120°	±120°	±120°	±120°	±120°
	J3	±178°	±178°	±178°	±173°	±173°	±173°	±170°	±170°
	J4	+60°/-145°	+60°/-145°	+60°/-145°	+45°/-145°	+45°/-145°	+45°/-145°	+60°/-140°	+60°/-145°
	J5	±178°	±178°	±178°	±173°	±173°	±173°	±170°	±170°
	J6	±60°	±60°	±60°	±60°	±60°	±60°	±60°	±60°
	J7	±90°	±90°	±90°	±90°	±90°	±90°	±90°	±90°
Joint Speed	J1	180°/s							120°/s
	J2	180°/s							120°/s
	J3	180°/s							
	J4	180°/s							
	J5	180°/s							
	J6	180°/s							
	J7	180°/s							
Ingress Protection Rating		IP50	IP50	IP50	IP50	IP50	IP50	IP65	IP65
Brake Control		Standard on all axes	Standard on all axes	Standard on all axes	Brakes on J1–J4	Brakes on J1–J4	Brakes on J1–J4	Standard on all axes	Standard on all axes
Power Consumption		400 W (average) 600 W (peak)	400 W (average) 600 W (peak)	400 W (average) 600 W (peak)	200 W (average) 400 W (peak)	200 W (average) 400 W (peak)	200 W (average) 400 W (peak)	1000 W (average) 2600 W (peak)	1500 W (average) 3800 W (peak)
Communication Interface		EtherCAT							
Communication Cycle		⩽1 ms							
Commissioning Software		Supplied with host-computer software for configuration, commissioning and visualization of all 7 axes							
Encoders		Dual absolute encoders							
End-Flange Interface (Handle)		Drag-teach enable button							
End-Flange Interface (Power)		24 V power supply (rated current 3 A)							
End-Flange Interface (Communication)		RS485, CAN FD, EtherCAT							
Operating Voltage Range		48 V (±10%)							
Certifications		CE, ISO/TS 15066, ISO 13849-1 PL d (Cat. 3), EN 60204-1:2018, EN IEC 61000-6-2, EN IEC 61000-6-4, EN ISO 12100:2010							

Product features

Marvin features an innovative cross-axis wrist design that enables highly human-like and flexible motion. This structure eliminates the degree-of-freedom degradation seen in traditional designs, achieving biomechanical equivalence to the human wrist. With a smaller rotation radius, Marvin performs grasping and adjustment movements more naturally, delivering smoother remote teleoperation and greater adaptability across diverse scenarios.



crossed-axis wrist

Humanoid Design & Intelligent Interaction

- **Human-Like Dexterity**

The 7-degree-of-freedom symmetrical design allows the robotic arms to move as flexibly and naturally as human arms.

- **Flexible & Safe Interaction**

Each joint is equipped with a built-in torque sensor, ensuring soft and safe interaction to protect users and their surroundings.

- **Industrial-Grade Performance, Reliable and Worry-Free**

Innovative compliance compensation technology significantly enhances absolute accuracy.Combined with industrial-grade precision and rigidity,the robot delivers outstanding performance in both commercial and industrial applications.

- **Lightweight & Integrated Design**

Featuring a lightweight, integrated jointmodule design, the system offers modularflexibility, easy maintenance,and anoverall effortless user experience.

- **Unrestricted Mobility for AnyEnvironment**

Compatible with various mobilit platforms, seamlessly adapting todifferent work scenarios.

- **Comprehensive SDK Capabilities**

The SDK offers rich functionality, including real-time force control and position control interfaces,supporting control frequencies up to 1 kHz.Ilt provides access to advanced algorithms such as dynamics, kinematics, impedance control, payload identification, hybrid force-position control,collision detection, drag-to-teach, and dual-arm coordination.

Multiple ExpansionOptions and FlexibleConfiguration

The dual-arm end-effectors are equipped with a wide range of communicationinterfaces (EtherCAT, CAN FD, RS485, etc.), making it easy to integrate dexteroushands, 6-axis force sensors, and various actuators. High-current power output interfaces are provided for convenient power supply to end-effectors.



8-Pin End Connector

Internal Cabling

The robot features a large hollow structure, allowing internal routingof camera cables and quick integration of stereo vision systems, whileavoiding cable damage from environmental contact.

