ROBOTERA

www.robotera.com

CREATING A NEW ERA OF ROBOT

About
ROBOTERA

Beijing ROBOTERA Technology Co., Ltd., was established in August 2023, was incubated by Institute for Interdisciplinary Information Sciences, Tsinghua University.
The founder, Chen Jianyu, is a doctoral supervisor and assistant professor at Tsinghua University.ROBOTERA is also the only humanoid robot company in which Tsinghua University holds shares.

ROBOTERA is committed to becoming the definer of native general-purpose embodied intelligent entities, creating a native robot model plus a brand-new hardware platform defined for AI, endowing machine intelligent entities with the most universal and native ability to interact with the physical world, bringing robots into tens of millions of homes, and ushering in a new era of robots.

Founder - Chen Jianyu

Professor Chen Jianyu, dedicated to overcoming "bottleneck" technologies, aspires to promote the independent and strong development of the country's core technologies.

- Assistant Professor and Doctoral Supervisor at the Institute for Interdisciplinary Information Sciences, Tsinghua University.
- He holds a Ph.D. from UC Berkeley, where he studied under Professor Masayoshi Tomizuka, a member of the U.S. National Academy of Engineering, a pioneer in mechatronics control, and the founder of MPC algorithms.
- A leading scholar in the field of robotics and AI, leading cutting-edge technical projects, fully leveraging resources from universities and research institutes to continuously promote technical problem-solving.
- Over 10 years of experience in robotics/AI development.
- The team has published more than 50 high-quality papers in the fields of robotics and AI, including several academic achievements on the deployment and planning of robot large models.
- Multiple papers in NeurIPS/ICML/ICRA/IROS, finalist for the L4DC, IEEE IV IFAC MECC Best Paper Award
- Named on Forbes China's "30 Under 30" list

Why develop humanoid robots?

Maximize Adaptation to Human Environment and Resource Utilization

To simulate human activities to the greatest extent, accomplish complex tasks, adapt to the human environment, and maximize the use of existing infrastructure in human society.

Meeting Human Emotional and Aesthetic Needs, Good User Interaction

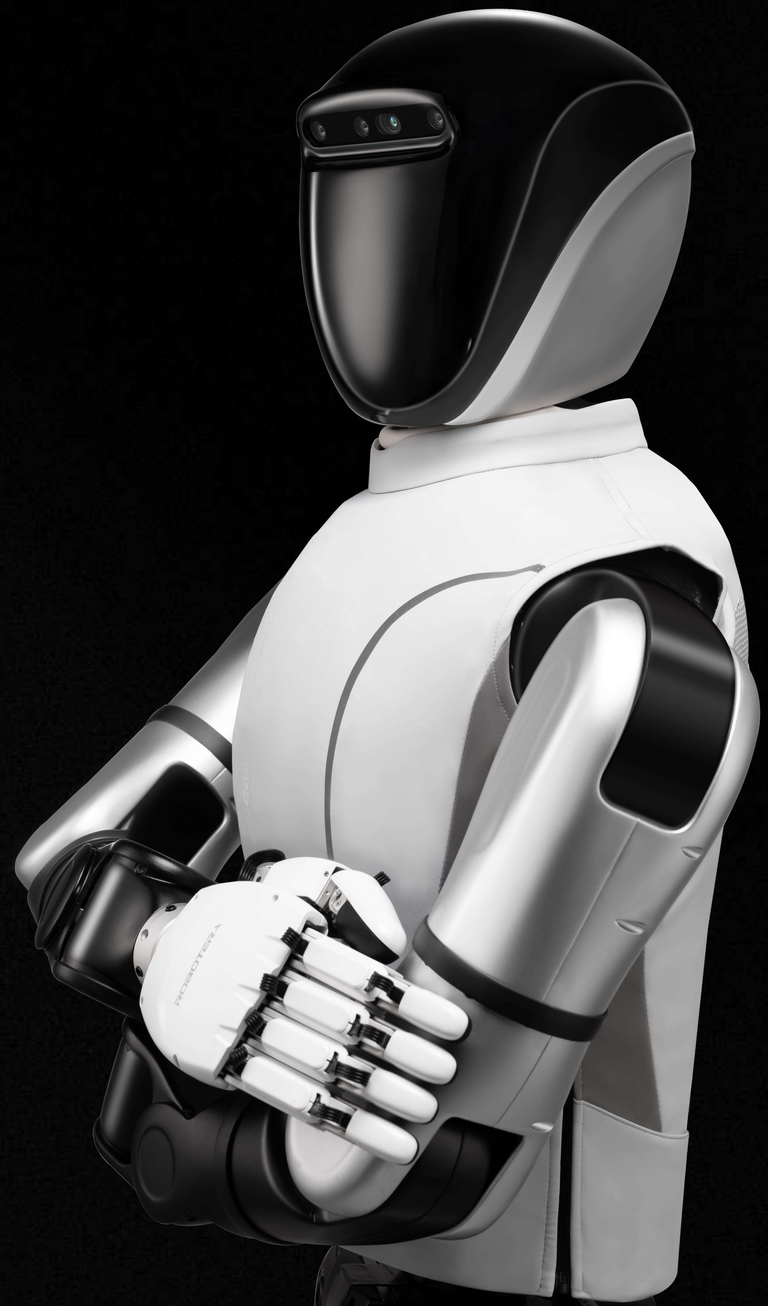
The form most suitable for social interaction, meeting human emotional and aesthetic needs.

High Availability of Training Data and Efficient Embodied Evolution

Data is the core element for achieving embodied evolution. Direct use of human data for training and learning allows for faster data accumulation.

Humanoid robots

are the ideal platform
for general embodied intelligence



What are the advantages of ROBOTERA?

ROBOTERA is committed to becoming
the definer of native general embodied intelligence

ROBOTERA Advantages

1. General Humanoid Robot Body

- **High versatility and autonomous adaptability**
- **Rapid iteration capability**
- **World-leading performance level**

- The most stable humanoid robot : it can flexibly adapt to various environmentsand easily
- The fastest humanoid robot： STAR1's outdoor running speed reaches 3.6 m/s, with a potential speed of 6 m/s, exceeding the running speed of marathon world champions

2. Robot Dexterous Hand

- **Fully Self-driven 12 Joints**
- **12 independent DoF**
- **High-Resolution 3D Tactile Sensors**
- **Powerful Grip and Load Capacity**
- **Designed for AI Research, Born for Humanoid Robots**

3.Robot Foundation Model

- **Large-scale video data and robot data fusion pre-training**
- **Collaborative learning of world models**
- **Addition of robot-specific modalities**

Definer of General-Purpose Embodied Intelligence Bodies

Robot Foundation Model + Hardware Platform Defined for AI

R&D Technical Advantages

AI-native new paradigm, ultimate versatility and simplicity

A brand-new AI-native learning paradigm that offers ultimate generality and simplicity, with ample capability for scaling up.

Full modality, full perception

Integrating visual, auditory, and tactile sensory information to replicate the interaction methods of organisms with the physical world, enabling intelligent agents to perceive and understand the environment more comprehensively and flexibly.

AI-friendly, enhancing Sim2Real efficiency

ROBOTERA has designed a brand-new humanoid robot hardware architecture that is integrated and tailored for AI. From the underlying motors to the bipedal system and dexterous hands, all components have been made AI-friendly. Ensuring that algorithms can be rapidly validated on the hardware significantly improves Sim2Real efficiency and achieves a collaborative evolution of software and hardware.

End-to-end, enhancing adaptability

Using an end-to-end architecture, the intelligent agent can adapt to tasks and environments in real-time without complex programming or manual intervention, greatly enhancing flexibility and development efficiency.

Modularization Efficient Collaboration and Rapid Iteration

The modular design enables rapid migration of algorithms between different generations and modules, laying the foundation for efficient collaboration and rapid iteration of software and hardware in the future, and empowering the technology to be applied across various industries.

Fully self-developed, high cost-performance ratio

All core components are independently developed, with the integration of software and hardware accelerating the efficiency of Sim2Real transfer, achieving controllable costs and the best cost-performance ratio.

Product Performance Advantages

High versatility and autonomous adaptability

STAR1 exhibits autonomous adaptability in a variety of unmodeled environments and is capable of performing diverse tasks such as picking up and pouring water, trimming plants, as well as walking and running on complex surfaces.

Rapid iteration capability

Based on the embodied software and hardware platform, ROBOTERA has rapidly iterated through 6 generations of humanoid robots in just one year.

World-leading performance level

The fastest humanoid robot: Outdoor running at 3.6m/s, surpassing marathon champions' potential.The most "stable" humanoid robot: The first humanoid robot to climb the Great Wall.

Product Line

General Humanoid Robots

More stable, faster, and more accurate

Core Components

Robot Dexterous Hand

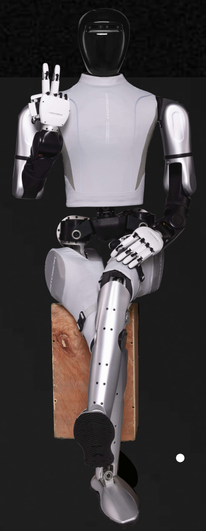
Fully Autonomous, Truly Free

Integrated Joint Module

HLightweight, High Performance, High Reliability

Product Line

[+] General Humanoid Robots



- Bipedal

- Manipulation Platform

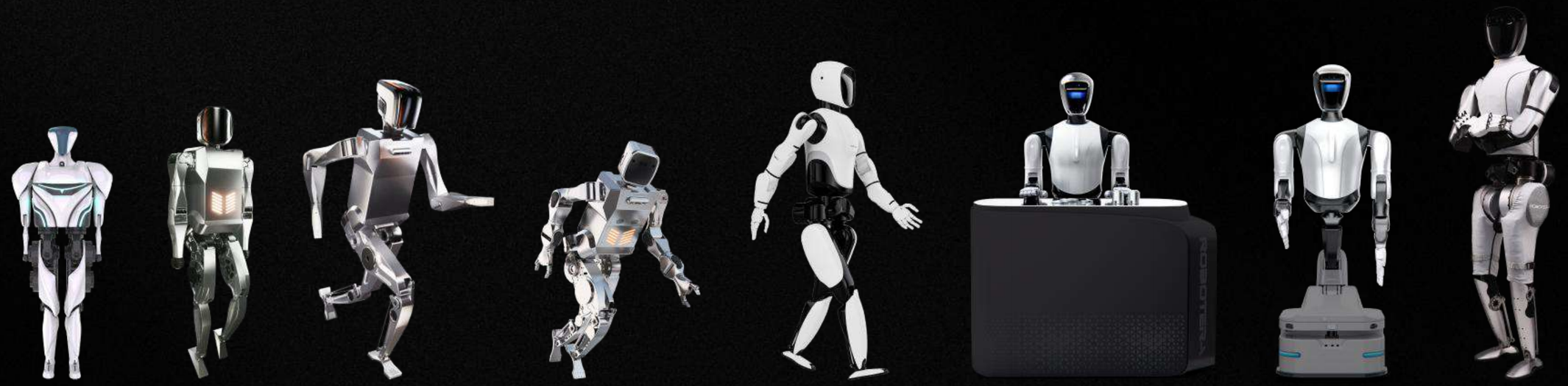
- Wheeled

[+] Robot Dexterous Hand

[+] Integrated Joint Module

ROBOTERA

Based on the embodied software and hardware platform,
General Humanoid Robots have rapidly completed the evolution of six generations of products within a year



2023 ⟷ 2024

General Humanoid Robots

- Bipedal

- Manipulation Platform

- Wheeled

Stay tuned

ROBOTERA STAR1

High Capability Humanoid Robot

ROBOTERA STAR1 is the first product-level high-performance humanoid robot from ROBOTERA, featuring 55 degrees of freedom (DOF). The maximum joint torque reaches 400 Nm, and it also has high-speed performance, with a maximum speed of up to 25rad/s. This makes STAR1 have the most advanced dynamic performance in the industry, outdoor running speed can reach up to 3.6 m/s, and with the 3 DOF waist, it can easily complete stable walking, running, jumping, and other complex movements in a natural gait; the upper limbs include self-developed 7 DOF high-precision bionic mechanical arms, as well as 12 fully active DOF high-performance dexterous hands XHAND1, making STAR1 the most advanced executive body in the field of fine operation tasks in the industry, adaptable to a variety of application needs.

ROBOTERA STAR1 is integrated with Intel's high-performance processors and Nvidia Orin's advanced computing platform, providing excellent computing support for humanoid robots in reinforcement learning, imitation learning, and end-to-end large model research. The robot is also equipped with a variety of peripherals such as fingertip array tactile sensors, depth vision cameras, microphone arrays, and facial interaction screens, as well as comprehensive software and remote operating systems, making it convenient and efficient for training and highly autonomous operation.

ROBOTERA STAR1 is an outstanding representative of the deep integration of artificial intelligence and robot hardware, designed to meet the current and future scientific research challenges, with excellent performance and flexibility.

Product Parameters

Height	171 cm
Weight	63 Kg
Degrees of Freedom	55
Computing Power	275 TOPS, support for external connection
Dexterous Hands	12 active DOF per hand, array fingertip tactile coverage
Sensors	Tactile sensors, cameras, depth cameras
Movement	Supports aerial running, up to 6m/s
Arms	Load capacity >20kg, 7 DOF high-precision bionic mechanical arms
Dexterous Hands	Can swing sideways, large finger movement range, single hand grip >25 Kg
Waist and Neck	3 waist DOF, 2 neck DOF, elegant gait, friendly interaction
Joints	Maximum torque 400 Nm, maximum speed 25 rad/s
whole	160 Kg

The first humanoid robot to climb the Great Wall

The most "stable" humanoid robot:
one network, end-to-end, generalizing all complex terrains

https://youtu.be/nx2YO3twZYs?si=omzvrE4hYP_kaHlo
(Click the link to watch the video)

- Equipped with advanced visual reinforcement learning technology.
- The robot has 54 degrees of freedom throughout its body, providing it with powerful strength and flexibility.
- Self-developed high-torque-density modular joint modules.

Born to run! ROBOTERA STAR1 navigates Gobi Desert with ease

The fastest humanoid robot:
with a pace of 438 breaking the world record

https://youtu.be/qw2y0kceAv0?si=tyGAumSEsZilA_23
(Click the link to watch the video)

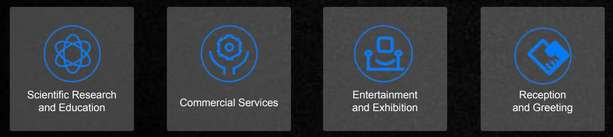
- Through advanced reinforcement learning technology, ROBOTERA STAR1 has achieved a speed of 3.6m/s in outdoor real-world scenarios, which is equivalent to a human running pace of 4 minutes and 38 seconds per mile.
- At the same time, ROBOTERA STAR1's potential speed is 6m/s, exceeding the running speed of marathon world champions.
- This data confirms that ROBOTERA STAR1 is currently the strongest performing and fastest robot outdoors in the world.

ROBOTERA M1

Humanoid Robot Operating Platform

ROBOTERA M1 is an advanced semi-humanoid robot operating platform developed by ROBOTERA specifically for research and service scenarios. This product is equipped with self-developed 7-degree-of-freedom high-precision bionic arms and 12 active-degree-of-freedom high-performance dexterous hands XHAND1, capable of completing complex and delicate operation tasks as easily as a real person. The high-performance processor and computing resources integrated within ROBOTERA M1 provide strong computing support for artificial intelligence research such as imitation learning. In addition, ROBOTERA M1 is also integrated with various peripherals such as depth vision cameras, fingertip tactile sensors, microphone arrays, and facial interaction screens. With a powerful integrated computing system, it can seamlessly collaborate with actuators and controllers to achieve highly autonomous operations. ROBOTERA M1 is widely applicable to various research fields such as dexterous hand fine operation, teleoperation data recording, imitation learning, and human-robot interaction, making it an ideal research platform for the deep integration of artificial intelligence and robot hardware.

Application Scenarios



Product Parameters

Weight	27.5 Kg
Material	Metal frame + plastic casing
Power Supply	DC60V
Height	765 mm
End Effector	12 active degrees-of-freedom dexterous hands (X-HAND1)
Arm Length	515 mm
Arm Degrees of Freedom	7 degrees-of-freedom high-precision bionic mechanical arms
Waist Degrees of Freedom	1 degree-of-freedom, can rotate 90° left and right
Neck Degrees of Freedom	2 degrees-of-freedom, can pitch and rotate 90° left and right
Protective Shell	Enclosed casing

ROBOTERA XHAND1

Fully Actuated, Truly Free

XHAND1 is the first product-level robotic dexterous hand launched by ROBOTERA, featuring high degrees of freedom, high performance, and high intelligence.

Product Features

- **Fully Self-driven 12 Joints:**
  -No under-acutation， reverse drivable, low damping
- **12 independent DoF**：
  -3 on thumb, 3 on index, 2 for rest fingers
- **High-Resolution Tactile Sensors:**
  ->100 point tactile sensors arry for 3D force and temperature
- **Powerful Gripping Force:**
  -One-handed grip up to 80 N and 25 Kg payload
- **High Intelligence:**
  -Verified by reinforcement and imitation learning

Product Parameters

Product Model	XHAND 1
Self-Degrees of Freedom	12
Weight	1.1 Kg
Size	190.36*94*47 mm
Force	15 N(per finger);80 N(entire hand)
Load Capaccity	5 Kg(per finger);25 Kg(entire hand)
Lateral Movement of Index Finger	±15 degrees
Thunmb Movement Angle	Less than 110 ◦
Minimum Grasp Diameter	16 mm

Integrated Joint Module

ROBOTERA, targeting the application characteristics of humanoid robots, has independently developed a series of integrated joints that combine frameless torque motors, precision planetary reducers, high-precision encoders, and drivers into one unit. These joints feature EtherCAT high-speed communication, high-precision force and position mixed control mode, compact structure, high positioning accuracy, high response frequency, and high torque density, making them suitable for robot applications with dynamic variable loads.

Product Features

Frameless Torque Motor:

- 36NM/Kg peak torque density of the motor, 3x TQ Drive
- Core indicators rank first in China

Low Reduction Ratio Speed Reducer:

- High transmission precision
- High efficiency (high energy efficiency)
- Compact structural design
- Good control response

High Power Drive and Control Unit

- High power density and high explosive power
- High precision position/torque control
- Low cost and compact structure
- Can replace Elmo

High Performance Hollow Cup Motor

- High power density
- Lightweight
- Compact structural design

Product Parameters (The product parameters for two models)

Model	15017	10520
Bus Voltage V	60	60
Rated Power W	3250	595
Joint Rated Speed rad/S	25	7
Joint Rated Torque NM	130	85
Peak Phase Current A	29	19
Joint Peak Torque NM	400	255
Joint Torque Constant	2	5.6
Joint Module Size mm	Φ180*64	Φ120×69
Communication Method	EtherCAT	EtherCAT

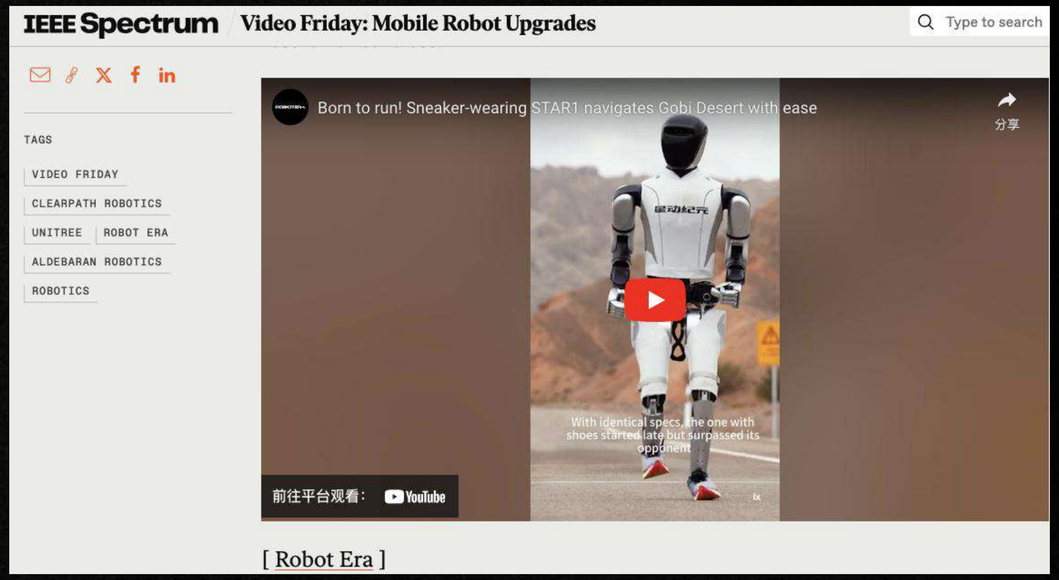
Appearing at the world's authoritative industry exhibitions

Featured on Mainstream Media China Central Television

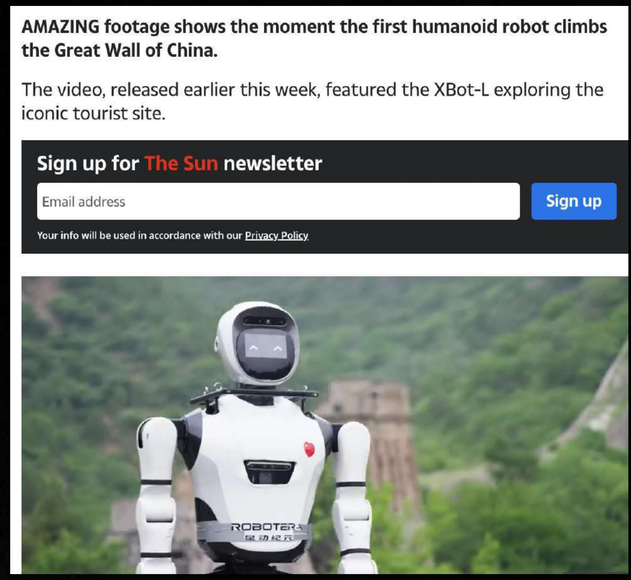
Media coverage

BBC

IEEE Spectrum



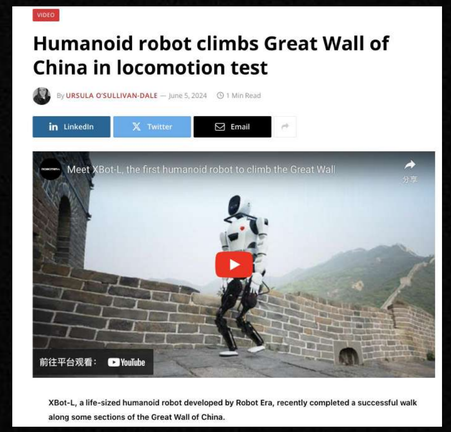
The Sun



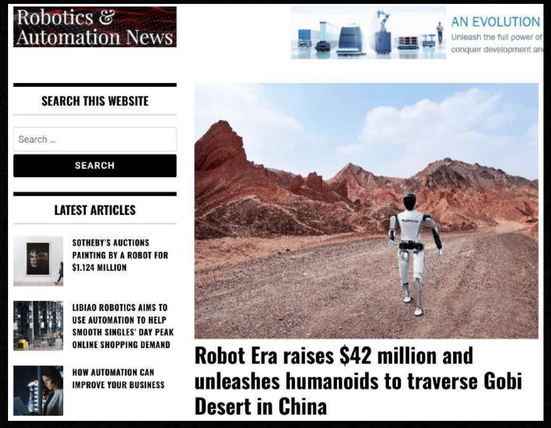
DealStreetAsia

NEW ATLAS

ROBOTICS AUTOMATION

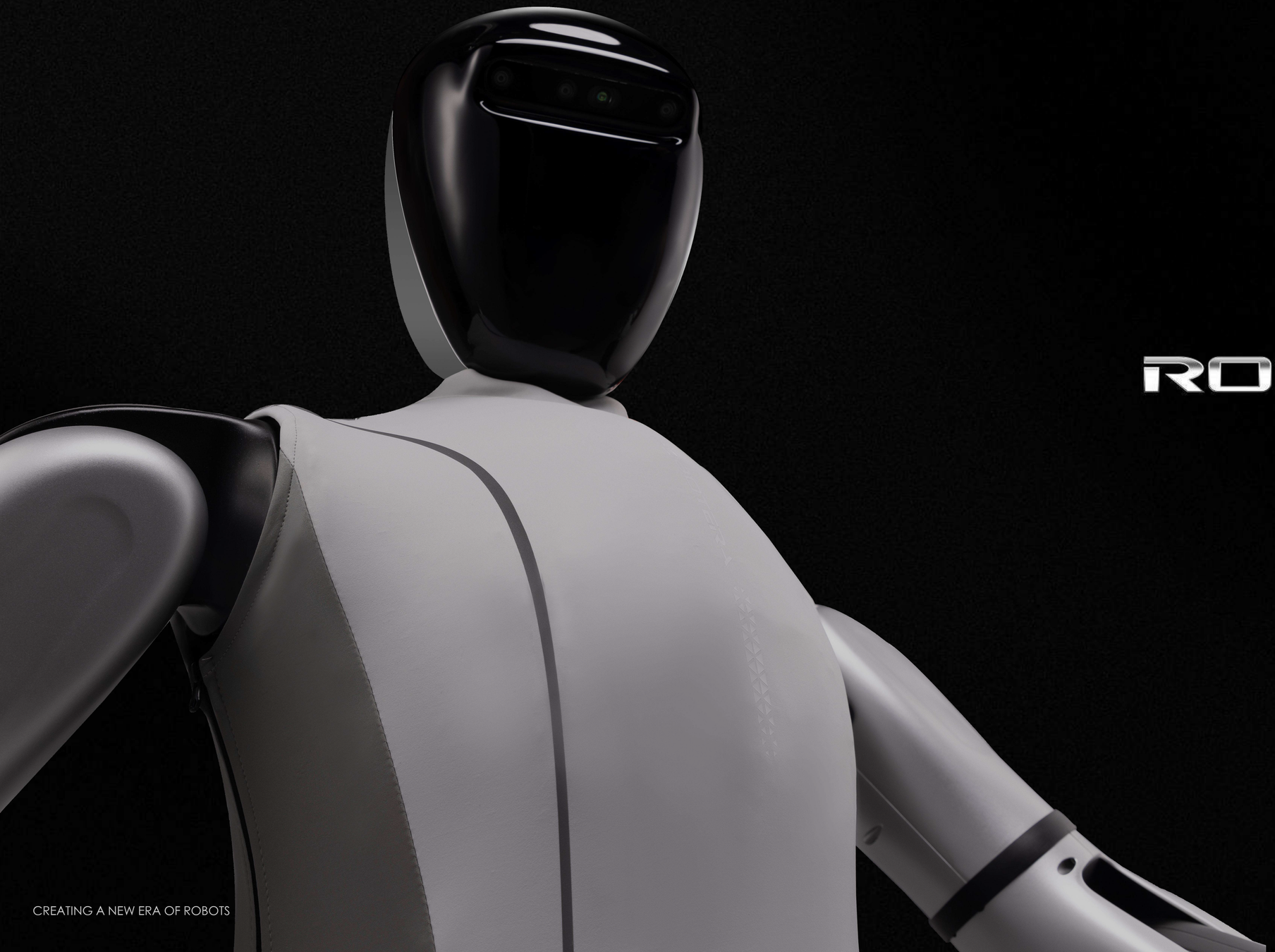


Robotics and Automation News



Honors for ROBOTERA

- QuantumBit Intelligent Future Conference "Top 20 Artificial Intelligence Startups of the Year"
- Fourth China Robotics Industry Annual Conference "Top 50 Most Investment-Worthy Enterprises"
- Fourth China Robotics Industry Annual Conference "2023 Robot Technology Breakthrough Award"
- Eleventh "Dongsheng Cup" International Entrepreneurship Competition "Most Creative Award"
- 2023 Beijing Humanoid Robot Innovation Center , Future Industry Innovation Task Champion
- 2023 World Robot Expo "Debut New Product - Little Star Humanoid Robot"
- 2024 First China Humanoid Robot Industry Conference - Humanoid Robot Intelligence Innovation Award
- 2024 Sino-European Humanoid Robot Innovation Pioneer Award
- 2024 China Humanoid Robot Enterprise Comprehensive Strength Ranking Top 10
- 2024 China's Most Investment Potential Robot Company Top 20
- 2024 AIGC Innovative Enterprise List



ROBOTERA

Contact Us

MKT@robotera.com

xhand@robotera.com

www.robotera.com

Official Web
www.robotera.com

ROBOTERA
Branding Manual

CREATING A NEW ERA OF ROBOTS