# Fourier GR-1

## General-Purpose Humanoid Robot
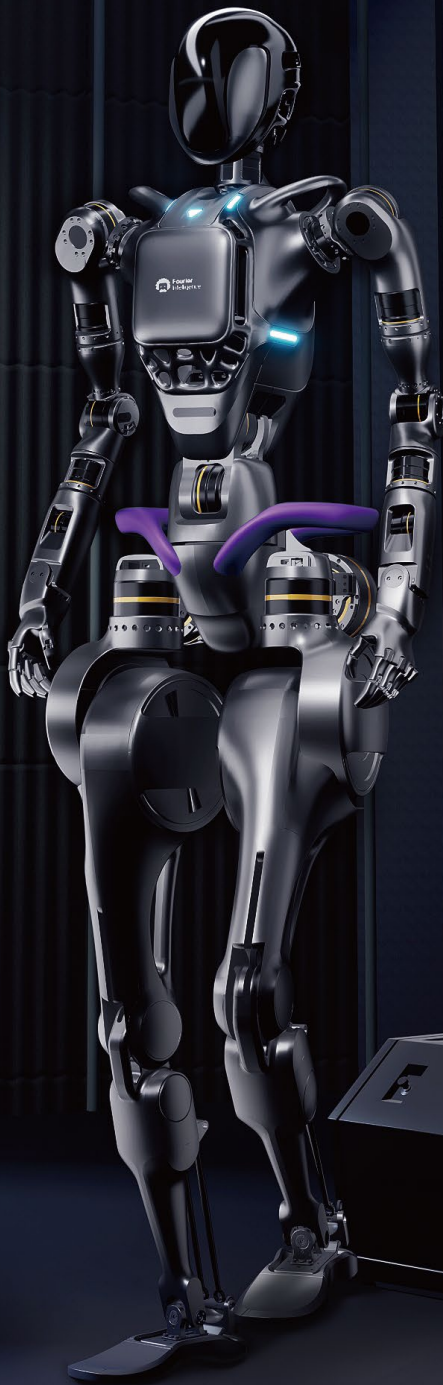
# FOURIER GR-1

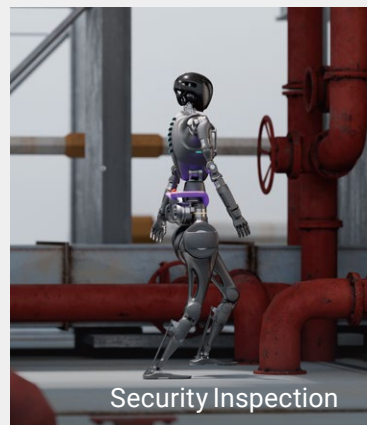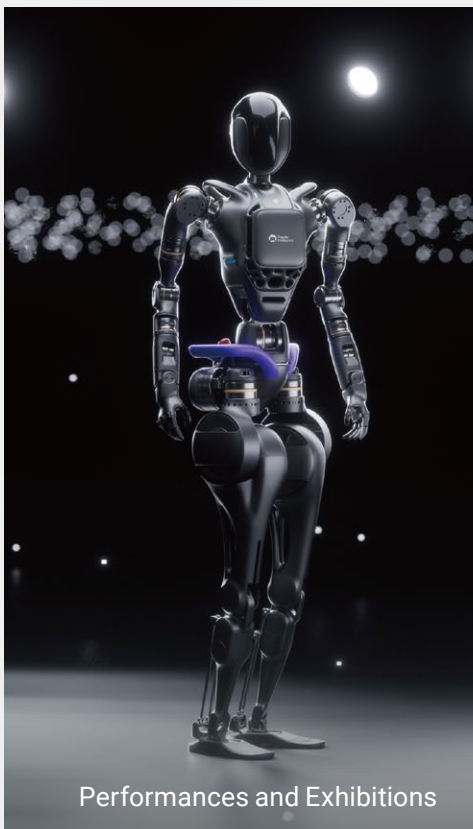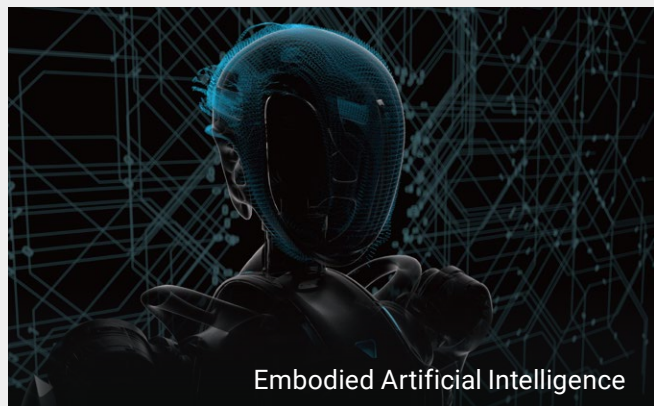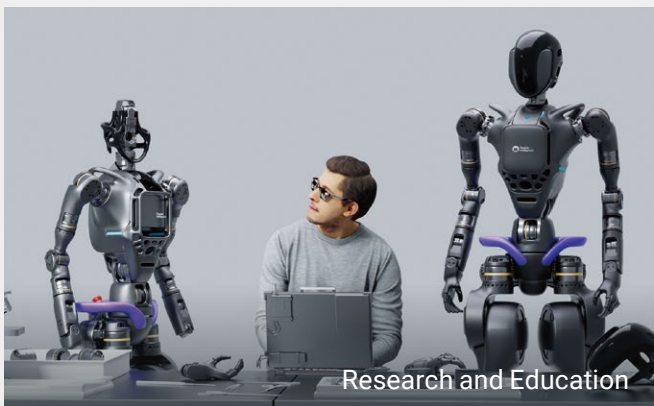The Fourier GR-1 stands out among its predecessors as the few robots capable of achieving widespread commercial application. With its versatile body structure and advanced motion control capabilities, the GR-1 can execute a wide range of motion with 54 DOFs. Coupled with a peak torque of 230N.m, this enables the GR-1 to excel with high agility and dexterity to avoid obstacles and traverse through various terrains.

## Application Scenarios

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Research and Education


Embodied Artificial Intelligence


Performances and Exhibitions


Robot Receptionist


Security Inspection


Medical and Rehab
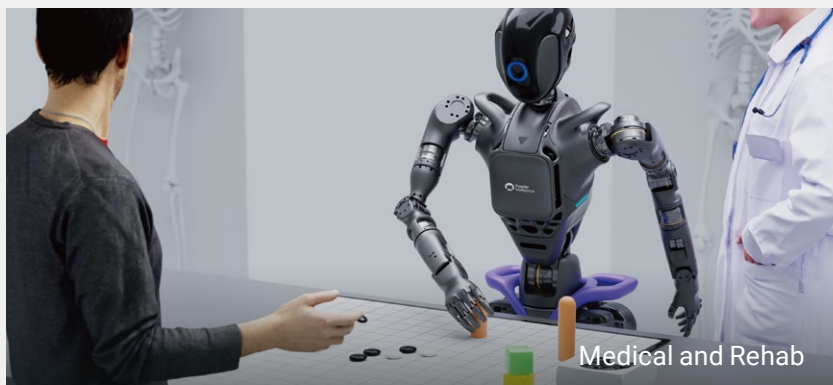
# Versatile biomimetic form
# with up to 54 degrees of freedom

—

Up to 54 degrees of freedom throughout the body, capable of simulating various human movements, including turning the head, twisting the waist, grasping, running, jumping, and other humanoid motions.

## 3
### Head DOFs

Head movement includes pitch, roll, and rotation for flexible perception and interaction.
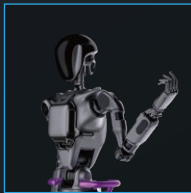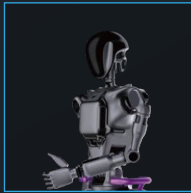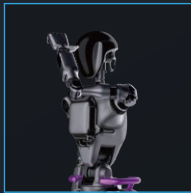
## 7*2
### Arm DOFs
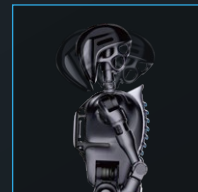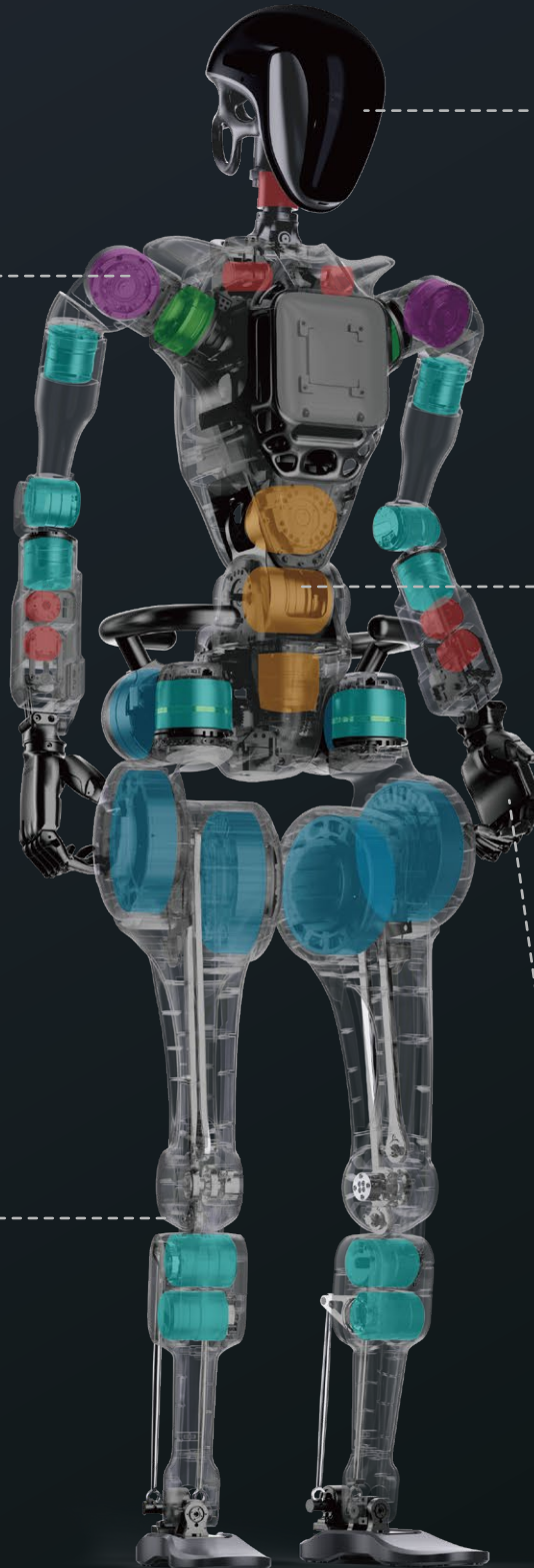
7 degrees of freedom design, end-effector capable of reaching any position and angle in three-dimensional space.

## 3
### Waist DOFs
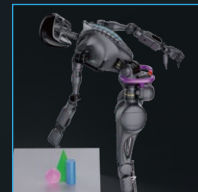
Designed for performing tasks and enables 360-degree observation without movement.

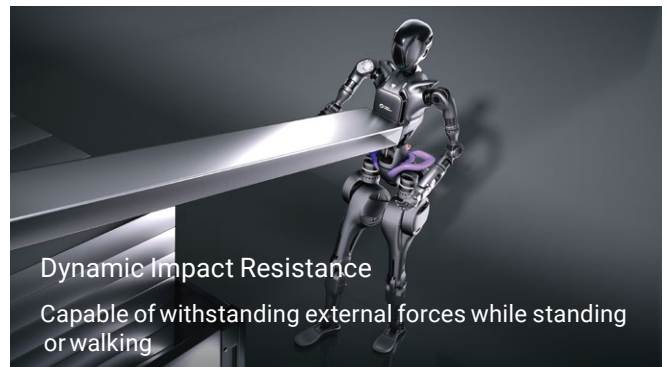## 11*2
### Hand DOFs

Human-like hand design for versatile grasping.

## 6*2
### Leg DOFs

An intricate ankle design to adapt and traverse on various terrains.

# Dynamic Balance Algorithm,
# Highly Adaptive to Surrounding Environments
—

In unstable, unassisted, and highly disruptive environments, the innovative dynamic coordination self-balance algorithm allows the robot to maintain dynamic equilibrium, expanding its applicability to a wider range of scenarios.



### Obstacle & Collision Avoidance
Obstacle avoidance through visual perception



### Multi-Terrain Adaptability
Uneven surfaces such as grass and gravel



### Steady Ascents and Descents
With slope stabilisation algorithms



### Dynamic Impact Resistance
Capable of withstanding external forces while standing or walking
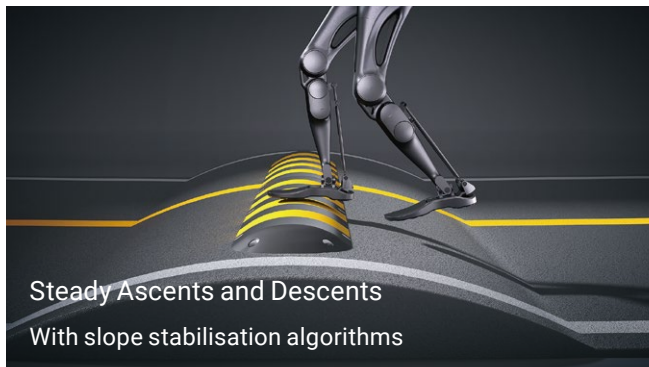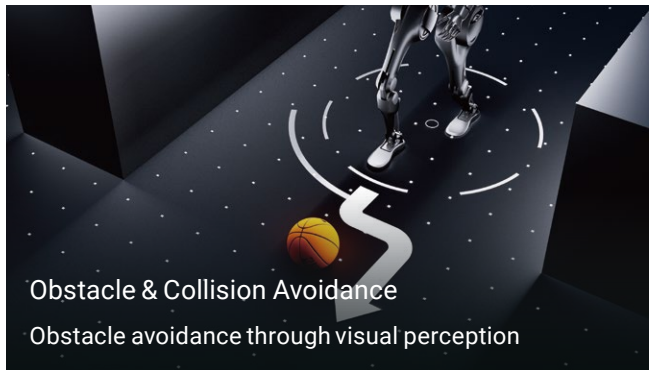
# Four motion modes,
# With an Extensive Offline Action Library.
—

Predefined rich action library for twisting, squatting, gripping, etc. in four motion modes: unassisted standing, dynamic locomotion, movements in standing, and end-effector manipulation



Unassisted Standing



Dynamic Locomotion



Movements in Standing



End-effector Manipulation
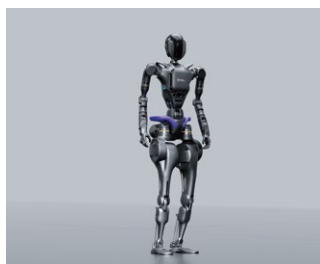
# Human-like Gait, Walking with Straight Legs, Wider Field of Vision and Power Efficiency

—

The GR-1's motion control algorithm simulates natural human gait patterns, enhancing head stability during walking, giving a wider field of vision, and optimising energy consumption.



Low perspective

High energy consumption

Bent-leg, Raised-leg Walking
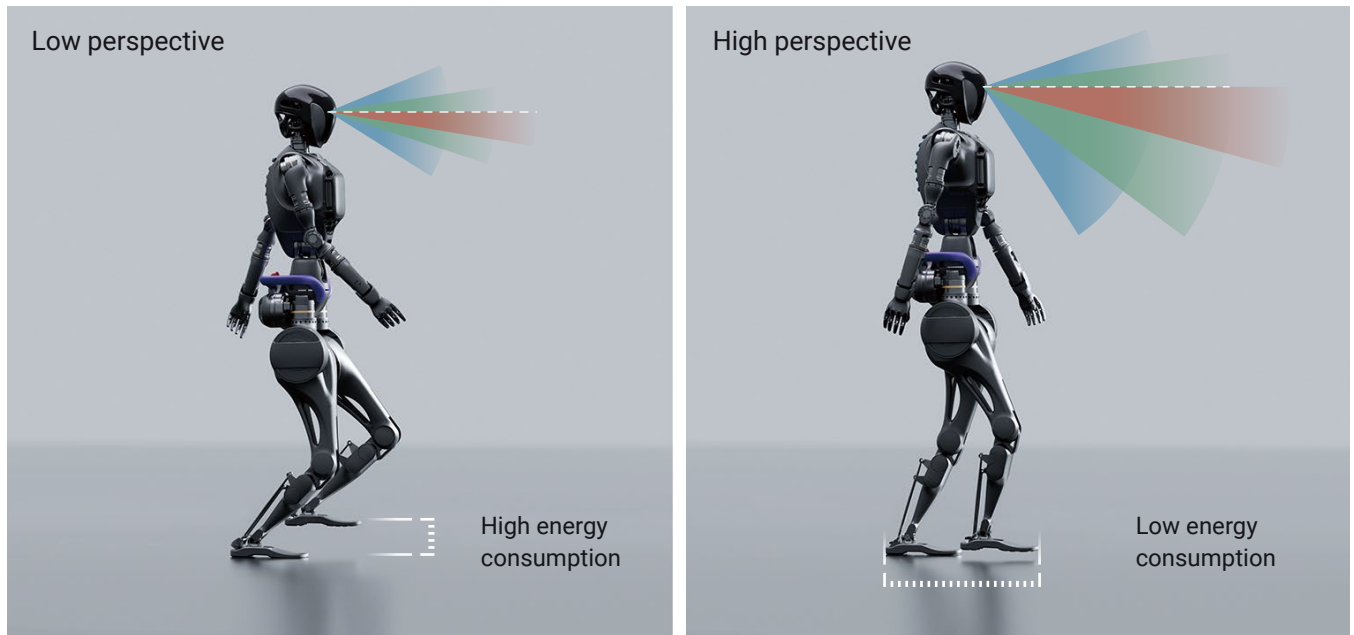


High perspective

Low energy consumption
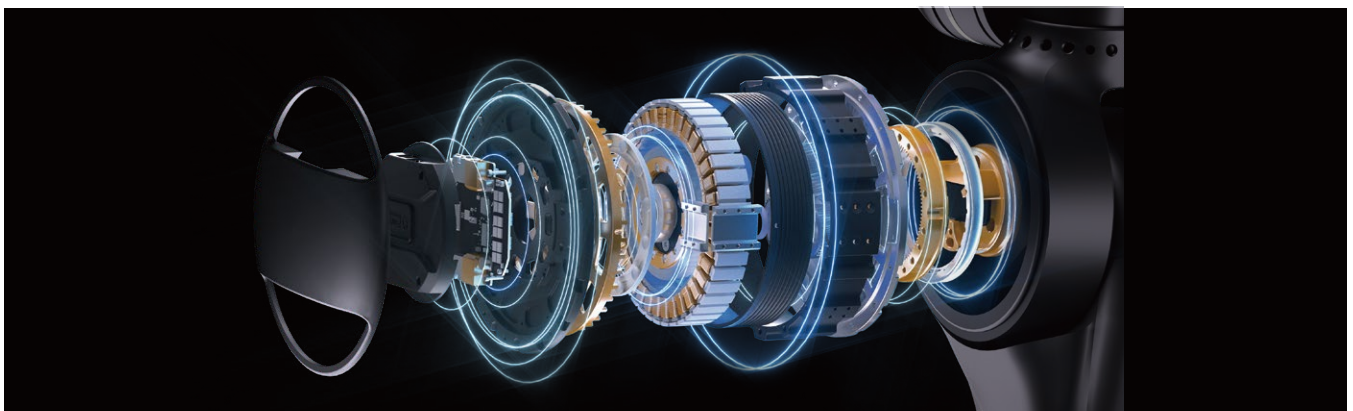
Straight-leg, Leg Translation

# In-House High-Performance FSA Actuators, Precise Execution of Complex Movements

—

Incorporating 32 high-performance integrated actuators (including motors, drivers, reducers, and encoders), with a maximum peak torque of 230N.m, high dynamic response capability, achieving precise force control.

# AI-Powered Speech & Visual Processing, Enhancing Human–Robot Interactions

—

Equipped with a GPT multimodal large language model (LLM) with advanced semantic knowledge, natural language processing, and logical reasoning for automating robot tasks. The LLM enables natural human-robot interaction via the high-definition curved display.

**Audio Sensors**
On-board speech recognition system

**Visual Sensors**
Depth camera Intel® RealSense™

**Display Module**
High-definition curved display

**Speaker**
Clear, crisp audio

Fourier Intelligence

# Visual Environmental Perception,
# Visible Obstacle Avoidance and Grasping.

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The depth vision camera, combined with AI vision algorithms, rapidly identifies different objects, providing comprehensive environmental awareness capabilities, including obstacle avoidance and object manipulation.
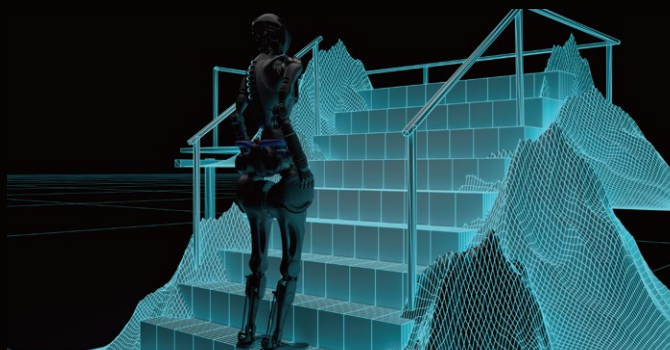


Visual obstacle avoidance
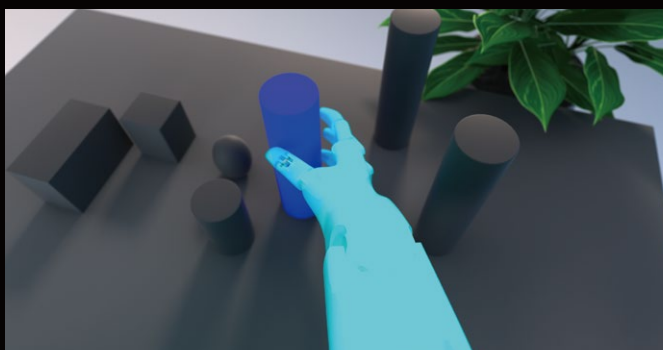


Visual object manipulation

# Open Platform,
# Accelerating Future Innovations

—

Its open platform and underlying SDK support further development and innovation by external developers. This allows endless possibilities and collaborations of AI and robotics, helping to solve real-world problems.



| Autonomous control | | | |
|---|---|---|---|
| Graphical programming | Cluster control | Proxy control | Embodied intelligent entity |

| Body | | | | | |
|---|---|---|---|---|---|
| Head interaction | Joint control | Upper limbs | Dexterous hand | Environmental awareness | Self-perception |

| Action library | |
|---|---|
| Motion control | Operation |

Network

# Expandable Hardware,
# Supporting Infinite Possibilities
—



Six-dimensional force sensor

Laser radar

# Multi-Device Control App,
# Intelligent Interaction, Easy to Get Started
—

Supports multi-device control for seamless motion control, high-definition video transmission, and user-friendly control, enabling the user to easily control the GR-1 when required.
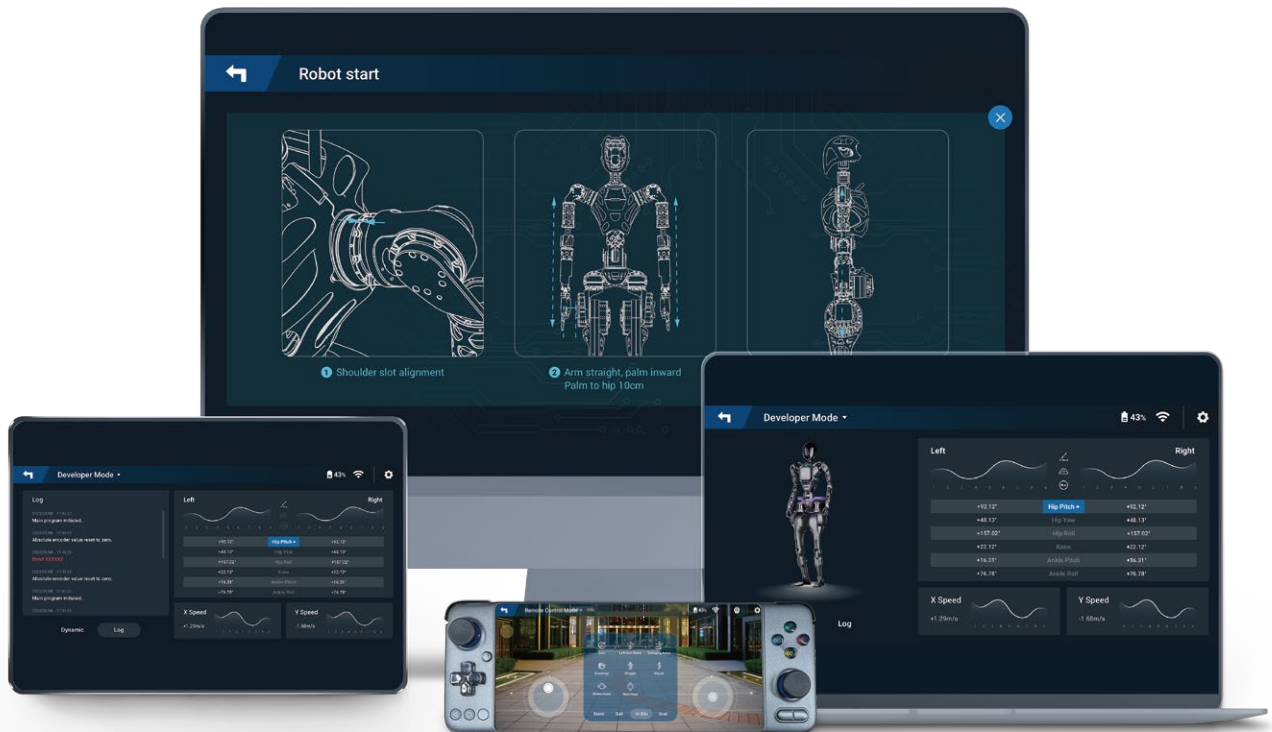
# Based on Robotic Research Platform
# Quantifying Robot Mobility

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The roboticresearchplatform Integrates a six-axis motion platform, six-component force plate, adaptive treadmill, dynamic weight support, and motion capture system to conduct research and further development of motion control for GR-1.
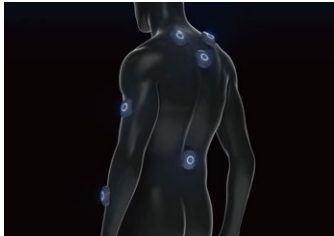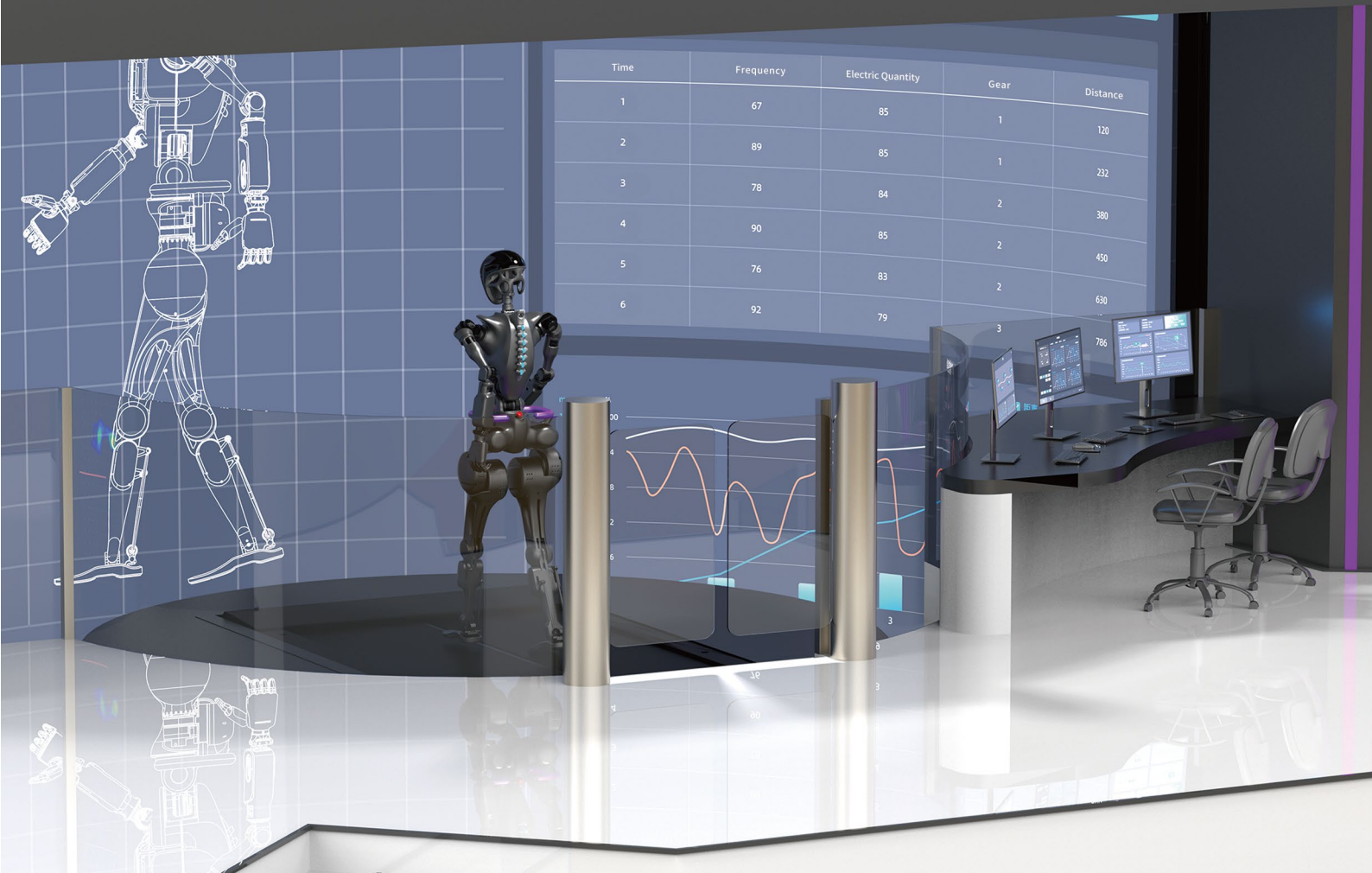


Motion Capture System   6-axis Motion Platform   6-component Force Plate   Dynamic Weight Support



| Time | Frequency | Electric Quantity | Gear | Distance |
|------|-----------|-------------------|------|----------|
| 1 | 67 | 85 | 1 | 120 |
| 2 | 89 | 85 | 1 | 232 |
| 3 | 78 | 84 | 2 | 380 |
| 4 | 90 | 85 | 2 | 450 |
| 5 | 76 | 83 | 2 | 630 |
| 6 | 92 | 79 | 3 | 786 |

# Technical Specifications

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| Product Model | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|

## Mechanical Specifications

| | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|
| Standing Size | 1650X515X320mm | 1650X515X320mm | 1650X515X320mm | 1650X515X320mm |
| Arm Span | 1680mm | 1680mm | 1665mm | 1680mm |
| Weight | ≈55kg | ≈55kg | ≈60kg | ≈60kg |
| Material | Aluminium alloy + Engineering plastic | Aluminium alloy + Engineering plastic | Aluminium alloy + Engineering plastic | Aluminium alloy + Engineering plastic |

## Electronic Parameters

| | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|
| Supply Voltage | 46.2V | 46.2V | 46.2V | 46.2V |
| Maximum Power | ≈550W | ≈550W | ≈550W | ≈550W |

## Performance Parameters

| | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|
| Speed | 5km/h | 5km/h | 5km/h | 5km/h |
| Single–handed Payload | 3kg | 3kg | 3kg | 3kg |
| Processing Power | i7–13700h 6P+8E 20thread 1.6/5.0GHz | i7–13700h 6P+8E 20thread 1.6/5.0GHz | i7–13700h 6P+8E 20thread 1.6/5.0GHz | i7–13700h 6P+8E 20thread 1.6/5.0GHz |

## Joint Parameters

| | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|
| Max Torque | 230N.m | 230N.m | 230N.m | 230N.m |
| Total Actuators | 34 | 44 | 34 | 44 |
| End–point Execution | Gripper | Dexterous Hand | Gripper | Dexterous Hand |
| Waist Flexibility | 3 | 3 | 3 | 3 |
| Head Flexibility | 3 | 3 | 3 | 3 |
| Ankle Flexibility | 2 | 2 | 2 | 2 |

| Product Model | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|

## Sensor Parameters

| | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|
| Depth Camera | Realsense | Realsense | Realsense | Realsense |
| IMU | ● | ● | ● | ● |
| Ring Microphone | — | — | ● | ● |

## Features

| | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|
| Motion Mode | Static Standing Gait Motion Stationary Movement End Effector Gripping | Static Standing Gait Motion Stationary Movement End Effector Gripping | Static Standing Gait Motion Stationary Movement End Effector Gripping | Static Standing Gait Motion Stationary Movement End Effector Gripping |
| Protective Casing | Skeleton Casing | Skeleton Casing | Enclosed Casing | Enclosed Casing |
| Waist Safety Handle | — | — | ● | ● |
| One–Click Start | — | — | ● | ● |
| Control Terminal | Touchscreen Remote Controller | Touchscreen Remote Controller | Touchscreen Remote Controller | Touchscreen Remote Controller |
| Voice Control | — | — | ● | ● |
| Cluster Control | — | — | ● | ● |
| Curved Screen | — | — | ● | ● |
| WiFi | ● | ● | ● | ● |
| Bluetooth | ● | ● | ● | ● |
| Secondary Development | ● | ● | ● | ● |

## Battery Life

| | GR–1L | GR–1 | GR–1L Pro | GR–1 Pro |
|---|---|---|---|---|
| Battery Capacity | 460Wh | 460Wh | 460Wh | 460Wh |
| Charging | 46V 2A | 46V 2A | 46V 2A | 46V 2A |

# Fourier X Global Robotics Innovation Labs

Fourier Intelligence collaborates with renowned institutions worldwide and has a presence in 56 countries.



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