

CONNECTIVITY SOLUTIONS FOR HUMANOID ROBOTS

Supporting Next-Generation Physical AI

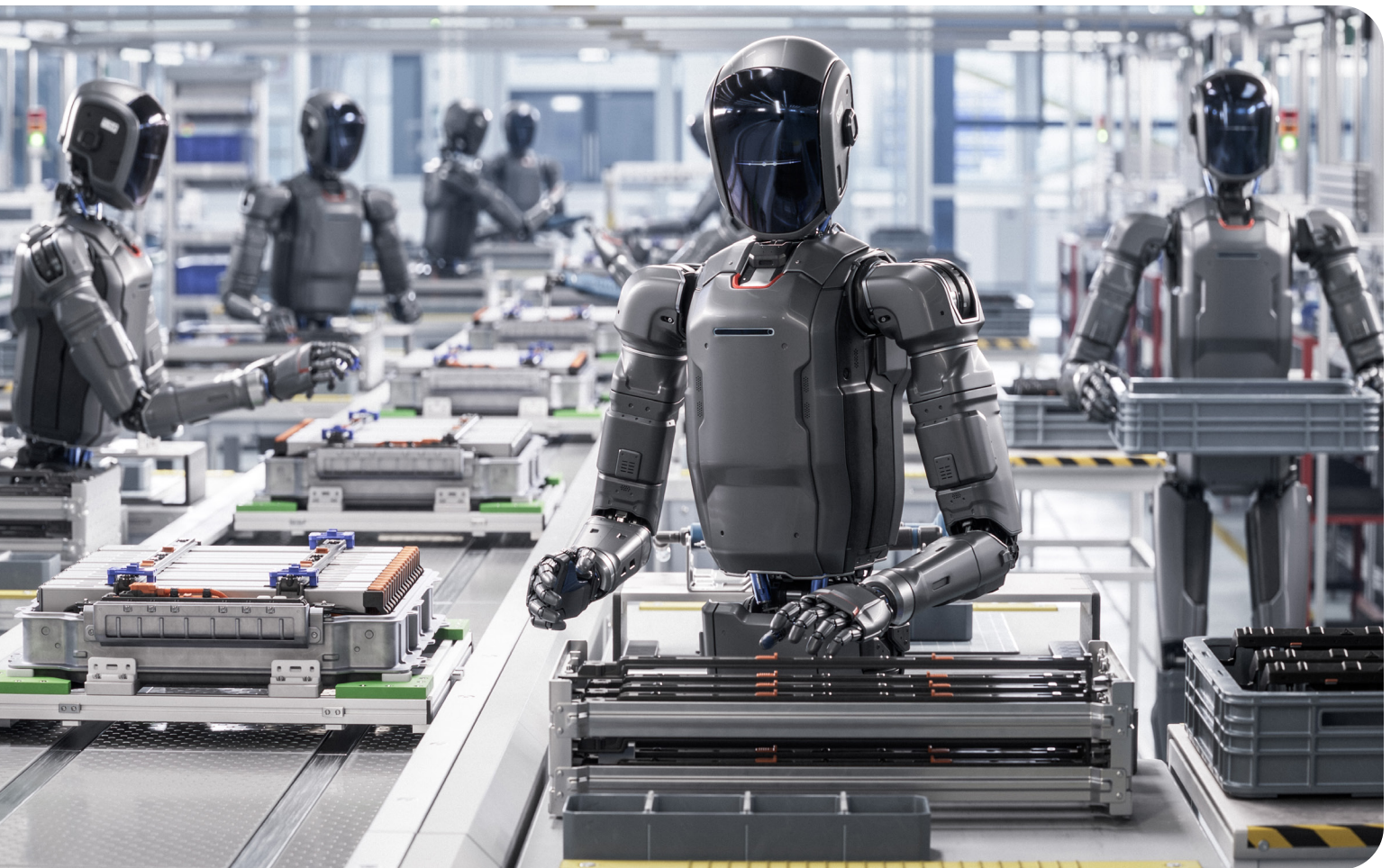


CONNECTIVITY FOR THE AGE OF PHYSICAL AI

High-speed data. Intelligent motion. Miniaturized design.

Humanoid robots combine AI compute, advanced sensing, distributed control, wireless communication, and precision movement within compact, constantly moving architectures. As these systems evolve, connectivity becomes increasingly important to supporting system performance, reliability, and scalability.

TE Connectivity (TE) offers miniaturized interconnect and antenna solutions designed to help support the bandwidth, power, wireless, and motion requirements of size and weight constrained humanoid and physical AI systems. With experience across industrial, communications, and embedded systems applications, TE helps customers address evolving connectivity requirements in humanoid architectures.



The information provided in this guide is general in nature and presents options from TE's commercial product portfolio. System requirements will vary by application. Customers are responsible for system architecture and design, including part selection and suitability for end use.

WHY CONNECTIVITY MATTERS

Connectivity Challenges in Humanoid Architectures

Humanoid robots introduce new connectivity challenges compared to traditional industrial automation systems. AI inferencing, machine vision, distributed compute, wireless communication, and precision motion control all increase demands on system architecture.

HIGH-SPEED DATA & AI CONNECTIVITY

High-performance interconnects help support low-latency AI processing, machine vision, distributed control, and signal integrity.



CONNECTIVITY FOR DYNAMIC MECHANICAL ENVIRONMENTS

Connectivity solutions engineered for vibration, motion, and thermal stress help maintain stable power, signal integrity, and reliable mechanical connections.

WIRELESS CONNECTIVITY

RF and antenna solutions help enable wireless communication for cloud connectivity, telemetry, localization, and subsystem coordination.



EFFICIENT POWER DISTRIBUTION

Hybrid power and signal solutions help simplify routing, reduce interference, and support efficient power distribution across robotic subsystems.

MINIATURIZATION

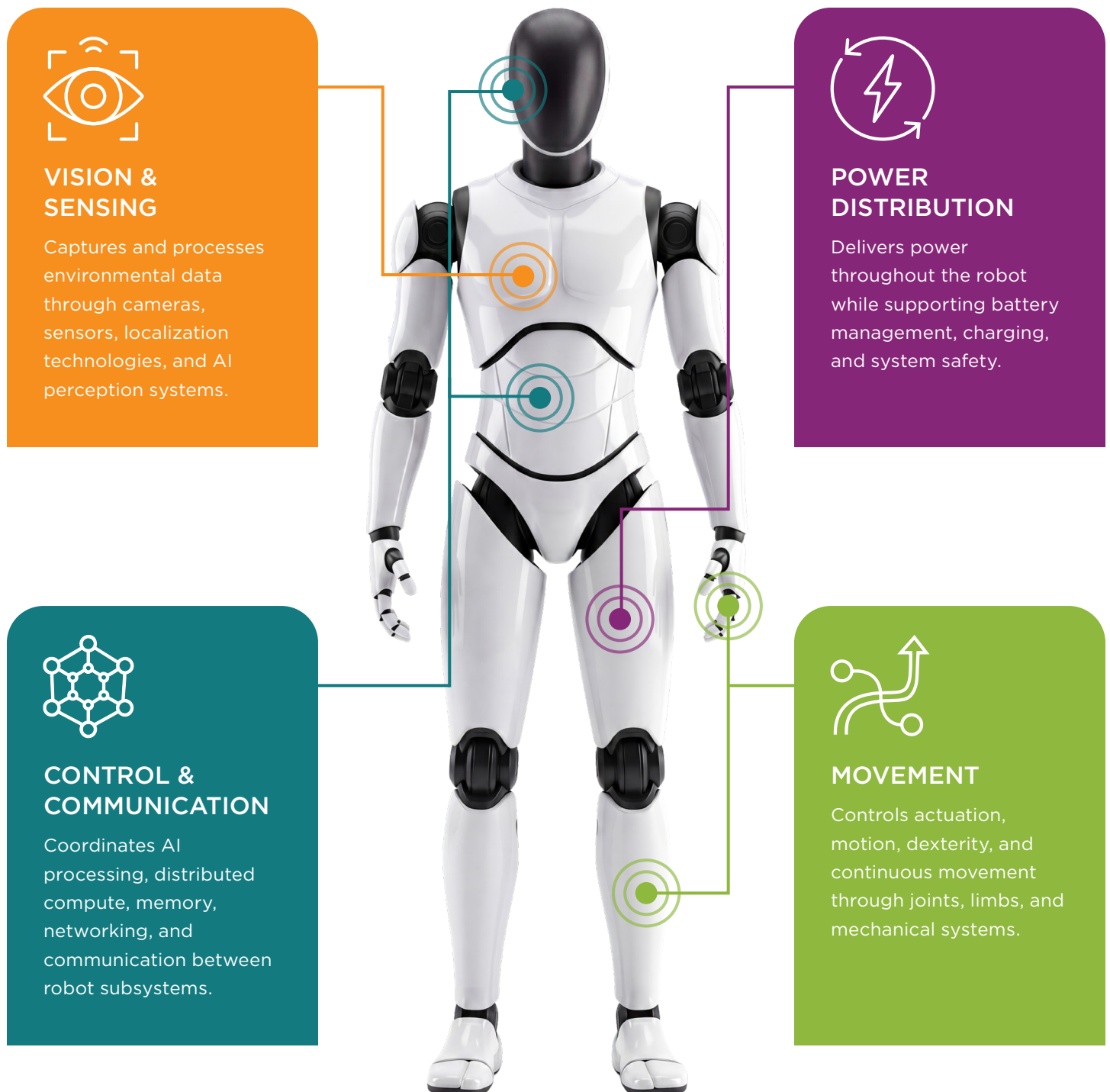
Miniaturized, low-profile interconnects help reduce space requirements, and support dense, lightweight humanoid system designs.



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CONNECTIVITY ACROSS THE HUMANOID ARCHITECTURE

Modern humanoid robots combine multiple high-performance subsystems that must communicate, share power, and operate reliably within compact, dynamic mechanical environments.



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CONNECTIVITY DESIGN CONSIDERATIONS IN HUMANOID ROBOTS

Each subsystem within a humanoid robot presents unique connectivity requirements based on its function, operating environment, and performance demands. These considerations influence how data, power, and wireless communication are designed throughout the system.

VISION & SENSING

Machine vision and sensing systems require:

- High-speed data transmission
- Low latency
- Signal integrity
- Dense routing
- Reliable wireless sensing and localization

CONTROL & COMMUNICATION

Distributed compute and AI processing architectures require:

- High-bandwidth communication
- Reliable networking
- Memory connectivity
- Edge AI processing
- Signal integrity

POWER DISTRIBUTION

Power architectures require:

- Efficient power routing
- System safety
- Simplified routing
- Hybrid power and signal architectures

MOVEMENT

Continuous movement, vibration and motion systems require:

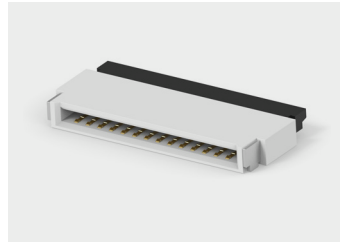
- Mechanical flexibility
- Motion durability
- Multiple bending cycles
- Miniaturization



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TE SOLUTIONS ACROSS THE HUMANOID ARCHITECTURE

TE Connectivity offers a broad portfolio of commercially available connectivity solutions to help support high-speed data, power distribution, wireless communication, and miniaturized robotic architectures. As connectivity requirements continue to evolve, TE is advancing connectivity solutions to help address emerging humanoid requirements. Representative examples from TE's portfolio include:



VISION & SENSING

Supporting machine vision, sensing, localization, and high-speed data transmission.

- Fine Pitch Board-to-Board Connectors
- Flexible Printed Circuit (FPC) Connectors
- Miniature FAKRA Connectors
- Ultra-Wideband (UWB) Antennas
- Mid-/High-Speed Miniature, Ultra-Miniature Connectors

POWER DISTRIBUTION

Supporting battery systems, charging, power management, and system safety.

- FPC Connectors
- Miniature High-Current Hybrid Connectors + Low-Speed Data
- Antennas for Wi-Fi, Bluetooth Technology



CONTROL & COMMUNICATION

Supporting AI processing, distributed compute, memory, networking, and edge communication.

- Floating Board-to-Board Module Connectors
- SoM (System on Module) High-Density Array Mezzanine Connectors
- Memory Socket Connectors
- High-Speed Miniature Connectors
- Antennas for Wi-Fi, Bluetooth Technology, Non-Terrestrial (NTN), UWB

MOVEMENT

Supporting continuous motion, vibration, flexibility, and compact joint architectures.

- Fine Pitch Board-to-Board Connectors
- FPC Connectors
- Floating Board-to-Board Module Connectors
- Ultra-Miniature Connectors with Power over Data Line (PoDL)
- Ultra-Miniature Low Current Connector + Low-Speed Data
- High-Current Connectors

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WHY TE CONNECTIVITY

Supporting the Next Generation of Physical AI

As humanoid and physical AI systems evolve, so do connectivity requirements. TE combines a broad connectivity portfolio, engineering resources, and global manufacturing capabilities to help customers evaluate, integrate, and scale connectivity solutions for evolving humanoid architectures.

BROAD INTERCONNECT PORTFOLIO

TE offers a broad portfolio of antennas, connectors, cable assemblies, and interconnect solutions.



ADVANCING CONNECTIVITY FOR HUMANOID SYSTEMS

TE is advancing solutions designed to address emerging requirements in high-speed data, wireless communication, power distribution, and miniaturization.



SUPPORTING CUSTOMER INNOVATION

TE works with customers to provide engineering resources, product information, and evaluation support to help integrate TE solutions.



Explore Connectivity Solutions for Humanoid Robots

Learn more about TE's connectors, antennas, cable assemblies, and interconnect solutions to help address evolving connectivity requirements across humanoid robot architectures and physical AI systems. [Learn More](#) →

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About TE Connectivity

TE Connectivity is a global industrial technology leader creating a safer, sustainable, productive, and connected future. As a trusted innovation partner, our broad range of connectivity and sensor solutions enable the distribution of power, signal and data to advance next-generation transportation, energy networks, automated factories, data centers enabling artificial intelligence, and more. Our more than 90,000 employees, including 10,000 engineers, work alongside customers in approximately 130 countries. In a world that is racing ahead, TE ensures that EVERY CONNECTION COUNTS. Learn more at www.te.com

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We make it easy to connect with our experts and are ready to provide all the support you need.

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