Giving Robots the Sense of Touch: How Tactile Sensing Powers the Next Generation of Machines

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The robotics industry continues to evolve as the number of use cases expand. We see headlines about robotic functions - humanoids folding laundry or performing martial arts, autonomous machines navigating factory floors, surgical systems performing procedures with sub-millimeter precision - are achieving remarkable feats of vision and mobility.

But for all the progress in cameras, LiDAR, and AI-driven motion planning, most robots today are still fundamentally incapable of sensing touch.

That gap between seeing and feeling is one of the most significant barriers to the next phase of robotic capability. And it is a gap that Synaptics is well positioned to close.

Why Touch Matters for the Future of Robotics

Human beings take the sense of touch for granted. We reach into a bag and identify objects by feel alone. We adjust our grip instinctively - holding an egg with delicacy and a hammer with force - without conscious thought. We detect slippage in microseconds and correct before an object falls.

This tactile intelligence, refined over millions of years of evolution, is what allows us to operate confidently in unstructured physical environments.

Robots, by contrast, have largely relied on vision and pre-programmed force limits to interact with the physical world. That approach works in structured, repetitive environments like the bolted-down arms of an automotive assembly line, for example. But it breaks down, and/or requires dexterity when a robot must handle objects of unknown weight, shape, or fragility. Current robot tech also faces real challenges when robots must work alongside humans and respond to incidental contact. And despite some publicity suggesting otherwise, current robots also struggle in use cases that represent the next wave of robotics adoption: humanoid assistants in homes and warehouses, surgical instruments that must feel tissue resistance, or agricultural systems that must judge the ripeness of produce by touch.

At the same time, third-party research highlights the scale of potential opportunity. MarketsandMarkets estimates the global humanoid robot market at approximately $2.9 billion in 2025, projecting growth to approximately $15 billion by 2030. Goldman Sachs Research has projected a total addressable market of approximately $38 billion by 2035, with over 250,000 humanoid units shipped for industrial use by 2030[1].

Most advanced machines will benefit from tactile sensing to achieve its potential.

Market size and growth projections are based on third-party research estimates and are subject to uncertainty and change.

Synaptics' Tactile Sensing Heritage

Synaptics has been engineering the interface between humans and machines for over forty years. Our capacitive touch controllers have shipped in more than two billion devices globally - from the touchpads that defined notebook computing to the touch displays on today's smartphones, automotive infotainment systems, and industrial panels.

We have developed deep expertise in the physics of capacitive sensing: detecting force, proximity, pressure, and contact geometry with high resolution, low latency, and exceptional noise immunity.

Our Robotics Touch ICs are purpose-built for these demanding environments. They are designed to provide high-resolution capacitive sensing arrays that can be embedded in robotic fingertips, palms, grippers, and other contact surfaces. The sensors detect micro-pressure changes and provide real-time feedback, to enable robotic systems to adjust grip force in real time.

Our controllers are designed to support machine learning and AI algorithms directly on-chip, enabling capabilities such as slip detection and adaptive force modulation, depending on system configuration and implementation. This is the kind of advanced tactile reasoning that separates a robot that can pick up a glass from one that shatters it.

From Touch Controllers to Humanoids

Synaptics is actively engaged in the humanoid market. We are currently sampling silicon for use in pilot builds of humanoids with a major industry participant in the robotics sector.

This engagement is built on two of our core product categories:

1. our touch controllers, which enable tactile sensing, and
2. our interface bridge solutions, which support the high-bandwidth data transport that a humanoid's distributed network requires.

Our touch controllers are being designed into the palm and the foot of humanoid platforms - surfaces that require entirely different sensing profiles. A

palm must detect the subtle pressure gradations needed to modulate grip force, ranging from handling delicate glassware to grasping solid metal objects. A foot must sense ground contact, weight distribution, and surface characteristics to enable stable bipedal locomotion. Both require the fusion of high-resolution capacitive data with on-device ML/AI processing to deliver real-time, adaptive responses.

This is where Synaptics' full-platform approach can serve as a differentiator.

Synaptics offers multiple technologies for a robotic system including processing, connectivity, and sensing.

Our Astra AI-native processors are designed to provide the on-device inference capability to process data at the edge, without the latency penalty of routing every reading to a central processor or the cloud.

Our wireless connectivity solutions support reliable, low-latency communication between the distributed subsystems.

And our touch controllers deliver the sensory data that makes the entire system aware of its physical environment.

At CES 2026, our partner demonstrated this integrated approach: a unified robotic hand that combines Astra processors, Synaptics connectivity, and Touch Sensing in a single platform suitable for both consumer and industrial markets, showcasing on-device inferencing for predictive maintenance, safety monitoring, and real-time operational decisions.

The Broader Robotics Opportunity

Humanoids represent the most visible - and most demanding - robotics opportunity, but the market extends far beyond bipedal machines. Robotics is a spectrum that spans from home vacuum cleaners to autonomous mobile platforms to industrial cobots to full humanoids. Across that entire spectrum, tactile sensing can enhance a robot's ability to interact with its environment.

For each of these applications, the requirements map to Synaptics' core competencies: high-sensitivity capacitive sensing with real-time AI processing, low-latency feedback loops, dense multi-channel sensor arrays that resist environmental noise, and the ability to operate within the power and size constraints of embedded systems.

Our portfolio scales across this entire range — from an MCU-class AI-native processing platform with integrated wireless connectivity for simpler robotic applications, to the high-resolution multi-channel touch controllers and high-bandwidth bridge solutions required by advanced humanoid platforms.

Looking Ahead

The robotics industry appears to be evolving from demonstration toward broader commercial deployment. Across segments of the market, pilot programs are becoming production commitments. Component ecosystems are maturing. And the companies that establish themselves as essential elements of the robotics supply chain today will define the industry for the next decade.

Synaptics is building that position by doing what we have always done: solving the hard problems at the interface between humans and machines. For forty years, that meant making touchscreens more accurate, displays more intuitive, and biometric systems more secure. Today, it means giving robots the sense of touch - the tactile sensing that transforms mechanical motion into adaptive, responsive interaction with the physical world.

Our financial results reflect this broader edge AI transition. In Q2 FY26, Synaptics delivered revenue of $302.5 million, up 13% year over year— our fifth consecutive quarter of double-digit year-over-year revenue growth, with Core IoT products growing 53% year over year. Robotics represents a developing and potentially meaningful dimension of this broader edge AI opportunity, and we are investing to capture it.

Forward-Looking Safe-Harbor Statement

This article contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, including statements regarding market growth projections, industry trends, product development activities, customer engagements, pilot builds, sampling activities, and potential business opportunities in robotics and edge AI. These statements are based on current expectations, estimates, and projections and involve risks and uncertainties that could cause actual results to differ materially from those expressed or implied. Risks and uncertainties include, but are not limited to: macroeconomic conditions; trade tensions and the uncertainty of tariff impacts; supply chain constraints; manufacturing and yield challenges; inflationary pressures; shifts in customer demand; competitive product offerings and technological developments; the pace of adoption of robotics and edge AI technologies; regulatory developments; and delays in product development, qualification, sampling, or volume production. For more information regarding these and other risks, please refer to the "Risk Factors" sections of Synaptics' most recent Form 10-K and Form 10-Q filings with the Securities and Exchange Commission. Synaptics undertakes no obligation to update any forward-looking statements, whether as a result of new information, future events, or otherwise, except as required by law.

Source Attribution

All factual claims in this article draw from the following public sources:

1. Q2 FY26 Earnings Call Transcript (February 5, 2026) — Revenue figures, Core IoT growth, humanoid sampling disclosure, Physical AI framing.
2. CES 2026 Press Release and Demonstrations (January 2026) — Unified robotics platform demo, Astra/Veros/Touch integration.
3. Synaptics.com Product Pages — Robotics Touch ICs, Astra platform, Veros connectivity, product capabilities.
4. MarketsandMarkets (April 2025) — Humanoid robot market sizing ($2.9B in 2025, $15B by 2030).
5. Goldman Sachs Research (updated projections) — TAM of $38B by 2035, 250,000 industrial shipments by 2030.
6. Semiconductor Engineering (July 2025) — "Enhancing Dexterous Humanoid Robot Hands With Superior Touch ICs" — Industry coverage of Synaptics tactile sensing for robotics.

[1]Market size and growth projections are based on third-party research estimates and are subject to uncertainty and change.