

BUILDING THE FUTURE OF Industrial Robotics



Advanced robotics are increasing productivity and enabling safer human/robot interaction. ADI is leading the industrial robotics revolution in areas including motion control, functional safety, advanced sensing, and system-level design.



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Leading the Revolution in Industrial Robotics

Worldwide consumer and economic trends are boosting the demand for enhanced flexibility, productivity, and efficiency. Today's intelligent robots and cobots are becoming more collaborative, smarter, and better positioned to take on these complex tasks. ADI's domain experts collaborate with partners and customers, not only to consider their immediate needs, but also to uncover the greater underlying design challenges.

Together, with customers, we architect robotics systems and solutions, meeting their needs and exceeding their aspirations.

Trends Accelerating Robot Adoption

Trends accelerating robot adoption can be broken up into three categories:

FLEXIBILITY IN THE FACTORY

Globalization



Changes in consumer behavior and expectations, along with increased demand for customization and faster turnaround, are forcing manufacturers to change how they operate, including more localized manufacturing facilities and design and production lines that can be quickly reconfigured for different product types and batch sizes.

Labor Changes



Manufacturers are facing a shortage of skilled labor, aging workforces, and high employee turnover. Thus, manufacturers must turn to automation and flexibility to keep up with demand and stay competitive in this ever-evolving landscape.

MORE ACCESSIBLE ROBOTS

Ease of Use



Traditional industrial robots were complicated to install and operate, but collaborative robots (cobots) work alongside humans and are much easier to install. Where once a business had to pay for a specialist engineer to spend several days installing and commissioning a robot, collaborative robots can be set up without specialist assistance.

Affordability



Return on investment for automation is increasing as robots become more affordable while also allowing greater productivity and flexibility. Open architectures make it easier to build robots and allow more people to get in the game.

SUPPLEMENT THE WORKFORCE

Global Pandemic



With the COVID-19 pandemic, manufacturing lines are pivoting to essential products, where flexibility is key. Collaborative robots allow for quick, seamless changes with plug and play interfaces and simple, fast reprogramming, allowing the robot to be redeployed from an existing task to something new.

Moving into New Spaces



Worker distancing and elevated cleaning and disinfection procedures provide new opportunities for robots in workplaces that previously may not have used robots. Robots are increasingly moving into cleaning where they can be faster and more effective than manual cleaning.



Robots Creating a Better World

Providing Safer Work for Humans



Robots are primarily assisting humans in the tasks that involve three Ds—dull, dirty, and dangerous—thereby preventing injuries or adverse health effects resulting from working in hazardous conditions. If the task is repetitive and dull, humans tend to make mistakes, sometimes causing bodily harm to themselves, whereas robots can do the same task repetitively without any mistakes.

Creating More Jobs



Robots are allowing us to maximize human capability, creating more cognitive work instead of dull, repetitive work. This is creating cognitive tasks, better work-life balance, and more rewarding jobs.

Performing Tasks Humans Can't



Robots are also being deployed to increasingly dangerous jobs like bridge inspections, chemical spills, and cleanup. Some incidents would be near impossible without suffering a heavy casualty count without the support of robots to maneuver inside dangerous areas and relay the information back to the command center.

Making Supply Chains More Robust



Reshoring, disrupting supply chains. Making supply chains more robust to things like the pandemic (this applies to all automation). But robots have a strong link because they can bring jobs back—companies don't need one or two huge factories with cheap labor. Robots make supply chains more stable—shorter distance with fewer dependencies.



Functional Safety

Robots previously were separated from workers and housed in safety cages, but now some interact directly with or in close proximity to humans. ADI has domain expertise in industrial functional safety standards, which provide the design and application requirements for robots and guidelines on collaborative operation.



Grippers and Effectors

Smart grippers and end effectors extend the range of tasks robots can perform. Ease of use and quick tool changes are possible with plug and play connector interfaces, and precise force and torque sensing and measurement enable productivity gains.



Condition-Based Monitoring

Condition-based monitoring enables early detection and diagnosis of machine and system abnormalities via real-time monitoring. The ADI OtoSense™ AI platform uses human knowledge to label events, analyzing machine health to enable preventative maintenance.



Environmental Awareness

Smart factories of the future require immersive collaboration between human workers and automation equipment. Depth sensing solutions are important for quality inspection, human safety, volumetric detection for asset management, and navigation for autonomous manufacturing. ADI's industry-leading solutions, such as 3D time of flight (ToF), enable depth sensing technologies to move toward highest resolution enhanced systems designed for the harshest industrial environments.





Position Sensing

These high resolution space constrained optical encoders require small high precision signal processing and robust communications. Magnetic angle sensors enable more robust, affordable medium resolution encoder solutions suited to the type of human assist tasks carried out by cobots.



Industrial Communication

Wired Connectivity

The ADI Chronous™ portfolio of Industrial Ethernet solutions supports all major Industrial Ethernet protocols and provides multiprotocol flexibility, ease of use, and support.

Wireless Connectivity

Analog Devices offers the only wireless networks designed for the harshest industrial environments where low power, reliability, resilience, and scalability are key.



Drive/Inverter Control

Our industry-leading data conversion, power conversion, and iCoupler® magnetic isolation technology enable high performance motor control and robustness in one of the harshest electrical environments.



Power and Battery Management

Miniaturization of robotic designs demands more efficient power management solutions to effectively reduce size and weight, and to minimize thermal challenges in constrained spaces. The ADI Power by Linear™ portfolio offers a broad range of high performance power management solutions.



Technologies Fueling the Robotics Revolution

Position Sensing



AD7380

A family of tiny, dual simultaneous sampling 16-bit ADCs suitable for space constrained applications like encoder design with simplified AFEs and digital back ends for easy integration.



ADA4571

A low latency and negligible drift AMR sensor with integrated signal conditioning and ADC drivers for robust, contactless angular measurement.

Digital Isolation



ADM2485

A galvanically isolated differential transceiver with high common-mode transient immunity for robust communication in servo applications. Current limiting and thermal shutdown features protect against output short circuits and bus contention issues.



ADN4654/
ADN4655

1.1 Gbps, 3.5 kV rms/5 kV rms, and low jitter LVDS buffers with integrated iCoupler technology for seamless isolation of LVDS network nodes with -75 dB power supply ripple rejection.

Battery Management



LTC6811

A multicell battery stack monitor with support for stackable architecture for high voltage systems. Has an isoSPI™ interface for high speed RF immune communications.

Condition-Based Monitoring



ADXL1002

A family of analog output ultralow noise accelerometers optimized for industrial conditioning monitoring with repeatable sensitivity. Low power and single-supply operation enable wireless sensing design.



ADXL356/
ADXL357

A family of low noise, low power, low drift MEMS accelerometers with integrated temperature sensors. Available in a hermetic package for long-term stability.

Environmental Awareness



ADSD3100

A cost-effective CMOS 3D ToF sensor that enables mobile robot navigation or collision avoidance in nonsafety applications.

Drive/Inverter Control



ADuM4122

An isolated gate with adjustable slew rate to maximize efficiency and minimize electromagnetic (EM) emissions of motion systems with integrated thermal monitoring and high pulse fidelity architecture for high motor power efficiency.



ADuM7703

A 16-bit isolated sigma-delta converter with industry-leading offset for phase current sensing that enables precise motor control. Industry-leading CMTI enables operation in high switching frequency systems.

Industrial Communication



fido5100

A real-time Ethernet multiprotocol (REM) switch with Layer 2 and Layer 3 protocol support. It supports fast startup and quick connect type network functionality.



ADIN1300

The ADIN1300 is a robust, single port, gigabit Ethernet transceiver with low latency and low power consumption specifications to enable high speed synchronization for robotic applications.

Grippers and End Effectors



AD74413R

Fully configurable I/O solution for plug and play end effectors and modular robotic controllers. Allows for any function on any pin.



AD7770/
AD7771

A 24-bit, 8-channel simultaneous sampling analog-to-digital converter ideally suited for 6-axis force/torque sensing. Precise measurement for strict tolerances and high-quality process control ensures increased tool lifetime and saves on wasted material.



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