

Robot users can benefit from artificial intelligence

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From voice control to the implementation of 3D vision, the pace of development in robotics is accelerating rapidly. But perhaps the most significant trend right now is the embedding of artificial intelligence into mainstream robotic systems. This is delivering extended capabilities and enabling the full potential of predictive – even prescriptive – maintenance to be realised.

Oliver Giertz, Product Manager EMEA for Servo/Motion and Robotics at Mitsubishi Electric Europe B.V, looks at some of the key benefits of artificial intelligence in robots.

Robot technologies, themselves, continue to evolve, and one of the most promising developments is the application of artificial intelligence (AI). We are already seeing a number of AI functions impacting on robotics. For example, in 3D vision sensing; adjustment time is significantly reduced by AI. Force detection precision is also improved by integrating AI technology with the force sensor.

Perhaps one of the most significant trends in AI with regard to robotics is the implementation of enhanced predictive maintenance technologies. A recent Frost & Sullivan report estimated that the cost of unplanned downtime within industrial manufacturing amounted to €45bn, of which 42% was primarily caused by factory equipment failures. There is more than just the cost of lost production itself to be considered. In addition unplanned outages force a reactionary and costly approach to maintenance, repair and equipment replacement in an effort to get the line up and running as quickly as possible.

This can be addressed by predictive maintenance, which provides the user with an early warning of failing or deteriorating parts. Having this information gives service teams the opportunity to perform any maintenance well in advance of any actual failure, reducing unplanned downtime and shortening planned downtime. This is just as relevant to robots as it is to other aspects of the production line: periodic maintenance is required on the robot's various servo joints to ensure long-term reliable operation.

These predictive maintenance technologies can be enhanced significantly by AI, where machine learning algorithms drive even greater insights into the machine's operation, not simply comparing current performance with a pre-established baseline, but going further to make decisions on real-time data and past trends.

A good example of AI-based predictive maintenance in practice is Mitsubishi Electric's MELFA [Smart Plus function](#) delivered within its latest robot series. This integrated technology precisely monitors the time each of the main robot components is in motion and derives maintenance schedules according to actual operating conditions. It also offers simulation capabilities to predict the robot lifetime during the design phase of the application and to estimate the annual maintenance costs. This gives engineers the opportunity to modify the robot's operation to extend the lifecycle.

Mitsubishi Electric's [MELFA RV-8CRL](#) is the latest industrial robot to benefit from the Smart Plus technology. The cost-effective, but quality performance robot has been built from the outset to minimise maintenance requirements. It incorporates features such as a beltless coaxial drive mechanism for reduced wear. It also uses the latest servomotors from Mitsubishi Electric which eliminates the need for batteries to back-up the robot's internal encoder. Combining these advanced design features with AI-based predictive maintenance can significantly increase availability by reducing both scheduled and unscheduled downtime.

There is still much more to come from AI-based predictive maintenance, and from the wider application of artificial intelligence to robots. It is a core technology for Mitsubishi Electric, with its process optimisation capabilities offering huge potential to improve productivity and availability on robotic systems, as well as the wider manufacturing environment.

Recognising the strategic importance of the technology, Mitsubishi Electric is developing artificial intelligence systems under a distinct brand, "[Maisart](#)" (Mitsubishi Electric's AI creates the state-of-the-art in technology), with the goal of enabling companies to derive the maximum gains from AI.



Image 1: AI-based monitoring of the robot's main components can give engineers the information they need to modify the robot's operation to extend the lifecycle, as well as enabling predictive maintenance to reduce both planned and unplanned downtime.

[Source: Mitsubishi Electric Europe B.V.]



Image 2: Oliver Giertz, Product Manager EMEA for Servo/Motion and Robotics at Mitsubishi Electric Europe B.V.

[Source: Mitsubishi Electric Europe B.V.]

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Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavours to be a global, leading green company, enriching society with technology.

With around 145,800 employees the company recorded consolidated group sales of 40.7 billion US Dollar* in the fiscal year ended March 31, 2019.

Our sales offices, research & development centres and manufacturing plants are located in over 30 countries.

Factory Automation EMEA

Mitsubishi Electric Europe B.V., Factory Automation EMEA has its European headquarters in Ratingen near Dusseldorf, Germany. It is a part of Mitsubishi Electric Europe B.V. that has been represented in Germany since 1978, a wholly owned subsidiary of Mitsubishi Electric Corporation, Japan.

The role of Factory Automation EMEA is to manage sales, service and support across its network of local branches and distributors throughout the EMEA region.

** At an exchange rate of 111 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2019*

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