AI boosts predictive maintenance of industrial robots

With Industry 4.0 now in full swing, and the increasing reliance on robotics that this entails, predictive maintenance tools are essential to keep these critical machines running smoothly. Now Mitsubishi Electric has introduced predictive analytics that runs on Artificial Intelligence (AI) to provide the ultimate high-tech solution. Barry Weller, Product Manager at Mitsubishi Electric, explains how AI-based predictive analytics is the future for robot predictive maintenance.

Both standard industrial and collaborative robots can create new opportunities for streamlining production and assembly operations. Yet, just like any other machines, robots require maintenance support in order to deliver optimal performance.

Predictive maintenance algorithms

To forecast when a piece of equipment is likely to fail, predictive maintenance algorithms process and analyse data collected from different sources to build a model that can deliver useful actionable insight on the status of a robot.

AI systems are the most useful tools to recognise patterns, make predictions and give practical advice on actions to take. By using a suite of technologies, AI shows an unmatched ability to process large volumes of data in order to identify patterns within the data and generate predictive models.

These can help to accurately calculate wear and consumption for different robot components or identify trends suggesting a component is about to fail. Examples of relevant information that AI-based predictive maintenance can use include machine operating conditions, components' average service lives, frequency of specific robot motion patterns or real-time data from the drives.

The raw data results obtained may be clear to the AI system, with its ability to crunch the numbers, however, they may not be straightforward for humans to interpret. Therefore, visualisation is a key aspect of AI-based predictive maintenance, as it presents the information generated by the model in an accessible and immediate way to plant and maintenance operators.

This leads to knowledge that informs meaningful decisions and quick actions, without the need for specialised skills or training in data mining. A direct result of this is efficient maintenance schedules that maximise equipment use or intervene before breakdowns occur.

Latest Mitsubishi Electric industrial robots feature AI functionality

Those using Mitsubishi Electric industrial robots now have direct access to that type of solution as the AI functionalities are embedded in the company's latest MELFA SmartPlus software for its FR-series intelligent robots. The system is built-in to the robot controller and offers three main functions.

Consumption degree calculation determines when robotic parts, such as ball screws and ball splines, gears, bearings and belts are likely to need replacement. Whenever maintenance is required, the system can send clear notifications.

The second function offers maintenance simulations. By combining the same data used by the consumption degree model, the AI system can estimate the robot service life and offer a maintenance schedule that optimises maintenance costs and considers the operating conditions and activities performed by the robot.

Thanks to this function, end users can understand, schedule and optimise robot maintenance even before installing the machine on the factory floor. This provides them with the confidence that their robot investment is worthwhile.

Finally, the AI system offers a centralised robot management platform. The data from SmartPlus can be loaded onto multiple cloud-based analytics solutions and will interact with upper-level enterprise systems to combine their data with maintenance data from the robot controller. In this way, the solution can deliver highly reliable predictive models.

Sometimes it is easy to forget that Industry 4.0 and Big Data do not only mean intensifying processes but also supporting maintenance activities. By applying AI-based predictive maintenance to their robots, industries can fully maximise the efficiency and productivity of their automated systems.

For more information, visit Mitsubishi Electric.

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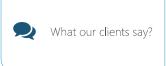The leading online technical resource centre for the Process Industry.

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