MITSUBISHI ELECTRIC
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FOR IMMEDIATE RELEASE **No. 3152**

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Mitsubishi Electric Develops Fast Force-feedback Control Algorithm by Applying AI Technology

Enables industrial robots to achieve fast, human-like nimble assembly

TOKYO, November 21, 2017 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today that it has developed a fast force-feedback control algorithm for industrial robots using its Maisart* proprietary artificial intelligence (AI) technology, resulting in low-tolerance precision tasks to be performed with fewer trials and in less time compared to human-supported robot assembly. In company-conducted tests, the algorithm shortened assembly insertion times by about 65 percent without requiring the robots to move violently. Mitsubishi Electric expects the algorithm to improve the efficiency of robotic tasks for assembling electric components, such as printed circuit boards and connecters, and inserting mechanical parts. Mitsubishi Electric will exhibit its new fast force-feedback control algorithm during the International Robot Exhibition at the Tokyo Big Sight exhibition complex from November 29 through December 2.

* **M**itsubishi Electric's **AI** creates the **S**tate-of-the-**ART** in technology

Insertion operation

At a time when interest in human-implemented cell-production systems is increasing, automatic-production systems using industrial robots are also showing great promise in advanced countries like Japan where labor populations are shrinking. Until now, however, automatic systems for precision assembly and insertion

operations have required programming and parameter adjustments by skilled personnel to achieve the flexibility of human-implemented assembly processes. Such requirements add to assembly costs and time, which manufacturers have been looking to reduce.

Thanks to Mitsubishi Electric's Maisart AI technology, the new fast force-feedback control algorithm shortens assembly time and eliminates violent movements by assembly robots. The technology allows parameters for tasks such as velocity to be adjusted fast and precisely. In particular, high-precision force-sensor data can be incorporated without stopping the robots. Conventionally, robots are stopped prior to introducing force-feedback control, but Mitsubishi Electric's new algorithm eliminates this step.

Going forward, Mitsubishi Electric will continue applying its proprietary AI technology to develop intelligent industrial robots and fast force-feedback control algorithms for faster and lower-cost assembly systems.

	Abstract	Performance
New	Multiple velocity commands, for which parameters can be adjusted automatically using AI.	Moving time: 1.9sec Applied force: under 10N**
Conventionally	Constant-value velocity commands that must be adjusted manually.	Moving time: 5.5sec Applied force: under 20N

** Newton = weight (kg) x acceleration (m/s^2)

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About Mitsubishi Electric Corporation

With over 90 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavors to be a global, leading green company, enriching society with technology. The company recorded consolidated group sales of 4,238.6 billion yen (US$ 37.8 billion*) in the fiscal year ended March 31, 2017. For more information visit:
www.MitsubishiElectric.com

*At an exchange rate of 112 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2017