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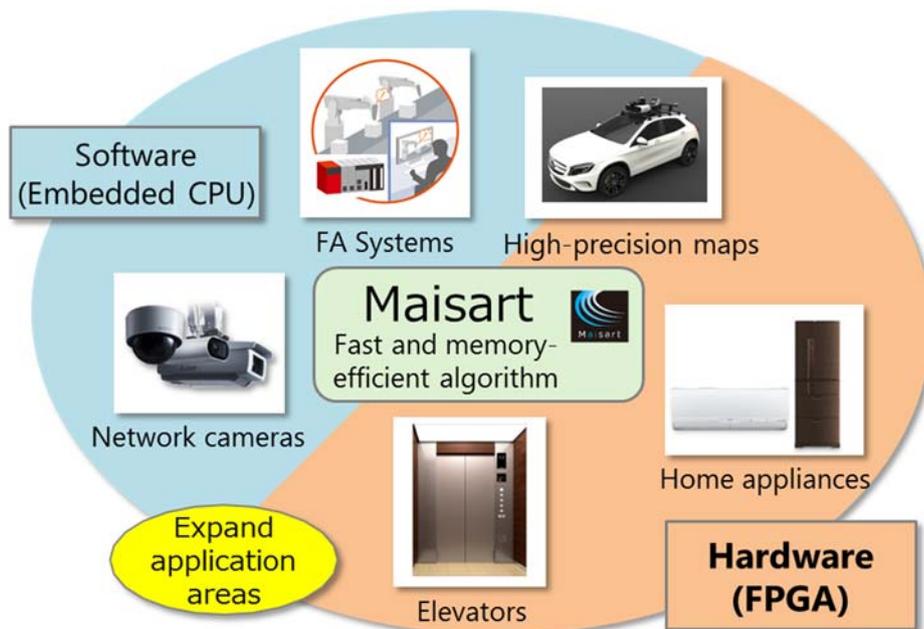
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Mitsubishi Electric Develops Compact Hardware AI for Implementation on Small-scale FPGAs

Improved real-time processing and reduced costs will expand opportunities for AI deployment in home appliances, elevators, high-precision maps and more

TOKYO, February 14, 2018 – [Mitsubishi Electric Corporation](http://www.MitsubishiElectric.com) (TOKYO: 6503) announced today it has developed a compact hardware artificial intelligence (AI) technology that can be implemented on small-scale field programmable gate arrays (FPGAs) that users and designers can configure to develop tailored applications. Mitsubishi Electric leveraged its Maisart*-brand AI technology to achieve a solution that uses a highly efficient calculation order and optimized circuit architecture for improved real-time processing and reduced costs, which is expected to expand the scope of AI deployment in home appliances, elevators, high-precision maps and more.

*Mitsubishi Electric's AI creates the State-of-the-ART in technology  **Maisart**



Envisioned applications for Mitsubishi Electric's Maisart-brand "compact AI" solution

Key Features

1) *Compact AI enables fast real-time processing in FPGAs*

- Improved calculation-order efficiency and optimized circuit architecture for FPGA implementation.
- Reduces inference computations to one-tenth** the time of conventional AI and improves real-time processing.

** Compared to Mitsubishi Electric's existing technology that implements conventional deep learning on FPGAs

2) *Compact, small-scale circuit architecture will expand usage of AI in FPGAs*

- Miniaturized circuit architecture realizes compact AI for implementation in small-scale FPGAs, as well as embedded CPUs, for reduced costs and energy consumption.
- Small-scale FPGA implementation will broaden scope of AI application in home appliances, elevators, high-precision maps and other products/fields where AI usage has been limited by high costs.

Details

Compact AI implemented in FPGAs

Deep learning can perform high-level inference, but computational needs can be costly and significant memory is required because of deep learning's multilayer network structure. Previously, Mitsubishi Electric developed compact AI technology, one of the Maisart-brand, featuring extra-efficient network structure and calculation algorithms, but to implement it as an FPGA solution without sacrificing these features required a more efficient calculation order. In response, Mitsubishi Electric further improved the technology's efficiency and optimized its circuit architecture for implementation in FPGAs. The resulting solution can reduce inference-computational time to just one-tenth that of conventional AI.

Expanding the scope of AI applications

Real-time inference can be performed in embedded small-scale FPGAs, as well as embedded CPUs. Implementation in FPGAs helps to lower the hardware cost when AI is required for real-time processing in applications such as high-precision mapping. Implementation in FPGAs also can lead to reduced power consumption due to the miniaturized circuits. For these reasons, compact hardware AI is expected to expand AI's application scope to including home appliances, elevators, high-precision maps and more.

Development Summary

	AI and on-board devices	Processing time on the same scale FPGA	FPGA scale required for the same level inference
Proposed	Compact AI on FPGA	Short (1/10 th of conventional time*)	Small (1/10 th of conventional time*)
Conventional	Conventional AI on FPGA	Long	Large

About Maisart

Maisart encompasses the Mitsubishi Electric's proprietary artificial intelligence (AI) technology, including its compact AI, automated design deep-learning algorithm and extra-efficient smart-learning AI. Maisart is an abbreviation for "Mitsubishi Electric's AI creates the State-of-the-ART in technology." Under the corporate axiom "Original AI technology makes everything smart," the company is leveraging original AI technology and edge computing to make devices smarter and life more secure, intuitive and convenient.

Patents

Pending patents for the technology announced in this news release number three in Japan and three abroad.

Maisart is a trademark of Mitsubishi Electric Corporation.

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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