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Mitsubishi Electric Develops 3D-model AR Technology for Inspections
AR smart glasses help to reduce workload and confirm data accuracy

TOKYO, November 7, 2016 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today that it has developed a maintenance-support technology using augmented reality (AR) based on a three-dimensional model that enables a technician wearing smart glasses to confirm the order of the inspection on an AR display and then enter the results by voice. The technology helps reduce workload and avoid entry errors because information can be entered by voice, even in noisy environments. The system is expected to be used for a variety of maintenance work, such as inspections of water-treatment plants and building electrical systems
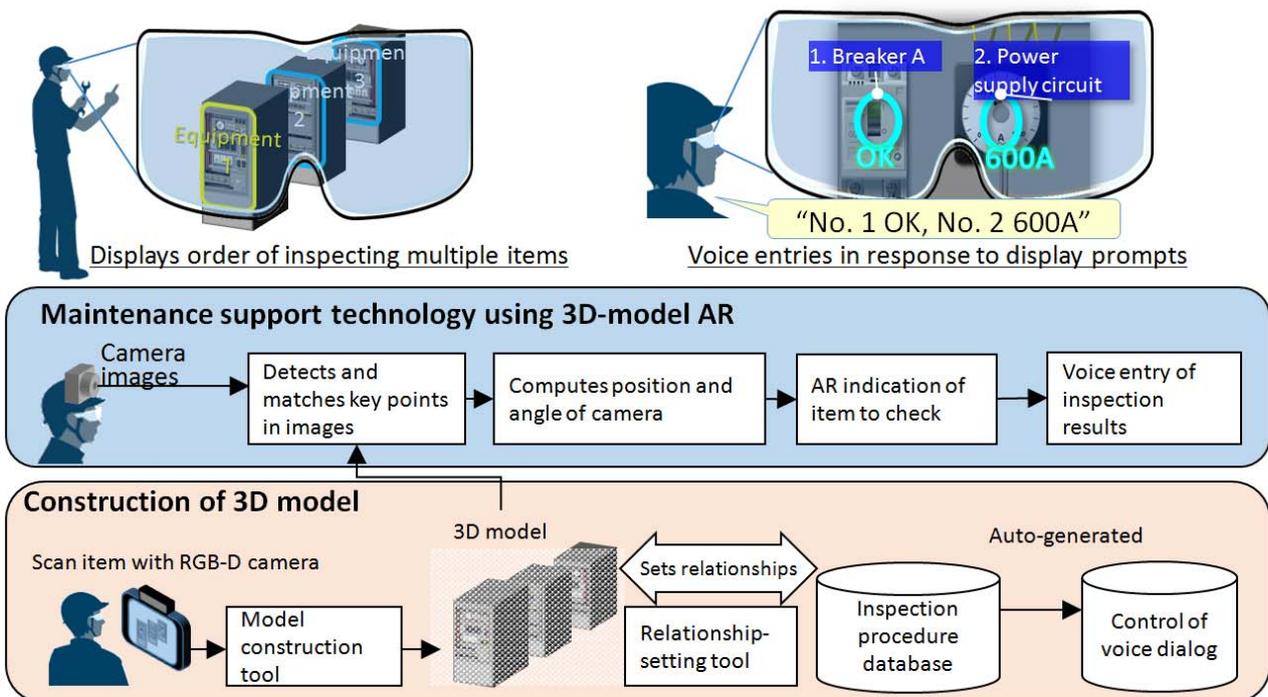
Mitsubishi Electric's new AR systems realizes highly intuitive inspections

<u>**Comparison with Conventional Technology**</u>

	New technology	Conventional technology
Function	AR display based on three-dimensional model	Two-dimensional AR display
	Voice recognition using deep learning	Voice recognition using simple statistical model (Hidden Markov Model)
Performance	Object positioning with max. 1.2 cm error at 60 cm	Object positioning with max. 4.0 cm error at 60 cm
	95 % accuracy at max. 85dbA	90 % accuracy at max. 85dbA

<u>**Features**</u>

1) *Precise, intuitive inspections with reduced workload*

The new system overcomes two key problems. First, conventional AR systems that use two-dimensional imaging require high volumes of pictures for large-scale inspections. Second, precise AR imaging requires difficult calculations of position and angle when there is a large difference between a technician's camera view and the super-imposed database images.

Mitsubishi Electric's new technology uses a three-dimensional model that is easily built by scanning objects with a RGBD camera equipped tablet PC. Continuous operation builds the three-dimensional model and shows check procedure related to the objects. In addition, precise AR imaging is possible by calculating the position and angle using a three-dimensional model instead of two-dimensional images. Moreover, the displayed contents of the check procedure are changed according to the distance between the technician and the super-imposed item.
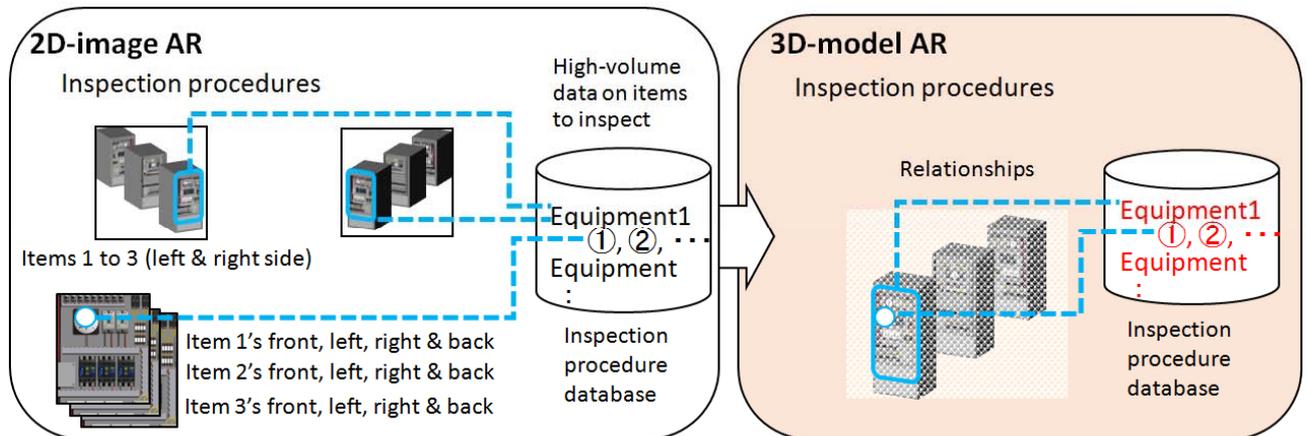
2) *Voice entry on AR displayed-form is precise and reduces double checking*

Inspection results are entered quickly by voice on an AR-display form, so the technician can confirm the accuracy of entries while still wearing the smart glasses. In addition, the system prompts the user to reenter ambiguous or incomplete information. Moreover, even under unsteady noisy environments, speech-recognition technology ensures high accuracy thanks to the use of deep-learning acoustic models that adjust to different types of noise.

<u>**Patents**</u>

Pending patents for the technology announced in this news release number 32 in Japan and 26 abroad.

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 4,394.3 billion yen (US$ 38.8 billion*) in the fiscal year ended March 31, 2016. For more information visit:
www.MitsubishiElectric.com

*At an exchange rate of 113 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2016