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Mitsubishi Electric Unveils “EMIRAI S” Concept Cabin

Latest sensing and HMI technologies will contribute to coming MaaS society

TOKYO, October 8, 2019 – [Mitsubishi Electric Corporation](http://www.mitsubishi-electric.com) (TOKYO: 6503) today unveiled its EMIRAI S concept car equipped with cutting-edge technologies, such as an innovative human-machine interface and biological-sensing technologies, which are expected to contribute to safe and secure transportation as well as enhanced passenger communication in the upcoming mobility-as-a-service (MaaS) society. The EMIRAI S will be exhibited during 46th Tokyo Motor Show 2019 at the Tokyo Big Sight exhibition complex from October 24 to November 4.



Rendition of EMIRAI S

Features

1) *Biometrics technology realizing safe and secure transportation*

- DMS¹ featuring contactless heart-rate sensing technology incorporating near-infrared camera. Face-tracking technology² continuously tracks driver’s face movements. Body surface temperature is measured with a sensor.
- Analysis of heart rate and body temperature enables system to diagnose driver conditions such as fatigue, drowsiness, sudden sickness, etc.

¹ Driver Monitoring System

² Face-tracking technology determines eyes, nose and mouth positions using camera images

2) ***Innovative human-machine interface facilitates communication both inside and outside vehicle***

- Speech-separation technology distinguishes voice commands from other verbal conversation in the vehicle, recognizing who utters voice commands and when based on camera images and audio signals³.
- Wide crossed-image display combines floating 3D images and holographic visual effects while a ring-shaped knob on a display simplifies operations using various via GUIs. Both help realize intuitive operations for enhanced user experiences.

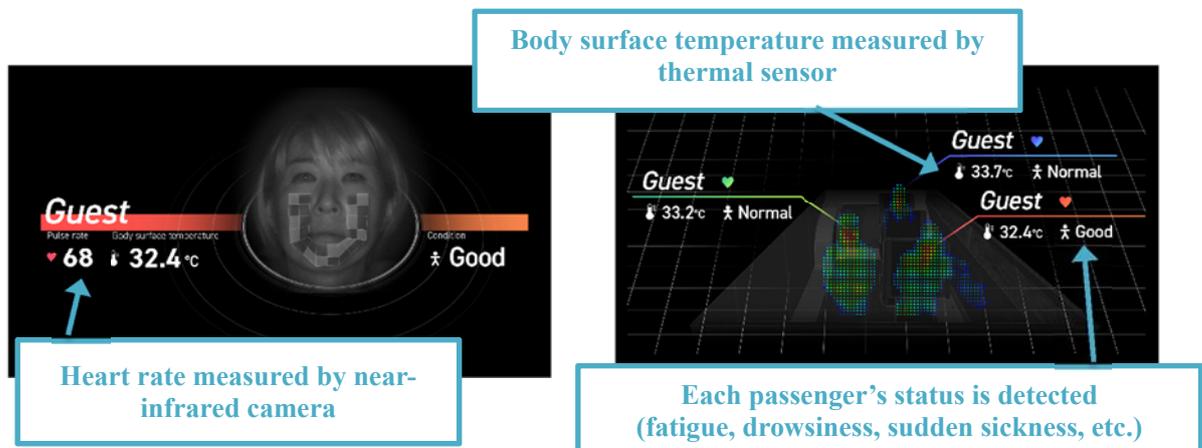
³ Smart, natural HMI technology for smart mobility
<https://www.MitsubishiElectric.com/news/2019/0122-c.html> (January 22, 2019)

Overview

In the coming MaaS society, cars will evolve beyond mere transportation to provide mobility that enables passengers to use their traveling time more effectively. Under the theme of “Mobility for better days,” Mitsubishi Electric developed the EMIRAI S to introduce technologies and solutions that contribute to the emerging MaaS society. The “S” in EMIRAI S stands for “shared,” “service” and “safety,” because the vehicle is equipped with cutting-edge technologies, such as an innovative human-machine interface for enhanced communication both inside and outside the vehicle, and biological-sensing technologies for safe driving.

Details

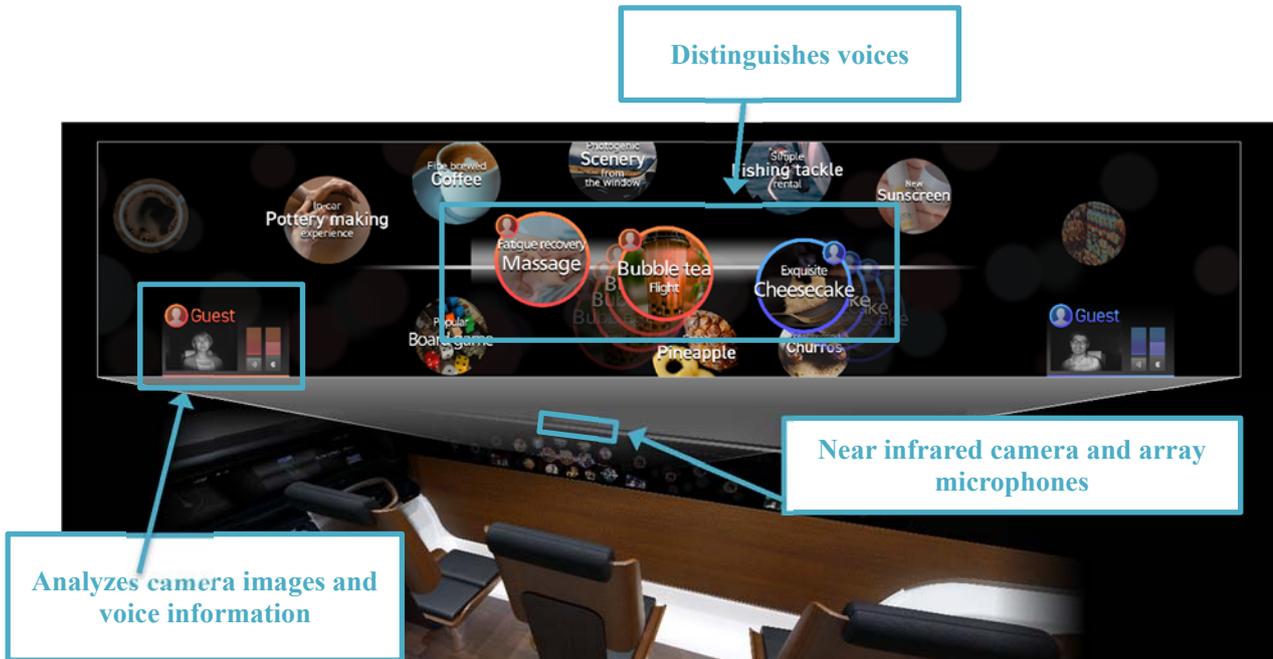
1) ***Biometrics technology for safe transportation***



Changes in skin brightness due to variance in blood flow are used to measure heart rates. The DMS enables contactless heart-rate sensing by detecting changes in skin brightness in near-infrared camera images. The DMS also has a robust face tracking function to track eyes, nose and mouth motions under a variety of lighting conditions. Also, human body surface temperatures are measured with a thermal sensor. By analyzing heart rate and body temperatures, the system can identify the physical conditions of the driver and passengers. For example, if the system detects driver fatigue, drowsiness or sudden sickness, it can make the interior more comfortable by adjusting air conditioning, lighting and/or sounds.

2) *Innovative human-machine interface for facilitating communication inside and outside the vehicle*

a. Speech-separation technology



A wide-angle near-infrared camera and array microphones⁴ are installed on the upper edge of a small display. By analyzing the positions and motions of the speaker's mouth in near-infrared camera images and voice information detected with the array microphones, the system can recognize each speaker's position and speech timing with high accuracy.

Each voice can be distinguished even in noisy environments, such as when the vehicle is in motion. Furthermore, EMIRAI S uses speech-separation technology not only to recognize commands from each speaker but also to respond to these commands. The commands and the responses are shown on a wide touch-display installed on an interior side panel to enhance communication between passengers.

⁴ Apparatus with a number of microphone elements arrayed in a line

b. Wide crossed-image display & ring-shaped knob on display



The wide crossed-image display⁵, which combines a half mirror with a diagonal LCD panel, combines floating 3D images and holographic visual effects to enhance the visibility of a wide variety of information from connected services. A ring-shaped knob on a display located on the side of the steering wheel functions as a controller to simplify various operations thanks to its innovative GUIs. Changes in electrostatic capacity on the display then analyze the movement of the knob. The knob's thin frame accommodates a large inner-display area for better visibility.

⁵ Reference release: Mitsubishi Electric Unveils EMIRAI 4 Smart Mobility Concept Car
<https://www.MitsubishiElectric.com/news/2017/1016.html> (October 16, 2017)

Patents

The technologies presented in this release cover 49 patents in Japan and 22 patents in other countries and an additional 58 patents pending in Japan and 73 patents pending in other countries.

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About Mitsubishi Electric Corporation

With nearly 100 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 a revenue of 4,519.9 billion yen (US\$ 40.7 billion*) in the fiscal year ended March 31, 2019. For more information visit:

www.MitsubishiElectric.com

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