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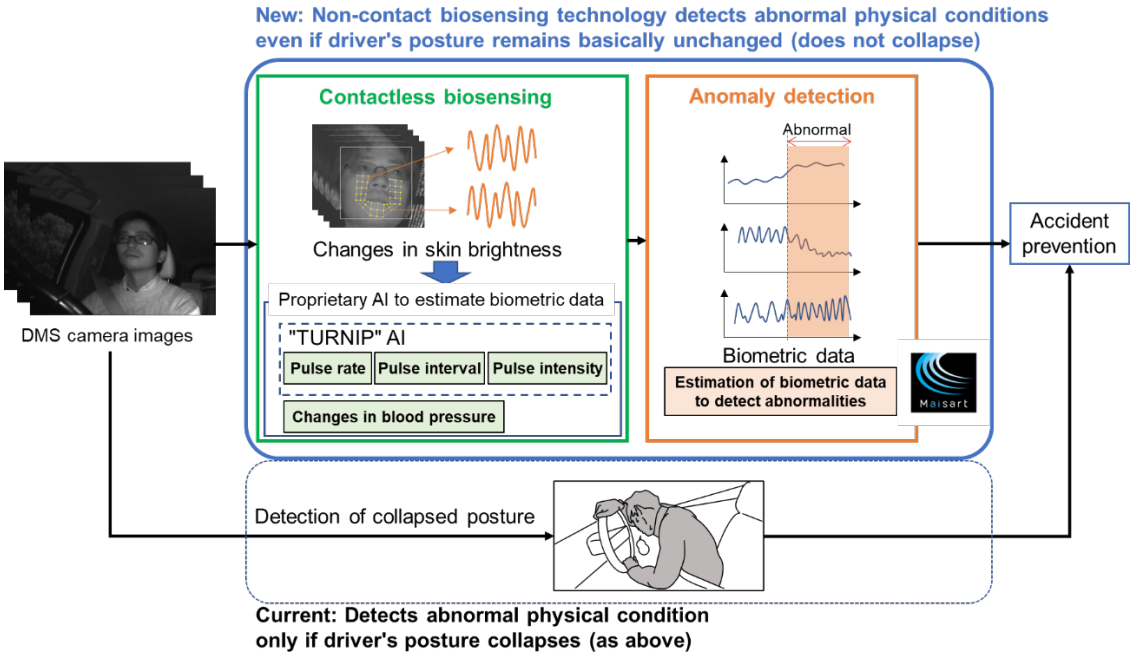
Mitsubishi Electric's New Car Technology Uses Biometric Information to Detect Serious Physical Conditions Experienced by Drivers

Camera-based technology expected to help prevent automobile accidents



Comparison of current and newly developed technologies

TOKYO, April 18, 2023 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today that it has developed a technology to detect serious physical conditions experienced by people driving automobiles, such as loss of consciousness, by estimating pulse rate, changes in blood pressure and other biometric data collected with a contactless Driver Monitoring System (DMS) camera, which the company has already launched to detect driver distractions and drowsiness. The new system uses Mitsubishi Electric's proprietary AI to estimate[1] biometric data and proprietary Maisart®[2] AI technology in order to detect abnormal physical conditions even when the driver's posture basically does not change.

[1] Proprietary AI estimates pulse rate, pulse interval, pulse intensity and changes in blood pressure. Time-series U-NET with recurrence for NIR imaging PPG (TURNIP) estimates pulse rate, pulse interval and pulse intensity
[2] Mitsubishi Electric's AI creates the State-of-the-ART in technology
Mitsubishi Electric's AI technology brand aimed at making every device smarter

In Japan, heart disease, epilepsy and cerebrovascular disease are the top three medical causes of car accidents that frequently result in death or serious injury. Existing on-board technologies use a DMS camera to detect abnormal posture due to sudden illness, but it is believed that about 50%[3] of the drivers who lose consciousness remain in an upright driving position without any noticeable change in posture, thus requiring a different method of detection.

Mitsubishi Electric has been working to develop a detection technology based on changes in biometric data that occur when drivers experience certain types of physical emergencies. The company's new technology focuses on physical changes that are typically caused by heart disease, epilepsy and cerebrovascular disease, using a proprietary AI to estimate biometric data such as pulse rate, pulse interval, pulse intensity and changes in blood pressure collected from the driver using a contactless DMS camera.

In the future, these technologies are expected to help to prevent high-risk accidents through incorporation in vehicle-safety systems that would automatically stop a vehicle on the roadside if a serious physical condition were detected in the driver, leading to improved automotive safety.

Features

1) Non-contact sensing enables stable estimation of biometric information while driving

- Mitsubishi Electric's proprietary AI estimates biometric data by using a DMS camera to detect minute variations in skin brightness due to changes in blood flow in the driver's face.
- The technology reliably tracks facial movements to determine changes in skin brightness. Multiple locations on the face are monitored to avoid false readings due to vehicle vibration, driver movement and changes in ambient light, resulting in 97%[4] accuracy.
- Contactless biosensing with a camera eliminates the need for a wristwatch-type measurement device.

2) Biometric data enables detection of physical abnormalities even when driver posture does not change

- Mitsubishi Electric's Maisart® AI technology detects physical abnormalities by identifying changes in various biometric data. Seizures due to heart disease are detected with 95.2% accuracy.[5]
- The use of biometric information enables the technology to reliably detect physical abnormalities even if the driver's posture does not change.
- Detection is achieved within three seconds in more than 70%[6] of physical emergencies, which would enable a vehicle-safety system to initiate accident-prevention measures promptly.

Future Developments

Mitsubishi Electric will accumulate patient physical data in collaboration with medical universities and continue to evaluate and improve the system through verifications combining such data and driving tests, with the aim of launching a commercial system in 2025 or later.

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[3] Percentage of patients confirmed to have epilepsy via video data by Automotive and Medical Concert Consortium (AMECC)
[4] Percentage of cases when pulse rates estimated via video data by the company were within 5 beats/minute of actual (using ECG)
[5] Percentage of heart disease patients with abnormalities detected within 30 seconds of seizure via electrocardiogram data by AMECC
[6] Percentage of heart disease patients with abnormalities detected via electrocardiogram data by AMECC

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About Mitsubishi Electric Corporation

With more than 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. Mitsubishi Electric enriches society with technology in the spirit of its "Changes for the Better." The company recorded a revenue of 4,476.7 billion yen (U.S.$ 36.7 billion*) in the fiscal year ended March 31, 2022. For more information, please visit www.MitsubishiElectric.com

*U.S. dollar amounts are translated from yen at the rate of ¥122=U.S.$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2022