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News Release

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Pioneer Develops a Driver Monitoring System that Detects Driver Drowsiness Early and Improves the Level of Alertness

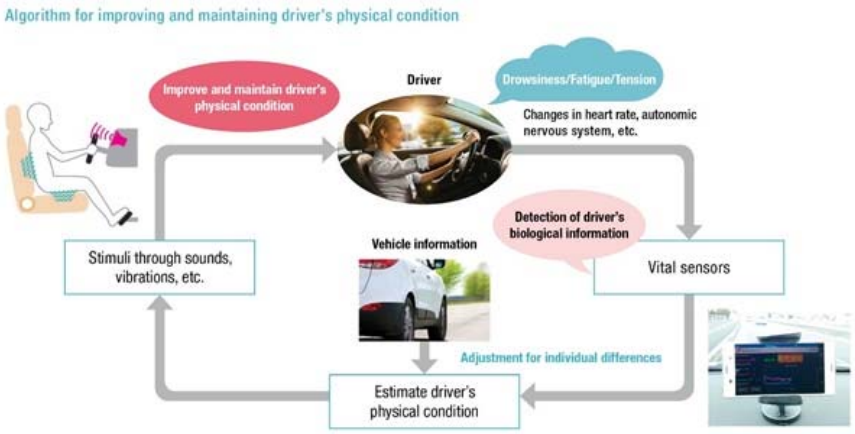
Striving to introduce it to the market in 2020 or thereafter as a support system for reliable and safe driving

Pioneer is striving to become an "essential company" in the autonomous driving society. As a key technology that is essential for autonomous driving and advanced driving support, we are developing the Driver Monitoring System, which detects driver drowsiness based on changes in the heart rate and improves the level of alertness through vibrations.

In the coming age of autonomous driving, at level 3 automated driving, where automated driving and manual driving coexist, it is necessary to decide whether the driver's condition is appropriate for driving in advance before automated driving changes to manual driving. Thus it is necessary to provide functions and systems which detect the driver's condition.

The Driver Monitoring System being developed by Pioneer makes it possible to prevent the driver's alertness from deteriorating by linking technologies that detect the signs of drowsiness by measuring the heart rate and through its original analysis algorithms, with effective technologies which improve the level of alertness through vibrations. It is proposed to be applied to prevent a driver from falling asleep while driving and smoothly change automated driving to manual driving in an automated driving vehicle (level 3.)

* This system is not intended to awaken drivers who are drowsy due to the serious lack of sleep, fatigue, or illness.



[Early detecting the drowsiness of a driver from the heart rate and improving and maintaining the level of alertness using vibration (conceptual image)]

[Features of the Driver Monitoring System]

- Early detection of signs of drowsiness by the heart rate

We focus on the autonomic nervous system and conduct research and develop technologies that detect signs of drowsiness very precisely and earlier based on changes in the heart rate or pulse. We are developing an in-vehicle heart rate sensor which is to be built into the seats or the steering wheel and algorithms that identify signs of drowsiness by taking into account the sensor precision in the in-vehicle environment. These technologies are applied to this monitoring system. By considering the fusion of sensors with cameras in the future, we strive to provide more highly precise and more comprehensive functions which detect drowsiness.

- Awakening and maintaining a good condition through vibrations

We develop technologies for this monitoring system, which improve the condition of consciousness and maintain it by properly providing stimuli to a driver through vibrations in the low drowsiness stage.. We evaluate the effects by incorporating the vibration unit that was developed on our own into the vehicle seats. Also we are working on developing content that controls decreasing alertness, as a driver becomes used to vibrations, by applying acoustic technologies that have been developed over many years.

- Optimization for individuals

We optimize the algorithms for detecting drowsiness, contents and timing for providing stimuli for alertness by providing feedback about changes in the physical condition which are caused by the stimuli through the vibrations of this system. It is also possible to link this system with vehicles and car navigation systems, generate parameters for each driver by utilizing personal information and information about the driving environment, and thereby further improve the precision of drowsiness detection.

We strive to improve the precision of drowsiness detection in this system and the effect of enhancing the level of alertness by collecting sample data through simulators and real driving, continuing the analysis, and aim at introducing it to the market in 2020 or thereafter.

We will also exhibit a conceptual cockpit incorporating this system at CES 2017, which will be held in Las Vegas, U.S.A., in January 2017, and at Tokyo Auto Salon 2017, which will be held in Makuhari, Chiba.