

FOR IMMEDIATE RELEASE

**Hitachi and Honda Successfully Develop Prototype of Portable
Breath-based Alcohol Detection Device for Vehicle Smart Keys**

Preventing drivers to apply alternative gases instead of their breathes



Prototype of portable breath-based alcohol detection device

Tokyo, March 24, 2016 – Hitachi, Ltd. (TSE: 6501) and Honda Motor Co., Ltd. (TSE: 7267) 's subsidiary Honda R&D Co., Ltd. (Honda) announced they have successfully developed a prototype of a portable alcohol detector that is tamper-resistant as it can distinguish human breath from alternative gases and that can be integrated into smart key. This device is capable of distinctively detecting the saturated water vapor from human breath and accurately measuring alcohol level within 3 seconds once a driver exhales breath onto the device. Hitachi and Honda jointly collaborated on this technology development in an effort to create the ideal alcohol detector.

They also developed a system that can show the alcohol level measured by the detector on the vehicle's display panel. It can become an ignition interlock to stop a vehicle starting its engine when it detects a driver under the influence of alcohol.

The effort to prevent or stop drunk driving is global and is an on-going focus of progress in safe driving technology. In Japan, transportation operators are required to use an alcohol detector to test whether professional drivers are under the influence of alcohol before they begin their shifts. Meanwhile, in the U.S., the National Highway Traffic Safety Administration (NHTSA) has launched and directed the development of ignition interlock technology that connects alcohol detectors to a vehicle's engine.

The prototype developed by Hitachi and Honda has advantages over the other ignition interlocks. These other systems require drivers to perform the test from the driver's seat once they are already inside the vehicle. With the Hitachi/Honda device,

drivers can measure their alcohol level from anywhere and, importantly, prior to entering their vehicle, thus reducing the temptation to drive. In addition, the Hitachi/Honda device can confirm that the applied gas is human exhaled breath and can detect the level of alcohol at the same time, an enhancement over currently available devices. Advancements like these will contribute to reducing or eliminating instances of drunk driving.

The features of this newly developed technology are as follows:

(1) Achieved both portability and human breath detection at the same time by making the saturated water vapors sensor very small. Also saves power.

Hitachi has developed sensor technology that can detect the saturated water vapors from human breath with a high degree of sensitivity. When human breath is exhaled onto the sensor which is an oxide insulator*¹ sandwiched between the electrodes, the water vapors from the breath is adsorbed on the insulator and then an electric current flows between the electrodes.

When this phenomenon occurs, the sensor can recognize if the applied gas is human breath. Furthermore, micro comb-shaped electrodes are used to extend the length of electrodes and to narrow the distance between electrodes, improving the sensitivity of the sensor. This enables the device to detect a tiny amount of saturated water vapors even though the sensor area has been decreased to only a 5mm square. As a result, the device is highly portable and can be used prior to a driver entering his vehicle. The device is also battery powered that is achieved from a design with the low power consumption technology.

(2) Achieved high accuracy measurement of ethanol concentration using three types of semiconductor gas sensors

In compliance with Japan's regulations related to drunk driving, the device has an improved ability to accurately measure the ethanol concentration from exhaled breath. The ethanol concentration is measured*² by three types of semiconductor gas sensors to detect ethanol, metabolized acetaldehyde in breath after drinking, and hydrogen. This method improves accuracy by about three times*³ compared with devices that only use an ethanol sensor for measurement. Also, the device is capable of measuring as little as 0.015 mg/L (an ethanol concentration) compared to 0.15 mg/L of the alcohol which constitutes being "under the influence of alcohol" and a charge of drunk driving in Japan.

(3) Developed a system that is integrated into a smart key function

By applying the recorded measurement result of the alcohol detector into the engine ignition mechanism, the system can prevent the vehicle's engine from starting if it detects that the driver's breath is over the preset limit. An alert indicator also shows the measurement results on the vehicle's display panel if the detector equipped smart key is close to the driver seat.

When validating the efficacy of this newly developed prototype, it was confirmed that the device can detect whether drivers are under the influence of alcohol based on the Japan's drunk driving regulation within three seconds.

Hitachi and Honda are aiming to commercialize this developed technology through effectively collecting data from future validation tests.

The achievement of this technology will be presented on April 12 – 14, at the SAE 2016 World Congress and Exhibit, which will be held in Detroit, Michigan, USA.

*1 Oxide insulator: an insulator with metal-oxide such as glass or ceramic.

*2 The concentration is calculated by differential evolution algorithm. The algorithm is one of the numerical analysis methods to obtain best solutions for plural unknown parameters in equations.

*3 Compared by Hitachi.

About Hitachi, Ltd.

Hitachi, Ltd. (TSE: 6501), headquartered in Tokyo, Japan, delivers innovations that answer society's challenges with our talented team and proven experience in global markets. The company's consolidated revenues for fiscal 2014 (ended March 31, 2015) totaled 9,761 billion yen (\$81.3 billion). Hitachi is focusing more than ever on the Social Innovation Business, which includes power & infrastructure systems, information & telecommunication systems, construction machinery, high functional materials & components, automotive systems, healthcare and others. For more information on Hitachi, please visit the company's website at <http://www.hitachi.com>.

About Honda Motor Co., Ltd.

Honda (TSE: 7267), headquartered in Tokyo, Japan, is a global manufacturer of vehicle, motorcycle and power product that sold more than 28 million units in the year of 2014. Also the company has started the delivery of Honda Jet since the end of 2015, and the fundamental researches for the future advanced technology including robotics is still on going. Since its foundation in 1948, based upon the dream of using technology as a means of serving people and following Honda Philosophy, Honda has continuously challenged to create technologies and make products that bring joy to our customers around the world. For more information on Honda, please visit the company's website at <http://world.honda.com>.

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