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Development of Battery-less Sensor for Maintenance of Infrastructures with Microwave Power Transfer

Shigemi Masuda[(1)] and Naoki Shinohara[(2)]
(1) MinebeaMitsumi, Inc., Asana1743-1, Fukuroi, Shizuoka, 4371193, Japan,
e-mail: smasuda@minebeamitsumi.com
(2) Kyoto University, Gokasho, Uji, Kyoto, 6110011, Japan, e-mail: shino@rish.kyoto-u.ac.jp

Maintenance of infrastructures, e.g. road, tunnel, bridge, etc., is one of most important issues that must be solved for sustainable society. It is usually measured and checked by human, however, it is very hard to measure a lot of infrastructures. Recently, new sensors to measure the infrastructures are developed and it is easy and convenient for the maintenance of the infrastructures. It is requested to expand a life time of the sensors. So battery-less sensor is hopeful expected because life time is decided by battery time.

A wireless power transfer (WPT) can solve the life time problem of the sensor for the maintenance of infrastructures. Especially a microwave power transfer (MPT) is a long distance WPT and is suitable to provide a wireless power to the sensors. (1) MinebeaMitsumi, Inc. is developing new screw sensor system at an exhaust fan in a tunnel with the MPT with Kyoto University. The system image is shown in Fig.1. Microwave power at 915MHz will be transmitted from driving car and the sensor will receive the microwave power. Monitored data will be transmitted to know a screw loosening with rectified microwave power. We are also simulating a suitable beam forming for the proposed MPT system with a phased array on the roof of the car. Totally we develop the battery-less screw sensor with the WPT.

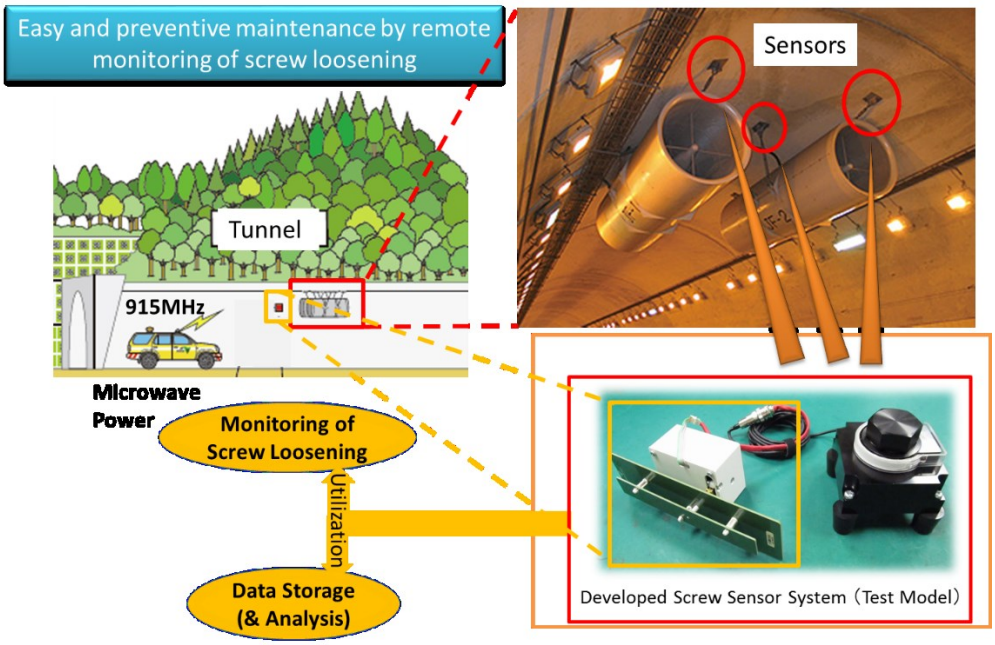

Figure 1. Wireless Charging System of Electric Bicycle via Microwave (a) System (b) Developed System

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