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Press Release

YRP Ubiquitous Networking Laboratory

**Successful Development of UWB Dice (tentative name),  
The World's First & Smallest UWB Active Tag of 10 mm Square**

Battery life of more than 9 years and highly accurate positioning to within 30 cm using  
next-generation wireless UWB

YRP Ubiquitous Networking Laboratory (Location: Shinagawa-ku, Tokyo; Representative: Ken Sakamura, Professor of the University of Tokyo), a laboratory for basic research in ubiquitous computing, has successfully developed UWB<sup>[1]</sup> (Ultra-Wideband) active tag<sup>[2]</sup>, UWB Dice (tentative name) in cooperation with the Central Laboratory of Hitachi, Ltd. (Kokubunji-City, Tokyo, Director: Yasushi Fukunaga). The newly developed tag is different from the existing Dice that uses the much weaker wireless frequency of 315MHz in that it is a next-generation wireless system UWB active tag with a central frequency of 4.1 GHz and a bandwidth of 1.4 GHz. UWB Dice is very low power and is equipped with highly accurate positioning and high reliability through the adoption of this system. It is an innovative active tag which is encased in a 1 cm square, including the battery and antenna.

YRP Ubiquitous Networking Laboratory is promoting research and development to establish the basic technology to automatically recognize "objects" and to realize a ubiquitous computing environment. By attaching ultra-small terminals (active tags) to people, objects and environment, obtaining the information continuously over time and transmitting and receiving the information through wireless networks, we aim to realize a safe and comfortable living environment. The reduction of power consumption of the wireless part of the active tag is essential from the viewpoint of battery life. By providing highly accurate position information, we can enhance the efficiency of the administration of DICEs significantly.

This newly-developed UWB Dice realizes ultra-low power consumption (battery life of more than 9 years<sup>[3]</sup>), highly-accurate positioning to within 30cm, and a communication speed of 10Mbps at a distance of 10m / 250kbps at a distance of 30m by adopting an impulse-type UWB wireless system. These features permit high-performance system operation which was not realized by existing wireless systems and the creation of a variety of new applications such as a

maintenance-free automatic inventory management system and highly accurate position tracing.

The details of this development shall be released at “The Society Conference of The Institute of Electronics, Information and Communication Engineers”, to be held starting September 19 in Kanazawa.

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[1] UWB, which is called ultra-wideband wireless communication was originally developed as military technology in the U.S.. The commercial use of this next-generation wireless system was authorized in the U.S. in 2002. The frequency bandwidth must be more than 500MHz. We can achieve low power consumption, noise-resistance, high-speed communication and highly accurate positioning coexistent with other communication systems by dispersing the signal power to the wide bandwidth. In Japan, the Ministry of Internal Affairs and Communications is working on legislation for UWB. It is expected to be authorized this fall.

[2] As the key device of the ubiquitous computing to identify “objects”, IC tag is attracting attention. The IC tag is also called RFID (Radio Frequency Identification), and is roughly grouped into two types: passive tags without batteries and active tags with batteries. As passive tags respond using the power of the radio waves from the reading equipment, their detection coverage is relatively limited (from several centimeters to several meters). On the other hand, active tags with batteries transmit the radio waves and have coverage from several dozen meters to several hundred meters. Active tags are attracting attention because they can incorporate the sensors to obtain a variety of information and realize sophisticated functions such as displaying their status by attaching an indicator.

[3] Conditions: button-type battery (150mAh), intermittent operation of once in 5 minutes

**[Inquiry regarding this release]**

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