

ETRI's latest ICT to showcase at CES 2017

ETRI showcases its latest ICT achievements at the CES 2017, to be held in Las Vegas from January 5 to 8, 2017. Seven technologies in the field of Broadcasting & Media, Hyper-connected & 5G Giga Telecommunications to be introduced such as wireless charging technology for a specific space; technology to acquire and reproduce super-multiview content; and international standards technology for healthcare and connected cars.

In partnership with its joint research institutions, ETRI is exhibiting some of its latest research results in a few booths. ABOV Semiconductor will jointly display the WoT (Web of Things) solutions, and Elcomtec is participating in the exhibition for integrated control platform technology designed for smart homes. SIGONGtech is partnering with ETRI for real-time image multiplexing technology for multiview display, and Hwashin demonstrates in the United States its automobile radar signal processing software.

At the exhibition, ETRI aims to display the latest achievements developed by its researchers and invite international companies interested in those technologies to provide consultation for technology transfer as a means to facilitate technology commercialization.

First, the **wireless charging technology** enables smart devices to be charged in a three-dimensional manner, regardless of their locations and direction. Although the currently available version of the technology requires smartphones to physically contact the charging pad, ETRI's newly developed charging mode simply requires users to place their smart devices inside kinds of small basket, such as the cup holder inside their car.

The **technology to acquire and play the super-multiview content** is a part of the Giga Korea Project. Most of the 3D imaging technology in the current consumer market are based on the support of dedicated 3D glasses. However, ETRI's technology readily acquires super-multiview content at a total of 81 viewpoints, and play the images on the glasses-free displays in real-time. Another technology to be showcased allows a large volume of super-multiview media to be transmitted, shared, and controlled to enable collaboration between remotely located users.

The **international standard technology for healthcare** is an extension of Bluetooth communication to combine with healthcare technology. This significantly helps the work of healthcare services and equipment developers. The research team plans to match the technology with the standards it will develop and strengthen its influence when they are selected as international

standards. The international standard technology for connected cars realizes a variety of automotive electronic data (speed, fuel, safety, telematics) in a Web-based manner, against the backdrop of rapidly increasing use of ICT in the field of automotive electronics. Currently, this technology is for the W3C standards, and an interlocking test is scheduled to be conducted with GENIVI Alliance, a concentration of global automotive industries.

By demonstrating the technologies with joint research partners, ETRI also aims to enter the North American market based on a strengthened competitive edge. ETRI's Smart Home Factory Research Section and ABOV Semiconductor are displaying the IoT solutions together. The IoT technology previously was mostly related to IoT-applied home appliances and was only provided for some premium devices. On the other hand, the IoT solution technology to be showcased at the CES 2017 loads WiFi-based, low-cost IoT chips, and ultralight IoT software optimized for hardware. This will enable the IoT solution to be applied to small appliances subject to fierce cost competition. As a result, the technology is anticipated to strengthen global competitiveness of home appliance manufacturers in the field of IoT technology, which is expected to grow rapidly.

Together with Elcomtec, ETRI also exhibits platform technology to manage and control home appliances. Connecting the appliances to the Web service, this Web-based smart home coordinating technology creates a personal smart life experience by allowing manufacturers, businesses, and users to use a diverse and creative smart home service. This technology was on display at the CES 2016, and this year it will additionally showcase the wellness service specifically designed for personal weight management.

The technology developed with SIGONGtech provides multi-view 3D images in the form of multivision for users to feel 3D illusion with the naked eyes. Depending on the interactions with users, images are dynamically created at 81 different perspectives in real-time, offering an experience of immersive 3D effect and parallax.


Finally, Hwashin and ETRI will showcase signal processing technology to detect targets by using high-frequency signals (77GHz) for vehicles. Also to be displayed is software technology to transmit high-frequency wave patterns, calculate a target's distance, angle, and speed, and detect a target.

"At the CES 2017, we will actively publicize Korea's latest ICT capabilities to international businesses," explained Dr. Soon Seok Lee, Vice president of ETRI, Communication Strategy Department. "With various efforts for global marketing, we are committed to promoting ETRI's outstanding technologies and leading overseas technology commercialization and entry into the global market."

** Attachment : Brief introduction to each technology(1~7)*

★ 1. E-Cup (True free positioning energy-cup)

The E-Cup, Energy Cup is truly true positioning wireless charger with new technology that surpasses current wireless charging technology. This is the level of wireless charging technology that consumers want. It is an energy cup that can charge the smart devices in three dimensions regardless of their locations and direction. [Youtube] <https://www.youtube.com/watch?v=7llvTc9mJhs>

<p>Features</p>	<ul style="list-style-type: none"> ○ 140 kHz Magnetic Resonance ○ 360 Degrees and Tilt of Freedom ○ Simultaneously Charging Two Devices ○ Eff.(DC/DC)=60±3% ○ Meeting KN 17 & FCC part 18 ○ Meeting ICNIRP(1998) guidelines
<p>Applications</p>	<ul style="list-style-type: none"> ○ Wireless charger for smart-phones ○ Wireless charger for wearable & IoT devices ○ Cup holder type wireless charger for smart devices in vehicles ○ Wireless charger for various small electric, electronic devices  <p>The diagram shows a central 'E-Cup' with a smartphone inside, surrounded by a circular path of eight icons representing different devices. Below it are three smaller 'E-Cup' units. Text on the right lists '3D-Wireless Charging' features: 140 kHz Magnetic Resonance, 360 Degrees and Tilt of Freedom, and Eff. = 60±3%. A quote says 'You won't have to fiddle to find that sweet spot!'. At the bottom, it lists: Simultaneously Charging Two Devices, Meeting KN 17 & FCC part 18, and Meeting ICNIRP(1998) guidelines.</p>

★ 2. Multi-view Content Acquisition & Real-Time Interaction Control Service


Real-time multi-view content acquisition and interaction control for synchronized rendering

- Real-time streaming technology for multi-view content obtained using a turntable and a camera
- Real-time user interaction control technology for content rendering synchronization over a network

<p>Features</p>	<ul style="list-style-type: none"> ○ 4K Multi-view Content acquisition using a 360° turntable and a camera ○ Multi-view content sharing across multiple 3D display terminals and real-time interaction control technology for content rendering synchronization
<p>Applications</p>	<ul style="list-style-type: none"> ○ Interactive e-learning and immersive media service ○ Tele-presence video conferencing and collaboration service ○ Out-of-home advertising, digital signage & entertainment service <div data-bbox="416 1335 1366 1908" style="text-align: center;"> <p>Multi-view content acquisition and media service platform for transmitting and synchronizing content rendering in multiple 108-view autostereoscopic display devices over a network</p> </div>


★ **3-1. OCF healthcare & BLE-GATT Gateway**

PoC (Proof of Concept) implementation which implements OCF healthcare resource model and Gateway which enables IoTivity devices to interwork with legacy BLE-GATT healthcare devices.

<p>Features</p>	<ul style="list-style-type: none"> ○ Implementation of OCF healthcare resource model ○ BLE-GATT gateway which lets IoTivity devices interwork with existing legacy BLE-GATT devices
<p>Applications</p>	<ul style="list-style-type: none"> ○ Healthcare wearable devices ○ Home gateway 

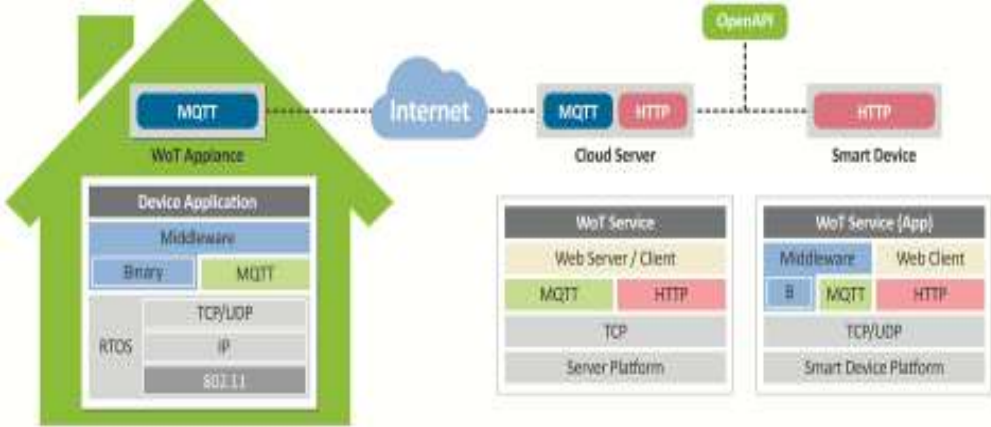
★ 3-2. W3C-OCF Automotive Standards Technology

PoC (Proof of Concept) implementation which enables smart devices (smart phone and smart watch) to interact with connected vehicle based on emerging W3C (World Wide Web Consortium) and OCF automotive standards

<p>Features</p>	<ul style="list-style-type: none"> ○ Web-based vehicle signaling processing technology for Connected-CAR ○ Implementation of W3C vehicle signal server ○ Interworking technology between W3C vehicle signal server and smart watch which supports OCF standards using OCF-VSS Translator
<p>Applications</p>	<ul style="list-style-type: none"> ○ Monitoring service for connected car, car sharing service ○ Convergence service between connected car and smart home 

★ 4. WoT (Web of Things) Solutions Technology

The Web-of-Things (WoT) solution being developed by Korea Electronics and Telecommunications Research Institute(ETRI) together with ABOV Semiconductor provides a total solution of following: Low-cost WoT MCU & HW module for home appliances and lightweight middleware SW.

<p>Features</p>	<ul style="list-style-type: none"> ○ Provides a total solution based on lightweight web protocol optimized for smart home appliances ○ Low-Cost Soc($\leq \\$1.2$) and HW module($\leq \\5) ○ Light-weight Middleware SW module (ROM≤ 50KB, RAM≤ 20KB)
<p>Applications</p>	<ul style="list-style-type: none"> ○ Supports optimized Wi-Fi total solution based on lightweight web-based protocol for home appliances and ○ Provides various guides and application notes to enable you to easily and rapidly develop your Wi-Fi smart home appliance projects 

★ 5. Smart Life Coordinator via SWOA

SWOA provides home devices an easy connection to the web and an easy generation of user-coordinated smart home services, e.g. security services, green home services, and wellness services.

<p>Features</p>	<ul style="list-style-type: none"> ○ Smart home Web Objects Management and Control ○ Commercial IoT Platform Interworking (e.g, SmartThings, AllJoyn) ○ Supports Security with Light-weighted Protocol and User Privacy ○ Service Evolution with Knowledge Base
<p>Applications</p>	<ul style="list-style-type: none"> ○ Providing Opportunities for New Business Service Models regarding Smart Life and Smart Home Service over SWOA Technologies ○ Providing Various Object Relationship and Knowledge-based Killer Applications ○ Open Service Providing Framework (Service Transparency) <div data-bbox="558 1276 1324 1792" data-label="Diagram"> </div>

★ 6. Real-time Multiview Multiplexing Technology for Tiled Automultiscopic Displays

The technology provides a real-time image synthesis framework for generating 3D illusion with glasses-free tiled displays and an efficient workflow for authoring multi-view content coupled with Unity game engine.

<p>Features</p>	<ul style="list-style-type: none"> ○ Depending on the interactions with viewers, images at 81 different perspectives are dynamically created in real-time, to offer 3D illusion with no support of dedicated 3D glasses. ○ Through 3D pop-up book content, viewers can have a realistic experience of riding a submarine and traversing the deep sea. The effect of edutainment is enhanced by allowing the viewers to observe the behaviors of marine life of their choice.
<p>Applications</p>	<ul style="list-style-type: none"> ○ Presenting the practicality of a key element technology to create 3D image content without glasses in the content industry with significant impact on the markets, such as advertisement/exhibition, edutainment, and medical training. ○ Facilitating the commercialization of glasses-free 3D image content services, by not only satisfying the availability of multi-view image content, but also providing the technology to produce super-multiview image content that minimizes eye strain. <div data-bbox="448 1525 1353 2024" style="text-align: center;"> <p>The diagram illustrates the workflow of the technology. It starts with 'Real-time multi-view rendering' (a 3D scene with multiple views). This feeds into a 'Real-time multiplexing on GPU' block, which is connected to an 'RGB multiplexing pattern DB' (database). The output of the GPU block is then displayed on 'Tiled multiview displays' (a row of monitors showing a 3D scene from multiple perspectives).</p> </div>

★ 7. Radar Signal Processing SW for Automotive Radar

Signal processing algorithms for detecting targets using automotive 77GHz radar, Implementation of radar control and signal processing software such as waveform transmission, target range/angle/velocity detection, and target tracking.

<p>Features</p>	<ul style="list-style-type: none"> ○ FMCW 77GHz radar signal processing SW technology ○ Implementation of FFT windowing and pulse integration for enhancing signal power of targets ○ Implementation of Embedded High-speed CFAR Processor for separation between targets and clutters ○ Implementation of target tracking algorithm for location estimation ○ Development of Radar GUI for displaying target positions and data for analysis (e.g. ADC samples and frequency spectrum)
<p>Applications</p>	<ul style="list-style-type: none"> ○ Signal processing for forward monitoring sensor of ACC(Adaptive Cruise Control) Radar system ○ Signal processing for pedestrian/object monitoring sensor of All-Around/Surround View Radar System ○ Signal processing for side and rear monitoring sensor of BSD(Blind Spot Detection) Radar system 