Service Robotics System Moves Closer to Becoming a Reality

Customer Service Robot, EMIEW3 Edges Closer to Commercialization after PoC Testing

As the issue of labor shortages in a society that is aging and declining in fertility comes into sharper relief, expectations for service robotics as a labor shortage solution are increasing. With a view to using robots in actual services, Hitachi developed the humanoid robot EMIEW3 and its robotics IT platform, and began proof-of-concept (PoC) testing at Haneda Airport in September 2016. Going forward, Hitachi intends to step up its efforts for the commercialization of service robotics in light of requirements and knowledge obtained through the PoC testing.

Atsushi Baba
General Manager, Robotics Research Department, Center for Technology Innovation – Mechanical Engineering, Research & Development Group, Hitachi, Ltd.

Shinichi Shitara
Senior Manager, New Project Department, Global Solution Division, Building Systems Business Unit, Hitachi, Ltd.

EMIEW3 for Use in Actual Services

Is EMIEW3 distinctly different from other interactive robots?

Baba   At the moment, most interactive robots are used solely for marketing and PR purposes. EMIEW3 on the other hand is a humanoid robot intended for use in actual services such as approaching customers in need of assistance and providing guidance. As such, EMIEW3 further advances elemental technologies such as autonomous travel technology accumulated since the development of the first generation of EMIEW to ensure stable operation at customers' sites. The use of robots in actual services poses numerous challenges, like uneven
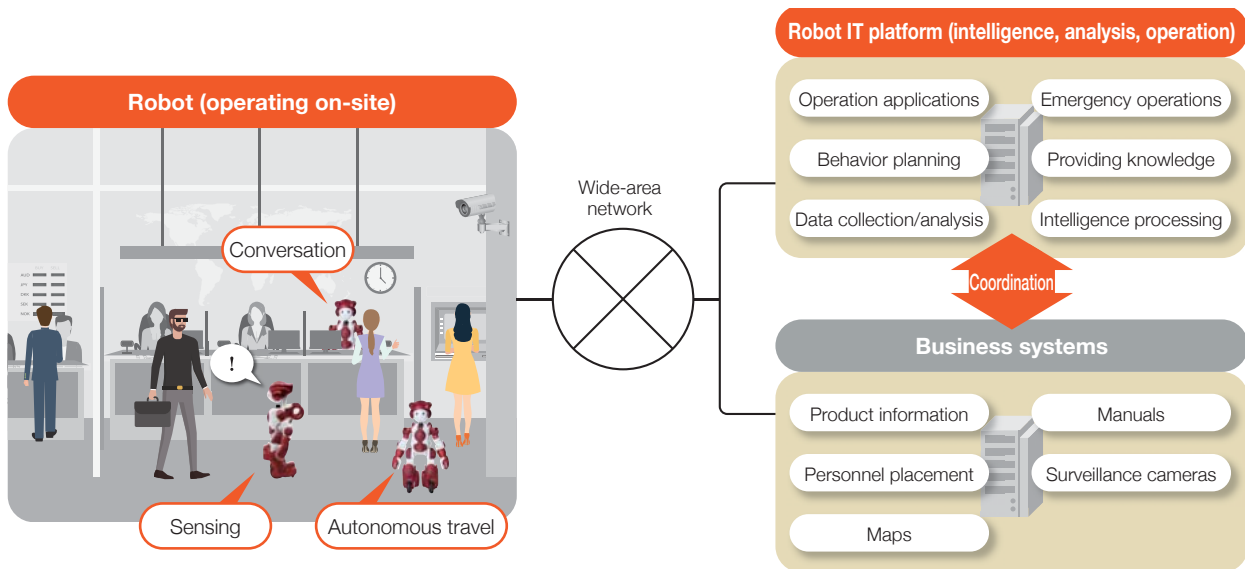
Atsushi Baba   Shinichi Shitara

Overview of the service robotics

road surfaces, for example. We therefore made a number of modifications, such as giving EMIEW3 a lower center of gravity than EMIEW2 and giving it a four-wheel structure with stabilizer wheels. We also gave EMIEW3 a topple-restore function so that if it falls over, it can stand up by itself and return to the task at hand. As for the robot intelligence processing system, we did, of course, further advance the voice recognition and image recognition technologies used in EMIEW2.

Shitara With its small, lightweight body and design, EMIEW3 has the same human centric design as EMIEW2 in terms of friendliness. We managed to deliver a robot that was small and compact and yet capable of providing actual services because we adopted a remote brain configuration, giving the robot itself only functions that require real-time processing such as collision avoidance and running other intelligence processing on the cloud. This configuration enables linkage with environment cameras and information-

sharing with multiple EMIEWs and it also allows us to flexibly run applications to meet a range of operational needs. Through the development of a mother brain component that provides centralized monitoring and control of multiple sites and multiple robots, it is also possible for EMIEWs to hand services over to each other. Combining operational technology (OT) and IT in this way, EMIEW3 is very much a robot befitting of Hitachi.

The Ideal Location for Multi-purpose Verification

Why did you decide to conduct PoC testing at Haneda Airport?

Baba There are many robots that have a single function, but EMIEW3 was developed as a multi-purpose robot. Since Haneda Airport also has many

stores selling goods, EMIEW3 is required not only to give airport users directions but also to give them store information. EMIEW3 could also conceivably be asked to make passenger announcements by airlines. In this sense, Haneda Airport was the ideal place for the PoC testing of EMIEW3.

Shitara We conducted the PoC testing in three stages. In step 1, EMIEW3 greeted airport users at a dedicated counter, dealing with them in Japanese or English. In response to questions from airport users, EMIEW3 provided information using aids such as a map, an airport guide and store photographs on an information display next to the information counter. In step 2, EMIEW3 led airport users who had asked a question to an information display by means of autonomous travel and gave them an answer or explanation. In step 3, EMIEW3 will travel around the terminal floor and guide airport users to their destination.

Future Challenges Revealed through PoC Testing

How do you view the results of the PoC testing at the present time?

Shitara From a business perspective, I was reminded that an airport is not just full of people but is also a place with many public information announcements. I was surprised that, even with this level of background noise, EMIEW3 was able to provide information in response to inquiries from airport users. In step 3 which is starting now, we plan to examine whether EMIEW3 appropriately matches the walking pace of customers and how many people accept EMIEW3's invitation to guide them to their destination.

Baba Due to the confusion of some customers when faced with EMIEW3 in previous PoC testing, we reprogrammed EMIEW3 to start up a conversation, and this turned out to be very effective. We do, however think there is room for improvement in terms of communication. In communication between people, non-verbal communication such as pauses and eye contact is important. More improvements, including improvements in signal processing, voice processing and movements, will be required to achieve such a smooth level of communication.

Aiming to Develop a Robot that Can Provide a Wide Range of Services

Finally, how do you see service robotics developing in the future?

Shitara EMIEW3 - the fusion of a humanoid robot and a robotics IT platform with a remote brain configuration - will provide actual services. We are considering rolling out a wider range of services by adding various optional plugins to a standard package consisting of linkage with elevators, cameras, etc. We also established a new Robotics Co-Creation Room in Hitachinaka, Ibaraki prefecture as a place for collaborative creation with customers. As you might expect, customers react differently when they actually see EMIEW3. Hitachi intends to further develop the new service robotics business by working with customers to assess ways and means of using service robots to bring about customer benefits.

Baba From a development perspective, we would like to enhance the intelligence of robots and broaden the scope of their application through the promotion of collaborative creation with customers in various sectors. What is more, since robot intelligence can be applied not only to EMIEW but also to smartphones and tablets and transportation support robots that drive themselves (ROPITS), we would like to apply the technology we have accumulated through the development of EMIEW in a wide range of applications, thus helping to solve social problems and realize a comfortable and convenient super smart society.