

KAIST's Interest and position paper for W3C Workshop on the Web of Things

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INTRODUCTION

As the Internet of Things (IoT) market emerges, so called IoT devices, i.e., sensory devices, gadgets, and App-Enabled accessories[1] with internet connectivity are increasing. A big portion of them are targeting personal or home environmental usage which can be easily purchased and deployed by individual users. When the number of IoT devices around people increases, accessing and turning on and off each apps (or Web pages or embedded softwares) to monitor and/or control them will get bothersome. Exchanging data or cooperative functioning among things is not supported since current proprietary and silo-style IoT service package obstacles inter-communication between things.

To address these issues, KAIST have designed and developed a software for unified monitoring and interoperable control of IoT devices under the project named as 'ThingsGate'. In this project IoT gadgets are virtualized based on their profile with process description using JavaScript. Then, to execute and control the instances of the virtualized objects, instance management functions and their interfaces are designed. We implemented our development in an existing wireless access point (AP) to apply in real home environment. In this position paper, we would like to share and discuss about our concerns related with standardization issues arose from our project.

VIRTUAL OBJECT SPECIFICATION INCLUDING INTERFACES

When we design a virtual object (VO), interfaces need to be included to communicate with real things, other virtual objects, and 3rd party services as depicted in Figure 1. Such interfaces are not usually contained or described in IoT devices so that we had to design by ourselves. Using Restful APIs with HTTP is viable when VOs communicate with others running on different service environment. However, within a JavaScript based VO running environment, communicating between VOs for cooperative operations i.e., mashup services can be done more simply by having intra-communication interfaces.

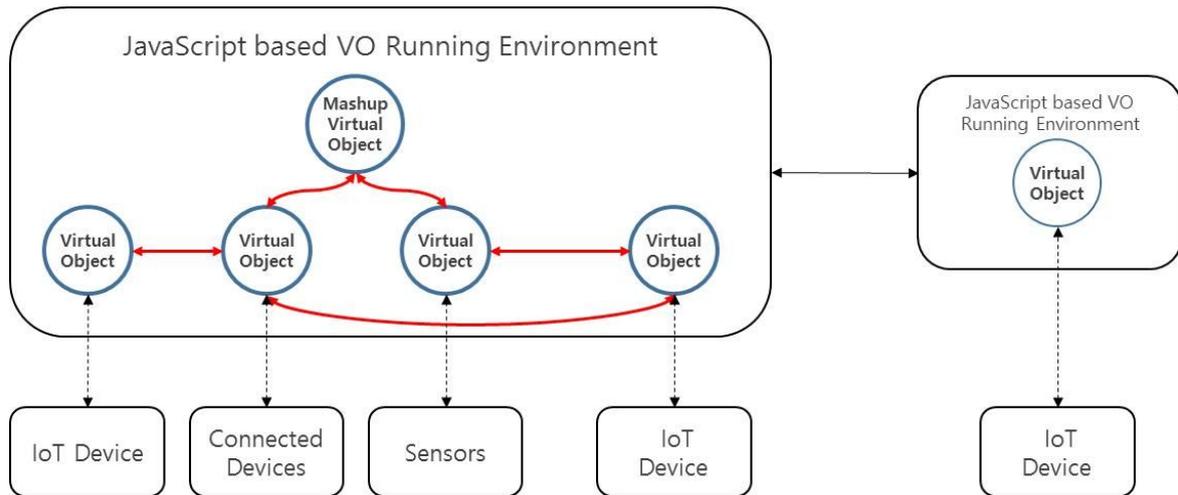


Figure 1 Communication ways for VOs

Having a standard VO specification including interfaces will help overcoming the heterogeneity and proprietary design of existing IoT devices and will extend the utility of the VOs, IoT services, and the IoT service platforms.

INVISIBLE IOT SERVICE DISCOVERY

Even though ‘things’ exist in any physical forms, their services usually do not have any user interfaces in browsable form. So far, in the world wide web, users have accessed/requested to the services using their addresses(URL/URI) or searching. Likewise, IoT services need to provide some decent ways to use rs, so that they can know that there are available services around them and how to enjoy them.

CONCLUSION

When the number of things that are connected to the internet increases, it is very likely to manage them in groups. Within the group, having direct interfaces for communicating between them benefits interoperable control. Providing ways to find invisible IoT services benefit service accessibility and usability.

While we conducting our project, implementing JavaScript based IoT service platform on a limited computing environment like wireless AP was not easy since current Web programming tools are not designed for such conditions. In that context, we are very pleased to hear that W3C is holding a workshop on Web of Things. We would like participate in following activities to develop relevant standard specification as well.