A Study of Semantic Actuator Platform based on Actuator Networks in IoT Environments

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Abstract. With the recent advancements in context aware systems and IoT technologies, rapid development is seen in smart appliances. These technologies are used in many domains (i.e. smart home, smart office etc.) to provide an enhanced user experience. In this paper, we present a semantic actuator platform architecture for an IoT indoor environment control using semantic web technologies. It enables user to intelligently control the actuators in his/her area. Our main focus is semantic actuator platform which is used for collection and storage of actuator information.

Keywords: Semantic actuator, service provider, ontology

1 Introduction

The vision of the Internet of Things (IoT) is to connect devices all over the Internet to share and exchange data in order to provide useful services to people. A primary goal of interconnecting these devices and collecting/processing data from them is to create situation awareness and enable applications, machines, and human users to better understand their environments. These devices generate huge amount of data to be acquired by many services and application in areas such as smart homes, smart grids, healthcare, and environmental monitoring. Nowadays a lot of research has been conducted in this area for making life easier for human beings by developing intelligent applications to control their surroundings. In [1] the authors have presented a control system for home appliances using human speech. They have used an ontology model for representing the context information and the state of the home appliances.

The aim of the semantic web is to provide meaningful data rather than focusing on the structure or representation of data [2]. Its vision is to connect and to attach meaning to data on the Internet for the machines and humans to be able to understand what the data is and where is it coming from. Issues related to interoperability and ambiguity leads to semantic oriented solution towards IoT. Applying semantic technologies to the things on IoT will make its data unambiguous and transparent for both the users and the applications using it. It also provides efficient data access and
integration, resource discovery, reasoning and knowledge extraction [3]. The different semantic web technologies such as ontologies, semantic annotations, semantic web services and linked data can be used for fulfilling the goals of IoT. In this paper we have developed a semantic actuator provider architecture based on actuator networks in IoT environment. This paper proposes a semantic actuator platform architecture for an IoT indoor environment control using semantic web technologies.

2 Semantic Actuator Platform Architecture

The proposed actuator platform is a part of a larger semantic actuator architecture that utilizes both semantic and database technologies to collect, store actuator state information and to exchange control messages between actuators and server layer. Semantic actuator platform module offers services for managing actuator information and exchanging control messages between application server and actuators.

Fig. 1 Semantic actuator platform configuration
Figure 1 shows the configuration diagram of the semantic actuator platform module and the communication flow between the actuator service provider, actuator middleware and actuators. This module performs actuator information management, as well as supplying and monitoring actuator control and operational status.

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