A Study of Actuator Network Middleware Based on ID for IoT System

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Abstract. Actuator network envisions the control provision of resources on Internet. Actuator network middleware supports the message transmissions for controlling the behavior of the environment or physical systems. This paper presents the actuator network middleware based on ID for control environment using multiple actuator devices. The middleware presented here is part of an IoT system. The proposed middleware provides a mapping table between actuator ID and IP address. The middleware supports to transfer command messages through a service interface.

Keywords: Actuator Middleware, Control device, Service-Orientation,

1 Introduction

There are different actuator middleware approaches for IoT(Internet of Things) service. These approaches help in offering important functions for different applications such as efficient control.

Actuator networks are a distributed system of actuator nodes that are interconnected. Actuators perform actions to change the behavior of the environment or physical systems. In many situations, actuator nodes typically have stronger computation and communication powers and more energy budget that allows longer battery life.

Actuator network middleware supports the control-based pervasive computing applications using control nodes. Actuator network middleware supports the message transmissions for controlling the behavior of the environment or physical systems

The Sentire is a framework to facilitate building extensible application middleware which includes logic to support resource and application management, sensor data processing etc. The Sentire supports the process of building such a middleware, rather than addressing a specific instance of a middleware in sensor and actuator networks.

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The Sentire consists of Interface manager, Data manager, Resource manager, Sensor manager, and Actuator manager. Interface manager provides initial layer of query/instruction filtering via developer-defined admit/reject policies. Resource manager supports other managers in their policy-based decisions. Sensor and actuator manager Influence both the quality of sensed information and adjustments to the environment. Data manager embodies develop-defined data processing routines.

In this paper, we propose the actuator network middleware based on ID for control environment using multiple actuator devices. The actuator middleware is designed for mapping between actuator ID and IP address in actuator network.

2 Proposed Actuator Network Middleware

As the proposed middleware is a part of a larger IoT system, understanding the actuator network middleware would describe various functionality.

Figure 1 shows the actuator network middleware detailed configuration. Its basic function is to transfer control messages to application client and the actuator. First function is two way communication using TCP sockets. The figure shows how this communication is managed and carried out with the help of the modules inside the actuator middleware. Second function have two management and processing.

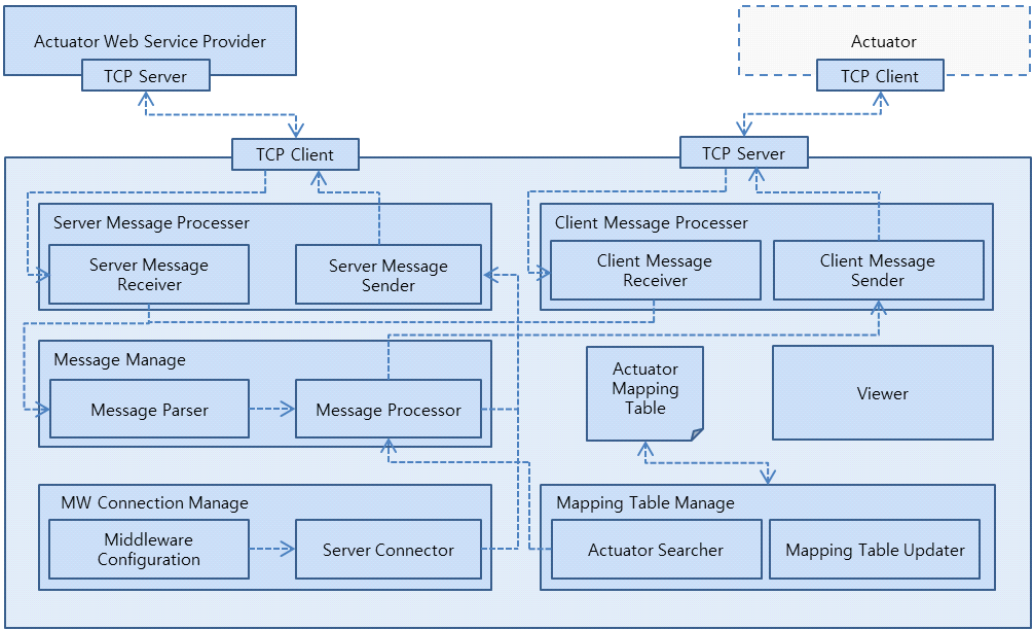

Figure 1: Proposed actuator network middleware for IoT System

The actuator network middleware has server message processor controls the sending and retrieving of messages. It consists of server message receiver, and server message sender, the former controls messages received by the application. But the later retrieves a message from actuator middleware and forwards it to the actuator web provider. Message manager has the message parser and message processor, the

former parses the messages received from the application and actuator. The processing type includes connection request, control request, mapping table renewal request, control response and connect response.

Actuator mapping table consists of actuator searcher and mapping table updater. This provides functionality for searching actuator id and actuator IP address, the later updates mapping table with actuator mapping information in real time which is saved in actuator middleware memory. It is used for storing the actuator IP address and actuator ID information.

Server message receiver receives control message sent by application, and it to the message parser. The parsed message is then forwarded to the message processor. The message processor searches the actuator connection information using the message contents and forwards the message

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