

Delivery and Storage Architecture for sensed information using SNMP

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Abstract. Many researches on context aware computing are carried out around the world. Among them, Context-Toolkit and Semantic Space provide separation of concerns between sensor and application. They make application developing easier. However, they have one problem that is lacking of simplicity in communication, compatibility and flexibility in building systems. To solve it, we propose one delivery and storage structure using standardized simple network management protocol which is useful to deliver, store and manage sensed information. We also verify that this architecture is efficient in wireless sensor network to deliver and store environmental information through an implementation of a SNMP agent. We confirm that this architecture with simplicity, compatibility and flexibility gives the efficiency to developing systems.

Keywords: sensed information management, sensor network management, SNMP

1 Introduction

Many researches about context aware computing are carried out around the world. Among them, Context-Toolkit[1] and Semantic Space[2] use a medium to manage context information between the sensor and application in order to resolve the problem of dependency. However, to let the application use context information, the medium in between must be newly established, or a complex connection must be made with the previous medium.

In Context-Toolkit, there is a problem of increasing connection points for communications. An example for this can be the understanding of overall resources

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Toolkit must execute resource discovery to understand the overall resources. The widget of Context-Toolkit has a communication module and data-processing module, which are vulnerable to the application and communication protocol of Context-Toolkit. Since a fixed communication type must be followed in Context-Toolkit, flexibility in development was decreased.

In Semantic Space, a Context Wrapper, which is like the widget in Context-Toolkit, transmits sensed information to the application or aggregator. To add or delete sensors, Context Wrapper is added to or deleted from the context aware system called smart space through UPnP service. Here some problems of resource discovery and communication type compatibility also exist, similarly in Context-Toolkit.

Thus, by establishing a sensor platform using the transmitting and saving functions of the well-known network management protocol, SNMP[3], we have tried to improve the problems in Context-Toolkit and Semantic Space.

By securing the transparency of sensor through servicing wireless sensed information received by the host PC with a SNMP agent, and by managing the sensed information of wireless network, this paper shows the possibility of flexible transmission and saving of sensed information through SNMP.

2 Delivery and Storage Architecture

The composition of the architecture which proposes in this paper is same below Fig.1.

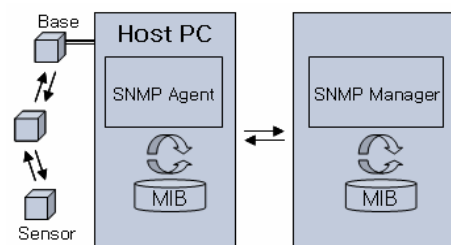


Fig. 1. Composition of architecture

SNMP agent of host PC, which collects and manages environment sensed information. And SNMP manager of outside systems, which can approach to information, approaches to SNMP agent.

SNMP agent module is consisted of SNMP agent, data transmittance, and MIB. SNMP agent manages and controls sensor. MIB stores environment information of sensor. SNMP manager module is consisted of SNMP manager and MIB.

In this paper, we compose server side's system (agent) to confirm that SNMP agent could serve environment information from wireless environments to client side's system (manager). Below Fig. 2 shows composition of agent part.

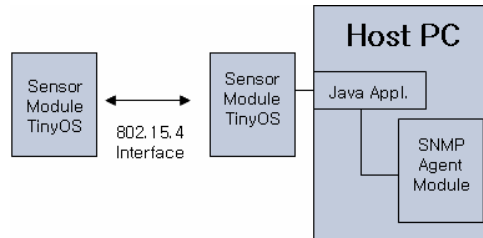


Fig. 2. Composition of Agent part

The sensor modules sense from environments and deliver sensed information to other sensor modules or the base one through wireless communications. Sensor modules install application programs managed by TinyOS. In this paper, we measure temperature, illumination, internal voltage etc. by installing a OscilloscopeRF application program. Except the base sensor module, the others are installed in OscilloscopeRF program that could send the sensed values. The base sensor module is installed in base station program.

The base sensor module acting like a gateway passes the sensed information acquired by the UART using Java interface to the SNMP agent application module. We composed the system that passes the sensed information using general MotelF application program here.

Environment information accepted in this host PC was passed to a SNMP agent part and the sensed values was managed by the SNMP agent. After monitored by an automatic polling program, we received the result managed by SNMP agent in this sensor information table, Fig.3. The periodic polling test shows that the SNMP agent brings environment information from the sensor properly.

| index | module | light | temp | voltage |
|-------|--------|-------|------|---------|
| 1 | 209 | 6362 | 852 | |

Fig. 3. Monitoring of sensor table

The SNMP manager acts like a client collects environment information from the SNMP agent and manages sensors through these commands Trap, Get, Set etc.

SNMP is widely used all round as a standard protocol, and the several application programs are possible. SNMP manager can access to the SNMP agent through basic information (IP, community information, MIB OID etc.) that can approach to the MIB.

Simply inserting SNMP manager module to an application or a middleware will get the environmental information of the sensor easily and the information will be

able to use. Fig.4 is the environment information of sensor got from MIB browser (client).

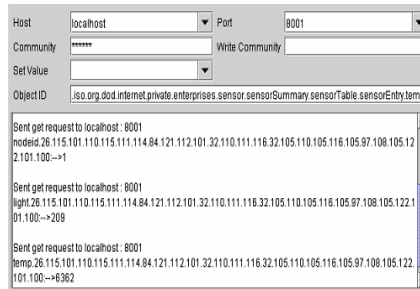


Fig. 4. Sensed information that uses Get command

Through the experiments above, I confirm that the SNMP module could search and control the environment information of sensor.

The wrapping of the agent using SNMP provides a transparent characteristic to the developers of application programs who do not need to know every vendor's API in input processing of various sensors. This gives the efficiency to developing systems.

3 Conclusion

In order to manage sensed information that supports wireless sensor network, this paper suggests a method of transmitting and saving sensed information through SNMP protocol. Also, through realizing agent parts, it suggests that the structure using previous SNMP protocol is also efficient in transmitting and saving sensed information. Through using such architectures, a sensor management structure can be built to satisfy the functions of information transmission, information saving, conditional informing and control.

By using a standardized SNMP protocol, problems in previous context aware computing technologies can be resolved, such as resource discovery, incompatibility and singleness of communication type, insufficient flexibility in development, etc.

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