클라우드 서버 기반 IoT를 이용한 무선기지국 원격 감시시스템 개발

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Development of Wireless Base Station Re4mote Monitoring System Using IoT Based on Cloud Server

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요 약

넓은 지역에 광범위하게 분포되어 있는 통신용 무선기지국은 관리에 많은 어려움이 있다. 특히 산간 오지에 있는 무인 통신무선 기지국은 위급한 상황 발생시에 접근에 많은 어려움을 겪고 있다. 대형 통신회사들은 송수신 정보만 원격으로 관리하고 있고 실제 시설 유지를 책임지고 있는 지역 중소기업 협력업체들은 이러한 기술을 보유하고 있지 않아서 일일이 현장 방문을 통하여 확인하고 있는 실정이다. 본 연구에서는 넓은 범위에 산재해 있는 무선기지국내의 온도, 습도, 화염 발생여부, 전원 동작 여부를 실시간으로 모니터링하여 클라우드 서버에 보내 사무실에서 실시간 모니터링을 통하여 관리 및 위급시 경고 메시지 전송 등이 수행이 가능한 시스템을 클라우스 서버 구축을 통하여 IoT 센서 기술을 이용하여 구현한 내용을 제시하고자 한다.

ABSTRACT

Radio base stations, which are widely distributed across large areas, have many difficulties in managing them. Unmanned radio base stations in remote mountains are having a hard time accessing them in case of emergencies. Major telephone service providers only remotely control incoming and outgoing information and local small business partners responsible for maintaining actual facilities do not possess such technologies, so they are each checked during field visits. In this study, in order to monitor temperature, humidity, fire condition, and power operation at a wide range of radio base stations, real-time monitoring is carried out at the office of Klaus server through real-time monitoring.

키워드

IoT, Particle Filter, Cloud, 4th industry revolution

Ⅰ. Introduction

The fourth industrial revolution has become a hot topic in recent years. The basic idea of the fourth industrial revolution is as shown in Fig.1, as the superconnection, super intelligence, and large fusion, and the industrial ecosystem generates vast data through IoT and IoP (Internet of People). AI can be understood as providing the super intelligent product production / service by making appropriate judgment and autonomous control based on Deep Learning of Big Data and leading the industrial revolution.

The Internet (IoT) refers to the Internet environment in which people, objects, and data are all connected to a wired / wireless network to generate, collect, share, and utilize information. On the other hand, applying the Internet of Things to real life requires the integrated implementation of the underlying technologies. The technologies required are largely the result of the middleware software that is used to store and analyze sensor and network hardware technologies, such as controller, wireless chip, and data reconstruction, and to represent the data representation.

In recent years, radio base stations have become so widespread in large areas that they are helping to ensure seamless communication. However, these

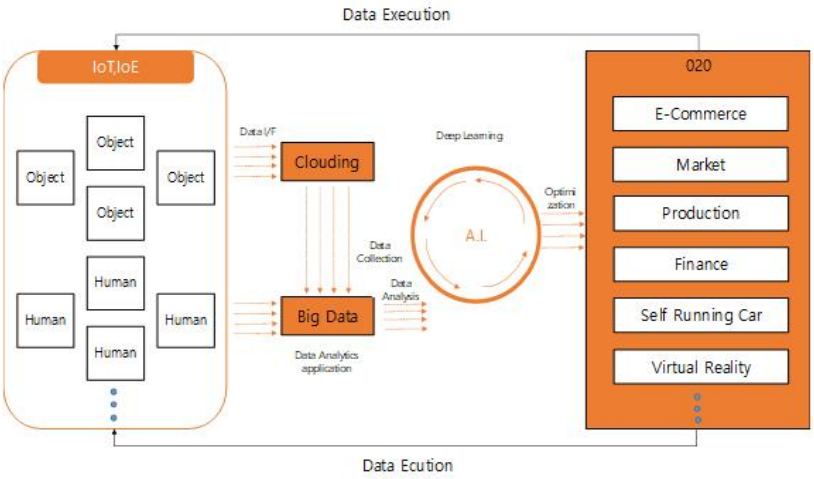

Fig. 1. Mechanism of 4th Industrial Revolution

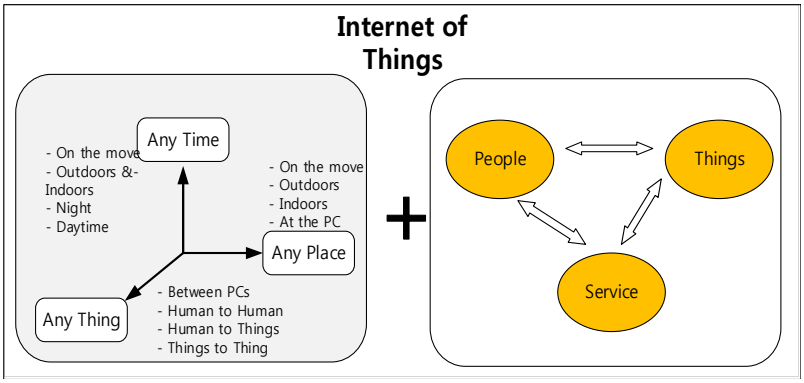

Fig. 2. Communication Environmental of IoT

base stations contain islands and mountainous areas, so it is very difficult to maintain them. In particular, in recent years, it has become increasingly difficult to maintain the system, such as to intentionally destroy base station facilities or to attempt to prevent arson on the ground that it harms EM threats to electromagnetic humans and animals and the surrounding beauties. Consequently, the need for remote monitoring in real time is increasing.

In this study, to solve these problems, a system that is based on cloud services is constructed, and a wireless base station scattered across the country is connected to the Internet, and IoT sensor (fire, temperature and humidity) is detected at each base station.

2. Implementation of Remote Control Base Station System

Figure 4 shows the functional diagram of the remote monitoring system of the cloud service of based wireless communication base station to be developed in this research. The flow of the main functions is as follows: First, each wireless base station detects intrusion detection, temperature, humidity, and flame by using four sensors, and transmits the transmission frequency status and power status in the base station equipment to remote logging information (transmission frequency, transmission output, transmission bandwidth range, power information), preprocess in IoT Device H / W, and connect to Internet AP using Wi-Fi. Information connected to the Internet is transmitted to the cloud system in real time. The cloud system is implemented as Software as a Service (SaaS), so that the actual company does not need to buy a separate cloud server, and it is implemented in a way that only the monthly fee is paid.

The wireless base station manager monitors the status information of each base station displayed on the dashboard, and automatically sets alarm ranges and sends alarm characters to the system.

The sensor and base station information are

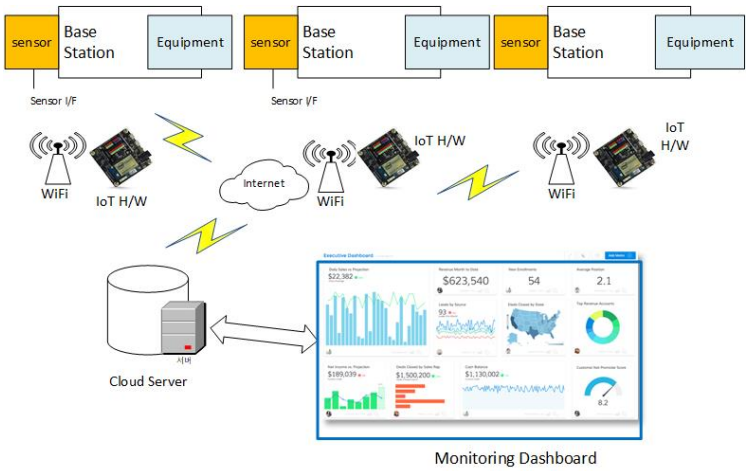

Fig. 3. Overall Configuration of Remote Monitoring System of Base Station

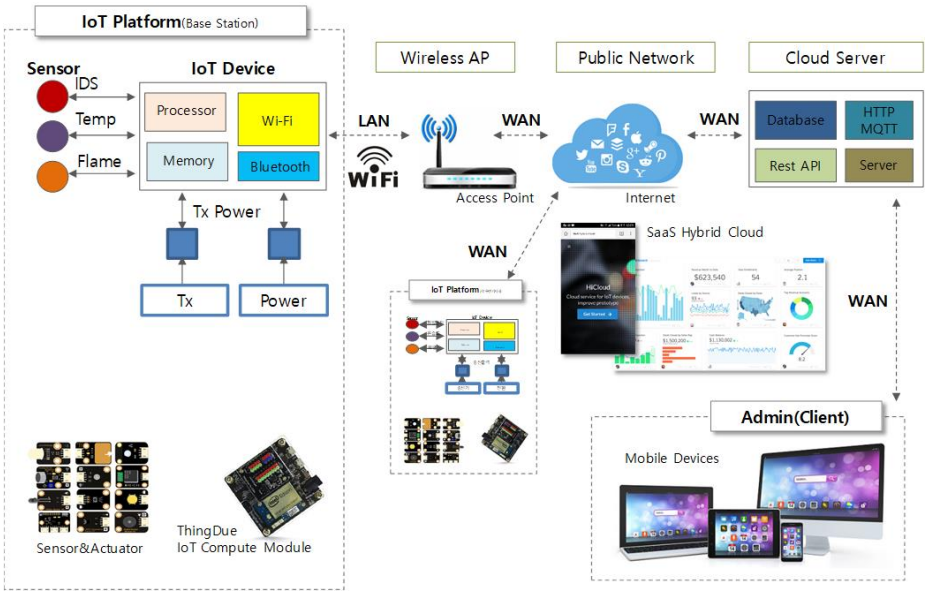

Fig. 4. System Operation Flow Diagram of S/W Structure

stored in real time in the database and are designed to accumulate data in a round-robin manner, so that the desired time zone can be shortened or enlarged.

3. Conclusion and Future Work

In this study, we developed the hardware and software that applies IoT and cloud service technologies, which are key keywords in the fourth industrial revolution. The IoT platform and node-RED proposed in this paper are used to provide services that are more capable of providing faster maintenance and also to drastically reduce maintenance costs.

ACKNOWLEDGMENTS

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References

[1] T. E. Fortmann, Y. Bar-Shalom, and M. Scheffe. Sonar tracking of multiple targets using joint probabilistic data association., IEEE Journal of Oceanic Engineering, 173-184(1983)

[2] N. Gordon, D. Salmond, and A. Smith. Novel approach to nonlinear/non-Gaussian Bayesian state estimation. IEE Proc.F, Radar and signal procesing, 107-113 (1993)

[3] M. Isard and A. Blake. CONDENSATION.

Conditional density propagation for visual tracking. Int. J. Computer Vision, 5-28 (1998)
[4] Y.W. Lee, Design of Smart Garden System Using Particle Filter for Monitoring and Controlling the Plant Cultivation, LNAI, vol.10363, pp. 461–466. Springer, Liverpool (2017).
[5] Y.W. Lee, Implementation of Mutual Localization of Multi-robot Using Particle Filter, LNCS, vol.7389, pp. 86–94. Springer, Huangsan (2012).
[6] W. Lee, Optimization of Moving Objects Trajectory Using Particle Filter, LNCS, vol.8588, pp. 55–60. Springer, Taiyuan (2014)