Implementation of Digital Contents System for Cleaning Facility management

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Abstract. There is a growing demand for a system that allows users to go online and work at anytime anywhere, as the smart phone is widely distributed and the technology is developing. In line with such a trend, this thesis has developed a system using a display with OS and bluetooth to help check and manage facilities of various industries as well as producing and delivering various contents. The system is based on the Internet of Things which supports the function of inspecting and maintaining facilities while providing various contents on display devices. This also receives from a service provider and displays advertisement contents real time. Therefore in short, the system manages facilities of a building including cleaning service management and displays various contents.

Keywords: Digital Signage, Bluetooth, IOT, Cleaning Facility Management

1 Introduction

Digital signage is a service where a variety of information such as text messages and images are shown on a display screen. Digital signage is an indoor and outdoor digital medium by which various contents and messages are provided through digital information display (DID). It works as follows. Contents such as video clips and images are sent to a set-top box through a fixed-mobile network and shown on TVs, electronic displays, films, small-sized monitors and other screens. [1]. Not only does the digital signage provide dynamic advertisements, but also it gives consumers useful information. So the overall quality of advertisements improves. Based on such advantages, from a standing signboard established in a big building to a small-sized display device installed in an elevator or a subway, the form diversifies, and its effect is expanding. Accordingly, in this thesis, I would like to explain how an integrated management system using radio communication can be installed in a display device with OS installed, which makes industrial facility inspection management possible. In the second chapter of the thesis, I will touch upon design a digital contents system for facility management in the third chapter. In the third chapter, I would like to show how to establish a system based on the design and then, present future challenges as well as my conclusion in the fourth chapter.
2 Design of Facility Management System

This system transmits and receives facility inspection results using tablet computers and smart phones through a fixed-mobile network.

[Flow Diagram Image]

Fig. 1. Flow Diagram of Management System

Figure 1 is a management system flow diagram. This diagram is the work flow of the top manager who can access all the data. A manager, first of all, accesses the Manager Mode in order to comprehensively manage device information, manager management and system error information. After inspecting each and every function and its
information, you can close the Manager Mode. Bluetooth is automatically closed in this case.

3 Establishment of Facility Management System

Since there are no clear-cut national mobile security guidelines, unlike private enterprises, governmental offices and public institutions are facing difficulty in establishing a mobile system. Accordingly, any operating system which uses a smart phone application requires functions development and measures to prevent system intrusion which can be caused by data leakage and through network. In this thesis, therefore, the technical security system for mobile system development is recommended to have a web system separate from network. A System is developed based on ASP.NET and MVC5 while the tablet side is developed based on C#.

Fig. 2. Security System based mobile system

Figure 2 shows security system for a mobile system. The basic secure zones are device, network and server. At the stage of device security, anti-virus is to be installed. The basic smart phone security guidelines should be applied and all the applications implemented must be shut off and DB files deleted when the phone is lost. Not only that, device as well as user authentication is to be implemented. At the phase of network security, web system network section and mobile system network section need to be disconnected and communication between mobile device and server can be done only through VPN (Virtual Private Network). Other
communication channels except for VPN are to be blocked so that data encryption can be done only through SEED algorithm. In addition, at the stage of server (data center) security, data server access can be shut off by server duplication. Single communication through VPN is only to be allowed. MDM (Mobile Device Management) client is to be additionally installed in the device. Through communication with MDM server, the device is to be more effectively managed and its security system can be further strengthened. It can be set to prevent any data from being stored in the device in principle, or to store the data only temporarily before the data is transmitted. However, the data must be immediately deleted after it is transmitted. In case of information transmission between device and server, all the data must be encrypted.

![Image](image.png)

**Fig. 3.** Interface for Contents Information creation

Figure 3 shows how to create new contents by clicking the Create button after inputting all the necessary information. When it comes to contents company names, only pre-registered company names can be displayed. Contents contract status is to be input in bool type such as 'Under Contract,' or 'Contract Suspended.' Contents screen is an item which shows the time how long contents are displayed [2].

## 4 Conclusion and Future Works

This system helps managing facility inspection by installing a touch monitor with tablet PC or OS embedded in specific locations. Manager automatic authentication is possible by using Bluetooth. Not only can contents be replayed at specific display locations, but also the integrated software management system with a camera or a sensor embedded allows frequency of use to be managed. Last but not least, this is a "hardware and software in one system" solution. Various display devices equipped with OS provide functions such as video clips, images, weather forecast service, present time and emergency call service. Bluetooth is used for interaction between this invented device and an end user’s mobile device and the system provides various information about it [3]. Our future challenges are to add the Internet-of-Things (IoT)-
based technologies for wireless interaction through various sensors and to develop cloud-based contents services.

References

