

IoT Smart Bell Notification System: Design and Implementation

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Abstract— In this paper, we provide a security system that combines the functions of smart phone and home network system. It enables the users to monitor visitors in real-time, remotely via the IoT-based doorbell installed near the entrance door to a house. If an outsider breaks into the house, the system can help identify the trespasser by acquiring CCTV evidence. Furthermore, this system can be used to report to the police or home security service provider immediately when a trespass occurs.

Keywords — Bell, Home Network, Internet of Things

I. INTRODUCTION

The goal of this paper is to design and implement a home security system by integrate smart phone and home network service in the absence of residents [1]. With visitor pressing the doorbell, the device records and sends the CCTV of the visitor to the user. Our system provides a convenient user interface for the user to view the CCTV and take appropriate action accordingly. This is implemented by interlocking with the real time SMS server that sends warning message to user when the doorbell is pressed.

Table 1 shows the existing doorbell and videophone systems. For comparison, there is only voice recognition feature for DP-KD audio door phone and video feature for Cav-70P video phone. Smart Chewy supports video and saving images, text and GUI features. Our smart bell system presented in this paper supports video, saving images, warning notice, GUI features. Existing products use the transmission protocol and uses the internet standard protocol. There is an advantage that it is easy to access system.

II. IMPLEMENTATION DETAILS

Figure 1 shows the processing flow of our doorbell system. If a visitor presses the smart doorbell installed near the front door, this system takes a picture of CCTV and sends photos and SMS to the user. The CCTV monitoring feature is implemented by connecting Web cam. The user can watch it through accessing the web page that the Apache web server provides.

The system uses the Apache web server (version: 1.3.34 <Win32>). A user can manage a doorbell home network through accessing the Internet connection. We implemented the system using C++ language and the front door monitoring feature through connecting a WI-FI router device, web cam, and a smart phone. The primary function largely consists of SMS class that sends message to user by connecting a text server system and video class that shows CCTV monitoring and stores these data.

TABLE 1. EXISTING DOORBELL SYSTEMS

	Kocom General audio Phone	Komax CAV- 70P Video Phone	Smart Chewy	Smart Door Bell
filming function	X	O	O	O
saving function	X	X	O	O
notice SMS function	X	X	O	O
GUI function	X	X	O	O
transmission protocol	itself	itself	itself	HTTP (subscribe / notify)

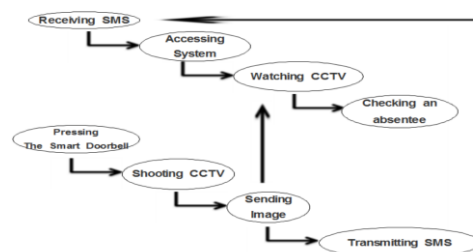


Figure 1. Smart Bell Acting Model

The main features implemented in the system are described in Table 2. The user should be notified that visitor is present and be able to view the CCTV, so that the user can identify visitors. The user should be able to report police officer if the visitor is suspicious. To do this, the server should be able to send message to SMS server connected with the smart doorbell. It connects the server and displays in real time when the user requests the CCTV monitoring service. The system sends a SMS message that contains a captured image of the visitor.

TABLE 2. IMPLEMENTATION FUNCTIONS (USE THE TEMPLATE AS IN [5])

Function name		Function Description
Main Function	Start Working	It activates CCTV set in the front door
	Smart Server Working	To communicate smart phone, Smart Server is activated
Function of transmitting SMS		If the user presses Smart Door Bell in the application, SMS is automatically sent to the user
Visitor Function	Doorbell Button	Visitors and users can press Door bell button set outdoor
application Function	Checking CCTV	The user can watch real time CCTV or stored CCTV by using Smart phone

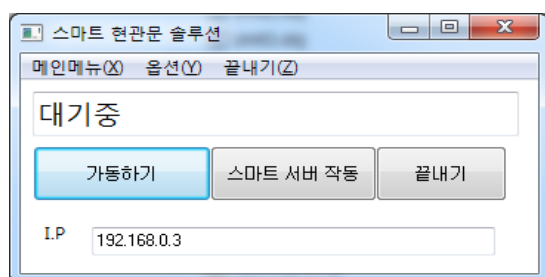


Figure 2. Smart Bell Start

Figure 2 shows the execution screen; when the user presses Smart Server Working button, it activates the Apache web server. The app terminates when the user presses *finish* button.

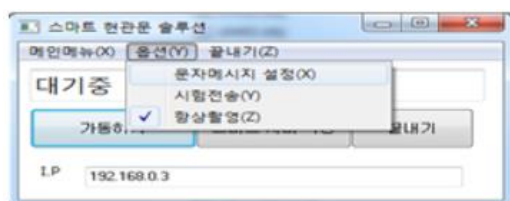


Figure 3. Smart Bell's additional functions

Figure 3 shows the additional function of the bell. If the user sets the configuration of text message, she has to enter

character National service ID and password first. Then, the user can set the configuration of text message. If the user presses the test sending button, the user can know whether the character system works well or not by sending test message. If the user presses shooting function button in figure 4 on the above, it captures the CCTV image.



Figure 4. Screen of working on Smart Bell

Figure 4 shows the final implementation of Smart Bell. If a visitor presses doorbell image, SMS is sent to the user. The user can access the address from the web browser of the smart device.

III. CONCLUSIONS

In this paper, we discuss the functions of Smart phone and home network system [2]. We implemented the intermittent notification system utilizing the existing doorbell function [3]. There are several advantages. For example, it allows the user to operate system conveniently. Currently, the system is limited in that only one Web cam device can be usable. In the future, voice recognition and face recognition functionalities can be augmented to strengthen the security system more [4]. We expect that smart bell systems can be spread to each household and it is expected to be developed to enable control using smart wear.

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