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Smart Doorbell with Enhanced Security.

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Abstract: The term home security is variously developing as a noteworthy concerning issue in the present life. The test of building up a home security gadget is to make it easy to use which can diminish human exertion and additionally guarantee security of individuals along with their home. The proposed project is used to minimize the doorstep crimes by implementing smart doorbell with push notification and smart door lock to homes, offices, etc. As soon as the bell is rung, a notification will be delivered via mail consisting of an attached image of the visitor to the registered members. A smart door lock which will be used can be unlocked by fingerprint or smartcard of authorized members only.

Keywords: IoT, Fingerprint scanner, NFC smart card, Home automation, Push notification**.**

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I. INTRODUCTION

In quickly creating mechanical world, individuals are seeking gadgets to guarantee security and convenience in their home. Considering the expanding request, analysts are attempting to create security gadgets for smart home with more insight and convenience to client. In this paper, a security device is proposed considering the home security and diminishment of human exertion. It also considers the nature and prevalence of doorstep crimes, in addition to prevention strategies and proposes novel technology based solution to aid in prevention of doorstep crime.The recent release of standards in the field, such as IEEE 802.15.4 and ZigBee, brought the technology out of research laboratories and stimulated the development of numerous commercial products such as home automation, building automation and utility metering [1]. This paper shows the commercial and residential application that can be built over ZigBee. In this gadget, the doorbell will act cleverly to send a push notification and an email with an attached picture when an individual is present at the door.

II. LITERATURE REVIEW

The following research articles are selected for review, keeping in mind the traditional and conventional approaches of smart doorbell with enhanced security:

M.A. Kader et al. proposed a fingerprint scanner which captures the fingerprint of the person and verifies it. It communicates with microcontroller via universal asynchronous receiver-transmitter (UART) module of microcontroller. After getting verification result from fingerprint module the microcontroller opens the door [2].

Andrew Ennis et al. proposed a technical implementation of the doorbell system and showed that the technical aspects of the system can provide assistance to a person through the use of Raspberry-Pi 2 and fisheye lens (Model:ELP-USBFHD01M-L180). They have showed that the system can be interacted with in an unobtrusive way using a simple smart phone, and therefore keeping the complexity of the technology hidden from the home owner [3].

Ayman Ben Thabet et al. worked on intelligent door bell system based on human face identification. Face recognition is initiated by pressing the door bell button by using Raspberry Pi with ARMv7 Cortex-A7. Indeed, integrated camera will capture several pictures of the visitors. The face recently scanned will be verified in the present database. In case of unknown face, a template will be generated then stored. Otherwise in case known face actual template is matched with template stored in database. Furthermore, the owner will be notified through mobile phone [4].

Sowmya K et al. proposed the project to facilitate the user with a simple and customized technology to effectively manage visitors slowing to the premises by controlling the doorbell in a smart way and to intimate

the user with picture and text message of the visitor with the help of MSP430 FG4618/F2013 an ultralow power and Finger print development module C5515microcontroller[5].

Yi-Chun Changet al. worked on an IMS network environment with open sources and further implemented the present server and the multimedia streaming server, both of which were connected to be IMS network. The multimedia subject contain and push notification mechanism implemented and runs on IMS network platform [6].

Yong Tae Park et al. proposed a smart digital door lock system for home automation. A digital door lock system is equipment which uses the digital information such as smart card fingerprints and secret code as the method for authentication instead of legacy key system. The door lock system uses RFID reader for authentication. A ZigBee module is embedded in digital door lock and it act as central main controller of the overall home automation system [7].

III. PROPOSED SYSTEM

Since the conventional doorbell is not secured to the increasing door step crime rates, smart doorbell system has overcome by replacing traditional doorbells with more secured and convenient doorbells.

The proposed structure differs from the other doorbell system because it focuses on providing security to the people by enabling them to review who is at the door by notifyingthem. The smart doorbell gives one stop solution to the person who faces diverse issue of security at homes or corporate work environments.The smart door bell is an IoT(Internet of Things) based assistant that assist its users home security. To achieve cost efficiency, it is necessary for the system to work with more efficiency and at low cost components as compared to existing system. So, thesmart doorbell will be controlled by Arduino circuit. Using Arduino kit, the fingerprint detected will be matched with the registered fingerprints in the database.Depending on the fingerprintmatching criteriaof known and unknown,the alert tune or unlocking of door will be controlled and if door bell is rung, the webcam will capture the image of visitor and the picture will be sent to registered user via email and notification will be sent with the help of Arduino and Pushing Box. This will helpto reduce the human efforts and will ensure safety and security of home members and their home at the same time by keeping track of visitors. In case of fingerprint scanning failure this door lock will be unlocked by using NFC(Near-Field Communication) smart card.

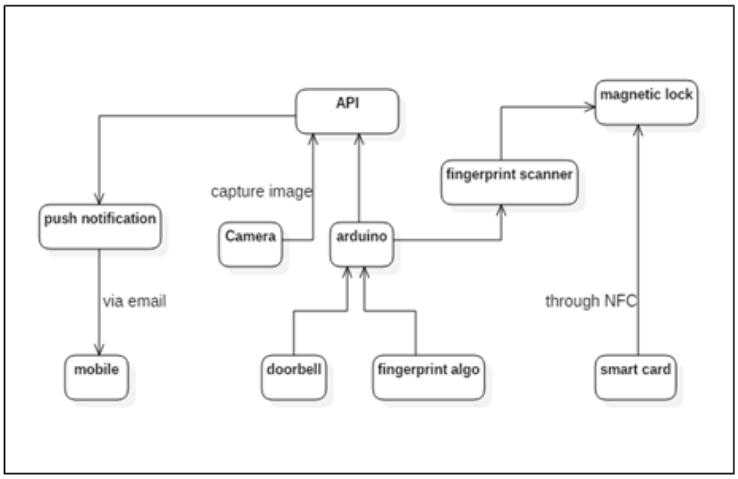

Figure 1. System Architecture

Following are the modules of this system:

a) Fingerprint Module:

This module works mainly with fingerprint sensors, which are used to match the detected fingerprint from the visitor which will compare the registered fingerprints from the database. As soon as the fingerprint is scanned it will start matching with the stored fingerprint. If the fingerprint is matched the magnetic switch of the door lock will be unlocked. And if the scanned fingerprint is not matched then the system will recognize it as an unknown guest/visitor and it will activate an alert tune.

If there arise an occurrence of fingerprint examining disappointment thedoor lock will be opened by utilizing NFC smart card.

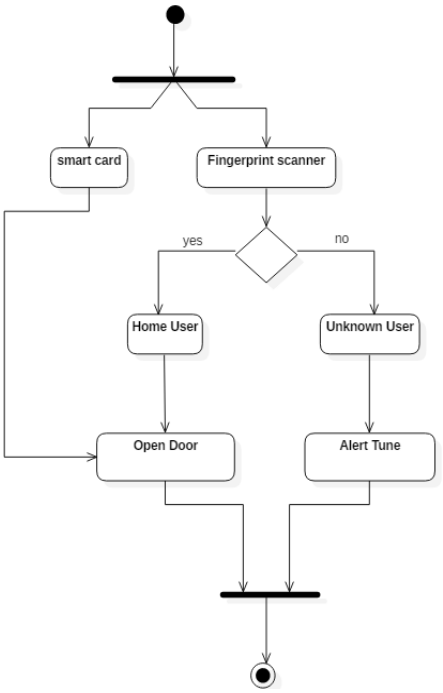

Figure 2. Fingerprint Module

b) Push Notification:

This proposed system uses Arduino, web camera/CCTV camera. When the door bell is pressed, the web camera will be attached with Arduino will capture an image of the visitor. The Arduino sends an HTTP request to the API(Application Programming Interface). The API launches the user scenario and gets a picture from the web camera/CCTV. The API sends a push notification to the user'sphone and a mail message with the picture attached. PROWL is used for iphone push notification, NOTIFRY is used for android push notification and TOASTY is used for windows phone notification.

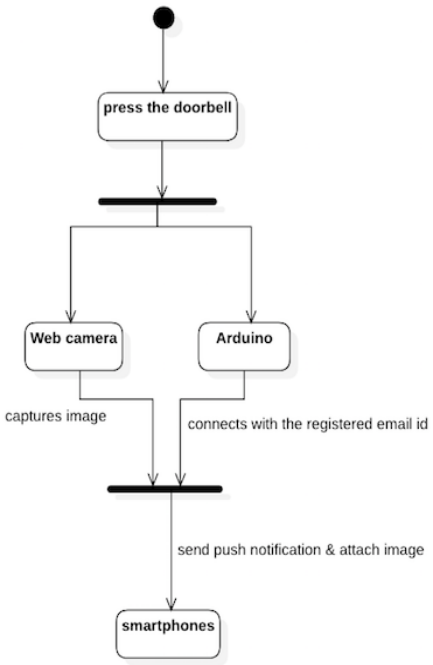

Figure. 3Push Notification Module

IV. RESULTS AND DISCUSSION.

This section depicts the entire setup of smart doorbell and the security module. All the components are connected and screenshots depicts the entire circuit connection.

Following are the screenshot in an orderly manner:

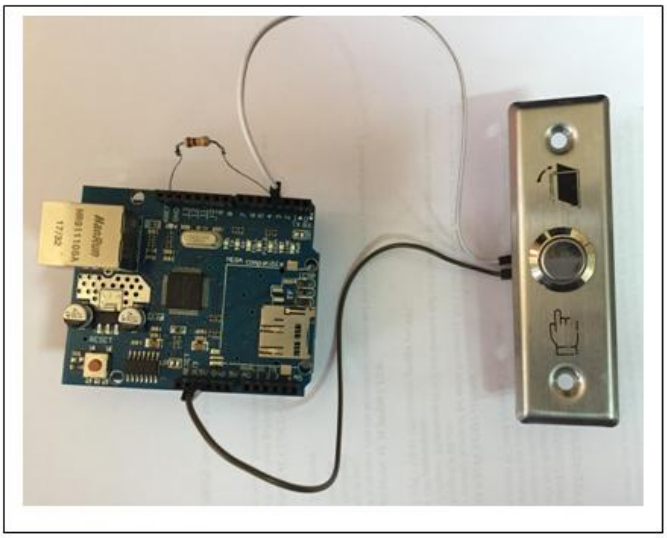

Figure.4 Initial setup of hardware.

Figure 4 depicts the initial setup of the hardware. The Arduino UNO R3 board and Ethernet shield are connected to the external power supply for the flow of current. The doorbell and the 10k resistor are connected to the Arduino board.

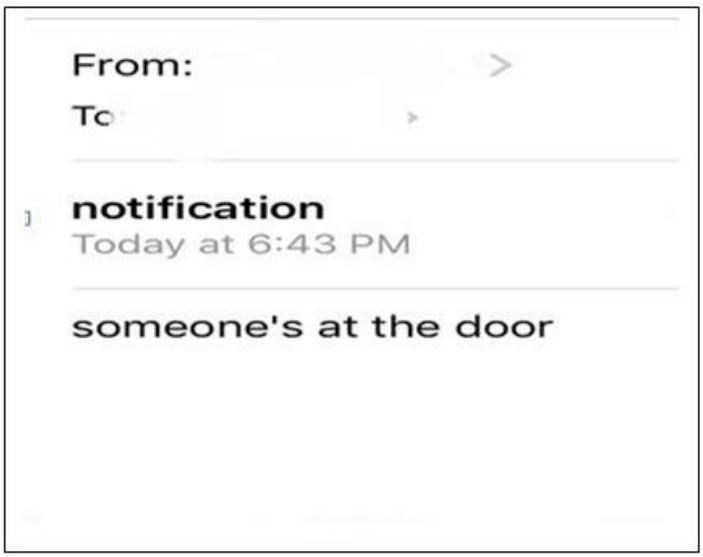

Figure.5 Message displayed when doorbell is rang.

Since the doorbell will be rang, it would send a push notification via email to the registered user with the customizable text according to the home user.

Figure.5.1 Message displayed when doorbell is rang

The above figure describes the twitter notification when the doorbell is rang and the registered twitter account gets the tweet with the time and date.

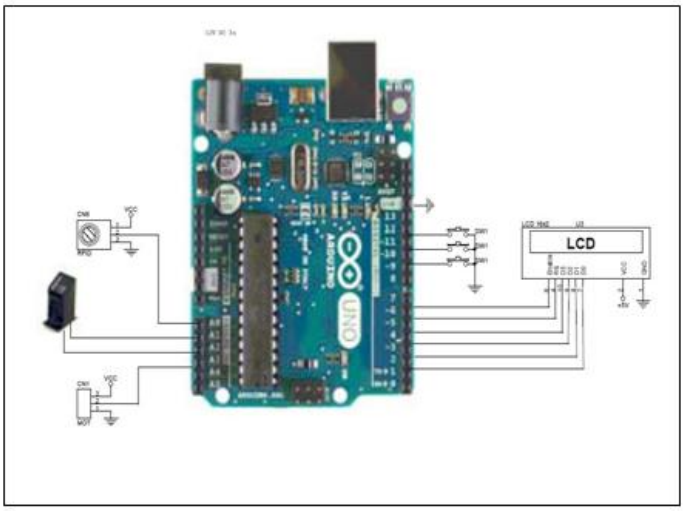

Figure.6 circuit diagram for RFID & Fingerprint module

Figure 6 shows the connection of RFID scanner and Fingerprint scanner connected to the Arduino board. According to all hardware connections and the test cases all the modules operate well to the security and home automation.

V. CONCLUSION

In conclusion the proposed doorbell security framework is displayed for the counteractive action of doorstep crimes, utilizing minimal effort furthermore, simple to introduce innovation, to help and further upgrade the mortgage holder's capacity to prevent potential doorstep criminals. The biggest advantage of our proposed system over existing one is that it sends push notification which makes easy for the owner to understand who is at the doorstep.

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