IOT SMART DOORBELL SURVEILLANCE

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ABSTRACT

The objective of this project is to facilitate the user with a simple and customised technology to effectively manage visitors flowing to his/her premises. It is a real time smart doorbell notification system for home security. The system combines the functions of a smart and a house network system. It enables the users to monitor visitors in real time via the IOT based doorbell installed near the entrance door to a house. The doorbell can be controlled in a smart way to intimate the user with a picture and a text message of the visitor at the doorstep. When a visitor rings the doorbell, an SMS will be sent to the registered mobile number of the house member and the response in the form of an SMS will be displayed on an LCD screen placed beside the door so that the visitor can read the SMS and act accordingly. The visitor can also leave a voice message that will be sent to the house member. Fingerprint recognition can be added to provide additional security and to replace the traditional lock and key. The doorbell will be installed with an Arduino chip to transmit and receive messages. This system is also intended to serve old age people and to identify unauthorised intruders. In the age of technology, it is necessary to update our security systems and to make living easier.

Keywords— *IOT, Arduino, Smart doorbell*

I. INTRODUCTION

The Internet of Things (IoT) is an important topic in technology industry, policy, and engineering circles and has become headline news in both the specialty press and the popular media. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible. An abundance of conferences, reports, and news articles discuss and debate the prospective impact of the "IoT revolution"—from new market opportunities and business models to concerns about security, privacy, and technical interoperability

This project focuses on exploiting IOT to ensure a better security system in households. The present doorbell systems follow traditional approach, when a visitor presses the switch bell that rings inside the house. If someone is present in the house they open the door and if no one is present in the house the visitor waits for certain time and leaves the place without any clue. Over the past few years technology has taken over the society. Technology is vital today and makes everything easier. One such advancement in the field of doorbell is using "The Automatic doorbell system" (ADBS). Door bells have moved from historical switches to modern touch pads and now it is more sophisticated with the usage of sensors and IOT.

II. LITERATURE REVIEW

The system, 'Home Security System for Alone Elderly People', is a project which was implemented in Thailand. It is in the aging society because the number of elderly population is more than 10 percent and keeps increasing every year, while the household size is decreasing. As a consequence, more elderly people have to live alone. Moreover, there are more than 10 percent of elderly's accidents occurred each year. In 2015, elderly abuses are more than 2 million cases and most of them are in elderly's house. With these reasons, Home Security System for Elderly People Who Live Alone is proposed to facilitate and increase the security level for elderly people. The system is a smart doorbell which allows elderly people to see, hear, and speak to their visitors at the front door via their mobiles to avoid a face-to-face communication.

Another research, 'Real Time Smart Door System for Home Security', they tried to implement the similar idea for a smart doorbell. According to this system, most of the proposed smart home systems try to bring solutions for security problem, but many of those systems use numerous sensor devices. Video based smart home security systems is an efficient approach with the development of video technology and Raspberry Pi is a strong and reliable embedded system device for the complex and challenging tasks. Using these technologies in the proposed system will bring several advantages in providing safety and security in terms of visualizing and identifying people who visit the home. In the overall proposed system, there will be two different significant techniques to provide home security.

The paper, 'Automatic Safety Home Bell System with Message Enabled Features', focuses on IOT related automatic doorbell systems which are designed to ring the bell automatically when a visitor approaches the door. If the visitor stands for more than a specified time span without the door being opened, an SMS will be sent to a registered mobile number of the house member and the response of the house member (i.e. in the form of an SMS) will be displayed on an LCD screen placed beside the door so that the visitor can read the SMS and act accordingly. This system was intended to service old age people and also to identify the unauthorized persons, if any.

III. SYSTEM ARCHITECTURE

The system architecture diagram includes the main components, the Doorbell, Smart Doorbell System, Wireless transmitter-receiver module and LCD Response. The data flow diagram shows the back end of the system. It shows the process and flow of data when the doorbell is pushed and how the visitor receives a LCD response. We used an Arduino and Webcam to build a doorbell that sends SMS Notification to the owner with the picture of the person at the door. It uses the PushingBox service to delegate the programming part.

When the doorbell is pushed, the Arduino sends a HTTP GET request to the PushingBox API. HTTP GET request is used to retrieve information from a given server using the URL provided. The requests using GET retrieve data without altering it in any way. On receiving the request, PushingBox launches the user's scenario and captures the image from the web camera, which is sent back to the API. On obtaining the image, a SMS Notification is sent to the owner's phone along with the image of the visitor. The communication between the visitor and the owner are done through the PushingBox API. To launch a scenario of notification a HTTP request is sent. The only argument required with the request is the device ID. As a response from the owner a LCD Response is sent to visitor.

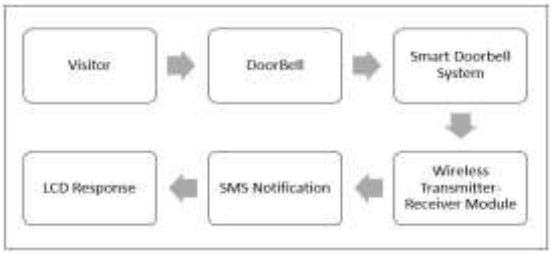

Fig -1 System Architecture

Hardware Requirements:

- Arduino Mega
- Ethernet Shield
- Doorbell/Switch
- Jumper cables
- Ethernet cable

Software Requirements:

- Arduino IDE
- Pushinbox API

IV. SYSTEM IMPLEMENTATION

The list of modules that are being implemented are given below:

- Configuration of Arduino board and Ethernet Shield
- Connecting Arduino to Doorbell
- Wireless Transmitter-Receiver module

- API to send SMS notification
- Response to visitor API

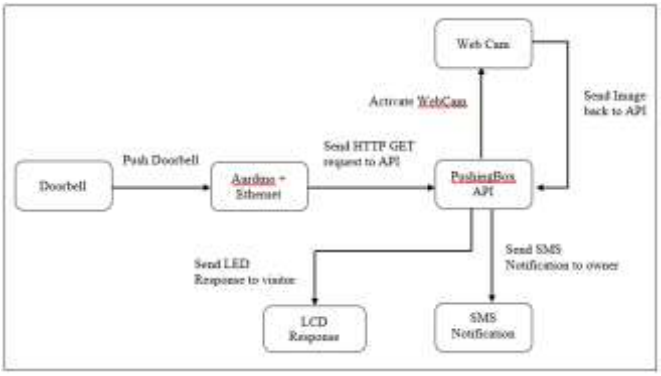

Fig - 2 Data flow diagram

A. Connecting bell to Arduino Board

1. Connect the short leg of the LED to this same ground rail on the breadboard then connect the long leg to a row on the breadboard.
2. Connect the 220-ohm resistor from pin 13 to the same row that you have the long leg of the LED attached.
3. Place the pushbutton on the breadboard. Most buttons will straddle the center trench on the breadboard.
4. Connect one side of the 10k resistor from the ground rail on the breadboard to the other side to the pushbutton – on the same side that pin 2 connects.
5. Plug the Arduino board into your computer with a USB cable.
6. Open the Arduino IDE.
7. Open the sketch for this section.
8. Click the Verify button on the top left. It should turn orange and then back to blue.
9. Click the Upload button. It will also turn orange and then blue once the sketch has finished uploading to your Arduino board.

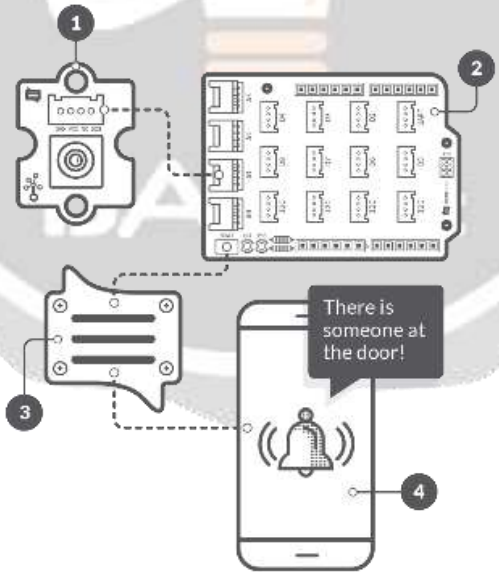

Fig - 3 Diagrammatic representation of module flow

B. Configuring PushingBox

1. Create a scenario called "Somebody's at the door".
2. Click on Create scenario.
3. Click on Add an Action.
4. First, add an action using the Email Service.

5. Fill in the mail Subject and the Body.
6. The third field is optional and is for attaching a shot from your IP camera to the email. Fill in the URL (publicly reachable) of your web camera.
7. The camera's output must be a picture less than 100KB in size.
8. Do the same with your Push notification service and click the Back button.
9. Your scenario is now created.
10. Click on "Test" to test the scenario.
11. You should receive a Push notification on your phone and an email.
12. Make a note of the "DeviceID" value of this scenario. You will paste it into the Arduino code.

V. TESTING AND RESULTS

The author has performed testing under various cases and the outcomes of test cases are recorded and listed below:

Scenario	**Test Type**	**Outcome**
Under different weather conditions	Sensor test	Works perfectly in all weather conditions
When visitor rings the bell	Visitor Arrival Test	Bell rings, SMS is received by owner after 3 minutes
Waiting time	Message transmission reception test	Acknowledgement by owner was displayed on the LCD screen

Every module has been implemented with a structured work flow using optimized coding. First the doorbell is connected to the arduino board using cables; the doorbell acts a push button. After the doorbell is connected the connectivity of the device is checked using arduino functions. Once the doorbell is connected, scenarios and actions are added to the push box services, the scenarios and actions help in pushing the SMS notification to the device. The SMS notification is sent once the scenarios are submitted. When the user receives SMS notification he checks the SMS and is aware of the scenario.

Fig - 4 Scenario created in PushingBox

Fig -5 Configuring the Arduino board and shield

Fig - 6 Push notification received when switch is pressed

VI. CONCLUSION

The project named "Smart IOT Doorbell Surveillance" has been designed with the domain as Internet of Things. The basic concepts and working of IOT has been displayed in the running of the project. The project uses mainly an Arduino Board and OOPS programming concept. Since, today, in a technologically enhancing environment, security issues is of utmost concern, this project shows how technology can be used to enhance the

security features of people's homes. A doorbell is constructed which has the feature to send a notification to the owner when somebody is at the door, with an attached picture of the person. It uses materials such as an Arduino Board, an Ethernet Shield (to send notifications across services), a doorbell, resistors and a web camera. This project enables users to stay connected to their homes and ensure safety, even when they're travelling.

VII. REFERENCES

[1] General safety feathers by Transport Canada, 2007.

[2] Yang, X., Liu, 1., Zhao, F., & Vaidya, N (2004), Vehicle-to-Vehicle Communication Protocol for Cooperative Collision Warning.

[3] Kurt Dresner & Peter Stone (2008), Replacing the Stop Sign: Unmanaged Intersection Control, pp.94-101, Estoril, Portugal.

[4] ARIB STD-T75, 2001 Zing Zhu, Sumit Roy. Dedicated Short Range Communication System.

[5] Sang-woo Chang, Jin-soo Jung, Jin Cha, Sang-sun Lee, Implementation of DSRC Mobile MAC for VANET.

[6] S. S. Dorle, Pratima Patel, Implementation of Adaptive Traffic Light Control System Based on Radio Propagation Model in Vanet.

[7] Usha Devi Gandhi, Arun Singh, Arnab Mukherjee and Atul Chandak, Smart Vehicle Connectivity for Safety Application