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IOT Based Home Automation System and Smart Security

Nagaraj Telkar*[1],Pavankumar Naik[1], Haripriya V[2], Shravani Talakal[2], Sudharani D[2], Sujata Ugargol[2]
[1]Assistant Professor, Department of Computer Science and Engineering, SKSVMACET, Laxmeshwar, Karnataka, India
[2]Student Department of Computer Science and Engineering, SKSVMACET, Laxmeshwar, Karnataka, India

ABSTRACT

Internet of Things (IOT) conceptualizes the idea of remotely connecting and monitoring real world objects (things)Through the Internet .When it comes to our house, this concept can be apply incorporated to make it smarter, safer and automated. This IOT project focuses on building a smart wireless home security system, which sends alerts to the owner by using Internet in case of any trespass and raises an alarm optionally. Besides, the same can utilized for home automation by making use of the same set of sensors. The leverage obtained by preferring this system over the similar kinds of existing systems is that the alerts and the status sent by the wifi-connected microcontroller managed system can be received by the user on his phone from any distance irrespective of whether his mobile phone is connected to the internet. The microcontroller used in the current prototype is the Raspberry pi 3 pad board, which comes with an embedded micro-controller and an onboard Wi-Fi shield making use of which all the electrical appliances inside the home can be controlled and managed.

Keywords: Buzzer, Bulbs, Camera, PIR Motion Detector Sensor, Raspberry PI 3,4Channel Relay, Smart Phone.

I. INTRODUCTION

IoT or Internet Things refers to the network of connected physical objects that can communicate and exchange data among themselves without the need of any human intervention. It has been formally defined as an “Infrastructure of Information Society”, because IoT allows us to collect information from all kind of mediums such as humans, animals, vehicles, kitchen appliances smart phones, tablets, digital cameras and sensors. The IoT infrastructure has helped by providing real time information gathering and analysis using accurate sensors and seamless connectivity, which help in making efficient decisions. This IoT project focuses on building a smart wireless home security system, which sends alerts to the owner by using Internet in case of any trespass and raises an alarm optionally.

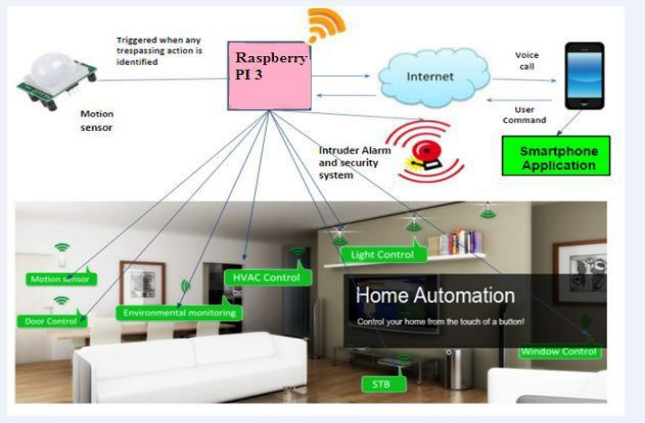

Figure 1. Overview of the Home Automation and Smart Security System

Besides, the same can utilized for home automation by making use of the same set of sensors. The leverage obtained by preferring this system over the similar kinds of existing systems is that the alerts and the status sent by the Wi-Fi connected microcontroller managed system can be received by

the user on his phone from any distance irrespective of whether his mobile phone is connected to the internet. The microcontroller used in the current prototype is the Raspberry pi 3, which comes with an embedded micro- controller and an onboard Wi-Fi shield. The low-voltage switching relays were used to integrate devices with Raspberry pi will show the switching functionality.

Wireless Home security and Home automation are the dual aspects of this project. The home automation controls the home equipment. "SAVE ELECTRICITY" is the main purpose of home automation. Home appliances are connected and controlled by the micro-controller in the system to welcome guest .If any sort of human movement is sensed near the entrance of owner home then it raises an alarm optionally and then alerts to the owner is sent over the message through the mail with an image captured by the camera. In this way, we are providing the security to the home. The same can do when the user himself enters the room and by virtue of the system, he can make arrangements from his doorstep such that as soon as he enters his house he can make himself at full comfort without manually having to switch on the electrical appliances. The alerts and the status of the IoT system is accessed by the user from anywhere even where Internet connectivity may not be readily available (since it is not necessary for the mobile phone to be connected to internet only board is required to have an access to Wi-Fi). The difficulty faced by current home security/surveillance system in providing information pertaining to the situation to users while being away from home is tried to overcome in this project.

II. WORKING PROTOTYPE AND MATERIAL

The working prototype is used in following two ways.

1. As a Smart Security system
2. As a Home Automation System

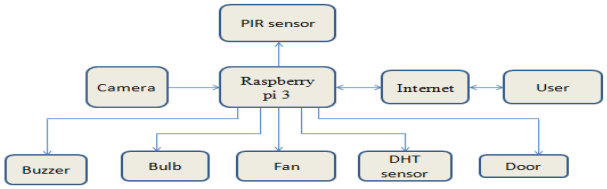

Figure 2: Block Diagram of Home Automation and Smart Security System

As a Smart Security System

PIR motion sensor and camera are installed at the entrances of home. The sensor, which detects their presence, becomes the input trigger for the micro- controller. The owner, who may or may not be present in that home, will be receiving a message and image through mail on his mobile phone (whose number is predefined in the program) stating that 'Intruder detected, immediately need your attention. If that image founds to be an intruder, owner can take further actions else owner can activate the home automation system.

As a Home Automation System

This application of the module can be explained by an example. Suppose the owner is expecting a guest at his home but he is not available there. Now, as the guests reach at his home the owner will activate the home automation system.

a. Raspberry pi 3

It is a single computer board with credit card size. It comprises a program memory (RAM), Processor and Graphics chip, CPU, GPU, Ethernet port and Power source connector.

b. PIR Motion Sensor

PIR sensor detects the levels of infrared radiation and sense the motion. PIR sensor has IC and Fresnel lens and has three simple connections (VCC, Output and Ground) Its Supply Voltage is 5V DC. Detecting range up to 6 meters.

c. Buzzer

A **buzzer** or **beeper** is a signalling device; it gives an audible warning when an accident occurs. If it is a false alarm or if the driver feels that he does not need immediate help, there is a switch in the system that he can use to stop the working of the system.

d. DHT11 Sensor

DHT11 digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity. The sensor includes a resistive sense of wet components and NTC temperature measurement devices, and connected with a high-performance 8-bit microcontroller.

e. Web camera

Web camera is a video camera that feeds or streams its image in real time to or through a computer- to-computer network. When captured‖ by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment

f. 4 Channel relay

It is an interface board, be able to control various appliances and other equipments with large current. The micro controller directly controls it.

III. FLOWCHART OF SYSTEM

The flowchart gives us the basic idea about how our system works. First, the initialization of the system is carried out in which it checks if the system is working properly or not. In this system there are two conditions.

First is to check the movement of an intruder through the PIR sensor. If any movement detected then camera captures the image and immediately the message and image are sent through the mail. Secondly, if that person is intruder then alarm raises optionally else automation system gets activated.

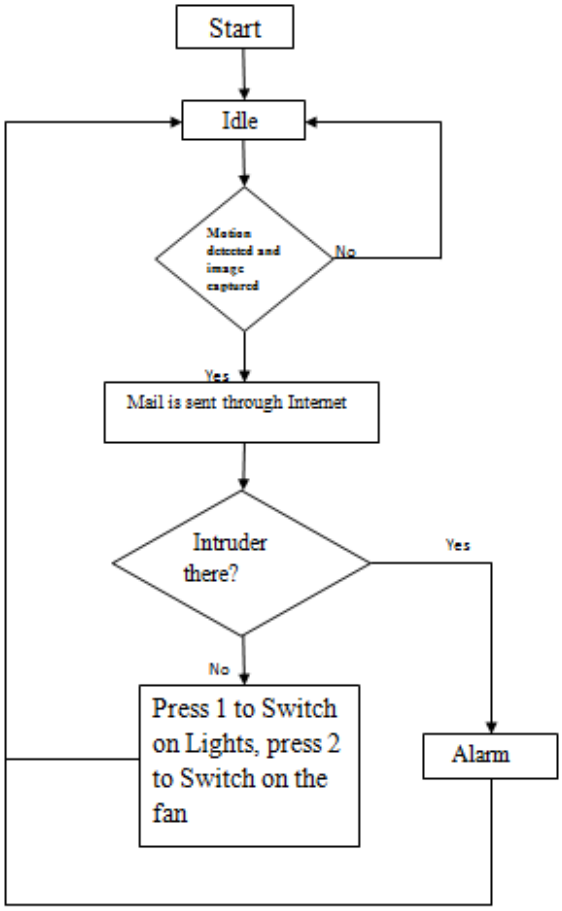

Figure 3. Flowchart of the System

IV. RESULTS AND DISCUSSION

The system is dependent on the user's discretion and Judge ability of the situation (whether it is a guest or an intruder entering his house) the use of a camera connected to the microcontroller might help the user in taking decisions whether to activate the security system or welcome the guest. The captured picture of the guest or intruder after face detection can be mailed to the user. Within the same smart phone application through which the user can even control his home appliances and activate the Home automation system to welcome the guest.

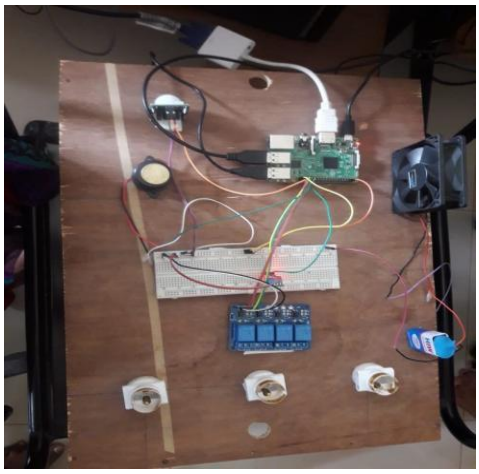

Figure 4. Expected Result

Figure 5 shows the message that owner has received the mail when motion is detected.

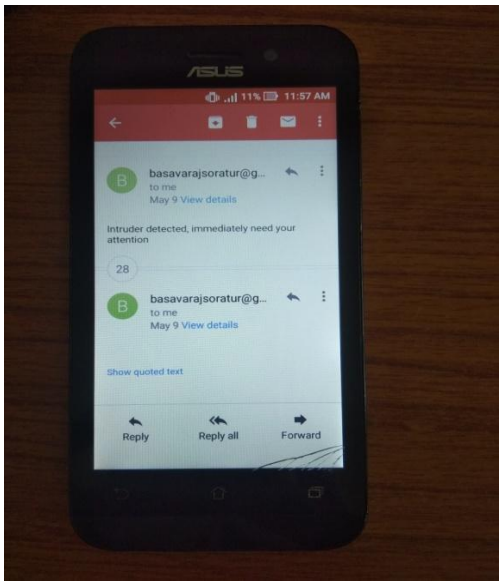

Figure 5. Message Received on Mobile

V. CONCLUSION

We designed the System, which reduces human efforts, and provide security. Proposed system is cheap, reliable and components are easily available. It is also portable and easily upgradable. System provides Security locks for door, comfort, connivance security and energy efficiency for user. Raspberry Pi-3Model B operates and controls motion detector and cameras for capturing the image of the guest. The security level increased due to the usage of Raspberry Pi-3Model B that sends the images to the user. It has in built capabilities of connecting to external devices. Raspberry pi proves to be smart economic and efficient platform for implementing the home security system and for automation. Two advantages provided by the system are that, Necessary action can takes in short span of time.

This work provides users with an easy to use in mobile and pc for which they can remotely access and control their home appliances and security this provides a full security support for homes. Hence it can be concluded that the required goals and objectives of a home automation system can be targeted by the above technologies.

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