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IoT-Based Home Security Using Raspberry Pi

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ABSTRACT –Internet of Things (IoT) is a network of all devices that can be accessed through the Internet. This device can be used for home security in an effective way. Home security has been a major issue in the world, where crime is increasing every day and everybody wants to take proper measures to prevent it. This system was invented to keep home safe from intruder. The system is portable and constructed in such a way that is easy to install, configure, run and maintain. Therefore the purpose of this system is to provide a security which gives immediate notification to the owner mobile phone in order to ensure that the owner can get the information about the dangerous situations and the security notifications will be through the email. In this paper, we developed IoT enabled system to send security alert to owner of the home through email whenever human is present in front of home door. IoT enable home security system using raspberry pi-3 model which take a very less power. In this paper our approach is to provide security against intruder using IoT platform.

Key Words: Internet of Things, Home Security, Raspberry Pi 3 Model-B.

I. INTRODUCTION

Security System plays an important role in the protection of lives. This security system is defined as to detect intrusion, unauthorized entry into a building or a protected area and deny such unauthorized access to protect personnel and property from damage or harm. It is necessary to secure home as the possibilities of intruders are increasing intentionally or unintentionally to gain access inside premises for harming and to become potentially threat to life, property which may cost to loss of unauthorized materials and information. If we look at different home security systems over time, they have always tried to provide efficient, convenient and safe ways for home inhabitants to access their homes.

Every system from the past has been found to be very much vulnerable. Home is a place where security is must, to keep all the valuables safe. The owner should have the confidence to step out of the house with the feel that nothing can happen to the home. This feel can only arise when the home is equipped with the reliable security system. Classifying the comforting zone traditional locks were used to guard the home. Somewhere there are chances for key loss. Due to this short come full system break down .The main aim of the system is to make our home security more efficient and more reliable. You might live in a reliable and sound neighborhood, but crime happenseverywhere. Criminals might try to break into your home but having a predefined plan in place will protect your family members and personal property. Such plan is very essential to your security. It is essential to make sure that everyone in your family knows the correct safety measures and also knows how to enable and disable any safety features or alarms in your home. Thus putting together a safety plan at home will keep each one on the same page.

Although user's expectations have changed and technology is advanced but the role of a home security system has remained the same. And if your family members are safe and secure, you can live in tranquility. But is this really happening in current scenario where the crime rates are ever rising? Most of us often overlook and ignore the importance of home security. Proper timely precautions can save you with all such consequences. And installing a smart security system and turning your home into smart home can be the solution to all these problems; providing such security system is hassle-free and user-friendly.

II. LITERATURE SURVEY

In the Home Security System(HSS) by Ashwini Pawar used raspberry Pi to get the security alerts after every event. The HSS provides security such as fire protection gas leakage detection and also protection from intruders.

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Enhancing HSS using IoT by Alanah Singh, in this the HSS that can be managed by a user through android phone. This is related to an Android platform.

Automatic service request system for security in smart home using IoT by Pranav Kumar. This discuss about implementation of raspberry Pi associated with web server or cloud via internet. The sensor data is processed by raspberry pi and if any problems found in protection then it will automatically send service request to the owner of the home regarding the security issue.

All the above system's purpose is to solve the security issues. In this project, we collect data from different sensors for monitoring the present status through IoT. This can be useful for intruder detection, fire accidents and any other abnormalities occur.

III. SYSTEM OVERVIEW

The system is made up of basic components like Raspberry pi 3 and peripheral sensors like vibration sensor, gas detector, fire detector, magnetic sensor, PI camera, relay, buzzer, exhaust fan, PIR sensor. The system is implemented on Raspberry Pi-3, because it can process captured image with low power and high processing speed. In the architecture of home security, PIR sensor is used to detect the presence of any intruder. Pi Camera is used to capture the image of intruder when the presence it is detected. It works whenever any person motion is detected, then system will capture an image and save it into database on 16GB Micro SD-card. Raspberry Pi 3 processes the image to find out the intruders, then it is decided that the intruder is familiar or un familiar with the help of stored database. If the person is not familiar then system will send the alert message through e-mail to the owner by sending captured image, video and audio clip of that person as attachment. If the person is familiar then system will capture the image of that person and store in the system.

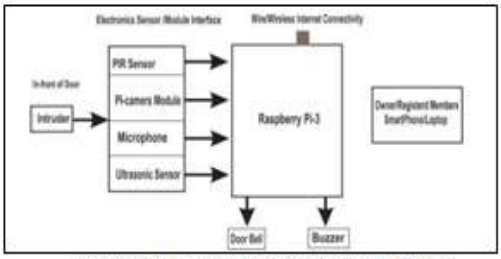

Fig 1: Block Diagram of Home Security System

Raspberry Pi is a credit card sized single board computer and designed to run an operating system called GNU/Linux Raspbian. Raspberry pi 3 Model B has a faster 64-bit 1.4GHz quad core processor, 1GB of RAM, faster dual-band 802.11 b/g/n/ac, Bluetooth 4.2, and significantly faster 300Mbit/s Ethernet. The device performs signal fetching through sensors and processing the signal, and sending email after processing. It fetches the signal from PIR sensor, Pi-camera and send capture images to the owner through email services. USB ports and GPIO pins are required as connectors for connecting the sensors and devices as shown in Figure 3 with various component present on the Raspberry Pi-3 module.

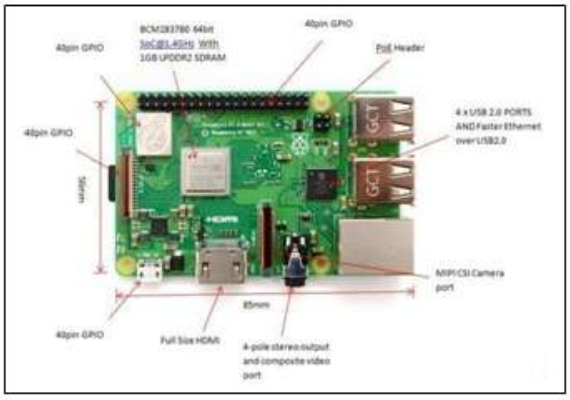

Fig 3: Raspberry Pi 3 Model B

The main features of Raspberry pi-3 as follows:

- CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz
- GPU: 400MHz Video Core IV multimedia . Chipset: Broadcom BCM2837 • Memory: 1GB LPDDR2-900 SDRAM (i.e. 900MHz)
- USB: 4 ports USB with 480Mbps data transfer
- Video outputs: HDMI, composite video (PAL and NTSC) via 3.5 mm jack
- Audio: Combined 3.5mm audio outjack
- Network: 10/100Mbps Ethernet and 802.11n Wireless LAN

IV. MATERIAL AND METHODOLOGY

The flow of the complete system is given over here in the following. Security hardware includes doors, locks, alarm systems, lighting, motion detectors, security camera systems, gas leakage etc. that are installed on a home.

A. Relay

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A relay are the switches which aim at closing and opening the circuits electronically. Many relays are used as an electromagnet of which switch is operated mechanically. We use relay to control high voltage circuits with the help of low voltage signals. And also used to control high current signals. . We can even use the relays when we need to control several circuits by one signal.

B. Power supply circuit

The power supply is the important need to complete the home security successfully. The power supply provides the uncontrollable output of +12V & the controlled output +5V. The sensors and components have the hardware part. This basically, collects the information of sensors and preserves into one chip (microcontroller) EEPROM.

C. Door and window sensors

Door and window sensors are also implemented in most home automation. The sensor is placed on or inside the door or window frame. The magnet is placed on or inside the door or window itself. When the door or window is opened, the magnet will separate from the sensor, causing it to activate.

D. Presence simulation

Some people simply leave the lights turned on while they're gone. But in this day and age smart home has got more advanced. They do this through movement simulation by using light- and shadow-effects at night or sound simulation at daytime.

E. Pi camera

Surveillance cameras used in the home are Pi cameras or closed circuit. Pi cameras connect over the internet. Closed-circuit, or CCTV cameras through wired or wireless links. These cameras stream live footage to users, allowing them to watch for activity that whats happening in home. F. Motion sensors

Surveillance cameras and motion sensors work hand in hand with allowing home owners to keep an eye on areas of their home that they might not have access to at the moment. Motion sensors create zones, if a person enter the home it will sense by his movement. Home security systems can be set up to have any movement detected on a camera to be displayed on the owner's account.

G. Raspberry Pi

Raspberry PI is a single board computer that supports multiple functionalities such as home automation, security etc. It is an embedded controller that controls the operations of sensors and other various devices connected to it. It connects all the devices through GPIO pins and is known as heart of the entire system. Automation can be achieved by designing an application on Raspberry Pi through various sensors for purpose of automated intrusion detection system to provide security.

H. Arduino

In this project we use Arduino also because the sensors need analog pins to sense , the pi has gpio pins which has problem for sensing some sensors . So we use Arduino and respberry pi.
I.PIR Sensor: A passive infrared sensor (PIR sensor) is an electronic sensor that detects heat emitted from humans and animals body and accordingly produces results. PIR detector works in 120º angle and 20 feet area in front of it.

J. Magnetic sensor: A reed type magnetic switch is used over here which is used at the door for security purpose. In this switch mechanism when circuit is closed it produces magnetic flux and after taking the reed apart the flux are disturbed. In this way at the door it works on opening and closing of doors or windows.

K. Buzzer: A buzzer is a small and efficient component. It is used to add alert sound to our system. It is a very small and compact 2-pin structure which can be easily used on breadboard.

L. Gas detector: A gas leakage may occur due to damage in gas pipe, like if someone is digging a hole and accidentally breaks an underground gas line. The gas detector require 5V of supply and when the gas is detected the output becomes 5V else the output becomes low that is 0V. Likewise every time our sensor will sense the environment and if the gas is detected digital pin will go high (5V) else will remain low (0V).

M. Vibration Sensor: Vibration sensor produces electrical signals in proportion to the vibrations produced in component. The sensitivity of Vibration sensor typically range between 10 to 100 mV. The module outputs logic level high (VCC) when it is triggered and a low (GND) when it isn't. The LED on the module is turned on when it is triggered. The supply voltage required to the sensor is 3.3V-5V.

Raspberry Pi-3 is used to control the whole home security system using python programing.

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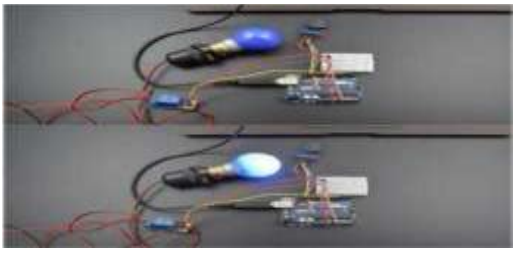
Flame sensor

Vibration sensor

Gas sensor

Pi camera



Bulb on relay

V. RESULT AND FUTURE SCOPE

In this project Home security system the security issues we covered over here are fire security, door security, glass break alert and gas leakage protection. The various sensors are connected to the Raspberry Pi board such as PIR sensor, MQ2 sensor, Vibration sensor, Flame sensor and Magnetic sensor. And the alert messages for fire security, gas leakage alert, glass break alert and captured image of intruder with alert message are attached to the mail of the owner.

For the further works we can do save the electricity by controlling usage of fans and lights. We can add rfid tags here for authentication of persons. Using this we can control the home theaters.

VI. CONCLUSION

Home security system using Raspberry pi helps people feel safe about their home whether they are away from home. This system is easily adjustable at any home. Here it has provided utmost security so it is quite impossible to any burglar to enter the home without the concern of owner. If any intruder is detected, the buzzer will turn on and the owner is notified via email. This security system help and assistance especially to disabled and elderly. It is a friendly user interface system. This system is easily operable, low power consumption and low cost and since it being the latest technology it provides more compatibility with the latest devices and sensors. Security factor is most important when it comes to proper implementation and development of home security system. Such systems will definitely provide a sense of security to every person at home and will effectively provide a peace of mind to the residents.

REFERENCES

[1]. Deepak S. Kumbhar, H.C. Chaudhari, Shabhangi M.Taur, 'IOT Based Home Security System using Raspberry Pi-3'.january 2019, Volume 6,issue 1.
[2]. P. Anitha, A jayakumar, 'Smart Security System in Home using Simple Internet of Things Enabler', March 2018, Volume 5. P-ISSN: 23950072.
[3]. Pavi Keshore Kodali, Vishal jain, 'IOT based Smart Security and Home Automation System, ' April 2016.
[4]. Aishwarya D, DR..j Arokia Renjith,
[5]. 'Enhanced Home Security using IOT and Raspberry PI', April 2017, P-ISSN: 2395-0072.
[6]. Automatic Service Request System for Security in Smart Home Using IoT
[7]. Pranav Kumar and Karthikeyan B 978-1-5386-
[8]. 0965-1/18/$31.00 ©2018 IEEE
[9]. Smart home-Smartphone Systems: Threats, Security Requirements and Open research Challenges by Khaoula Karimi and Salahddine
[10]. Krit 978-1-7281-0827-8/19/$31.00 ©2019 IEEE

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