

SECURE HOME ENTRY USING RASPBERRY PI

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ABSTRACT

Automated secure entry is a basic need in today's Home Automation System. To accomplish this need, we are proposing secure home entry system using Internet of Things. This proposal is an attempt to construct a smart, innovative and secure entry by using the raspberry pi controller, camera and various other associated sensors. To enhance the home security system, the best possible way is to use facial recognition and has been implemented in our proposal. In existing system, notification is through E-mail or Twitter account. Due to popularity and flexibility of using current social network for all type of generation, we are proposing home security system using Telegram notification. The advantage of using Telegram App for this project is to send notification to the user as it provides an instant secure communication between the user and the home automation system.

Keywords: *Raspberry pi, Serial Communication, Automation, Face Recognition.*

I.INTRODUCTION

In the world of Internet of Things when we have all the technologies to revolutionize our life, it's a great idea to develop a system which can be controlled and monitored from anywhere. There are many types of good security systems and cameras out there for home security but they are much expensive so today we will build a low cost simple Raspberry Pi based Intruder Alert System, which not only alert you through an email but also sends the picture of Intruder when it detects any. Home automation system includes many features like controlling of light intensity, temperature, music system, and other home appliances like washing machine, refrigerator, AC and many more. Internet of Things (IoT) is one of the most suitable methods that can be used to control the home appliances remotely. For surveillance purpose motion sensor and camera are widely used and controlled by Raspberry pi.

The internet-based functioning of physical devices (also known as "connected devices" and "smart gadgets"), buildings, and other items integrated with electronics, software, sensors, actuators, and network connectivity, allowing these objects to gather and share data, is referred to as the Internet of Things. Home automation is defined as the interconnection of physical things via sensors and software. Network connections are used to acquire and share data. Home automation refers to the automated and electronic control of household features, activities, and appliances. Home automation systems are becoming more popular as a way to control objects around the house. All forms of home equipment, including doors, lights, fans, electric heaters, surveillance systems, and consumer electronics, are included in the household automation system.

Internet of things is a technology of the future that has already started to touch our homes. Here we propose an IOT based home automation system using raspberry pi that automates home appliances and allows user to control them easily through internet from anywhere over the world. Our proposed system consists of a microcontroller based circuit that has lights and fan connected to it along with LCD display and Wi-Fi connector interfaced with raspberry pi. Our system interacts with out online IOT system that IOT Gecko free web interface for controlling our home appliances with ease. After linking with IOT Gecko, the user is allowed to send load switching commands over IOT to our circuit. The circuit receives the commands over IOT by connecting to internet using wifi connector and then the raspberry processor processes these commands. After this the processor now processes these instructions to get user commands. It then displays these on an LCD display. Also it operates the loads (lights and fan) for switch them on/off according to desired user commands. Thus we automate home appliances over internet using raspberry pi.

II.LITERATURE SURVEY

Z. Sundas et.al [1] described as attacks against homes, workplaces, businesses, and banks are becoming more common, because of the frequency and pervasiveness of burglaries, an effective and dependable intrusion detection system with an alarm has become an absolute must. Motion detection is an essential part of security systems and PIR sensor is one of the most commonly used sensor for triggering the alarms when motion is detected. The designed security system is characterized with efficient video camera for remote sensing and surveillance, featured with stream live video and offers a cost effective ubiquitous surveillance solution, efficient and easy to implement. A web based dashboard using IOT is deployed to display the monitoring result in timely manner when motion is

detected. Once it detects the motion, the circuit will trigger an alarm buzzer, and then automatically a message will be sent to the owner mobile like an alert about a motion is detected.

P. S. Dhake et.al.[2] described that with low power usage security and safety is one of the most discussed topics in almost every field like surveillance, industrial applications, offices, and in general, in smart environments. Traditional surveillance systems suffer from an unnecessary waste of power and the shortcomings of memory conditions in the absence of invasion. In this paper we design a home embedded surveillance system which evaluates the development of a Low-cost security system using small PIR (Pyroelectric Infrared) sensor built around a microcontroller with ultra-low alert power. The system senses the signal generated by PIR sensor detecting the presence of individuals not at thermal equilibrium with the surrounding environment. Detecting the presence of any intruder in any specific time interval, it triggers the signal wakes up the MCU. After the MCU sends the sensor signals to the embedded system, the program starts the Web camera. Our sensing experiment will show that reduction in use of memory required for saving the previous data as well as the system's power consumption.

R. Verman et.al.[3] has said the proposed work will present the idea of motion detection and tracking using image processing. This type of technology is of great importance when it comes to surveillance and security. Live video streams will therefore be used to show how objects can be detected then tracked. The detection and tracking process will be based on pixel threshold.

U. Kumar et.al. [4] described as this project is designed to develop a home security system based on Raspberry Pi which realizes the function of providing residence with security and alarm information through remote sensing. To complete this project, team members use temperature and humidity sensor and PIR sensor to detect the temperature, humidity and motion information of a house, and then report any potential unusual or dangerous situations to the owner. In order to ensure that the owner can get the potential unusual or dangerous situations in time, security notifications will be by email, and all information will be by WiFi to a commodity wireless router. The final products are robust, packaged, and powered by mains. The goal of this project is to replace the current DLINK security system with a system that does not need to go out to the cloud for information sharing and control.

P. Sanjana et.al. [5] Proposed a home security system captures information and transmits it via a 3G

Dongle to a Smart phone using web application. Raspberry pi operates and controls motion detectors and video cameras for remote sensing and surveillance, streams live video and records it for future playback. It can also find the number of persons located with the help of the Infrared sensor. For example, when motion is detected, the cameras automatically initiate recording and the Raspberry pi device alerts the owner of the possible intrusion having a smart phone. Raspberry- Pi has two main components interacting with each other: one is the Web Application that executes on the mobile device's browser and server-side scripts that run in a cloud which will be operated by the Raspberry Pi Hardware tool component.

Bajorek et.al.[6] has said in the present study, a home monitoring healthcare system for elderly and chronic patients has been proposed. The system was developed for three types of users: assisted person, doctor and guardian. It analyzes the collected information (e.g. biomedical signals) and in case of detection of dangerous events informs physician and guardian. A mobile device has a key role in the system. It allows exchange and visualization of data to the users. This paper describes the design and implementation of a tablet in the home monitoring healthcare system, with specially developed data exchange protocol. Additionally special security features to protect data exchange were introduced. Software part of the system was made using modern technologies such as JavaFX for central unit and Android for mobile devices.

III. EXISTING & PROPOSED SYSTEM

Existing System:

Traditional video surveillance systems primarily consist of CCTV (Closed-Circuit Television) and DVR (Digital Video Recorder) setups. These systems have been the backbone of security monitoring for decades, providing real-time video feed and recording capabilities. With advancements in technology, IP (Internet Protocol) cameras have been introduced, allowing for remote viewing over the internet from PCs and smartphones. Commercial spaces, universities, hospitals, casinos and warehouses require video capturing systems that have the ability to alert and record beside live video streaming of the intruder. The advancements in video surveillance technology have made it possible to view your remote security camera from any internet-enabled PC or smartphone from anywhere in the world. This encompasses the use of CCTV (DVRs) systems and

IP cameras. This technology is awesome but its cost of implementation has proven to be an impediment especially for a small home application.

Limitations:

- Older systems may lack high definition resolution, affecting the clarity of footage.
- Limited local storage capacity can be prone to tampering and may not support long- term data retention.
- The initial setup and maintenance costs can be high.
- Physical components like cameras and recorders can be susceptible to damage or tampering.

Proposed System:

The secure home entry system using Raspberry Pi utilizes various hardware components and software functionalities to enhance security and convenience for homeowners.

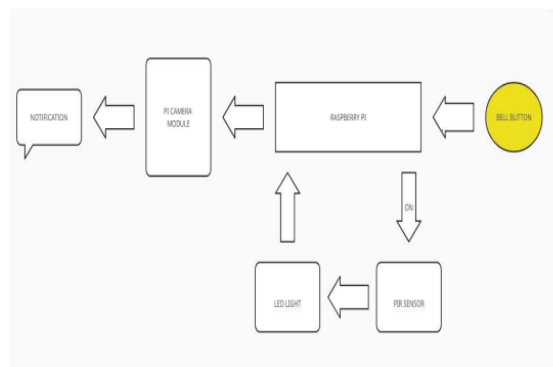


Fig.1: Block diagram of Proposed System

The system's operation can be broken down into several key steps:

Motion Detection: The system uses a passive infrared (PIR) motion sensor connected to the Raspberry Pi to detect the motion near the entry point, such as a door. When motion is detected, the sensor sends a signal to the Raspberry Pi.

Image capturing: Upon receiving the motion detection signal, the Raspberry Pi triggers the Pi camera module to capture an image of the area near the entry point. This image serves as visual confirmation of the presence of a person near the door.

Image processing: The captured image is processed by the Raspberry Pi to extract relevant information, such as the presence of a person and their identity if facial recognition is implemented.

Alert Notification: The Raspberry Pi then sends the processed image to the homeowner's Android device via email or a notification. This alert informs the homeowner about the presence of someone at the door in real-time.

IV. RESULTS & DISCUSSION

The implementation of a secure home entry system using a Raspberry Pi and email notifications would provide an affordable and customizable solution for enhancing home security. By integrating features such as mobile app control, cloud storage, and advanced authentication methods, the system could offer convenience and peace of mind to users. Potential future developments could include voice control, machine learning algorithms, and integration with smart home ecosystems, further enhancing functionality and security. Overall, the project offers a scalable and adaptable solution with significant potential for innovation and improvement in the field of home automation and IoT technology.

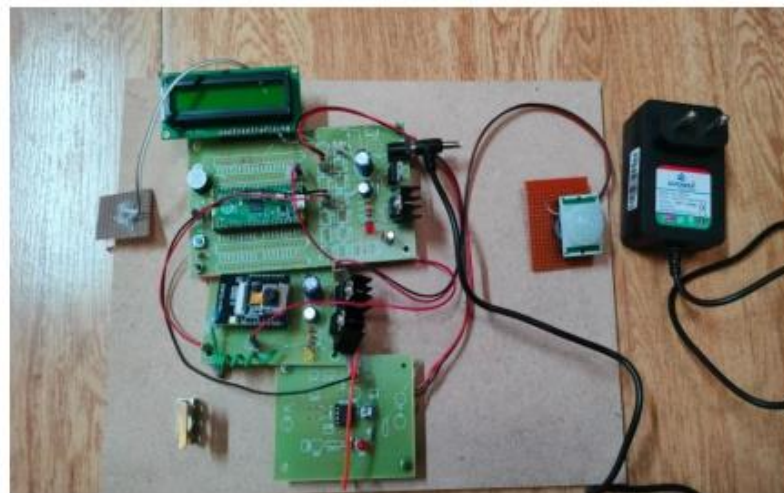


Fig.2: Experimental Results

V.CONCLUSION & FUTURE SCOPE

Conclusion:

The project designed and implemented a security system based on the Raspberry Pi. The

aspects of the system are: motion detection using a PIR sensor, video capturing using a Pi Camera and sending out an alert through e-mail. It did not however achieved the option of image processing in the Raspberry Pi because of system constraints i.e. processor speed.

Future Scope:

In the future, the project of implementing a secure home entry system using a Raspberry Pi and email notifications could evolve in several directions. Integration with mobile apps for remote control and monitoring, cloud services for scalable data storage and analytics, and biometric authentication methods for enhanced security are potential avenues. Voice control capabilities, advanced security features such as intrusion detection, and smart lock integration could further improve convenience and protection.

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