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Simulation of Advanced Home Security Surveillance System using IoT

Bhimrao S. Lankeshwar*1, Dr. Amol Kumbhare*2
*1⁽Research Scholar,E & TC Engineering Department, DR. APJ Abdul Kalam University, Indore,India)
*2(Research Supervisor E & TC Engineering Department, DR. APJ Abdul Kalam University, Indore,India)
bslank20111@gmail.com*1,dramol@aku.ac.in*2

Abstract:

 In our daily lives, security is far too crucial to be concerned about. Everybody wants to feel as safe as they can. We can rest easy knowing that our house or place of business is safe. Today, as we all know, stealing has grown to be a serious problem. As things stand, making sure people are safe and secure is becoming a need. Since it is commonly acknowledged that the impact of contemporary technology has peaked, there is an increasing need for security solutions. An intelligent home requires minimal human intervention. As digital and wireless technology advance, automated security systems become increasingly sophisticated. A user can see his home remotely with the use of a surveillance camera, and depending on the type of sensor, sensor networks can offer additional security features. Faster data transfer and global system monitoring and control with the accuracy of a raspberry pi are made possible by adding WiFi to security systems

Keywords : Security, Safe, Intelligent, Digital, Sensor, WiFi

I. INTRODUCTION

From large-scale companies to residences, surveillance is essential to ensuring our security. Theft and burglary are two examples of issues that have always existed. Within the context of major companies, personal safety pertains to the monitoring of individuals' changing information, such as actions and behaviour, in order to safeguard, control, and impact personal information. The term "surveillance" describes using technological devices, such as CCTV cameras, to observe something from a distance. People ought to have the freedom to live fearlessly and the self-assurance to conduct business without worrying about being insecure. The technology developed in this study provides privacy protection and security because it is only viewable by one person. It also makes use of a straightforward circuit. Images can be sent to a smartphone thanks to the system's use of Node MCU for operations. The standard surveillance system comes with a number of energy-related expenses and issues. It is better to have a mobile, energy-efficient device that can take pictures while a burglary is taking place. People can feel more comfortable and independent in their daily activities thanks to the system. Moreover, it is superior than the surveillance systems in use today because it emits a warning signal. A camera is installed by the homeowner or business in a specific area that has to be watched over to guarantee security. The user may access and keep an eye on security from various locations, including remote ones, thanks to the system. A

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The main purpose of this study is to develop a security-based system that is more flexible and affordable in terms of location. Specifically, the goals are as follows:

a. To design a PIR security-based system that is easy to use, simple to deploy, and economical utilizing current technology.

b. To create a PIR security-based system for people who might wish to operate their house, place of employment, or office   remotely.

c. To create a PIR-based security system. The system is easy to use because it is compact, portable, and powered by its own source. It is affordable for both home and personal use and has energy for fast alerts. The Internet of Things (IoT) has gained significant attention due to advancements in technology and a shift in industry.

The Internet of Things has been widely applied in all fields, including agriculture, industry, security systems, and medical. Numerous research have been conducted on IoT-based smart homes, including home security systems. A prior study recommended the usage of Raspberry Pi, ESP wifi module, and reed sensor; however, only reed sensor was used in that study, which served as a security system by placing it in front of the door and notifying people via smartphone when

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the door opened. There is still a greater chance of criminality with this approach. In a different study, a sensor PIR system was installed at the building's entry as part of an Internet of Things-based smart security and home automation system. When the sensor detects human movement, it triggers an input to the microcontroller, notifying the owner via voice calls.

By activating the light and alert, this system may give the owner real-time action. The owner can do this by pressing the previously programmed keypad button. An Internet of Things (IoT) smart house that uses the Blynk Framework is made up of three separate, isolated subsystems: temperature sensors, GPS module systems, relay module systems, and PIR and ultrasonic sensors that use wifi to detect the water level in the linked tank using a Node mcu with the Blynk App-based interface. On the other hand, sensors coupled with the Arduino Mega microcontroller and Ethernet shield allow smart home designs based on Ethernet systems to monitor and safeguard dwellings against gas leaks, fire, and humidity. A message notification system was put up to alert the owner in the event of odd or exceptional activity. Ethernet systems, however, are limited to local networks. The Internet of Things has been widely applied in all fields, including agriculture, industry, security systems, and medical. Numerous research have been conducted on IoT-based smart homes, including home security systems.

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II. LITERATURE SURVEY

V.Krishnaveni et. al. designed an advanced electronic security system by using small PIR and IR sensors built around the Node MCU controller. PIR sensor sense the presence of intruder & Controller reads the signal from sensors and if intruder is detected, it compares the detected image with predefined images in the database then it turns on the buzzer as well as making a notification to predefined number. At the same time the video of intruder can also be monitored and make them anesthetic. [1]

Anitha et. al. prepared a "Home security system using internet of things" She design the system will inform the owner about any unauthorized entry or whenever the door is opened by sending a notification to the user. After the user gets the notification, he can take the necessary actions. The security system will use a microcontroller known as Arduino Uno to interface between the components, a magnetic Reed sensor to monitor the status, a buzzer for sounding the alarm, and a WiFi module, ESP8266 to connect and communicate using the Internet. [2]

Sruthy S et. al. designed and development of IoT based security surveillance system in buildings using Raspberry Pi Single Board Computer(SBC) with WiFi network connectivity. Adding wireless fidelity to embedded systems will open up various feasibilities such as worldwide monitoring and control, reliable data storage etc. This system comprises of wireless sensor nodes and a controller section for surveillance. Remote user alerts, live video streaming and portability are the prime features of the system. WiFi enabled IoT(Internet of Things) module processes the sensor based events and sends the sensor status to controller section. Upon receiving the event notification, the controller enables the camera for capturing the event, alerts the user via email, phone call and SMS and places the live video of event on webpage. The IoT module eliminates the need of a microcontroller and wireless transceiver module in sensor node, thus it makes the node compact, cost effective and easy to use. [3]

Wadhwani et. al. proposed a design for home automation and home security technique. The sensors will be interface with Arduino. The status of our home appliances will get uploaded to a cloud platform through wireless module. System and mobile should be connected over same wireless network. Sensors will be able to enable or disable the sensors which will be in control of the user. The flex sensor will depend upon the gestures of our fingers to control the appliances. The magnetic sensor will enhance door breaking security. [4]

Taryudi et. al. proposed an integrated home security and monitoring system using Internet of Things (IoT) by combined the Arduino-nano and Node MCU ESP8266 as a controller. The home security system involved RFID reader, numerical code to open the door and email notifications to users. The monitoring system used PIR sensor to detect the intruder, DHT-22 sensor to detect the room temperature and humidity, rain sensor to detect the rain, fire sensor to detect the stove's fire, and LDR sensors to monitor the light condition. Also, we setup light bulbs and solenoid valves used as the actuators. [5]

Ventylees et. al. proposed an Internet of Things (IoT) for smart home system, together with due consideration given to user convenience in operating the system. The IoT smart home system runs on conventional wifi network implemented based on the All Joyn framework, using an asymmetric Elliptic Curve Cryptography to perform the authentications during system operation. A wifi gateway is used as the centre node of the system to perform the system initial configuration. It is then responsible for authenticating the

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communication between the IoT devices as well as providing a mean for the user to setup, access and control the system through an Android based mobile device running appropriate application program. [6]

Pawar et. al. focused mainly on improving quality of life overall. The IOT based devices will help in surveillance and energy management and also provides support for a direct message or SMS to nearby friends and support with GPS location and predefined message just by a single tap of user. All these operations are controlled by cloud system with active internet support. [7]

Sarkar et. al. proposed by 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 also be utilized for home automation by making use of the same set of sensors. The leverage obtained by prefering 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 TI-CC3200 Launchpad 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. [8]

Medupu et. al. gives the design of Home Security Surveillance System and Automation using Raspberry Pi, Sensors, IoT module. Different type of sensors is used like Infrared (PIR) sensor, LPG gas sensors, Fire detecting sensors etc which are connected to the Raspberry Pi. Raspberry Pi is a tiny supercomputer which performs signal fetching and processing. After the process it alerts to the owner via email, text or phone call. [9]

Azlan et. al. discussed Security Challenges, Security Requirements and Solutions" They investigate security attacks in smart home and evaluate their impact on the overall system security. They identified security requirements and solutions in the smart home environment. [10]

III. PROPOSED OBJECTIVES

A. To design a software to program the security system for the room door with auto-lock feature.

B. To demonstrate and apply the idea of computer port programming and PC-based control system.

C. To develop an interface which will be used by the user to manage and control the system.

D. To integrate the door system with personal computer using any available Communication port.

E. To design and integrate hardware with electronic and electrical elements which will be used to simulate the security features of alarm system.

We plan to use Raspberry Pi, the open source and user friendly hardware, with Wifi connectivity portable to laptops and PCs The thief entry is monitored by the above setup placed inside the home Once the entry is detected a notification will be sent to the owner The video can be monitored through the mobile phone.
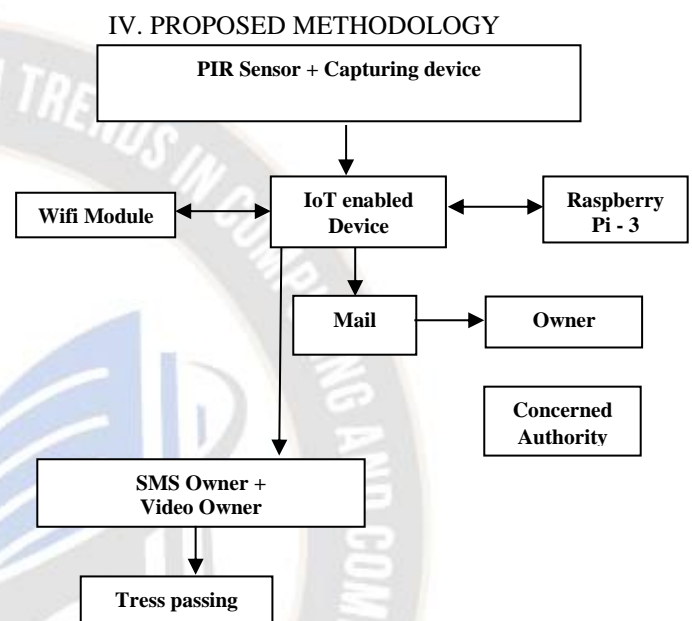
IV. PROPOSED METHODOLOGY

Fig. 1 Block diagram of the proposed system

The system's command modules made use of the Python programming language and the Open CV library. Video and image files were analyzed using Open CV. Thus, Open CV offered the required framework to accomplish image processing. Open CV is used to implement the code that allows for the processing of videos. Python is a highly helpful programming language with an easy-to-read syntax that enables programmers to write code in a fraction of the time compared to languages like assembly, C, or Java. The microcontroller was programmed using the Python programming language to carry out commands.

The system software's algorithm is displayed as follows:

Step 1: Image capture and transfer: Scenes at a fixed position are being captured by the camera. The Raspberry Pi controller receives the collected frames.

Step 2: Background subtraction: To obtain the foreground image where the motion is to be identified, the background subtraction method is applied to each frame.

Step 3: Motion detection: Using the temporal motion detection approach, motion of objects larger than a standard

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size (small insects and animals are not taken into account) is detected across a series of frames.

Step 4: Turn on alert mode: The alert mode is turned on by a trigger to the controller if any motion that is recognized as belonging to a predetermined size or type.

Step 5: Transfer of the alert message: The email's contents are constructed using the frames that were determined to include motion. Subsequently, the email is sent to the recipient by activating the API command. The taken image is saved locally after being emailed to the user.
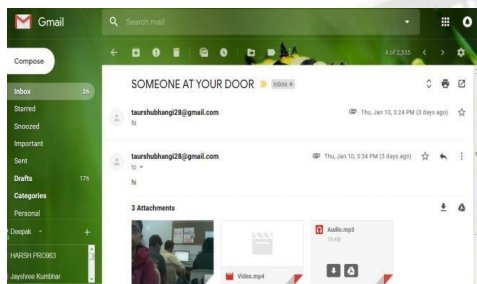
V. RESULT

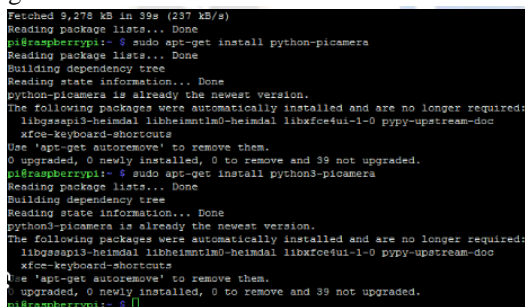Fig. 2 Screenshot of E-mail alert on Internet browser

Fig. 3 Communication establishment wifi input and raspberry pi

V. CONCLUSION:

The Raspberry Pi-3, Pi-camera, and PIR sensor were used in the design and development of the Internet of Things-based home security system. Through email on laptops or cellphones, users can receive warnings at any time and from any location. The device sounds a loud warning whenever it detects any unusual or suspicious movement. As a result, the system's architecture effectively blocks entry for any unknown individual into the house. And also can be intergrated with sms alerts through sms api platform

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