INNOVATIVE SECURITY SYSTEM DESIGN WITH RASPBERRY PI FOR ENHANCED PROTECTION

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ABSTRACT

Everywhere, everyone's top priority is security. Everybody wants their house, workplace, etc. to be safe. A home and business security system is described in this notion.Despite its simplicity, this security system is easy to set up and works well. Here, a passive infrared sensor can identify people anywhere we put it, whether it's at a door close to our home, in an office, a factory, or any other location we need to keep an eye on constantly for security reasons. In this configuration, the Raspberry Pi serves as the controller for the application.

A PIR sensor activates the webcam and captures an image when it senses movement. An alarm is triggered to alert the homeowner to the intruder's presence, and Internet of Things technology transmits photos to the cloud so that someone can identify the individual who showed up at that precise moment. In that scenario, a buzzer is sent to notify other nearby individuals.

I.　　INTRODUCTION

1.1 Introduction

These days, technology is an essential part of our everyday lives. Technology in the area of security systems is developing quickly.In the current environment, where safety and security are crucial for supervision, the term "motion detection" is becoming increasingly popular. These systems are gradually being incorporated into a variety of settings, such as shopping malls, traffic areas, institutions, and various organizations. They are also being used for home security. Reduced theft, employee protection, building security, remote facility monitoring from a smartphone or tablet, and deterring trespassers from trying to enter the business are just a few advantages of a Raspberry Pi security camera system. The usage of numerous pricey components, such as computers, cameras, and cable, makes the troublesome CCTV camera or surveillance system expensive. In order to store video, we also require a hard drive with a larger capacity. Too much room is set aside for continuous

recording, and it takes labor to find the illegal conduct.

When the Raspberry Pi security system detects the presence of a person, the camera takes pictures of them, and our controller transfers those pictures to the cloud over a computer network. in order for the person's info to appear at that precise moment. In addition, a vibration detector is installed to detect attempts to open the door, and a siren is activated to notify everyone involved. In contrast to the troublesome surveillance system, the Raspberry Pi security system is inexpensive and offers extra capabilities like transmitting photographs to the cloud to notify the owners. Instead of watching the full movie to identify the issue, the email notification feature in this system helps the user notice what's wrong. The Raspberry Pi system is not only easy to use, but it can also be put together by someone with a moderate level of expertise if the required components are accessible and some additional files are created to help the operating system store the data. As a result, they are both an effective security system and a project that saves money.
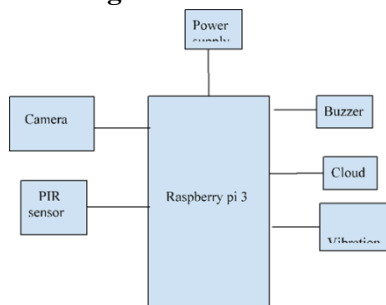
1.2 Block diagram

Figure 1.Block diagram of advanced security system

II.　LITERATURE SURVEY

2.1 Koluguri Neelima1, K. Ashok Kumar2, "Advanced Security System with Intruder Image Capture and Forward Through Email."

Here, the Raspberry Pi serves as the controller for the program, and the PIR detector detects the presence of a person wherever we tend to position this module—at a door near our home, at an office, a factory, or any other location where we'd like to keep an eye on things every minute for security purposes. Every time PIR detects a person's presence, a camera image of the person is taken, and our controller uses the computer network to send the photographs to the pre-stored email address. in order for the person's info to appear at that precise moment.

2.2 Marwa Khalid1 and Sadia Majeed2 present "A Smart Visitor's Notification System with Automatic Secure Door Lock using Mobile Communication Technology."

In order to manage vacationers' records and secure homes or workplaces, this article proposes an automated security system that will automate their access. One component of this technique to verify the visitors is face recognition.

This approach works in real time since it will recognize the visitor's face based on the outcomes of the face recognition technique as soon as they arrive.For approved visitors, it will open the door; for unauthorized visitors, it will alert the owners and give them the authority to take any necessary action. The intended system is created and successfully ensures security, records management, and gate functioning without requiring the owner to physically interact.

2.3 A. Alheraish's SMS-based Home Automation System

Using SMS, a home automation system is suggested. The suggested solution enables authorized users to modify the passkey for the door and control the lights in the house while detecting unauthorized entry. Light Emitting Diode (LED) and infrared sensors are used to monitor the condition of the home entrance in order to detect any unauthorized intrusion. Any four numbers can be used as the passkey to the door, and it can be set using the keypad or by sending an

SMS from a registered user's mobile number. Using SMS from their registered cellphone number, a user can remotely control their home's lights. By turning on lights in various rooms at odd times, one can create the illusion that the house is occupied when it is not.

III.   HARDWARE DESCRIPTION

RASPBERRY PI

The Raspberry Pi is a credit card-sized minicomputer that can be used with any input and output hardware device, such as a keyboard, mouse, television, or monitor, thereby turning the setup into a low-cost, full-fledged PC.

The earliest computers were enormous processing devices constructed using vacuum tube technology. As time went on, smaller and less costly models of the future computer appeared. We carry around minicomputer devices like smartphones these days. Despite their widespread use, computers are still not generally available in developing nations. The Raspberry Pi computer was developed as a result of this disparity in access to computers and programming skills.

The Raspberry Pi is a tiny, inexpensive, credit card-sized single-board computer that enables users of all skill levels and backgrounds to experiment with and learn how to compute. The Raspberry Pi foundation in the UK created this improved motherboard, which is now widely acknowledged as a component of developing computer technology. Additional peripheral hardware, including a keyboard, mouse, and monitor, can be connected to the minicomputer.

Learning programming languages and managing a network are just two of the many uses for Raspberry Pi. It serves several purposes and has become much more well-liked in recent years than was first anticipated.

The Raspberry Pi can be programmed. Although it lacks internal storage and peripherals, it has all the essential components of a typical computer's motherboard. You must insert an SD card into the designated slot in order to configure the Raspberry computer. The operating system must be placed on the SD card in order for the computer to boot up. Linux OS is compatible with Raspberry computers. This fosters a diverse ecosystem and lowers the amount of memory required.

Once the operating system has been configured, the Raspberry Pi can be connected to output devices such as HDMI televisions or computer monitors. Additionally, input devices such as keyboards and mouse must be connected. The buyer determines the precise purpose and applications of this minicomputer, which may perform a wide range of tasks.

Fig 2 Raspberry pi 3

IV.   IR Sensor

4.1 Introduction

An infrared sensor is an electronic gadget that produces light to detect objects in its environment. In addition to detecting motion, an infrared sensor may measure an object's temperature. Typically, every item in the infrared range emits heat radiation of some kind. Although these radiations are undetectable to the human eye, they can be detected by infrared sensors.
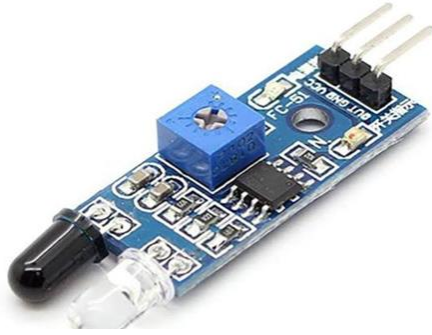
4.2 PIR sensor

A human being traveling within ten meters of the PIR sensor is detected by the sensor. Since the real detection range is between 5 and 12 meters, this is an average number.The basic component of PIR is a pyroelectric sensor, which is capable of measuring infrared radiation levels. For many important tasks or things that must be found after a person has departed or arrived at the location. PIR sensors are amazing; they are easy to use, require little effort, have a large lens range, and are straightforward to interact with.
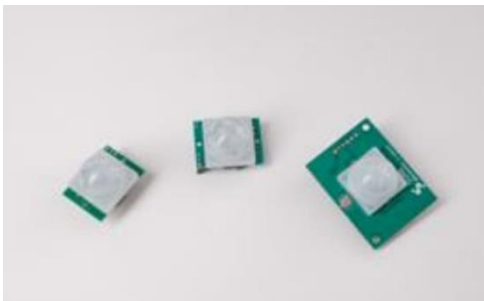

Fig 3 PIR sensor

4.3. Vibration sensor

The ability to monitor, measure, and analyze vibration is crucial in today's business, such as research and development. Regretfully, researchers who are unfamiliar with test instruments and vibration analysis may not always understand the best methods for creating a precise and repeatable vibration measuring system. The choice of appropriate components, system construction, signal conditioning, waveform analysis, and setup are some of the

difficulties involved in measuring vibration. Another name for the vibration sensor is a piezoelectric sensor. These flexible sensors can be used to measure a variety of operations. By converting to an electrical charge, this sensor measures changes in temperature, force, acceleration, pressure, and strain via piezoelectric effects. By instantly measuring capacitance and quality, this sensor is also utilized to determine scents in the air.

Fig 4 Vibration sensor

4.4 Camera

Small digital video cameras that are either directly or indirectly linked to a computer or computer network are known as webcams.The software that comes with webcams must be installed on the computer in order for users to record or stream video to the Internet. Although the video quality may be lesser than that of other camera models, webcams may capture both still images and high-definition films.

Another name for webcams is web cameras.An input device that takes digital pictures is called a webcam. The computer receives them and transfers them to a server. They can then be sent to the hosting page from there. Webcams are frequently included with desktops and laptops.

Figure 5 Camera

4.5. Buzzer

A buzzer is a compact yet effective part that gives our system or project sound capabilities.

This component is frequently used in most electronic applications because of its small and compact 2-pin structure, which makes it easy to utilize on breadboards, Perf Boards, and even PCBs.
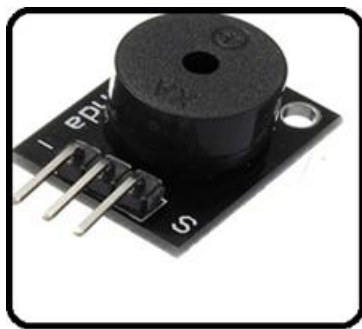

Fig 6 Buzzer

Commonly available buzzers come in two varieties. The buzzer in this picture is a basic buzzer that, when powered, emits a continuous beeeeep. The second kind is a premade buzzer, which looks bigger than this but also emits a beep. Beep. Beep. It produces sound because of its internal oscillating circuit. However, the one displayed here is the most popular since it can be readily adapted to our purpose with the aid of additional circuits.

All you need to do to utilize this buzzer is supply it with a DC power supply between 4 and 9 volts. Although a regulated +5V or +6V DC source is advised, a basic 9V battery can also be utilized. In order to turn the buzzer on or off at the appropriate time and interval, it is typically connected to a switching circuit.

V.   RESULT

One person was forced to enter an empty, closed building in order to test the experiment. When a human is spotted by the PIR sensor, a signal is sent to the microcontroller. Following signal reception by the microcontroller, the camera will take a picture of the individual and transmit it via IOT to the property owner. After that, a buzzer sounds.

During testing, the suggested showed excellent performance and precise execution results.

In many instances, the results was roughly the same after numerous observations.

Figure 7 Working Module of advanced security system

5.2 Advantages of the project
● 	Highly flexible
● 	No need of human effort
● 	High security is provided

5.3 Drawbacks of the project
● 	It just detects the intruder entering into the property but doesn't stop the intruder from entering inside the property.
● 	 It cannot be used in remote places where the network does not exist.

5.4 Applications
Used to detect intruders and enhance security at:
●Museums
●Home
● Office
●Jewelry shops
●Banks

VI.   CONCLUSION   AND   FUTURE   SCOPE

6.1 Conclusion

Building and developing a system that can detect when someone is attempting to enter a space and send out photos of the intruder was the primary objective of this project. The system makes use of the Raspberry Pi 3 microcontroller. The system operated well and as intended. This type of surveillance system is reasonably priced, allows for faster intruder alarm transmission, and is accessible from anywhere at any time. This has several applications in terms of jewelry store, bank, and residential security.

6.2 Future scope

● In addition to identifying the presence of an unknown person, a security system can be designed to prevent them from entering the property. When a visitor arrives, this system instantly recognizes their face. Depending on the results of the face recognition technique, it will either unlock the door for authorized guests or notify the owners and grant them permission to take any necessary action if an unauthorized visitor shows up.

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