Semiconductor Optoelectronics

AN IOT APPROACH FOR MOTION DETECTION USING RASPBERRY PI

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Abstract— The primary purpose of the internet of things is to transmit data over a network without the need for a human interface. The purpose of this paper is to offer protection systems for homes, workplaces, industries, etc. Here, we're creating a programme to track the surroundings constantly. This system primarily picks up on environmental changes, such as motion, and alerts the user or proprietor if there is a problem. When motion is noticed, this system takes pictures of the motions and sends them to the owner's email address as well as sending notifications to an Android app. Therefore, based on the notification received, the person will take the appropriate action. In the suggested remedy, a video module is connected to a raspberry pi.
Key words: Raspberry Pi; Internet of Things

1. INTRODUCTION

The internet of things (IOT) is the interconnection of physical objects, structures, and other things that are embedded with electronics, software, sensors, actuators, and network connectivity and can thus gather and share data. 20 billion gadgets are anticipated to be online by the year 2020. Since it was created with a wide range of applications in mind, it can be used in areas where other systems cannot. This system can also be used to replace existing systems in a variety of other ways. The fact that a user can utilise the system locally or remotely depending on the circumstance makes it user-friendly.

Fig 1: The IoT Different Services, Technologies

Everyone must be able to protect their property from common harms like burglaries, property destruction, and other such events given the recent rise in security concerns. Modern society frequently sees advances in technology, and this is also true of hoodlums and thieves. Accordingly, it is essential to upgrade the tracking tools in addition to keeping up with the evolving surroundings. This project aims to develop a monitoring system that can rapidly respond to motion recognition by snapping a photo and transmitting it over an administrator device to the internet platform. The device requires a Raspberry Pi module, a motion sensor, a camera, and an internet connection. Users can access the system from any location on the planet. The Raspberry Pi, a credit card-sized computer, can become a video monitoring device when its own camera chip is used.

A new method has been developed to detect movements. PIR sensors are used almost always to determine whether a person has entered or left the sensor's area of vision because they can sense motion. They are strong, lightweight, reasonably priced, low-power, and easy to use. Every time the PIR in the room detects activity, the camera will capture a photo, which will then be momentarily saved in the raspberry pi module. A Python application is used to send an email notice each time motion is detected. These components can be used to build an efficient, low-cost, and security video system. This application is ideal for tracking in limited or guarded areas because of its advantages. The cost-effectiveness of any method is its main problem. The traditional methods used to develop these security systems include pricey sensors and various components that obtrusively increase cost and intricacy and are also difficult to implement. The systems that are presently in use include Surveillance cameras, biometric readers, and facial recognition. These limitations inspired us to develop a high-speed, economical security system that can be controlled and monitored remotely via the internet.

2. EXPLANATION OF PROJECT

For example, it is beneficial to incorporate and apply IOT into your security system to detect movements when you are at a distant and want to watch and receive alerts if there is activity at your house or place of work. The initiative aims to offer a fairly cost, highly sophisticated motion sensing device. The primary goal is to provide a simple user interface that can rapidly send the user an email or text communication.

3. FINAL PROPOSED WORK

This project aims to develop a monitoring system that can rapidly respond to motion recognition by snapping a photo and transmitting it over an administrator device to the internet

platform. The device requires a Raspberry Pi module, a motion sensor, a camera, and an internet connection. It will create an application of a surveillance system that demonstrates the idea of monitoring a particular place in remote regions.

From anywhere on the planet, the individual can monitor the device. The two main parts of the monitoring technology are as follows:

• Hard-wired Security Systems: In this type of system, the power source, Ethernet connection, motion monitors, cameras, and other components are all attached to the pi.

• Remote Entry Systems: With this kind of system, a security system can be monitored and managed from any location in the world using an Android smartphone.
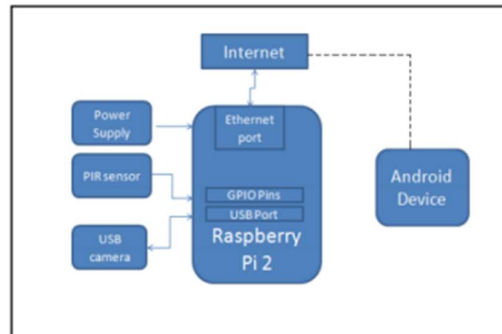

Fig 2: Block Diagram

The raspberry pie will be located in a distant location and will be watching the activities, as can be seen from the block diagram above. Through an Android application, the device can be controlled from anywhere in the globe. The system includes a USB camera to record the intruder's pictures.

3.1 Review of the Structure

The following is a summary of the various components' functions:

• USB Camera: When a motion is detected by PIR, a USB Camera is used to take a picture and transmit it to the Raspberry Pi's USB port. Model 2.0 USB Webcam is utilised here.

• Raspberry Pi: The Raspberry Pi is a credit-card-sized computer that can be used to create smart devices or as a regular desktop computer.

• Android device: An Android device is required in order to view the remotely recorded images and to receive notification messages.

• PIR sensor: Passive infrared sensors, also known as PIRs, can be used to identify the presence of people nearby. The USB camera's operation can be controlled using the output.

Pushetta is an application designed to send real-time alerts to a variety of devices (cell phones, programs, savvy TV, etc.,).

In the event that we registered on the Pushetta website, we can receive push notifications from the server. Internet access and 650 mA@5 volt power supplies are required for the Raspbian operating system-based device.

Opens is used to capture the image, and Python scripting language is used in the programming to deliver the notification. The raspberry pi's GPIO pin will receive a signal whenever the PIR senses an intrusion. The Raspberry Pi detects the transmission and activates the USB camera to take pictures. One notification message will be sent to the user's Android smartphone along with the temporarily stored image on the raspberry SD card.

3.2 Project Execution

• Raspberry Pi Setup The chosen operating system must be written to an SD card, which must then be inserted into the Raspberry Pi's Micro USB port. Attach a keyboard and mouse to it. Connect the HDMI cable that links the Raspberry Pi to the monitor as well as the power cable. power source with DC input for the Raspberry Pi.

• Using a Raspberry Pi without a screen, keypad, or mouse Without using a computer, connect the Raspberry Pi to the internet using an RJ-45 cable, deliver electricity, and attach a USB camera. The Raspberry Pi can be programmed using Putty, and the device can then operate independently. The command window of the Raspberry Pi device can be accessed via IP address.

• Raspberry Pi VNC Gateway Installation Install VNC by using the command line. Sudo apt-get upgrade for $ Client Side: $ sudo apt-get install snug VNC server (Laptop) Download the VNC client and enter the Raspberry Pi's IP address dynamically to run it from a distance. Since the network pi has SSH, it can be used from any location as long as the network is linked.

• Running VNC Server at Raspberry Pi Start-Up VNC enables system operations remotely with Raspberry Pi's GUI, so make sure VNC automatically begins at Raspberry Pi's start-up. The connections between PIR and the hardware of the Raspberry Pi should be made as shown in fig.
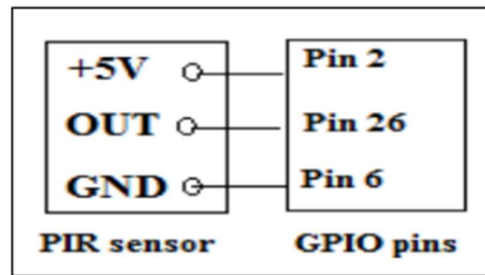

Fig 5: Connections between PIR and pi hardware

• Movement detection When the last and current frames of a live video cannot be matched by a Python script, a motion signal is activated. When the flag is activated, the camera is prompted to take further pictures.

• Notifying People PIR transmits a signal to the Raspberry Pi when it senses motion, and the Pi then activates the camera to take a picture. The camera then notifies the user via an Android app. The software used here is called Peseta. It is necessary to have a channel membership prior to that. A notice will be sent to that specific registered channel when a breach is detected.

4. FUTURE ENHANCEMENT

Future improvements to this system could include the inclusion of more IR radiating devices to identify people's faces even when they are wearing masks. In addition, we can connect devices like gas sensors, smoke sensors, and fire sensors to produce the appropriate warnings.

5. CONCLUSION

The Raspberry Pi proves to be a bright, affordable, and successful tool for carrying out the house management. This initiative primarily focuses on motion recognition and gives proprietors the ability to keep an eye on their buildings and houses even from a distance. This system might be a substitute for the pricey protection systems that are currently in use. The

base where this device is placed does not need to be altered in any special ways. It can be carried out without much difficulty.

6. REFERENCES

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