Journal of Engineering Sciences

Vol 13, Issue 04, APRIL /2022

ISSN NO:0377-9254

IOT BUILT SECURITY SYSTEM

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ABSTRACT:

The Internet of Things (IoT) is a network that connects everything, mostly for the exchange of useful data. The partnership between the Internet of Things and Cloud Computing has acted as a catalyst, allowing new sensory devices to be processed with new advancements. Individual security in a company is becoming increasingly important as the use of security technologies in our daily lives grows exponentially. We primarily want to improve on the traditional security system, namely, the IoT-based suggested system's ability to interact with devices in real time. Recognizing this, we designed a methodology for sensor creation combining IoT and cloud computing. The suggested system includes Raspberry Pi, Pi-camera, Laser Sensor, Motion Sensor, Ultrasound Sensor, and Piezo Speaker, all of which are connected to a protoboard. Using the IoT concept, this system sends alert messages to authorised individuals and makes intelligent decisions. This prototype is a cost-effective, dependable, and understandable solution that demonstrates how we can accomplish this using IoT and cloud computing.

INTRODUCTION

The current situation ensures that safety and security are more important than ever. As the influence of modern technology reaches its apex, there is a regressive progress in the security system. It is referred to as a modern house when it has the bare minimum of human needs. Wireless and digital technologies, when combined, result in an automated intelligent security system for our home. The surveillance camera and multiple sensors can be used to implement an automated house security system, and the use of these sensors will define the characteristics of these sensors. When using Wi-Fi to connect to security systems, high-speed data transmission occurs, allowing the user to control and monitor the system. The requirement for video surveillance In the present day, the number of systems is rapidly increasing. The first thing people want to know about their security surveillance system is whether or not they can connect to it via the internet for remote monitoring.

Raspberry Pi, with its built-in quadcore processor, can act as a "Internet Gateway" for IoT devices. Pi, which is powered by a cloud network, serves as a web server for uploading and transferring sensor data to IoT platforms. To use Pi Computer as a web server, you only need custom code, an operating system, a Python library, and a cloud network. An IoT project powered by Raspberry Pi follows a straightforward design, implementation, and modification path, making it ideal for IoT applications.

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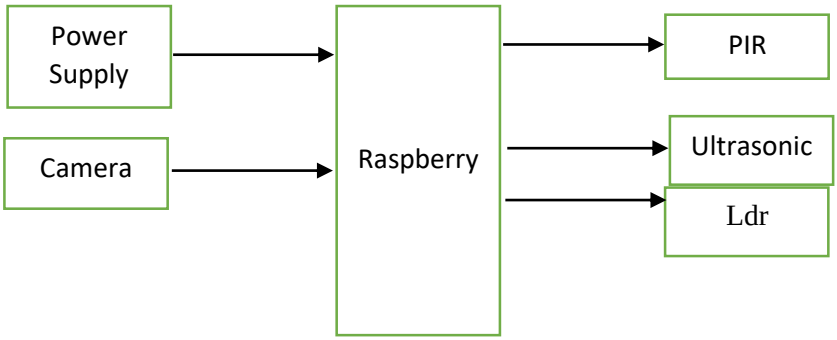
Problem Statement: In the era of the Internet of Things (IoT), where we have all of the advanced technology to revolutionise our lives, it's a fantastic idea to create a system that can be controlled and monitored from anywhere. There are many good security devices and cameras available for home security, but they are very expensive, so today we will build a low cost simple Raspberry Pi based Intruder Alert System that not only alerts you via email but also sends a picture of the intruder when it detects one. This system will detect the presence of an intruder and immediately notify the user by sending an alert email.
This email will also include a photograph of the intruder taken by the Pi camera. We will add two more sensors to this system (ultrasound and laser sensors) that will detect motion in our security system. The Raspberry Pi is used to manage the entire system. This system can be installed at your home or office's main door, and you can monitor it from anywhere in the world using your email and the internet.



Hardware:
RaspberryPi
PIR Sensor
Ultrasound Sensor
Laser Sensor
Piezo Speaker
Prototype Board
Connecting wires

RASPBERRRY PI:

Raspberry Pi is an ARM cortex-based board intended for use by Electronic Engineers and Hobbyists. It's a single-board computer that runs on very little power. Because of its processing speed and memory, the Raspberry Pi can be used to perform multiple functions at the same time, much like a standard PC, and is thus referred to as a Mini Computer in your Palm.
Because it is powered by an ARMv7 processor, it can run the full range of ARM GNU/Linux distributions as well as Microsoft Windows 10, which we will discuss later. The ARM architecture has had a significant impact on modern electronics. All of our processors and controllers are based on the ARM architecture. In our mobile phones, iPods, and computers, for example, we use ARM CORTEX processors.
Pi is a fantastic tool for realising the 'Internet of Things.' In this session, we will go over the hardware and software requirements for the Raspberry Pi, as well as how to set up the operating system for the first run of PI.

Hardware Requirements :

- A mobile phone charger with a 5V, 1000mA output for powering up my PI. This is the bare minimum current rate.
- An LCD or LED screen is required; you can use an old PC screen as a Raspberry Pi screen. After you've decided on a screen, you should check to see if it supports HDMI inputs. If your screen has an HDMI port, all you need is a male to male HDMI cable.
- You'll need a mouse and keyboard; make sure they're USB-powered or you won't be able to connect them to the PI, which only has USB ports.
- To connect SD card to PC, you'll need a Micro SD card (Memory card) and an SD Card Reader (or Adapter) (or laptop). The SD card must be at least 8GB in size. Otherwise, you won't be able to easily install the OS (Operating System) on the PI.

Software Requirements:

- First, we'll need the PI's OS (Software Platform), which can be downloaded from the Raspberry Pi website's Downloads section:
- https://www.raspberrypi.org/downloads/
- It will display all of the operating systems that are compatible with the RASPBEERY PI 2. You can download and install any of the operating systems listed there on your Pi. We will download "Raspbian," the official supported operating system for the Raspberry Pi. Download the Raspbian Jessie Full Desktop Image by clicking on "RASPBIAN." Using a Zip file extractor such as Winrar or Winzip, extract the Rasbian image from the Zip file.
- We'll also need Image Writer software to install the operating system onto the Micro SD card. We used "win32diskimager" to create the image on the Micro SD card, which can be downloaded from the link below: https://sourceforge.net/projects/win32diskimager/
- After the download is complete, install the software; an icon will appear on the Desktop Screen.
- After successfully installing the Raspbian operating system on the Raspberry Pi, we must install the Pi camera library files in order to run this project on the Raspberry Pi. To accomplish this, we must follow the commands given to us.

PIR SENSORS :

Infrared sensors are sensors that detect the motion of objects using infrared sensing technology. There are two types of sensors that use infrared to detect motion: active infrared sensors (AIR sensors) and passive infrared sensors (PIR sensor).
A PIR sensor, also known as a PIR motion sensor, is a type of sensor that measures the Infrared radiations emitted by objects to determine whether they are moving or stationary. This type of motion sensor only detects infrared waves and does not emit any infrared beams, as Active Infrared sensors do.

- PIR motion sensors can detect moving objects even in dark with great accuracy.
- PIR sensors can detect the motion of objects without coming in contact with them.
- They are very easy to install and do not require much wiring

ULTRASOUND SENSORS :

An ultrasonic sensor is a type of electrical gadget that emits ultrasonic sound waves and converts the reflected sound into an electrical signal to determine the distance of a target object. High frequency waves travel faster than audible sound (i.e. the sound that humans can hear). The transmitter (which emits sound using piezoelectric materials) and the receiver are the two main components of ultrasonic sensors (which encounters the sound after it has travelled to and from the

target). When it comes to measuring thickness and distance to a parallel surface, they outperform many other methods. Because of their high frequency, sensitivity, and penetrating power, they are ideal for detecting external or deep objects. Ultrasonic sensors are simple to use and pose no danger to nearby objects, people, or equipment while in operation.

- Unaffected by object colour or transparency
- Can be used in dark environments
- Low-cost option
- Unaffected by dust, dirt, or high-moisture environments.

LASER SENSORS :

A laser sensor is a type of measurement value recorder that uses laser technology to convert a physical measured value into an analogue electrical signal. This means that the laser sensor is designed for non-contact measurement. The triangulation principle is used by the laser sensor. A laser sensor can measure the length of a road, the length of a distance, and positions without making any contact. This takes place at a very high resolution. In addition to different resolutions, laser sensors have different linearities.

- These sensors are built into a point or line laser. The line laser differs from the point laser in that the former projects one or two fixed lines. The lines are created using an integrated fixed lens. Point lasers generate one or more points.
- • Due to the compact and very robust design of a laser sensor, it is possible to integrate it in very small devices or, for example, to include it as a component of industrial robots.
- • With integrated intelligent signal analysis, the laser sensor can provide a precise result.

PIEZO SPEAKER:

- A piezoelectric speaker (also known as a piezo bender due to its mode of operation, and sometimes colloquially as a "piezo", buzzer, crystal loudspeaker, or beep speaker) is a type of loudspeaker that generates sound using the piezoelectric effect.
- Piezoelectric speakers have several advantages over traditional loudspeakers, including the following:
- They are resistant to overloads that would normally destroy most high frequency drivers.
- Due to their electrical properties, they can be used without a crossover.

PI-CAMERA

The Pi camera module is a portable, light-weight camera that works with the Raspberry Pi. It communicates with the Pi via the MIPI camera serial interface protocol. It is commonly used in image processing, machine learning, and surveillance projects. Because the camera payload is so small, it is commonly used in surveillance drones. Aside from these modules, Pi can also use standard USB webcams that are used in conjunction with computers.

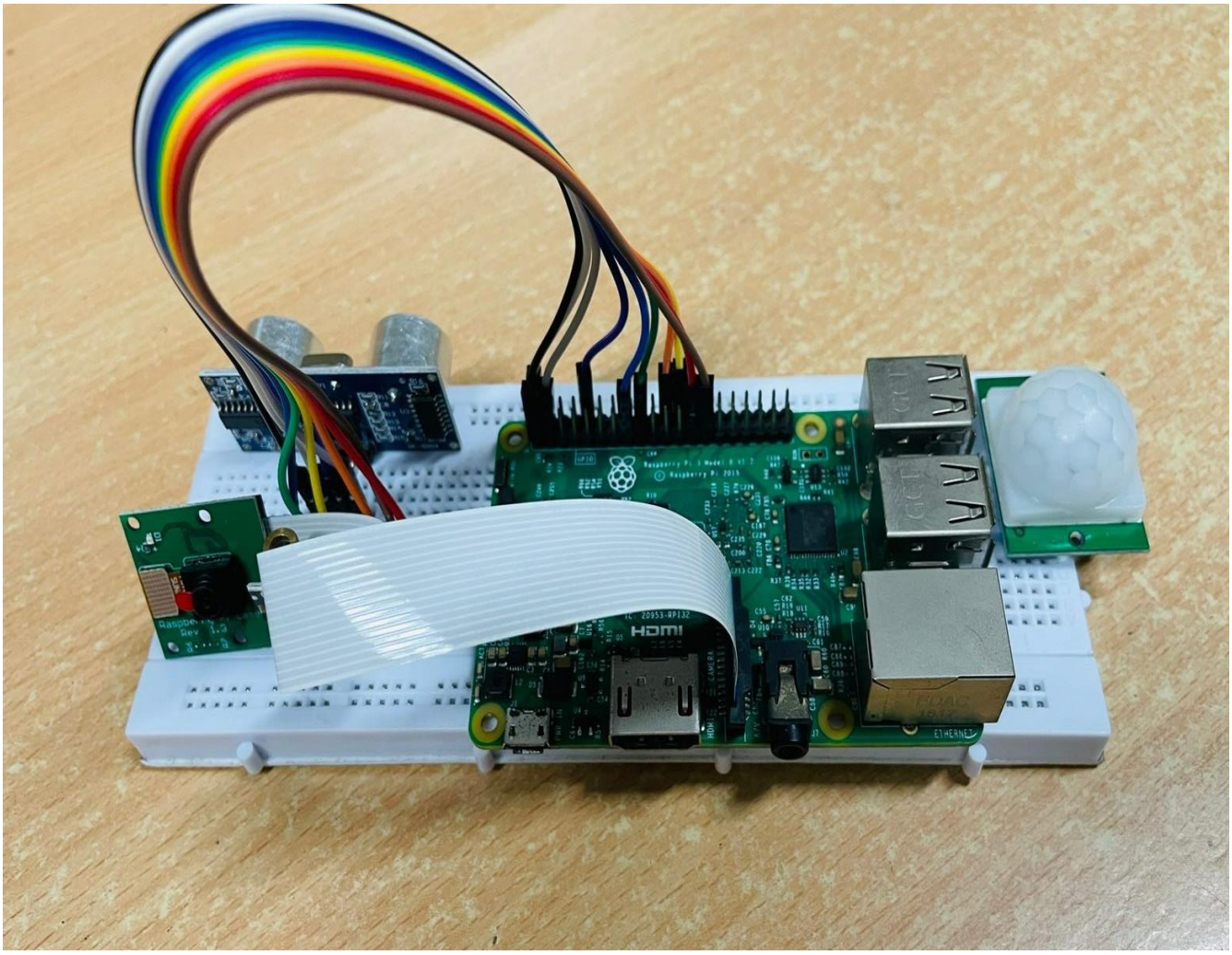
WORKING:

This project's operation is extremely simple. When a person's involvement is detected, a PIR sensor is used to detect it, and a Pi Camera is used to capture images.

When someone or an intruder comes into range of the PIR sensor, the PIR Sensor activates the Pi Camera via the Raspberry Pi. The Raspberry Pi sends commands to the Pi camera to take and save the picture. Following that, Raspberry Pi generates a mail and sends it to the specified email address, containing the most recently clicked images.

The email includes a message and an image of the unauthorized user as an attachment. We've used the message "Please find the attachment" here, but you can change it in the code at the bottom. We do the same thing when using ultrasound and laser sensors to detect.

When we use the laser and ultrasound sensors to detect something, the piezo speaker makes a sound. All of this equipment is linked to the prototype board via connecting wires.



CONCLUSION:

IoT devices and applications are extremely relevant to modern life. IoT enables both humans and machines to stay connected at all times and from any location. A smart security system is critical for safety. If there is any motion by an unauthorised person, the system will collect various events and send a notification; it also detects fire and gas leakage using sensors. The outcome of the testing ensures that the recommended system works properly. This security framework can be used in a variety of settings, including banks, hospitals, and offices.

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