Pi Alert System Using Raspberry Pi

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ABSTRACT

The main objective of this project is to illustrate the technology used for security systems. This work presents the development process in security system that uses CCTV for security purpose. This security system is implemented using Raspberry Pi 3B. In home automation security system, once the person enters the building, the lights will be turned on automatically. We use face recognition systems which detects the liveliness of the person for the authorizations for the restricted section of the building and is secured by motion sensors and sound detection sensors. When any motion or sound is detected there without authorization, then the alarm is triggered, the camera is activated and a message is sent to the security. This system powered is by Raspberry pi it includes, two tiles for demonstration purpose, Infrared motion sensor, Raspberry pi camera.[5]

Keywords

Alarm, Raspberry Pi, Face recognition, Infrared Sensor**,** Security System, Motion Sensing.

1. INTRODUCTION

IoT or the internet of things is the interconnection of devices within the existing internet infrastructure. Generally, the Things in Internet of Things can be of any sort of device with any kind of built in different types of sensors with the ability to collect and also transfer the data at a faster rate over the different types of networks without the human intervention. The latest embedded technology in the different objects helps them to interconnect and have interact with internal state and also with the external environment which in turn helps us in the decision-making process. In the nutshell, Internet of Things is a concept that connects with all the possible devices to the internet. Internet of Things is also trying maximum to expand the interdependence in humans i.e., interact, contribute and also collaborate to all things.

Since Internet of Things allows all types of devices that need to be controlled remotely across the internet, it creates different opportunities to connect the system directly and then integrate with the physical world to computer-based systems using different type of sensors and internet. Some of the common sensors include accelerometer, temperature sensor, magnetometer, proximity sensor, gyroscope, image sensor, acoustic sensor, gas RFID sensor, humidity sensors and micro flow sensors. The interconnection of these multiple embedded devices will result in automation in nearly all fields, also enabling advanced applications. The obtained results indicate the improved accuracy, system efficiency and also socio-economic benefits with the reduction in human intervention. It also encompasses the technologies such as smart systems, smart grid, smart phones, smart technology, smart applications, intelligent transportation and smart cities.

Raspberry Pi is a small credit card sized computer developed in the United Kingdom by the Raspberry Pi Foundation. It is used for multiple purposes. It can be used as a general computer, for browsing the internet, playing HD videos, making spread sheets and word-processing or playing games. It is mostly used for making Internet of Things project like infrared cameras, security systems, music systems, monitoring weather conditions these days. It is also used in the field of robotics due to its portable size and good processing power required for stand-alone system.

In this project we describe about "Anti-theft home automation". The proposed design is a system which provides security to the building and protects the building from thieves. Firstly, the building is automated. Whenever a person enters the building, the lights and fans will be turned on automatically. It will be turned off automatically when there is no one inside.

The restricted section of the building is secured with face recognition and access is granted only if the person is authorized. The security system mainly consists of piezo-electric sensors, sound sensors and a CCTV camera. If any unauthorized person enters inside the restricted area, the piezo-electric sensors detect the vibrations and the alarm will be triggered. This also activates the camera and the camera starts recording. A message will also be sent to the owner of the building.

2. MOTIVATION

Intrusion, the act of someone that you don't know, who enters into your area without your permission, is on the rise. A human intrusion detection system is designed to detect an unauthorized entry into a building or a protected area and deny such unauthorized access to protect personnel and property from damage or harm. Security systems are mainly used in residential, commercial, industrial, and military properties for protection

against burglary (theft) or property damage, as well as personal protection against intruders. The human presence of security guard may not be completely trustworthy. In such cases, this system provides proper detection of intruder and provides security. By using this system, we can reduce robbery by detecting the intruder. So, we can respond quickly such that no harm takes place in our home.

3. PROBLEM STATEMENT

- Monitoring the Home security is important task as everybody working away from home.

- We cannot continually monitor our web cam feed at remote location.

- Recognizing the person entering our home is necessary.

- Everybody ordering many things online now a days so there is need of identifying when parcel is delivered.

4. EXISTING METHOD

The block diagram of the proposed method is shown in Fig, 1.

Hardware Components

The block diagram of the proposed system consists of the following components – Raspberry Pi, camera module, infrared sensor, sound sensor, smoke sensor and so on. This system is also equipped with a sprinkler system in case of fire emergencies.

a) Raspberry Pi

Raspberry Pi 3 Model B was released in February 2016 with a 1.2 GHz 64-bit quad core ARM Cortex-A53 processor, on-board 802.11n Wi-Fi, Bluetooth and USB boot capabilities. On Pi Day 2018, the Raspberry Pi 3 Model B+ was launched with a faster 1.4 GHz processor and a threetimes faster gigabit Ethernet (throughput limited to ca. 300 Mbit/s by the internal USB 2.0 connection) or 2.4 / 5 GHz dual-band 802.11ac Wi-Fi (100 Mbit/s).

The Raspberry Pi is a credit card sized single board computer. In this project we are using a Raspberry Pi Model 3B which comes with 1GB of RAM. Here, the Raspberry Pi is the main controller of the system which takes input from all the sensors and gives appropriate actions as the output.
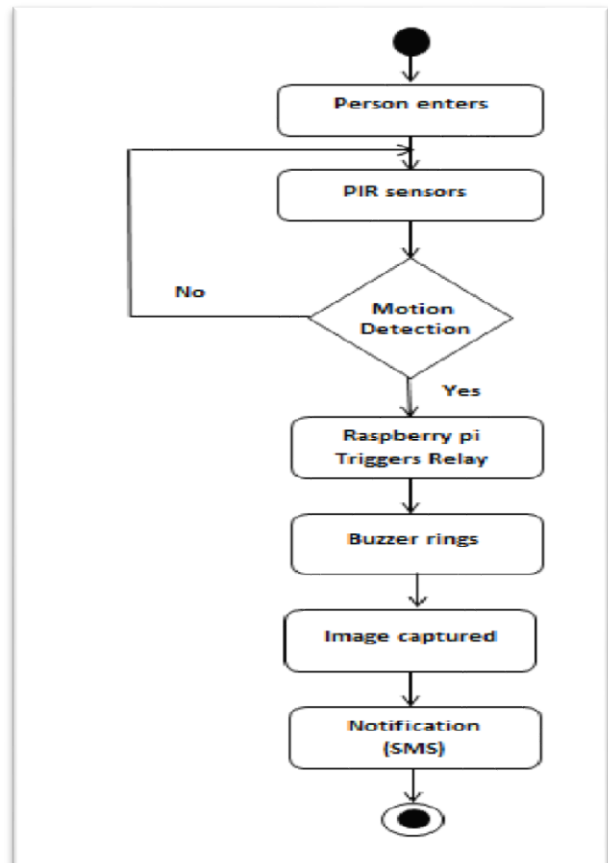

Fig 1. Proposed method for visitor tracking system

Fig 2. Raspberry Pi

b) Camera Module

The Raspberry Pi camera module v2 is a high quality 8MP Sony IMX219 image sensor which is a custom designed add-on board for the Raspberry Pi featured a fixed focal length. In this project we are using a camera sensor to record the entire restricted area as soon as motion is detected.

Fig 3. Raspberry Pi Camera Sensor

c) Infrared Sensor

An infrared sensor is an electronic device that emits infrared waves in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detect the motion. In this project, we are using IR sensors for motion detection in the restricted section of the building.
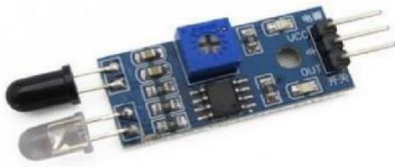

Fig 4. Infrared Sensor

d) Buzzer

A buzzer is an audio signalling device, which may be mechanical, electromechanical or piezoelectric. In this project, the buzzer is used to indicate an alarm. When an unauthorized person tries to access the restricted section of a building, the buzzer gets activated.

e) Power Supply

The component that supplies power to a computer is called power supply. One purpose of power supply is to convert AC to DC so that the computer has proper power to run its components, another is to distribute proper voltage to each component. The Raspberry Pi uses a 5V DC power supply. It can either be a mobile charger, a power bank or batteries connected to a power booster module to supply constant voltage.

5. IMPLEMENTATION

In this IoT based Smart system, the security system with intruder detection with automation Using Raspberry Pi is designed. This system will help user to being confident about security of the area where system is installed. It helps the user for the security of home using Raspberry Pi that works in real time. The system consists of a camera which will be activated either on the motion detection or the request from user for live stream. It used machine learning based face recognition algorithm based on tensor for known person data as the system will be outside of home so for night vision it will automatically activate light for clear detection. The alert can be generated using speaker connected to Raspberry Pi. As the system is connected to the internet it will require either Wi-Fi or internet connection. If the intruder is present, the system differentiates between pets and human beings.

5.1 RESULT

The overall Project of IoT based Smart Home Security System is consist of Raspberry pi 4, webcam, OpenCV. Once the device is ready and by providing required

commands it starts acquiring the video. Now, it compares the person in the video with the database pictures present in it. Then an email is sent along with the picture of the person.

Fig 4. Hardware Setup

The hardware setup looks like in the above image. Consisting raspberry Pi with enclose and the camera module which is integrated.

Fig 6. Screenshot of Email (Output)

5.2 CONCLUSION

There are a lot of devices which are developed to monitor the security based on different technologies. Some of them uses sensor like PIR Sensor for person detection. In PIR, false alarm can occur which provide wrong information about security. Some system uses camera to capture image and send it over email. Some systems are sending SMS as an alert which require external GSM modem for operation. This system is based on Raspberry Pi minicomputer with IOT integration Face recognition using advanced technology like tensor flow deep learning. This system also provides the live stream of video to

user using internet. It also activates lights and alarm in required situation.

7. REFERENCES

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