IOT And GSM Integrated Multipurpose Security System

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Abstract- This paper details the design 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 feasibilies 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 inthe sensor node, thus it makes the node compact, cost effective and easy to use. The biggest advantage of the system is that the user can seek surveillance from anywhere in the world and can respond according to the situations.

Keywords- Internet of Things (IoT), WIFI module, Sensors, Raspberry Pi, Camera

I. INTRODUCTION

While today's burglary statistics show an overall decrease in burglary rates, thousands of homes (roughly 325,000) are still being broken into every year – often in plain view, during the day. In fact, property crimes in 2017 resulted in losses estimated at $14.3 billion. Police solve only 13% of reported burglary cases due to lack of witness or physical evidence. This model eliminates the problem with high security in two ways. First is the breaking of house doors and next is breaking from roof top and underground tunnelling thefts. If any person stands in front of the house for more than a prescribed time it is sensed by a PIR sensor. Also a PIR sensor, a sound sensor, a vibration sensor and a temperature sensor are present insidethe house. If any of the sensors detects uneven activities a SMS is sent to the house owner and also the prescribed numbers and a live streaming is enabled to view the person. A SMS to the police station along with the address and the map of the house is provided by the house owner if the person is found guilty.

Keywords:- Intrusion Detecting System, Data Mining, Clustering, Attacks.

II. EXISTINGSECURITYISSUES

A. Reasons for proposal

1) AUG 10 2016: The RBI was transporting Rs.342 crore worth used currency notes from Salem to Chennai on three special coaches of Salem-Chennai Egmore Express train. Robbers took away Rs.5.75 crore, belonging to the ReserveBank of India (RBI), from the train in Tamil Nadu Monday night. Sources said that the robbers gained entry in the coach of Salem-Chennai Egmore Express by cutting an opening on the roof of one of the coaches where boxes containing the currency were kept. The case is still open and no evidences has been found so far.

2) MAR 24 2017: Chennai- Burglars broke into a jewellery store at Palayamkottai in Tirunelveli district of Tamil Nadu and decamped with 60kg of gold jewellery worth crores of rupees on Thursday night. Preliminary investigations revealed that the burglars gained entry into the three storey building from the terrace. Tirunelveli city police sources have stated that the gang used a gas cutter to open the grille.

B. Existing system and its demerits

Ip camera-based solution is proposed wherein the police trace the records of the theft once it has happened. No proposal has been provided till date to detect on the spot and capture the culprits immediately as the Ip cam only records the video footage and no intimation of the theft is given to the police personnel.

The recent survey states that there is 1 burglary every 13 seconds across the world.

There are roughly 2.5 million burglaries a year and among those nearly 66% are home break-ins.

The proposed system eliminates these risks by providing a higher level of security to the house owners as it deals not only with burglary involving door break but also the entry of robbers from any part of the house.

III. OVERVIEWOFPROPOSEDSYSTEM

A.B lock Diagram

The entry to the house is secured in two ways. First is through the door. The entrance door has a PIR sensor which detects the presence of person at the entrance for more than the prescribed time.
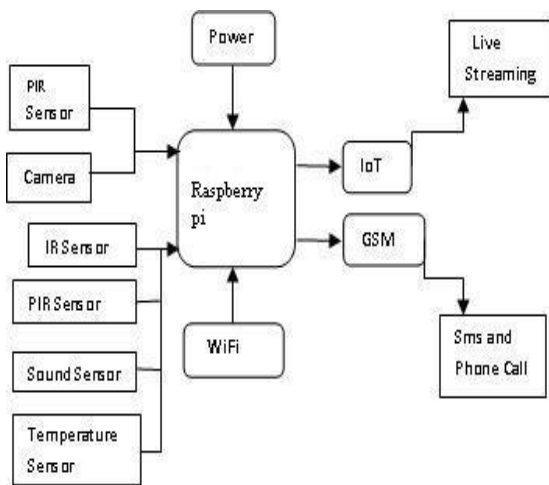

Fig.1. Block Diagram

Second is through roof top and underground tunneling. Four sensors viz. a PIR sensor a sound sensor a vibration sensor and a temperature sensor are present in the house. If any of these sensors detect uneven events in the house the sensor output is fed to the Raspberry Pi and it activates the camera and captures the event. Using the IoT module the captured event is placed on the webpage and using the GSM module an alert SMS and a phone call is sent to the owner.

B. Operating strategy

As explained earlier the security system is operated at two stages.

The first stage is at the entrance door. Here the PIR sensor alert is the primary input of the model. When the PIR sensor detects the uneven event i.e. a person near the door for more than prescribed time interval it immediately activates the camera and places the footage on the webpage and also sends an alert SMS and phone call to the owner.

The second stage is entry of intruder from other parts of the house. This process consists of four sensors viz. a PIR sensor, a vibration sensor, a temperature sensor and a sound sensor.

- The PIR sensor detects the human activity inside the house
- The vibration sensor is used to detect any of the vibrations caused by the intruder
- The temperature sensor detects the change in the room temperature due to the entry of any human being
- The sound sensor to detect the unwanted noise created during the intrusion time.

If any of these sensors detect an unusual event inside the house the information is sent to the Raspberry Pi and the controller section immediately activates the camera and posts the live footage in the webpage. It also alerts the owner and other prescribed numbers regarding the intrusion. Upon viewing the video if the owner finds that the intruder is guilty the event footage can be sent to the police personnel immediately during the time of intrusion along with the map and address of the house so that action is taken at the same time.

C. Work Flow of the Project

The first stage is at the entrance door, where the PIR sensor is present. As shown in Fig.2. When a person stands for more than a particular time interval alert is sent to the controller section and then the camera is activated and the video is posted on the web page and an alert message with a phone call is sent to the owner of the house.
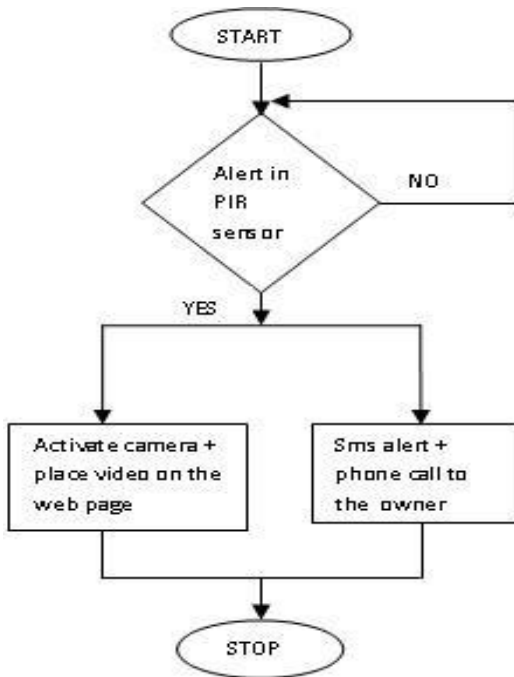
Fig.2. Flowchart at the entrance door

The second stage is the entry from other parts of the house. As shown in Fig.3. four sensors are present inside the house.

When any of these sensors detect any uneven things happening in the house i.e. any sort of intrusion from any part of the house is detected the controller section alerts the user through a phone call and a SMS, simultaneously a video footage of the event is placed on the web page.
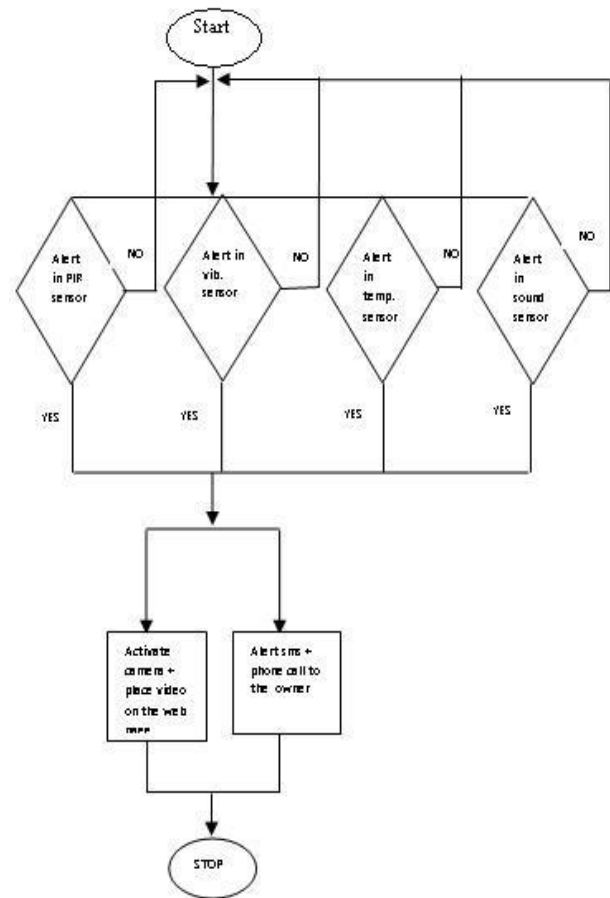

Fig.3. four sensors are present inside the house.

Once the intruder finds that the person is guilty a complaint can be immediately given to the police personnel along with the video footage, address and map of the house during the time of intrusion.

IV. DESIGNANDIMPLEMENTATION

A. Raspberry Pi

The Raspberry Pi Single Board Computer is used to connected model integrate all the sensors and camera with the IoT module.

Fig.4. Raspberry Pi

WIFI, it creates an easy way for worldwide communication and reliable data storage.

B. Keypad

The Hex keypad is used to set a code by the owner before leaving the house so that the house is locked. This password initiates the start of the surveillance system.
The specifications are as follows,

Parameter	Specification
Maximum Rating	24 Volt DC, 30mA
Operating temperature	32 F to 122 °F

C. Web camera

Webcam is used in proposed approach to capture the images of any improper activity happened in home while the owner is not available. It captures the event and instantly sends the captured images to Raspberry Pi.

D. PIR Sensor(Passive Infrared Sensor)

PIR sensor is used in proposed approach that frequently utilized as a part of movement detectors by measuring infrared lights which is transmitting from the object over sensor range. For home security, we have used it for motion detection in home. PIR sensor also work in darkness, so we get more security instead of just using camera for detection.

E. IR Sensor

The IR sensor is used to detect the unwanted motion inside the house. The vibration caused by the intruder is detected and is connected to the control section.

F. Sound Sensor

The sound sensor can detect the sound strength of the environment. Based on the level to be sensed it is activated to detect any noises arising from the intruder.

G. Temperature sensor

The temperature sensor is used to detect the temperature and convert it into electrical signal. This is used to detect any sudden change in the temperature

H. GSM Modem

A GSM SIM900 module has been paired up with Raspberry Pi in the circuit. Any working sim card can be put into the module, making it user friendly. Whenever unusual events are detected by the sensors this module sends out alert messages to the authorities for the required action to be taken.

I. Software

Raspbian Operating system has been loaded on the SD card with NOOBS OS which is necessary to boot the Raspberry Pi. The coding of sensors and modules attached to the Raspberry Pi has been done on the Python platform. Coding on Python can be done either by using the shell or by python software IDLE.

V. CONCLUSION

This model will be greatly helpful in having a secured home as it eliminates the risk of theft by entering from other parts of the house. The expected output would be as shown in the Fig.5.

Fig.5. Expected output of Proposed System

In future the crime rates is expected to reduce as this system provides a high scale of security in the household. In the future aspect of this model, we look forward to provide a real time security system to all kind of commercial buildings where security level is low.

It is seen that the model can be built easily scaled up for real time applications, with regard to the security of the premises.

This model provides monitoring from across any part of the world. The use of 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.
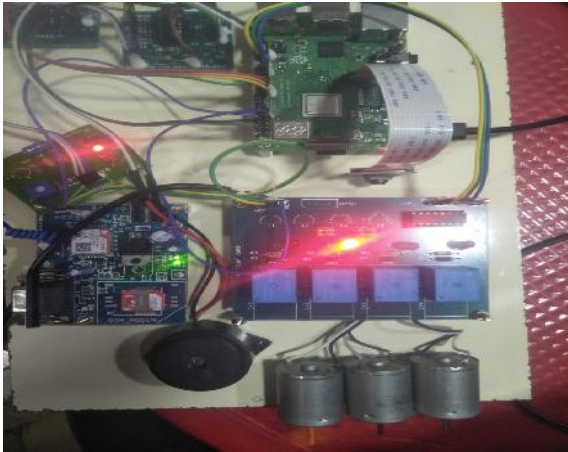
Fig 6.Actual project image

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