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Theft Detection and Prevention Based on Internet of Things

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ABSTRACT: Securing a house is an important task attributable to the felony incidents. The traditional style of home security systems typically monitors solely the property and lacks physical management aspects of the house itself. In today's context, it's common to leave the house with their tight daily schedule. Therefore, the general public has chosen the home security system. All the body generates heat within the type of infrared rays that is invisible to eyes. But it will be detected by electronic device. PIR sensors area unit wide applied in wireless residential security systems, home alarm systems and lots of additional security circuits as motion detection sensors. A typical PIR device detects the Infrared (IR) waves also called 'human sensor'. PIR device used for sensing and so microcontroller is employed for dominant purpose and a GSM module is also embedded. Once anybody comes in vary of PIR device, then sensor sends a logical signal to microcontroller and lead and perform a given task.

KEYWORDS: PIR Sensor, GSM module, Microcontroller, PIR Sensor Alarm, Human detection.

I. INTRODUCTION

PIR device could be a system designed to reduce the high rates of crimes in most personal housing. In present time Home/Office and more of alternative place, security is more important.

This paper shows to design a Remote Security System based on Wireless Sensor Network using GSM Technology and creating an easy microcontroller based home security system employing a GSM module and a PIR device. The controller sends a alert message to the predefined contacts.

II. RELATED WORK

LITERATURE SURVEY

Nico Surantha, Wingky R. Wicaksono [1] designed and implemented a system for home security with PIR sensor and resulted that the system takes an average of 2 seconds to detect the intruder with a accuracy of 89%. Haitham Abbas Khalaf, A.S. Tolba, M.Z. Rashid [2] presented a system for an intelligent system for event-triggered video recording process which is based on an enhanced Multi-Scale Structural Similarity detection technique. Ying-Wen Bai, Zi-Li Xie and Zong-Han Li [3] designed and implement a home embedded surveillance system with ultra-low alert power by using PIR and pressure sensors as the alert group in windows and doors where an intruder must pass through. N.Arun Prasath R.Sathishkumar Mr.N.Kumaresan [4] designed and implemented a system with PIR sensor and pressure sensors by programming the system in a microcontroller unit (MCU). Their experiment showed that the system power consumption is reduced. Padmashree S. Dhake, Sumedha S. Borde [5] designed a home embedded surveillance system which evaluates the development of a Low-cost security system using small PIR (Pyroelectric Infrared) sensor built around a microcontroller with ultra-low alert power and showed that experiment will reduction in use of memory required for saving the previous data as well as the system's power consumption. Rafael Almar , Chris Blenkinsopp,

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Luis Pedro Almeida, Rodrigo Cienfuegos ,Patricio A. Catalan [6] introduced a new method of runup detection from video imagery is introduced and validated at an energetic dissipative beach. Since it is based on motion detection, it is less sensitive to changes in lighting conditions. Mahesh N. Jivani [7] described GSM (Global System Messaging) based secured device control system using App Inventor for Android mobile phones. This also mentioned that no need to write programming codes to develop apps in the App Inventor, instead it provides visual design interface as the way the apps looks and use blocks of interlocking components to control the app's behavior and App Inventor aims to make programming enjoyable and accessible to novices. M. Sathishkumar, S.Rajini [8] implemented a security system based on the embedded system along with GSM and sensor networks which is highly reactive approach and has low computational requirement. M. Kastek, H. Madura, M. Morawski, T. Piatkowski, E. Powiada, H. Polakowski [9] designed a test bed to evaluate angular parameters of detection zones of PIR sensors and resulted about the accuracy and angular parameters of PIR sensors. Junge Zhang , YanhuShan,KaiqiHuang [10] presented a paper on ISH smart video analysis for home security and stated the following results (1) proposed and built a complete smart home system based on the intelligent video analysis for home security. (2) Proposed a novel foreground segmentation method based on the history pattern, which is very suitable for indoor scene analysis. (3) An exact cutting based Region of Interest (ROI) generation and scene structure modeling method is proposed for fast human detection. (4) A concurrence relation graph of visual words is developed for reliable behavior analysis. Jinfeng Suna, Zhiyue Zhang, Xiaoli Sun [11] focused on how to detect and monitor abnormal noise and vibration beforehand or in real time by the Internet of Things (IoT). Firstly stated the diversities of crude oil theft and the difficulties of oil anti-theft are analyzed in China, and the requirement analysis of the IoT application. Secondly, planned and designed the intelligent antitheft system based on the IoT is for crude oil transportation by tank trucks and by oil pipelines. Thirdly, implemented, discussed about the problems in anti-theft. Rolf H. Weber [12] explained the right to information, provisions prohibiting or restricting the use of mechanisms of the Internet of Things, rules on IT-security-legislation, provisions supporting the use of mechanisms of the Internet of Things and the establishment of a task force doing research on the legal challenges of the IoT.

III. METHODOLOGY

EXISTING SYSTEM

Alarm based human motion detection is an embedded system which we are used to provide security. This is our proposed system. Instead of manual security if we use alarm based detection system for detecting human motions to provide security which reduces man power and is very cheap. As we know human body radiates heat in the form of Infrared radiations. When a person moving around this circuit, PIR sensor detects the change in the IR levels of surroundings and sends a signal to the microcontroller.

PROPOSED SYSTEM

The system contains PIR sensors to detect obstacle, GSM Module for communicate with GSM Phone. The whole system is controlled by open-source microcontroller. The system collects all information from PIR sensors, process that information and sends call to corresponding GSM mobile phone number by using a GSM modem. If PIR sensors detect any obstacle in covered area then a signal send to microcontroller, controller activate GSM and make a call and SMS to the home owner mobile phone using the GSM Module.

IV. EXPERIMENTAL SETUP

In this system PIR sensor used for sensing and then microcontroller used for controlling and then a GSM module which is used for calling purpose. When anybody comes in range of PIR sensor, then sensor sends a logic signal to microcontroller, then it will have necessary action to take control and perform a given task. Here a calling and SMS task is given to microcontroller using GSM.

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A. Microcontroller

The image of microcontroller is shown in the fig 1. Open-source physical computing platform based microcontroller board for developing a software environment for writing program for the board.



Fig1: Microcontroller

B. PIR Sensor

The working of PIR sensor is shown in the fig2. PIR is basically pyroelectric infrared sensor. The term passive means this PIR device only accepts incoming infrared radiation, it doesn't emit. "infra" means below our ability to detect it visually, and "red" because this Colour represents the lowest energy level, As human eyes have property to sense before it becomes invisible. Thus infrared means below the energy level of red Colour, which is applied to many sources of invisible energy. Most PIR modules have 3 pin connection at side or bottom. One will be ground, another will be signal and final one will be power. Along with this pyroelectric sensor IC has been used which produces digital output. Fig. 2 shows PIR sensor. When human body or any other animal passes in area of sensor it firstly intercept one half of PIR sensor which makes positive differential changes between two valves. When this passed human leaving to that area the reverse condition happened, where as it generates negative differential change.

This positive and negative differential change that is a pulse which is detected. For covering maximum area, detection lens is split in to number of multiple sections, of which each section is termed as Fresnel lens. This PIR sensor has range of approximately up to 6 meter.

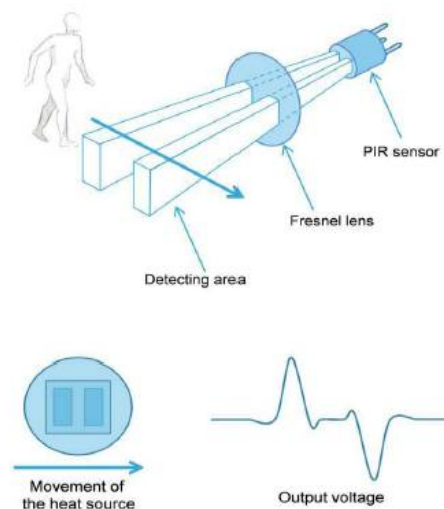


Fig2: PIR Sensor

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C. GSM Module

The image of GSM module is shown in the fig 3. System for Mobile Communication is an open, digital cellular technology used for transmitting mobile voice and data services. A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator. A GSM modem connected to a computer, allows the computer to use the GSM modem to communicate over the mobile network. GSM modems can also be used for sending and receiving SMS and MMS messages. AT commands are used to control GSM module. ATD are commands are used for calling.



Fig 3: GSM Module

V. WORKING PRINCIPLE

The flow chart of security system is shown in the fig4. The project mainly focuses on providing security when the user is away from home's mobile technology that can perform remote technology communication wherever they are. Through this facility messages can send quickly, accurately and at a low cost. Mobile phone integrated security systems, where the information send by a security system to user mobile phone in the form of call. C programming language is used in making this system, the program was applied to create a security system works automatically, which can make a way to communicate with user mobile phone when there is a security breach in the house. Modular in design use to make easy expandable for add more sensors to the core system microcontroller platform. The system contains PIR sensors to detect obstacle, GSM Module for communicate with GSM Phone. The whole system is controlled by microcontroller. The system collects all information from PIR sensors, process that information and sends call to corresponding GSM mobile phone number by using a GSM modem. If PIR sensors detect any obstacle in covered area then a signal send to microcontroller, controller activate GSM and make a call to the home owner mobile phone using the GSM.

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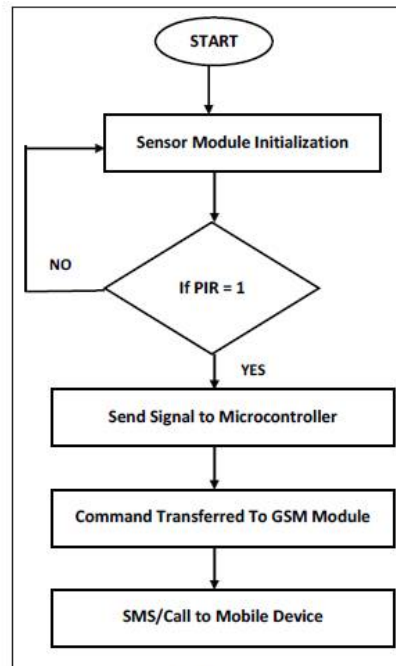


Fig 4: Flow chart of security system

VI. SIMULATION AND RESULT

Once the PIR sensor detects the movement of humans inside the targeted room, it will trigger the microcontroller. The microcontroller circuit detects the PIR sensor's triggered voltage and perform the defined functions. First it trigger's the GSM module with alert message that is already coded in the micro controller with predefined contact numbers to send the alert SMS as shown in the fig 5.

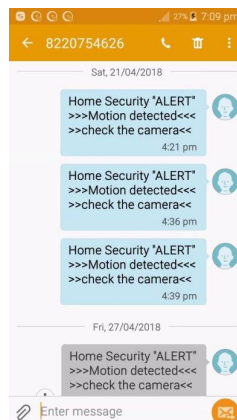


Fig 5: Sample Alert messages

At the time of sending messages the microcontroller also triggers the android application that will stream live video of the targeted place .The live video can be watched using android application or windows application. This is an

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additional feature of our project using an android mobile connected with the microcontroller. By using an application we can even watch videos as shown in fig 6. During low light conditions we can use android mobile's flashlight that can be triggered remotely.



Fig 6: Sample Live video feed

VII.CONCLUSION

This system is very helpful as it protects home from theft, burglaries and murders as become routine in big cities. This embedded Home surveillance system is designed with the help of smart sensors like ultrasonic sensors and pyroelectric infrared sensor (PIR) which detect unauthorized person or intruder. SMS is sent to predefined number through GSM and sending captured image to authorized person.

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