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Home Security System Using PIR Sensor-IoT

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ABSTRACT

This work, "HOME SECURITY SYSTEM USING PIR SENSOR-IOT" includes a PIR module which constantly monitories the Home space and lockers. A camera is placed with the PIR module which captures the people moving in that range. When the PIR module detects an intruder in the home or opening a locker, in the absence of family members, then a notification is sent to the owner through a mobile app. This mobile app can be accessed by the whole family where each member will be given login credentials. In this application there will be a chat box where family members can discuss whom to take action regarding this alert. This chat box application is given security using an encryption algorithm (IDE). This android app has the facility to call police to take action.

Keywords : IOT, Arduino, Android Application, Chat Box

I. INTRODUCTION

Wireless Home security is the aspect of this project. The currently built prototype of the system sends alerts to the owner over through the Android application using the Internet if any sort of human movement is sensed near the entrance of his house and raises an alarm optionally upon the user's discretion. The provision for sending alert messages to concerned security personnel in case of critical situation is also built into the system. The alerts and the status of the IoT system can be accessed by the user from anywhere even where Internet connectivity must be readily available. The existing infra-red (IR) or Wi-Fi remote controls present in the market are in general appliance specific and the same cannot be used interchangeably. Mobile appliances connected through Bluetooth making use of Blue-tooth enabled smart phones cannot be managed from a distant location so using Wi-Fi module we can manage from distinct location [2].

In the presence of intruder alert is been sent to the application in the form of notification where whole family who are logged in can receive it. This application also consists of chat module where family members can talk and take action against intruder. This application also contains call module where family members directly call to the police. This chat module is developed using http client server architecture.

II. ADVANTAGES

- This low cost system with minimum requirements takes care of home security.
- Using android application the main advantage is sending notification to all family members at same time.
- Chat module helps family members to discuss and take action against intruder.
- This system does not require the user to manually trigger an alert but still it provides the user withthe advantage of analysing the situation and

then triggering the security alarm remotely from his phone.This idea overcomes the common fault in many existing home security systems which causes unnecessaryembarrassment by triggering security alarm due to thesystems inability to judge a special situation in whichit should not have triggered the alarm.

- This application also helps to make direct call to nearby police station
- Using android application, the usage of different modules can be reduced

III. IMPLEMENTATION SETUP

A. Components required

1) Arduino Board
2) Accessible Wi-Fi
3) PIR motion detector Sensor
4) Smart Phone
5) Internet
6) Arduino IDE (Software)

B. Arduino

Arduino is an electronics prototyping platform based on a micro controller. Arduino boards are usually made using Atmel's Atmega series micro controllers or ARM micro controllers. Arduino is an open source hardware project which means the designs of board (the hardware architecture, CAD files) are available to public with open source license. Anyone can modify the hardware designs and the associated software.*Arduino is composed of two major parts:*

1. *The Arduino board, which is the piece of hardware you work on when you build your objects;*
2. *The Arduino IDE, the piece of software you run on your computer. You use the IDE to create a sketch (a little computer program) that you upload to the Arduino board. The sketch tells the board what to do.*

C. Arduino IDE

The Arduino integrated development environment is a cross-platform application that is written in the programming language Java. It is used to write and upload programs to Arduino board. The source code for the IDE is released under the GNU General Public License, version 2.

Fig 1. Arduino Board

D. Wi-Fi Module:

The purpose of this module is to send the information gathered from the ultrasonic sensor is sent to the cloud, so that it can be used for further analysis. To send the data continuously, using GSM would incur cost on the user. Instead, with the help of this Wi-Fi module, there can be a connection established between the cloud server and Arduino, by connecting to a Wi-Fi router. The Wi-Fi module that can be used is ESP8266. GSM module consists of a GSM modem assembled together with power

E. Setup

The PIR motion sensor is connected to a digital in-out pin of Arduino board. The board is powered up by external 12V batteryor 12V adapter. The board is programmed to have access to the local WiFi. This board is also connected to Internet module. The mobile phone should have internet connection and should enable permission to android application to make calls

IV. WORKING OF PIR MOTION SENSOR

The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a *positive different* change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected. Human Beings emits thermal energy of wavelength around 10-12 micro-meter every day. Pyroelectric or Passive Infrared Sensor (PIR) [6], [7] is an electronic device which is designed to detect this IR wavelength when a human being is in its proximity. To have a wide range for detection a simple lens issued. Sensors may also be calibrated in such a way so as to ignore domestic pets by setting a higher sensitivity threshold or by ensuring that the floor of the room remains out of focus.

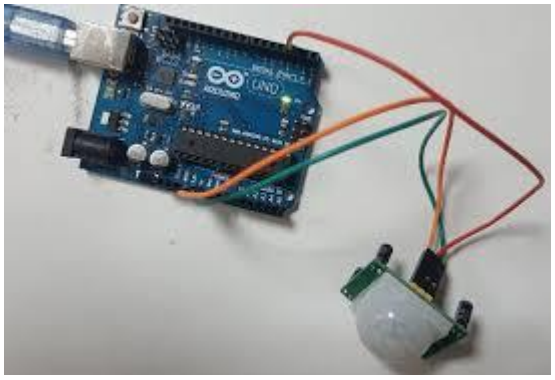

Fig 2: PIR motion sensor connected to Arduino

V. WORKING OF PROTOTYPE

As a smart security system

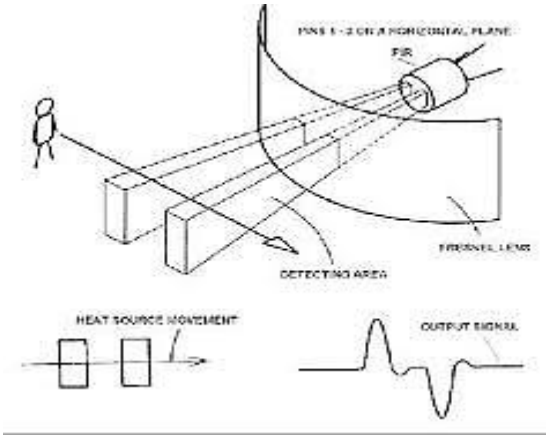

Fig 3: PIR motion sensor working principle

PIR motion sensors are installed at the entrances of a building. These sensors as explained earlier detect the motion of human beings. This signal which detects their presence becomes the input trigger for the micro-controller. The owner, who may or may not be present in that building, will be receiving a notification through android application on his mobile phone stating that 'There is an Intruder in the House. The PIR sensor will be triggered again as soon as the module detects any unexpected motion and the owner will receive the notification and the process continues so on.(To ensure the safety from other entrances too, motion sensor should be installed at those places and will be controlled by a single micro-controller).

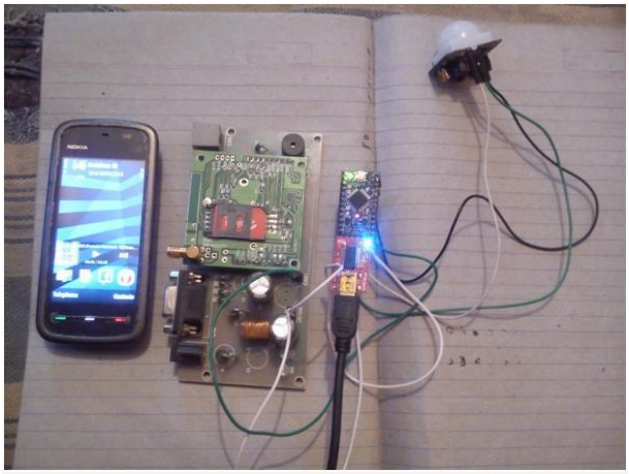

Fig 4: Sending Notification to mobile

VI. FURTHER SCOPE

As the system is dependent on the user's discretion and judge ability of the situation (whether it is a guest or an intruder entering his house). The captured picture of the guest or intruder after face detection, can be mailed to the user. The user can further forward the same photograph to the police station if he wishes, this photograph is taken by PIR camera. Further the system may be made more synchronised by integrating the Notification to the android app feature within the same smart phone application through which the user can even control on/off of the PIR sensors.

VII. CONCLUSION

Security can be provided without the human intervention by automating the device using IOT. Here, any intrusion can be detected and also if the device is working or not can be verified using the information sent to the cloud. This information can be used for maintenance of the devices and also for providing the registered user with any information about the intrusion. Chat box helps in discussion of the family members. Thereby, this system can find its applications in the field of home security system.

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