

Intruder Detection Technique for Smart Home Applications

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Abstract— Lifestyle in the modern society along with human behavior and thinking is changing dramatically with the advancement of technology, and the concept of a simple home is changing into a smart home. Home security has been a major issue where crime is increasing and everybody wants to take proper measure to prevent intrusion, besides homes the system is also implemented in business premises and office. Home security is needed for convenience and safety which take a very less power. This system invented to keep home safe from intruder. In this work, we present the discuss about the GSM based wireless home security system. Any undesirable conditions inside the home we know that from the system. It does not requirement any human interaction to operate. The property inside the house are saved from theft. This system consist of microcontroller, receiver and sensor circuit. This home security system will inform the owner about any intruder detection by sending a SMS to the user.

Keywords— Intrusion, GSM Module, SMS, Home Security, Intruder, PIR sensor

I. INTRODUCTION

In today's age of digital technology and intelligence systems home automation has become one of the fastest developing application based technologies in this world. The home security has changed a lot from the century from the last century and will be changing in the coming years. Security is an important aspect or feature in the smart home application. The idea of comfortable living in home has since changed for the past decade as digital vision and wireless technology are been developed. The new and emerging concept of smart homes offers a comfortable convenient safe environment for occupants. Intelligent homes can be defined is a simple term as that the homes which are all fully automated in terms of carrying out a pre determined task providing feedback to the users and responding according to the situation [1,2]. Automated security systems plays an vital role of providing an extra layer of security through user authentication and also to track illegal unsolicited activities. Security is a prime concern in our day-to-day life. Everyone wants to be as much secure as possible. In recent times the world has experienced an exponential increase in the rate of crime. Criminals break into houses on a daily basis around the world carting with huge amount of money and precious items. Sensitive and confidential documents, materials and equipment by corporation are constantly declared missing from where they are kept [3,4,5]. So there is a need to provide a device that can detect any intrusion in an environment. In a network or a system, any kind of unauthorized or unapproved activities are called intrusion. The important of home security has greatly increased in recent years. The purpose is to keep house safe.

II. LITERATURE REVIEW

The authors Ayush Agarwal and R.C.Joshi in [7] had create a low cost GPRS based wireless home protection system which comprise wireless protection sensor nodes and a GSM/GPRS router. The advantages of the system are low cost, less power consumption, easy installation and speedy response and easy user interface. Normally, GSM modem acts as the interface between the users and the sensors nodes. The system have three types of sensor nodes and placed in the region which consist of the security sensors, infrared sensors, and fire alarm sensors [8]. This system comprise components like amplifiers, filters, converters and wireless interfaces. The transceiver section to communicate data between router and various sensor nodes. All sensor node contains a hardware component like microprocessor and a transceiver module. The working principle of the microprocessor is to get and process the signal from the sensors and the current status of all sensor nodes.

In paper [9] the author has investigate a wireless security system which consists of a programmed alarm system in a Graphical User Interface (GUI) module. The system is used to control monitor the fixed RFID reader, tag and the GSM module. The information scanned by the tag is sent to the main server in a RF linkage that is display in a GUI. For example the laptop is stolen from the enclosed region, the alarm s will begin to represent awareness. For the meantime, the laptop owner will be know by an alert message. In addition, the alarm system will not be stopped until the laptop is put back in the covered region, or the program is stopped/terminated. RFID have been available for many years for reading bar codes RFID tag located several meters away. It is increasingly being used in other applications ranging from inventory management to anti-counterfeiting protection. In a wireless security system [10], a RFID tag is attached to the laptop and RFID reader is connected to server. If the laptop is stolen from the reader, the alarm system will be triggered to draw attention with loud noise. The laptop owner will be notified with short messaging service from the server via GSM module system in a few seconds. Alternatively, it can be improved with Bluetooth technology which is embedded in most of mobile laptop today. The GSM terminal is used as the SMS interface to send messages. Generally the notebook acts as the base station to run the program. Usually GSM terminal comes with a RS232 connector to external terminal equipment, and the Subscriber Identity Module cardholder and the external connector.

Z Bing et al in [11,12] has create a security system against asset theft by using radio frequency identification technology. The system consists of five main parts: RFID reader and tag, GUI, database system, CCTV and wireless transmitter and receiver. The RFID reader is installed at the entrance of the campus and the tags are attached on/in student ID cards and their properties.

III. SYSTEM ARCHITECTURE

Conventional security system keep house owners, and their property, safe from intruders by giving the indication in terms of alarm. However, a smart home security system offers many more benefits. There has been much research done in the design of various types of automatic security systems. Many security systems are based on single systems. This system mainly focuses on the security of a home when the user is far away from the place. The security system is SMS based and uses GSM technology to sends the SMS to the owner. The proposed system is aimed at the security of Home against Intruders.

A. PIR Sensor

PIR sensor are used to detect living beings movement. PIR is a Passive Infrared Sensor, which detect infrared rays. All living beings with a temperature above absolute zero emits heat energy in the form of radiation. These radiation are infrared rays. When any living being comes in range of PIR sensor, it detects heat of that living being and generate an output. PIR sensor module does not send any rays for detection, it only detects heat (Infrared). You can know more about PIR sensor in PIR sensor circuit

B. GSM Module

The SIM900 is a complete Quad-band GSM/GPRS Module which delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS and Data with low power consumption.

C. AT Command

AT commands are used to control GSM module. There are commands for calling and messaging that we have used in this project for sending message. After receiving AT command GSM module respond with OK which means GSM module is working fine. Here are some useful commands ATEO-For echo off .

D. Working Principle

We have used 8051 microcontroller for controlling the whole process. A PIR sensor is used for sensing human presence. And when PIR sensor sense any movement in targeted area of room then it gives a HIGH

logic to microcontroller and then Microcontroller take place and make a call via GSM module using AT command. Controller calls to a predefined mobile number and at the same time it also sends a message to the same number via GSM module .

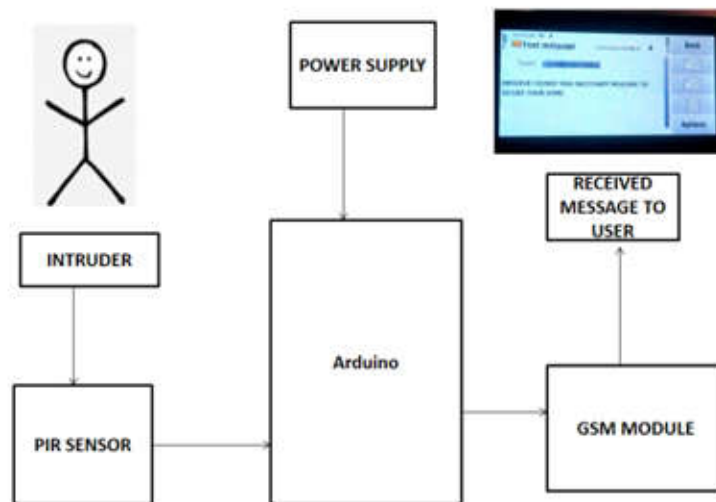


Fig. 1 Proposed System Architecture

E. Circuit Diagram

Circuit connections are shown in the above circuit diagram. GSM module's receiver and transmitter pins are directly connected to transmitter and receiver pin of microcontroller And supply by using a 12 Volt adaptor. A PIR sensor module's D_{out} pin is directly connected at pins 21 ($P2^0$) of Microcontroller with a 10K pull up resistor. A 11.0592 MHz Crystal oscillator is used in this circuit for generation clock signal for microcontroller. And a 5 volt voltage regulator is used for provide 5 volt for the whole circuit.

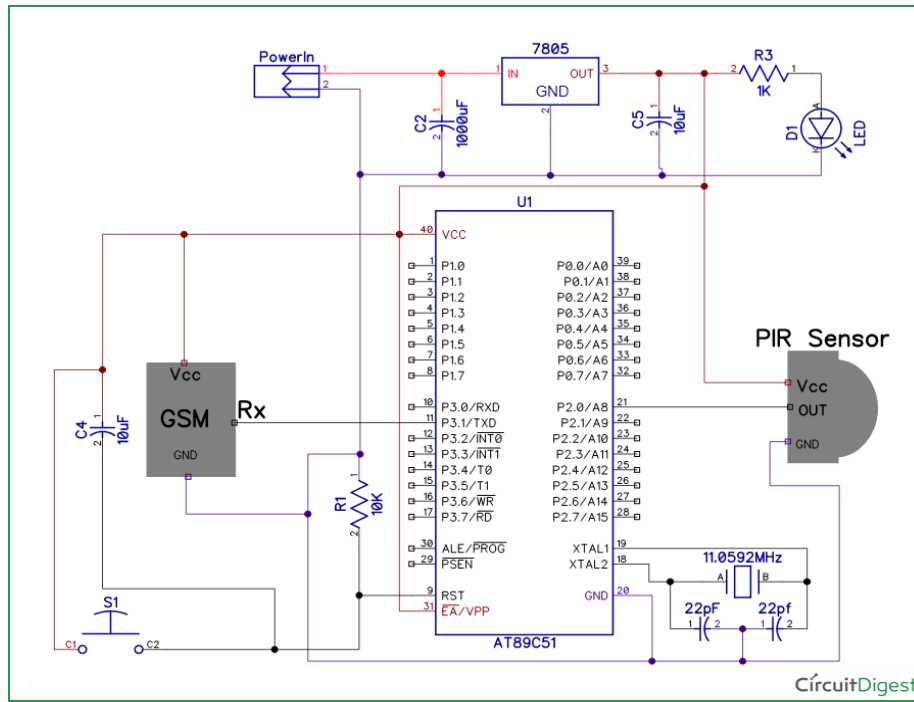


Fig. 2 Proposed System Circuit Diagram

RESULT

Controller calls to a predefined mobile number and at the same time it also sends a message to the same number via GSM module. The security system is capable of detecting intruders as shown in figure.3. This home security system uses PIR sensor and microcontroller 8051. PIR sensor detects the intruder with the help of microcontroller and hence, from the system the owner receive a message through GSM module to the phone no matter where the person is, except if the person is in the region where there is no network coverage at the time of intrusion.

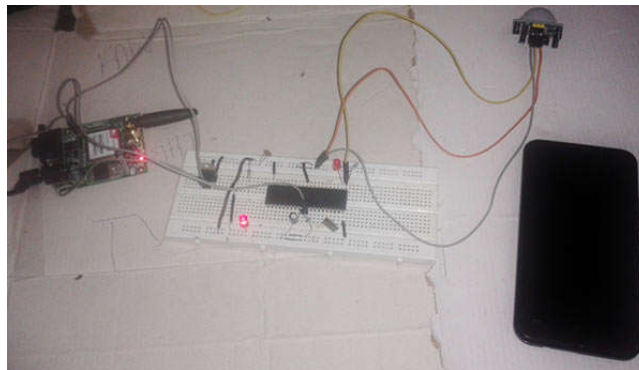


Fig. 2 Proposed System output

IV. CONCLUSIONS

Thus the proposed system provides a very good security for real time applications. The device can be used at homes, schools, churches, etc. The aim is to develop a system that can be able to detect when an intruder enters an area, the system should alert the public by sounding an alarm, illuminating the area, as well as sending SMS to three different numbers. Hence the system is an innovative device that is active in detecting an intruder.

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