
Home Security and Safety System Using Arduino Mega 2560 Controller

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Abstract -Home security has been a major issue where crime is expanding and everyone needs to take legitimate measures to forestall interruption. What's more, there was a need to mechanize home with the goal that user can exploit the innovative headway such that a person going out does not get worried with the either Gas leakage or Taps leakage. The present work shows an attempt made by considering the different types of products existing and merging them to develop a new system . This system consumes comparably less power and focuses on the different security features of house .In this system various sensors have been used, Magnetic switches to check the doors and windows, The PIR sensor is used for detection of the change in the status or surroundings, IR proximity sensor mainly to Guard the chest in the Almera (Locker) where valuables are kept and also a temperature

sensor to detect any changes due to use of any gas cutters by intruders. The most important sensors, Gas sensor which detects the gas leakage due to unforeseen condition, water level sensor which measures water flooded due to some faulty system or rain. The system is completely controlled by the Arduino mega controller. This responds rapidly when an intruder is detected and GSM(Global System for Mobile) module alerts the concerned authorities with the predefined message which should be embedded in microcontroller and horns the buzzer and sprays the pepper salt based on severity conditions .

Keywords: GSM (Global System for Mobile), Arduino Mega Controller

I. INTRODUCTION

In the present day to day life home security is a very important factor. It has been evolving a lot

with many great changes since the last century and also going to be more in the future .

Security is an important aspect or feature in the smart home applications. The Conventional security systems help the owners to keep the home and their property safe from the cat burglars and intruders by indicating them in terms of alarm[1]

This paper mainly focuses on the security of a house when the owner is away from the home. While developing the system it is prime to concentrate on entry point of the home i.e. the entry gate which acts as major way to pass in out of the home .So, here we give an entry only to those who know the default password which is set by the owner .The default password will already be known to the concerned users which should be maintained confidential .

This system of security is based on the short Message Service and uses the GSM technology to send a message to the concerned authority. The propounded system is aimed at the security of home against intruders and fire ,gas and water leakage. If any of the above mentioned cases is triggered while the owners are out of the home, then the system sends SMS to the emergency number which is provided default to the system.

The system is made up of sensors ,GSM module (sim900a), Atmega2560 microcontroller, buzzers to give security alert signal by means in of sound and pepper spray by which intruder may get caught by himself .

II. LITRETURE REVIEW

As per our survey, the common parameters or characteristics of home security system are 24 hours monitoring of the intruder, ease of use, reliability, efficiency, fastness and precision of the notification system. Today numerous security systems of different models and working methods are available in the markets for residential buildings as well as commercial.

Yanbo Zhao and ZhaohuiYe [2], presented a home network design that can be implemented in low cost based on the GPRS and GSM gateway using three kinds of wireless security sensor nodes. These are the nodes installed for door security, infrared security and fire alarm and can be installed easily .This system has a user interface made up of LCD screen and also a capacitive sensor keyboard and can respond quickly when the alarm incidents.

M.Meyer ,M.Hotter and T.Ohmacht[3] has presented a new system that can detect the moving objects in natural scenes based on the video recorded and further it transmits the images from this video through some digital networks. These images are detected based on

an object-oriented and multi-feature examination in video sequences.

SudipanSaha and SutasomBhaumik [4] has developed a system to monitor a home security to safeguard from intruders. This is a system based on short message service technology with the help of any GSM mobile or modem. They also developed a scheme of electrical home appliances and computer controlled remotely and thus establishing complete home automation. This remote control system can be operated from anywhere in the world where the mobile service is available.

Sheik IzzalAzid and Sushil Kumar [5] has presented a paper on the performance studies over a SMS based home security system. The security system is developed by providing the features like light sensor ,temperature sensor ,motion sensor ,humidity sensor and smoke detector which are controlled by a PIC 18F4520 microprocessor with the help of a SMS protected by password .The study was conducted taking responses for about 25 samples and observed that it takes 8 to 10 seconds to intimate the occupant or concerned authorities regarding any unusual incident happened and takes 18 to 22 seconds to act any command given by the occupant by remote control.

III. PROPOSED WORK

Motion sensors are included in the security system proposed which can detect any sort of unauthorized movement and immediately sends a notice to alert the concerned user/authorities .Thesystem acts very flexible in supporting various varieties of technology such as Bluetooth , GSM module ,wireless network and World Wide Web.

IV. METHODOLOGY

The system is basically deals with the security related mechanism for the system. In security all the efforts are made for which the system can be secured. The security system made is generally mounted at the entry point of the system. The home or the user/owner have default password. The Mobile is connecting to the microcontroller through a GSM Shield. The GSM-Shield is an equipment that is used to transfer the messages and communicate with the microcontroller and it works in such a way that the User/owner sends a message to the system with the help of SIMCARD that has been placed in this GSM shield. The system then performs the corresponding operation which is assigned to it when it receives the message sent by the user.

a. Hardware Requirements:-

The sensors used this project are PIR sensor ,IR sensor ,Gas sensor ,Water level sensor ,Temperature sensor and Arduino mega 2560

controller, GSM module , keypad , lcd ,aerosols ,buzzer ,emergency switch are used .

b. Software Requirements:-

The programs developed for Arduino are generally written in C, a high level programming language .An open source software called IDE (Integrated Development Environment) helps us in writing the code and uploading it on micro controller board. This can be run on different platforms viz, Linux, Windows and Mac OS .

Arduino Mega Controller:

Arduino Mega 2560 is a microcontroller which consists of 54 digital input/output pins out of which 14pins can be utilized as PWM outputs, 16pins can be used for analog input, 4 UARTs acts as hardware serial ports.Also it consists of a 16 MHz crystal oscillator, an ICSP header, a power jack, a USB association, and a reset catch. It contains everything that is expected to help the microcontroller. This is associated it to a PC with a USB link or powered with an AC to-DC connector or a battery to begin. The Mega is compatible with most shields designed for the ArduinoDuemilanove or Diecimila .

1. GSM module:

GSM is an international standard for mobile telephones. it is an acronym that stands for Global System for Mobile Communications. It is Sometimes referred to as 2G, as it is second

generation cellular network. This is a very low cost and simple Arduino GSM-Shield. We use the module SIM Com SIM900a. It is the cheaper module now available in the market.

Block Diagram :

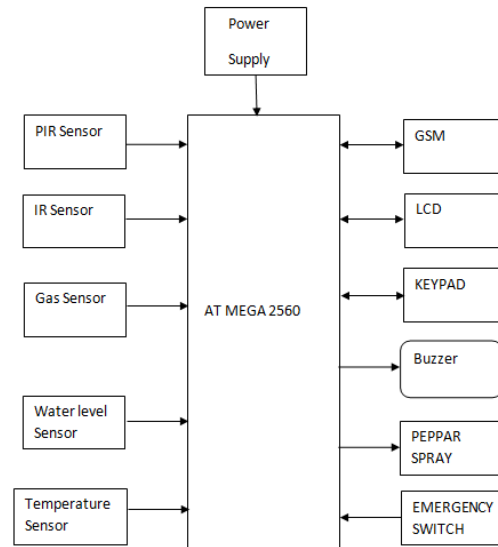


Figure 1: Block Diagram of prototype

The block diagram of the system is shown in figure 1 . The microcontroller unit consists of five sensors. The microcontroller reads the data continuously from all the sensors and an alert is send to the owner via GSM if something is sensed (Emergency Switch) or something reaches beyond the limit in case of sensors and issues the commands to activate buzzer and peppar spray

Data Flow Diagram :

The Data flow diagram of the system is shown in figure2. It consists of five sensors. PIR Sensor ,IR Sensor comes under emergency

category and Gas sensor ,Temperature sensor ,Water level sensor comes under non-emergency.All the sensors are controlled by Arduino mega 2560 controller .At first , the user can lock the system using a password .Then the micro controller will monitor the sensors and issue the commands to display the status of sensors on LCD .If something is sensed (Emergency Switch) or something reaches beyond the limit in case of sensors ,controller will send message to pre defined mobile number and issue commands to activate buzzer and peppar so that an intruder might caught easily .

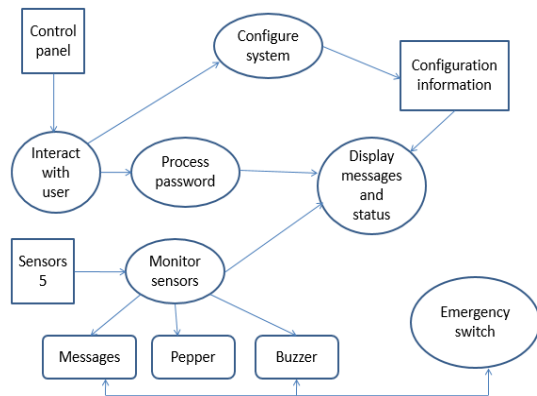
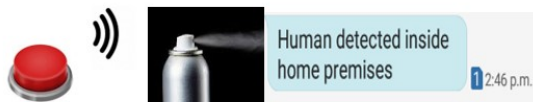


Figure 2: Data Flow diagram

V. RESULTS

PIR SENSOR



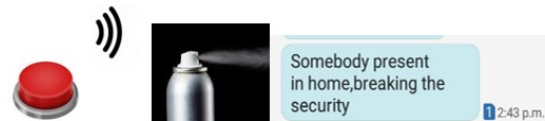
GAS SENSOR



TEMPERATURE SENSOR



IR SENSOR



EMERGENCY SWITCH



WATER LEVEL SENSOR



VI. FUTURE SCOPE

An Android application can also be developed to enhance the ease in the usage of the system, where the GUI should be simple that the user should be provided direct buttons for switching the system On or Off.

In order to enhance the security a camera module can also be installed in the system and kept be operated in such a way that it gets activated when a person get denied with the password for three or more consecutive attempts to enter the home. With the help of this feature , the images of that person who is trying to attack on the system can also be captured .

a. PROBLEM FACED

In the whole system, GSM shield is a prime part of the equipment which is serves as the media in communicating the mobile phone and corresponding microcontroller. And this GSM shield works with the help of a SIM card where the actual problem lies in. Due to the range / signal fluctuations or the network being busy, sometimes GSM shield could not work properly.

VII. CONCLUSION

There are Different types of Individual products available for home security and Home safety and the Product cost are also high. In this paper, a novel architecture for a low cost and flexible home security and monitoring system using Arduino micro controller has been proposed and implemented. The result of our outline has met our desire, in which each sensor is working and will sound particular caution when the system goes into ready status. The keypad and LCD moreover offer marvelous interface and users

can be familiar with our system in under couple of minutes.

General Arduino is basic and its coding is basic. By implementing this type of system we can secure Entry point of our Home as well as for more security we can use various sensors.

VIII. REFERENCES

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