Microcontroller's Based Home Security System

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Abstract **- Security is the major concern in our day-to-day life for our convenience and safety purpose. Everyone wants to be much as secure as possible because of the drastic increase crime rate due to increasing unemployment or starvation in corona epidemic. In this review paper, we had tried to increase the standards by combining new design techniques and developed low-cost home and industrial automated security systems. Lot of research been carried out deploying sensors like PIR, sensor, camera, GSM modules towards detecting the intruder at home. But the major drawback in all these systems is that they are all too much costly to be deployed integrated with LCD panel or camera. As a part of our review paper, we have developed an integrated 3 level HSS. The first level being authentication access for the residents, where in we have used a fingerprint scanner. The next level in our HSS is to detect any unwanted intruder entering the house. The 3rd level is to detect fire in the house.**

Index Terms **- PIR, Sensors, GSM, Fingerprint Scanner.**

I.INTRODUCTION

The most important things for a person are property and life, and he aims to secure these. Home Security System fulfils this need. In olden days people used to secure the homes when they leave by using locks and key. But now such kind of systems can be easily broken, and owners are not aware of it. Today, the home security system has moved to a next level where the control lies completely in the hands of the house owner. Research has been conducted in regard to automated home monitoring using Web Camera and accordingly information delivered to user's phone via GSM. We perceived the drawbacks of these systems, and aimed to overcome them through our project.

II. LITERATURE SURVEY

Research has been conducted in regard to automated home monitoring. One of the researches done was on an Advanced Internet of Thing based Security Alert System for Smart Home in order to detect an intruder or any unusual event at home, when nobody is available there.[1] At a point when the thief movement is beginning at your home then the PIR sensor is connected with the framework and sensed the action happened at home. After that, it offers flag to the raspberry pi. Raspberry is computational circuit which processes the information inside it. Therefore, with help of raspberry pi it can offer flag to another segment. Here, we take advantage of the camera for catching the present action of your home. Camera is catching the picture and offer back to the raspberry pi with the goal that it sends the email to the owner whose mail id was already put away inside it. The email is sent through IMAP (Internet message get to convention). For that the raspberry pi is associated with the Internet through either RJ45 or the WIFI module. This Home security provision using raspberry pi and Web Camera is in economical and not feasible, also requires high maintenance. Also, there is a need of internet connectivity for this system. [2]

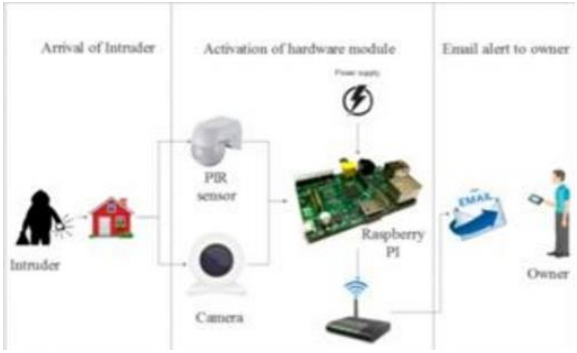

Figure1. Block Diagram of Internet of Things Based Home Security System.

Other research done was on Machine-to-machine Communication Based Smart Home Security System

by NFC, Fingerprint, and with Mobile Android Application. Machine -to-machine (M2M) communication takes place between embedded devices at one end and a network server at the other end via an internet network using either wired, wireless or a combination of both, the first security level uses Near Field Communication (NFC) tag, the second level uses a secured password system, and the third level uses fingerprint authentication. After that, a GSM module embedded with the proposed HSS delivers the logged password to a remote server through M2M communication. The server encrypts the password and notifies the homeowner via an android based mobile application whether the person is an authenticated person or not. This system with a smart android mobile application (i.e. apps) lead to battery drainage and requires a sufficient amount of precious storage in the user's mobile phone.[3]

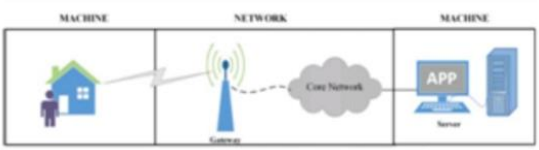

Figure.2. Block Diagram of the M2M communication

III. SYSTEM COMPONENTS

PIR sensors: PIR sensors allow us to detect motion if a human has passes in or out of the sensing range. They are small and compact, cheaper, low-power consumption, easy to use and install. For these advantages we have used this in our home security system.

GSM Module: GSM stands for Global System for Mobile Communication. A GSM module is a specialized type of compact modem which accepts a SIM card, and operates over the subscribed mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. We chose using GSM module as it has the most widespread network and is the most stable cellular technology. This increases the probability of reception of messages to the owner at the right time, even at remote locations.

Advantages of GSM:

- Improved spectrum efficiency.
- High-quality speech.
- Lower the cost of mobile sets and base stations (BSs).
- Compatible and support for new services.[4]

Features of GSM:

- Short message service which allows you to send and receive 126-character text messages.
- Ability to use same phone in a no. of network-related countries.
- Allows data transmission and reception across GSM networks at speeds up to 9,600 bps currently.
- Forwarding of calls to another no. More capacity, ensuring rapid call set-up.
- Small Handsets and more robust.
- Places call on Hold while you access another call.
- Encrypted conversations that cannot be trapped.
- Emergency calls- in most of countries, emergency no. can be dialed free.
- No-static connections. [5]

Smoke Detector and Fire Sensor: A smoke detector is a device that detects smoke, typically as an indicator of fire. A fire sensor basically detects a change in the intensity of light near it and indicates when it encounters a fire. We propose on using the smoke detector in awareness with the fire sensor so that none of the two sensors initiate a false alarm and thus increasing the precision of the security system.

Fingerprint scanner: The fingerprint scanner uses a biometric sensor to authenticate the users into the home. It uses a flash memory to store predefined number of fingerprints and then compares it whenever someone tries to access the home.

IV. SYSTEM DESIGN AND ARCHITECTURE

In this review paper we presented the Home Security system which is an integrated three level security system. The 3 levels have been explained in detail below:

Authentication Access: This part of the security system is constricted by using a fingerprint scanner module (Sunroom 1125). It will be installed at the entrance of the home. This module executes three basic functions: ADD, SEARCH and EMPTY. The ADD switch, when pressed allows the user to add the desired number of authentic fingerprints and hence stores this biometric data in the module's flash memory. The SEARCH button needs to be pressed when someone scans his/her fingerprint and is willing

to enter the house. The EMPTY button clears the flash memory and resets the module with no fingerprints in its memory. When someone continuously enters a wrong fingerprint for 3 consecutive times, the controller informs the owner via sending a text message and switches the alert buzzer on.

Figure.3. Screenshot of the messages from the HSS to the GSM module

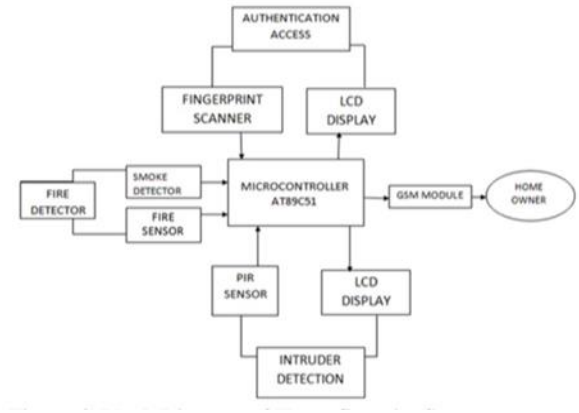

Figure.4. Block Diagram of Home Security System

Intruder detection:

The intruder detection block of the security system is completed using a PIR sensor. A PIR sensor detects Infrared energy emitted by a human in its field. The Passive Infrared Sensors will be installed at all the windowpanes of the house and all other possible places from where an invasion can take place. When the house is empty or the PIR circuit is active, any human movement in the path of the PIR sensor is sensed.[6] On reception of signal from the PIR sensors the controller will activate the buzzer circuit and also warn the owner by sending a text alert.

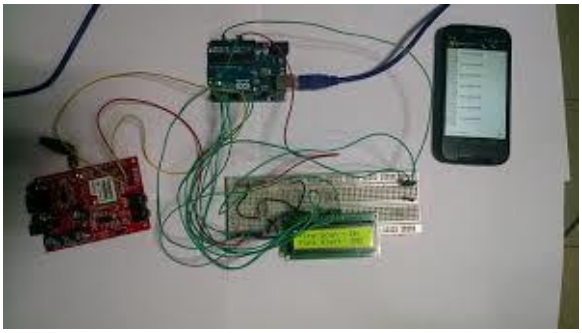

Figure.5. Hardware Unit of Home Security System

Fire Detection:

Fire is the most hazardous threat to a home and hence becomes the most significant part of the home security system. This action of fire detection is completed by using two sensors simultaneously, smoke detector and fire sensor. When both of these sensors are active, only then the controller confirms a fire in the house. A smoke detector detects the presence of smoke in the home, but there could be other reasons for presence of smoke, such as essence sticks, or a person smoking cigar, or any other human activity. Hence, to eliminate these faults, a fire sensor is used which detect a change in the intensity of light in the home. When both of these parameters are excessive, only then the fire is verified. On detection of fire, the controller starts the alarm, and the owner receives an alert.[7] To protect the house from any further damage and the controller trips the main electric supply using a relay which saves the appliances and fire due to the electric line.[8]

V. DISCUSSION OF PROBLEMS IN PREVIOUS PAPERS

After studying all the papers, we have come to know that lots of work have already been done in the field. of Home automation and Home security but the real problem is each system have different area of work and perform different task that means, there are systems which is used to measure the temperature or fire in the building and systems which used Cameras and GPRS System. But there is no such system available, yet which have all the features and could perform every task, in short one for all system. There is one more problem in all these systems and that is every decision is to be taken by the system itself and there is no intervention of the owner of the system that means the system will behave same even in the

situation of false alarm. These are some of the area where a little bit of work is required.

VI. RESULTS AND DISCUSSION

As results available in smartphone which gives a proper result. This system is easy to use and very simple. The model can be installed with a economical cost. The GSM technology gives a good response after received a message of This system tested on the latest technology particular action from microcontroller. SMS received time to house owner is basically depend on the signal strength range that you have got through mobile tower. We have developed and tested the model using C language further the same model can be enhanced with the help of some high-end language and which would be more portable.

VII. CONCLUSION

Home security has been a major issue of concern because of the major increase in crime rate due increasing unemployment and starvation in many places in this corona epidemic. For increasing the security homes and belonging, we introduce the basic level of home appliance control and remote monitoring has been implemented by employing Web camera, Raspberry-Pi, Ultrasonic Sensors with LCD display for alerting the person towards security threat. But none of these systems are economical and feasible for every common man. So, in this paper we introduce Home Security system for owner authentication, intruder detection and fire detection, by employing Fingerprint Scanner, PIR sensor and Smoke Detector interfaced with Microcontroller towards alerting the homeowner via GSM for action and alert. These are shown as screenshots. By using this system, the security services like police and fire brigade of a nearby region are also informed about the intrusion instantly and they can take steps immediately. So, this system is safe and cost effective.

VIII. FUTURE SCOPE:

The research is still not complete as there is more room for improvement towards future work. Home Security System can be extended by allowing the system to alert the owners and nearby police station with the help of a call which will help to take preventive measures and protect the house from theft. Also, a provision could be made to start water sprinkling at the particular point, in case of fire detection. For the authentication access of the owner, additional biometric verification such as iris, face detection can also be provided. In future the system will be small box containing the PC and GSM modem the hardware will be self-contained and cannot be prone to electric failure. This appliance will have its own encapsulated UPS and charging system.

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