IoT based Home Alert System using Wi-Fi and Cloud Technologies

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Abstract—We are living in an hi-tech era where crime is increasing day by day. Due to increase in numbers of threats and intrusions in society, everyone needs a Hi-Tech security system which can keep their belongings secure and at the same time we also want to protect our home assets from any kind of hazard. Knowing our home is protected provides peace of mind when we are away. The customers require simple, reliable and high performance core system that can be easily implemented. The major concern of the paper is to design a budget home security system based on wireless sensor network using Wi-Fi and Cloud technologies. It can detect the theft, fire, leakage of gas or smoke and sends an auto-generated email remotely to intimate the owner. In this review paper; we survey the current work on security system and applications. We examine the existing work, which is held by using different sensors and contributes to better understanding of the challenges in existing work on security systems and further research direction. In this paper we take an overview on how to protect our home from fire, theft and safety issues.

Key words: Home Security, Microcontroller Intel Edison, Wi-Fi, cloud, motion sensor, Smoke sensor, temperature sensor.

I. INTRODUCTION

The concept of smart home has been so popular now-a-days. A Smart home can be viewed as an intelligent or automated home where the home appliances can be automated and monitored remotely. Security system is an essential part for any organization, Banks and homes. The goal is basically to protect individuals and property from various hazards such as fire, crime and loss.

This paper is based on review of available security systems assembled with microcontrollers. We are considering microcontroller because it is affordable to the general public. It is also reliable in order to operate without any failure. A majority of homeowners simply do not have sufficient funds to pay for a professionally installed security system. The use of this Home Alert System in this paper is affordable and easy to install.

II. LITERATURE SURVEY

According to the literature research, the common parameters or characteristics of home security system are 24 hours monitoring the intruders, ease of use, reliability, efficient, fast and precise notification system. Today numbers of home security systems are available in market, which guarantee to keep homes safe and secure. [1] Design and Development of a House-Mobile Security System, The system is designed to avoid the entry of possible intruders into the house and to alert the owner via a mobile phone text message. If the house has been opened or an attempt has been made to open it illegally. It has the ability to activate/deactivate and will automatically open or close the door for the user. Microcontroller ATMEL 168, PIR sensor is used to detect the motion of doors or windows. The magnetic sensor type DS10A, Vibration sensor is used when movement or vibration occurs, the unstable portion of the circuit moves and breaks the current flow, which produces an alarm. A Numeric keypad is used for authorization and the failed authorization results in an alarm. [2] A Multilevel Home Security System (MHSS) The sensor nodes consist of a thief alarm, presence detecting circuit and the break-in camera. The captured images are delivered to the house owners and the police forces via email. The system is used to monitor the RFID reader, RFID tag and the GSM terminal and send information to server. The laptop and vehicles security is controlled by RFID and GUI respectively. Microcontroller PIC184520, infrared sensor nodes, and fire alarm, Gate sensor node, Presence Detecting Node, Break-in Sensing Node, thief alarm are used. [3] GSM Based Home Automation, Safety and Security System Using Android Mobile Phone, This system detects the occurrence of fire, leakage of gas, and theft using an antitheft reporting system which will report the owner by ringing an alarm and by sending an SMS. This system allows the owner to control the appliances and to receive a feedback status of the home appliances by sending instructions in form of SMS as well as through an android application. microcontroller ATMega2560, GSM modem SIM900,
ultrasonic sensors, Relay Module, MQ7 detects carbon monoxide gas, MQ2 detects smoke, LPG, butane, propane, methane, alcohol, Hydrogen, smoke, and alarm are used in this system. [4] Advanced low-cost security system using sensors, Arduino and GSM communication module, This system focuses on the controlling of home appliances remotely and providing security from fire and thefts, when user is away from the place. The system is SMS based and in case of intrusion an SMS is sent to the home’s owner and another SMS to the Police Station, in case of fire an SMS is sent to fire brigade too. [5] Design and Implementation of Low Cost Home Security System using GSM Network, This system is proposed to protect from thief intrusion and fire attack. SMS service is provided to alert users of a possible intrusion into the property. The system contains sensors to detect obstacle, touch, heat, smoke, sound and warns about any intrusion, fire and leakage of any kind of gas 8-bit Microcontroller PIC16F76 controls the whole system, GSM MODEM is used to automatically receive the call and also sends the voice message to the preconfigured number about the status of appliances and intrusion through AT commands. IR sensor TSOP1738 (IR RX1), NPN transistor BC548 (T1) and timer NE555 are used for obstacle detection, IR transmitter and Receiver for smoke detection AMP LM358 for sound detection. The thermal sensors for fire detection, PIR and Proximity sensors are used for motion detection attached to the windows and doors. Pyro-electric sensor senses heat generated form human body which detects unauthorized intruders. [6] Home Security System Based on PIC18F452 Microcontroller, This system is based on PIC18F452 microcontroller and specially designed to avoid robberies and thefts by monitoring the doors and windows of house and can set alarm and sends warning signal to the nearest police station if anybody tries to break in. This also provides the functionality to identify the residents ID card to get access to the house without turning on the warning signal and alarm. [7] Anti-theft home security system, This project is designed to protect houses from thieves. There is constant monitoring between the transmitter and receiver and as soon as some moment is detected by the sensors or reed switch, immediately the buzzer will go ON and the user will come to know about the activity through LCD. [8] Development of individual home security system using CAN and ZIGBEE protocol, This system has been developed to detect human intrusions, leakage of LPG gas. The system sends alert message to the owner of house In case of any intrusions and also the controller triggers the exhaust fan in case of gas leakage. It uses electromagnetic Lock that provides security to house. [9] Microcontroller Based Home Automation System With Security. It controls of any or all electrical devices in our home or office, when we are there or away. It integrates electrical devices in a house with each other. This system provides facilities of Password Based Locking System, Counter dependent automatic switching system of room, Temperature controlled cooling system, Light saving system, Fire and Smoke sensor. [10] Microcontroller based Home Security System with Remote Monitoring, This system is developed to detect the fire and intrusion at home in the absence of home owner. In this system the alarm is fired when the temperature goes above a predefined value, the owner is notified through SMS about the alert. It is used at doors and windows in case of intruders for safety purpose. It works on the principle of amount of light falling on the photodiode.

III. OBJECTIVE

Our main objective is to make a budget smart Home alert system which can provide security from almost every perspective. And which can be accessible remotely.

The main objectives of the system are as follow:

- It provides safety from any kind of intrusion related activities.
- Provides safety from threats that can be caused due to leakage of gas or increasing of temperature in case of fire.
- It provides remote access of his home’s condition.
- The data can be stored in cloud for further references.

IV. PROPOSED SYSTEM

We are working on a home Alert System as a solution of these certain problems. Our objective is to make Smart Home Alert System, which keeps the homes and its assets secure from thefts, and other miss happenings. It monitors various home affecting environmental parameters like intrusions, fire, leakage of LPG and other smokes and sends a real time information via email to the owner in case of any threat. This system is composed of Intel Edison Board as a base and various sensors to fulfil the people’s
requirements. The system monitors some unexpected parameters like gas leakage, high temperature, fire and intrusions in the absence of the family members and intimates the user about the abnormal behaviour of the environment of house with the help of an auto-generated email with the risk of high, moderate or low.

Components Used: Intel Edison Board, LM35 sensor, MQ2 sensor, PIR sensor, 16x2 LCD, BreadBoard, Buzzer, LEDs, IoTAnalytics Cloud Platform, Wifi module.

Table 1: Cost of the Proposed System

<table>
<thead>
<tr>
<th>Sno.</th>
<th>Components</th>
<th>Price in Rupees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intel Edison Board</td>
<td>3300</td>
</tr>
<tr>
<td>2</td>
<td>PIR sensor</td>
<td>105</td>
</tr>
<tr>
<td>3</td>
<td>MQ2 sensor</td>
<td>145</td>
</tr>
<tr>
<td>4</td>
<td>LM35</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>Buzzer</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>16x2 LCD</td>
<td>145</td>
</tr>
<tr>
<td>7</td>
<td>Potentiometer</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>BreadBoard</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Overall Cost</td>
<td>3855</td>
</tr>
</tbody>
</table>

Architecture of proposed system:

In this Block diagram, The microcontroller unit plays a central role, where all the sensors are connected to it like PIR sensor which detects the motion about 6 meters of distance, MQ2 and LM35 sensors are to detect its atmospheric conditions and notifies the user about the intrusions and other abnormal environmental parameters by sending an auto-generated email using WI-FI module and same copy of data will be stored on cloud so that it can be used for further investigations. The user can access this data from anywhere remotely and can have track of his home safety.

V. SYSTEM IMPLEMENTATION

The flow chart describes the working of the proposed system. It detects the motion around it and sends an alert email to the user and also intimates by ringing a buzzer. The system is also capable of sensing the smoke in its environment and if it finds it in excess amount then it rings the buzzer and also sends an email to alert the user. In case of any fire or high temperature then also it intimates the user about the abnormal condition of the environment of his house.

VI. RESULT

It collects the real time data from sensors and put it on to the cloud from where it can be accessible by the home’s owner using his cloud account.

Result 1:
**Result 2: Sensor’s data on cloud**
The data of sensors are stored in IoT Analytics cloud showing the graphical representation of all the calibrated values with date, time and at a particular location:

In case of any miss happening or threat an automated email is sent to the owner to intimate him about the abnormal conditions so that he can take some preventive actions.

**Result 3: Email Alerts**

VII. CONCLUSION
The first module deals with the interfacing of sensors and other components with their implementations. The second module is responsible for managing the communication and remote access. It provides the remote alert functionality in case of emergency so that the home’s owner and other important people can be informed about the unwanted happenings which may occur at home like fire, intrusion and gas leakage. This is a low budget smart home alert system. This is very user friendly, which is very easy to use, It doesn’t need any expertise to operate it. It has made the use of latest technologies like Wi-Fi and cloud which has replaced the GSM technology, which incorporates a very high cost, RF and Bluetooth technologies which were used only for short distance. The proposed Home Alert System provides a remote access to your home from anywhere by just login into your cloud account. You can also track the previous information at a particular date, time, location stored in cloud. This system has tried to solve almost every problems related to the security of homes and its assets.

VIII. FUTURE SCOPE
We can further extend this project by adding some more features which can make it more efficient and security oriented. The camcorder can also be used to track all the activities of the unknown person or intruders. An emergency Alert can also be made to police and fire brigade as well. The complexity of the algorithm of the system can be increased by introducing number of sensors to make the system more efficient. We can use voice command to convey the message more clearly about the unforeseen happenings inside house. Door locking system can be implemented at door which can be locked/unlocked using face detection and finger prints. This system can have the facility to predict the natural hazards and alert the people about it.

IX. APPLICATIONS
- The system is basically designed to protect homes from any kind of threats.
- But it can also be deployed in college premises to increase the safety.
- It can also be used in Hospitals and Factories to detect the temperature and smoke level.

X. REFERENCES


