SMARTPHONE BASED CONTROL FOR HOME ENVIRONMENT

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Abstract-**This paper presents a design and prototype implementation of new home automation system that uses Wi-Fi technology and GSM technology to control the appliances when user is present in the home or out of home and the second part is hardware interface module, which provides appropriate interface to sensors and devices of home automation system. This proposed scheme allows controlling n number of devices. This paper provides a good interface to control all the appliances through smartphone. Sensors make the automated environment for the home which provides more convenience for the user.In addition to all, theft detection is done through PIR sensor and if theft is detected message is given to owner through GSM. This proposed system is better in terms of scalability, flexibility and cost than the commercially available home automation systems.**
Keywords– *Wi-Fi, GSM technology, sensors, smartphone, home automation*

I. INTRODUCTION

A home automation system[2] is a means that allows users to control electric appliances of various kind. Home automation is also known as domotics, a contraction of the words "domestic robotics". When home automation principles are applied to buildings not falling in the "home" category, building automation system is a commonly used term. The most common usage scenario of a home automation system is lighting control, which is fairly easy to both explain and set up.It is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. These can be used as a replacement of the existing switches in home which produces sparks and also results in fire accidents in few situations. Considering the advantages of Wi-Fi an advanced automation system was developed to control the appliances in the house. It is a wireless technology that uses radio frequency to transmit data through the air. Wi-Fi has initial speeds of 1mbps to 2mbps.Wi-Fi transmits data in the frequency band of 2.4 GHz. It implements the concept of frequency division multiplexing technology. Range of Wi-Fi technology is 40-300 feet. The controlling device for the automation in the project is a Microcontroller. The data sent from mobile over Wi-Fi will be received by Wi-Fi module connected to Microcontroller. Microcontroller reads the data and decides the switching action of electrical devices connected to it through relays and triacswitches. The microcontroller is programmed using embedded c language. It is a technique to use computer/smartphone and information technology in controlling home appliances and home features is called home automation system.

A. BENEFITS

The potential benefits[2] we can gain from home automation are almost only limited by imagination and as such it

would be infeasible to create a comprehensive list of them. The short list below exemplifies potential benefits in four areas of home automation. The examples are meant to spark the imagination.Energy Savings-Through user tracking both in- and outdoors, a home automation system would potentially be able to make sure that, for example, no unnecessary light or heat is turned on in individual rooms. Convenience-Throughapp based access and no need for internet connectivity to the home automation system provides an efficient method compared to previous solutions. Security-Tracking user locationscan assist in automatic alarm system arming. Also, security cameras or pir sensors might be accessed from a vacation to check that the house is alright. When engaging in movie watching, the lights might be set to an appropriate dimming level. When listening to music, speakers might be changing from room to room for your listening pleasure throughout the house. Digital paintings on the wall might change according to persons currently occupying the room.

B.FEATURES

1.Wi-Fi based user-friendly interfacing.

2.Low power consumption.

3.Controls high and low voltage devices.

4.Long life.

5.Reduced installation costs.

6. Easy development, installation

7. System scalability and easy extension.

8.Low cost

The reminders and Structures as follows: Section 2 we discussed briefly about our related works. Section 3 contains Existing System. Section 4 contains proposed system and explained each module. Section 5 contains Simulation and Results and We conclude our work in Section 6.

IIRELATED WORKS

R. Chutia, D. Sonowal and S. Sharma[1] have proposed "the design and development of a remote household appliance control system using mobile handset through GSM technology." The advantages of cellular communications like GSM technology is a potential solution for such remote controlling activities. GSM-SMS technology can be used to control household appliances from remote places. Remotely, the system allows the homeowner to monitor and control his house appliances via his mobile phone set by sending commands in the form of SMS messages and receiving the appliances status as well. This system provides ideal solution to the problems caused in situations when a wired connection between a remote appliance/device and the control unit might not be feasible. The system is wireless and uses the user's mobile handset for control and therefore the system is more adaptable and cost-effective. The system uses GSMtechnology thus providing ubiquitous access to the system for appliance control.

Ahmed ElShafee, Karim AlaaHamed [2], have proposed "a design and prototype implementation of new home automation system that uses Wi-Fi technology as a network infrastructure connecting its parts". The proposed system consists of two main components; the first part is the server (web server), which presents system core that manages, controls and monitors users home. Users and system administrator can locally (LAN) or remotely (internet) manage and control system code. Second part is hardware interface module, which provides appropriate interface to sensors and actuator of home automation system. Unlike most of available home automation system in the market the proposed system is scalable that one server can manage many hardware interface modules as long

as it exists on Wi-Fi network coverage. System supports a wide range of home automation devices like power management components, and security components. The proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

Luo Wei, Li Wei, Li Xin[3] have proposed a "Smart home system, makes home life more comfortable, more safe and more efficient by connecting application subsystem with each other". The disadvantages of ordinary home is not far to seek. Such as few functions, single interactive mode. Compared with ordinary home, smart home has many strengths, especially this smart home system .Our smart home system is composed of a lot of popular technology, for instance, speech recognition, GSM, GPRS, Sensors, camera, smart phone, etc. It is based on ARM platform and AT89s52 SCM. It is without a doubt, smart home system bring a cool experience to users.

R.A.Ramlee,M.H.Leong,R.S.S.Singh,M .M.Ismail,M.A.Othman,H.A.Sulaiman,M. H.Misran,M.A.Meor Said [4], have proposed "the overall design of Home Automation System (HAS) with low cost and wireless remote control". This system is designed to assist and provide support in order tofulfill the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home. The main control system implements wireless Bluetooth technology to provide remote access from PC/laptop or smart phone. The design remains the existing electrical switches and provides more safety control on the switches with low voltage activating method. The switches status is synchronized in all the control system whereby every user interface indicates the real time existing switches status. The system intended to control electrical appliances and devices in house with

relatively low cost design, user-friendly interface and ease of installation.

Mahesh N. Jivani [5], have proposed "the remote Home Automation turns out to be more and more significant and appealing". It improves the value of our lives by automating various electrical appliances or instruments. This paper describes GSM (Global System Messaging) based secured device control system using App Inventor for Android mobile phones. App Inventor is a latest visualprogramming platform for developing mobile applications for Android-based smart phones.The Android Mobile Phone Platform becomes more and more popular among software developers, because of its powerful capabilities and open architecture. It is a fantastic platform for the real world interface control, as it offers an ample of resources and already incorporates a lot of sensors. No need to write programming codes to develop apps in the App Inventor, instead it provides visual design interface as the way the apps looks and use blocks of interlocking components to control the app's behaviour. The App Inventor aims to make programming enjoyable and accessible to novices.

Meng-Shiuan Pan and Chun-Jie Chen[7],have proposed " a smart home, electric devices(e.g., plugs, lights, TVs, and so on) can have the capability of wireless communications". Users are allowed to control these devices by smartphones through wireless links. However, we observe that the current control schemes are not user friendly. More specifically, users need to switch between APPs to control different kinds of controllable devices or need to traverse a long device list to find the target one. In this paper, we propose schemes to achieve the control fashion that when a user raises her smartphone to point to a device, the phone's screen automatically pops out on the control panel of the device, and then the user can enter control commands

directly. In this paper, we evaluate the proposed schemes by simulations and real implementation and the results demonstrate the effectiveness of our designs.

Kuen-Min Lee, Wei-GuangTeng, Member, IEEE, and Ting-Wei Hou, Member, IEEE[8]have proposed With numerous connected devices and appliances, the smart home is one of the representative fields of Internet of Things (IoT). As the complexity of devices/appliances increase, numerous buttons (sometimes dozens) are designed on the remotecontroller in home spaces even if several of them are seldom used.A user may be confused with the controller even if he or she only intends to perform a simple operation. This confusion also leads to a higher probability of mal-operations. remote control system for home appliances named Point-n-Press is proposed. Point-n-Press addressesthe directionality feature, which enables easy and the remote controller. By leveragingthe state dependencies of home device/appliance operations, only functional buttons that are relevant to the current context are utilized.Intuitive control by pointing to the target device to display the target's control interface on the screen of In addition, conventional methods of communication between remote controllers and connected devices, such as eXtensibleMarkup Language (XML) messages, are usually bandwidth-consumptive. To address these problems, an intelligent universal two real prototypes are implemented to verify the feasibility of the proposed scheme. The evaluation results show that Point-n-Press is a useful and suitable control scheme for IoT-based smart homes.

Shiu Kumar, Seong Ro Lee[10] have proposed "Automation plays an important role in today's human life and people's life is gradually changing with smartliving due to modern technology development and AndroidSmartphone". This paper presents a low-cost Smart LivingSystem, which uses Android based User Interface for control ofhome appliances. Connection to the smart living system can bemade from the designed app via Bluetooth or internetconnection. It also integrates home security and alert system.

III.EXISTING SYSTEM

Thus existing systems have used all the technologies like GSM,WIFI,Bluetooth,zigbee,etc.Whencompared with all the existing technologies Wi-Fi and GSM covers larger distance.Bluetooth covers only shorter distance and Wi-Fi covers longer distance and speed of the Wi-Fi technology is faster compared with other technologies. Only limited number of devices can be controlled and point n press type of technologies presents those sensors should be present on both the device and mobile. It is a disadvantage because it is not possible always and the system is a failure model and costly. Thus a comprehensive literature survey was made to analyzed all the technologies and proposed system will overcome all the demerits of existing technologies and will provide efficient and cost effective solution.

A.DEMERITS OF EXISTING SYSTEM

- Only limited number of devices can be controlled
- Smartness of the devices cannot be controlled using most of the existing methods
- Most efficient home security has not been considered in most of the methods

IV.PROPOSED SYSTEM

Password based automation and control of appliances using one common remote control called smart phone. The android app is developed in such a way that smartness is included like regulating the fan speed, intensity control on

lights,etc through neat user interface. Two modes of automation is proposed first one is In home mode done through Wi-Fi and second one is Out of home mode that is done through GSM. There is no need to remember any AT commands of GSM because app itself convert the commands and send to microcontroller. Another added concept is theft detection using PIR sensor, the motion of the human is detected by the sensor and sends the signal to the microcontroller and it will make all the electrical appliances to switch on which intimates that some person is present inside the home and make the GSM to sent message to owner and nearby police station or the other people with registered SIM card number.Water level sensors are used to indicate the level of the water in the tank and the tank empty indication. Gas sensor is used to indicate the gas level in the cylinder and also the gas leakage detection. Two IR sensors are used to open and close the door automatically when it detects the vehicle incoming and outgoing.Mikro C software is used to generate a PIC coding and embedded in microcontroller.

A.MODULES

- Home automation(Wi-Fi)
- Sensors interfacing
- GSM and theft detection
- Smartphone and hardware interfacing

1. HOME AUTOMATION(Wi-Fi)

All the electrical devices are connected through relays and relays are interfaced with microcontroller such that using the smartphone devices can be controlled within the range of Wi-Fi. Controlling is basically done through webpage developed using html programming i.e.,local area network will be created.it uses only the speed of the Wi-Fi not the data connection.

2.SENSORS INTERFACING

Sensors like water sensor to detect the level of water in tank, empty and tank full alarm. Gas sensors are used to detect the gas level by indicating in terms of a

value and gas leakage alert.IR sensors are interfaced with door such that whenever the vehicles enters inside the home or goes out of the home it will be sensed and door will be opened/closed automatically. PIR sensors are interfaced in a door so that whenever the human motion is detected it will ring the calling bell automatically and makes the electrical devices to switch on automatically when user enters inside the home, it makes the user more and more convenience which makes the home automated. Temperature and humidity sensors are interfaced so that the light and fan will be regulated automatically by sensing the environment. Automatically the heater will be switched on/off by this temperature sensor.

3. GSM AND THEFT DETECTION

GSM is interfaced with microcontroller so that user can able to control devices from anywhere at any time with low cost. PIR sensor detects when theft happens and message will be given to the owner and registered mobile numbers. It also makes the electrical devices to switch on automatically which intimate the thief that somebody is present inside the home.

4.SMARTPHONE AND HARDWARE INTERFACING

Webpage is developed in such a way that any devices can be controlled within the range of Wi-Fi.AT commands are given for the GSM to control the devices from anywhere.

B.PROTEUS SIMULATION

Proteus ISIS 7.7 version software is used to develop the simulation. Simulation for the whole project has been developed and simulated successfully.

C.ADVANTAGES OF PROPOSED SYSTEM

- Security is good enough
- Not only controlling but also smartness through app made easy
- Theft detection is also useful

- No constraints on room shape and size
- Covering range of Wi-Fi is larger compared to zigbee, Bluetooth
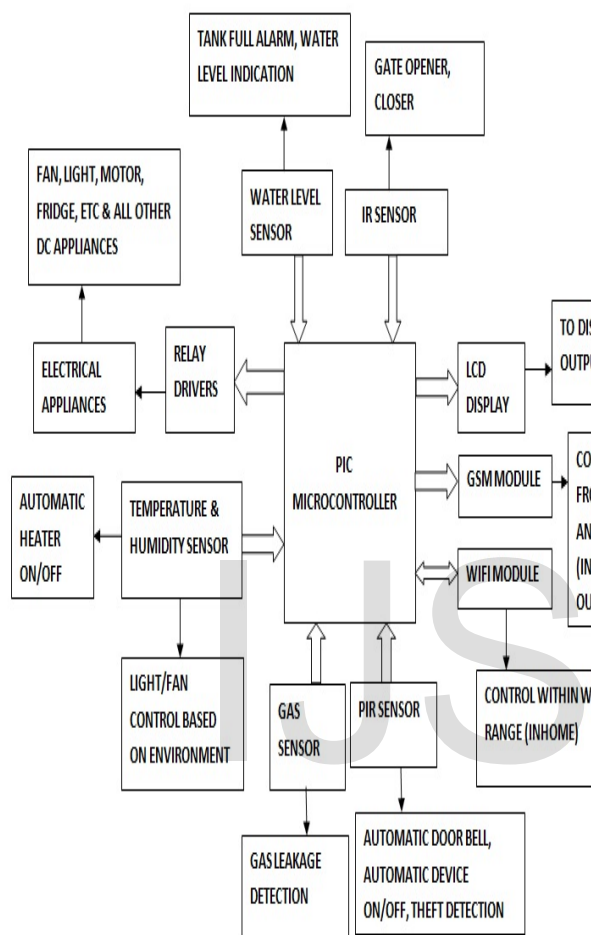- Low cost and simplicity

Fig 4.1. Proposed Home Automation System

Fig 5.1. Wi-Fi username and password
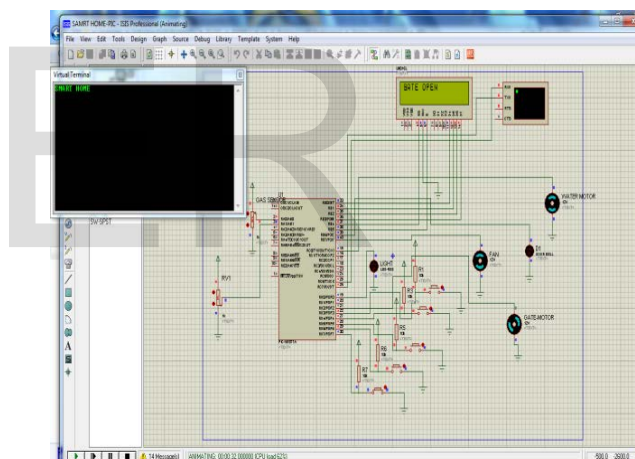
Fig 5.2 simulation for gate open

V SIMULATION AND RESULTS

Simulation results for all the sensors and device control has been developed. Under that figure shows some of the simulation results and hardware interfacing.

Light, fan, PIR sensors has been interfaced with microcontroller and webpage has been developed to control the devices.
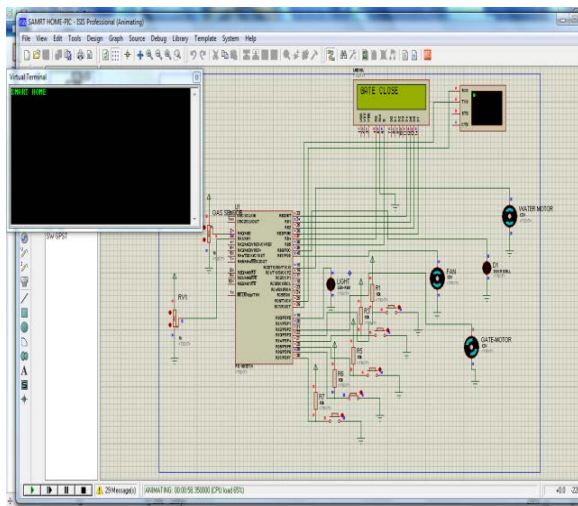
Fig 5.3 simulation for gate close

Fig 5.4 Hardware interfaced with Wi-Fi
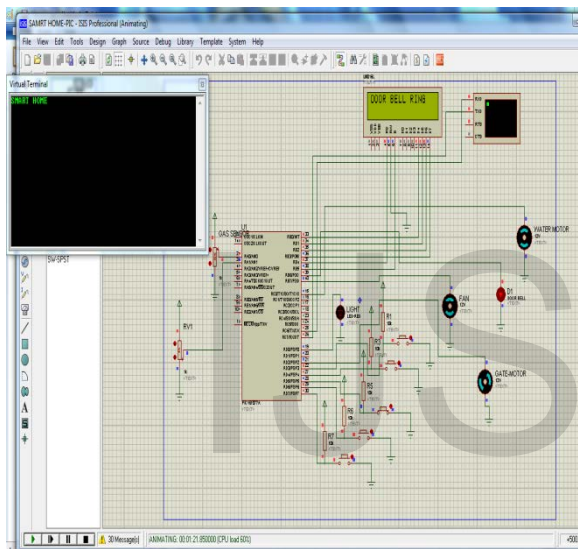

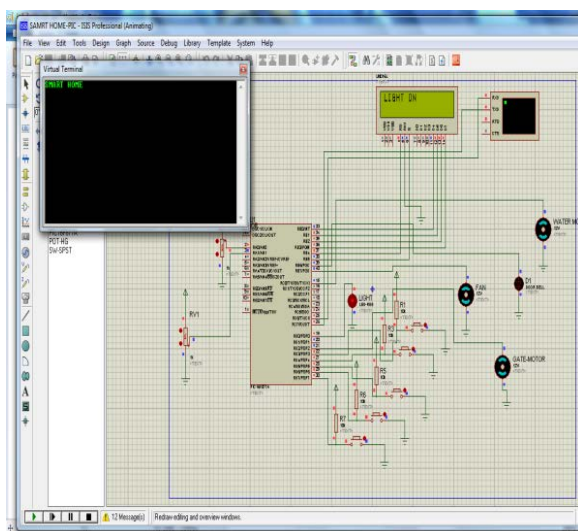Fig 5.3.simulation for doorbell ring

Fig 5.4.simulation for light on
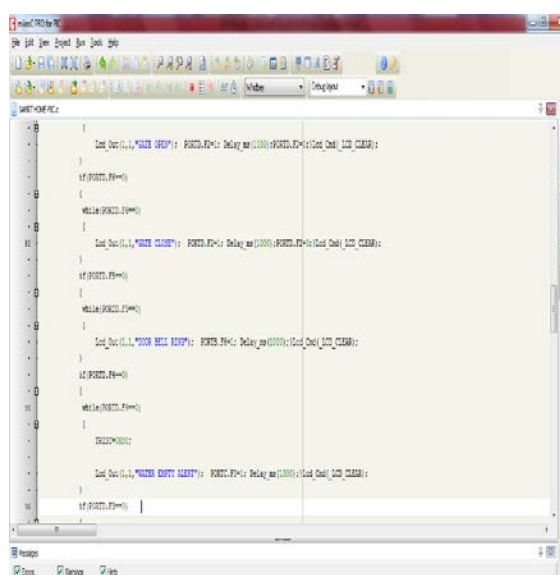
Fig 5.5.connection establishment

Fig 5.5 Sample coding using Mikro C

VI CONCLUSION

Home automation has becoming a major solution to all the problems facing in home. Under this home security for theft detection is an important Issue.This proposed systemis better in terms of scalability, flexibility and cost than the existing home automation systems.Thus,it can be further enhanced to an IoT project so that it makes the home smarter.Wi-Fi and sensors has been interfaced with microcontroller and proteus simulation also done which has been given in simulation and results.

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