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Home Automation

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Abstract*—Home automation is a system in which user can control his home's subsystem's using an application to achieve the purpose of home automation. The idea of home automation came from modern home which filled with electronic appliances to make life easier at home, secure, and more comfortable that the user can control his house while he is relaxing or working. When the user leaves his/her home to go on holiday/work, he/she loses all control over the functions of the house while he/she is away and cannot tell whether someone has broken security or whether he/she had left the living room light on. If the alarm has been triggered at his/her home, there is no way that the user can become aware of this unless he/she returns to his/her home. In order for the system be useful. Automation is needed in a house so that some functions in the house occur automatically, for example the outside light can turn on when it becomes dark outside. It is mandatory of having secure, reliable and user friendly system that it can have full control on electronic equipment's of the house that can be access from across the globe.*

Keywords—Bluetooth, gesture-based automation, internet of things (Iot), microcontroller, smart home system, Wi-Fi

I. INTRODUCTION

Home automationmeans control of electrical appliance of our house. Technology advancement in electronic devices is producing a large number of user-friendly and flexible systems which take smart living technology to the next level. Daily usages appliances can be remotely controlled by our electronic devices such as smart phones which makes our life easier and comfortable.Home automation system is used to control the activity of electrical components in our home. Depending on activities, automated systems has been developed. Automation helps to control of electrical appliance, save time, and reduce efforts. Nowadays many wireless technologies are coming into day to day life. Home automation based on Internet is one of the most popular home automation system in today's market. To control and monitor the houses through Internet requires big and heavy computers. It becomes difficult to carry out. For this we are using mobile phones or tablet from which we can controlled the appliances wherever we are. The different wireless communication standards such as Blue-tooth, Zig Bee, and GSM are used by the home automation system to exchange the data. This helps to reduce the installation cost, reduce human efforts and becomes more scalable and flexible. Android based home automation helps the user to provide secure and configurable home automation system.

II. LITERATURE REVIEW

In earlier decades so many inventions were invented in the field of electronics such as cell phone, air conditions, home security devices home theaters etc. these appliances can be controlled by a single controller, using personal area network in a home or in office . Due to busy environment, large area and personal limitations home automation system come in picture, in which Bluetooth is an ideal solution for this invention. In home and offices electronic devices can be easily controlled by home automation system but it required highly configured computer, it become more costly .to overcome this issue simple home automation system was developed which consists Bluetooth enabled mobile, host controller, and home appliance. The client module communicate with the host controller through a wireless medium such as Bluetooth.[13]

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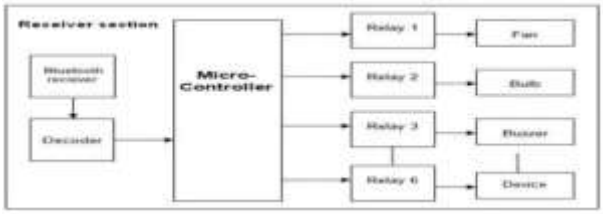

Figure: - block diagram of Bluetooth based home automation

Home Automation is also involved in large space offices such as warehouse in which lights, security devices and other appliances are controlled through highly configured computer. all the devices used in large space offices are control by a single controller using a wireless network .Client module and host controller are communicate with each other through a wireless device or medium such as Bluetooth enabled android smart mobile phone. Home automation system is not a big thing but it is an advance automation system which nowadays it use in big and expensive infrastructure. Using an automation system can lead to high cost to overcome this issue low cost, flexible secure home automation system comes in picture which can easily control TV, lights ,fans and other electronic appliance with the help of android based mobile phone using Bluetooth.[13]

III. PROPOSED SYSTEM

The proposed system is designed in such a way that it overcome limitation of existing system. The proposed system designed with quality of more secure, scalable and flexible. Home automation system is implemented using raspberry pi, an android application from which we can control the devices and relay circuit. The Wi-Fi signals must be strong so that devices can control the appliances. Through relay the appliances can be also controlled vice versa .The main purpose of the home automation system is to provide a cheap, secureand open source home automation which can control all the home appliances through smart (android / iOS) device. The main advantages of home automation is that it provide security and flexibility through the android system, good range of scalability. It will help the user to save his or her effort. It will help to save electricity when not in use.

IV. SYSTEM ARCHITECTURE

In home automation many new inventions have been made. Sothe concept of home automation is still on trending. Thearchitecture consist a Wi-Fi , relay circuits , sensors, android application and raspberry pi which is small size computer that is used for the purpose to manage the network and for remote access .With the help of Wi-Fi network the user can communicate through raspberry pi and it can be configured according to our home system. The Wi-Fi signal must be strong and the system alsoscalable and flexible too. TheWi-Fi plays most important role in it which is the medium to communicate with the devices. It can be also modify tomake services secured.The main part of the home automation is the raspberry pi circuit which is a credit card size computer and performs many functions. For every home appliances, the raspberry pi is configured and the corresponding relay will get switch ON/OFF so that corresponding device will function appropriately. Home automation is has a very easy installation. The project consist of 4 main modules which are as follows:

1) Android/iOS Application (Smart Phone)
2) Raspberry pi
3) Relay circuit
4) Wi-Fi

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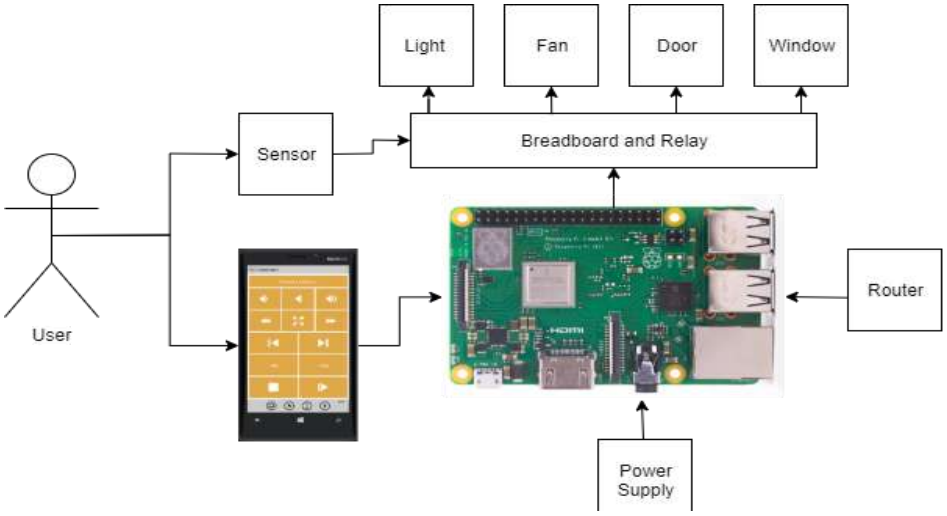

FIGURE:1 - Architecture of system

V. DEVELOPMENT PLATFORM

5.1 Android/iOS Application (Smart Phone)

User interface is developed by using android / iOS so that the user can easily control the home appliances.Smart phone devices is use control the home automation system..Smart phone devices provide special interface such as menus. The interface must allow user to view the status of automation system as well as control the system.There are n number of applications are available on play store / app store to make home automation system. Wecan download that software / application or else we can build stand-alone application for the same. Home automation application can communicate with different devices via different signals. There are several connection options are such as [1]

FIGURE 2:- Android/iOS Application (Smart Phone)

5.1.1 Bluetooth

Bluetooth module HC-05 supports master and slave mode communication SPP and UART interface. Using this features it can communicate with other Bluetooth-enabled devices like mobile phones, tablets and laptops. this module can runs on 3.3V to 5V

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power supply.[3].The slave mode in HC-05 will not initiate a connection to other Bluetooth device, but it can accept connections. Master mode can initiate a connection to other devices.[4]

FIGURE 3:- Bluetooth module HC-05

5.2 Z-wave

Z-Wave is a wireless technology thatcan helps electronics of your home to talk with each other, and it gather them into a personal area network, it can be add any electronic device of your house. It used to provide remote control access and automated operation of lighting, locks & unlocks and garage door controller devices in your home. [5]. Z-Wave modules are available in variety of sources cheaply so that they can provide an excellent service for home automation. [6]

FIGURE 4:- ADT Z-Wave module

5.3 Zigbee

It is a wireless communication technology developed by Zigbee Alliance as an open global Standard.it has low-cost, low power, wireless sensor networks. Zigbee can be used at almost anywhere and it is easier to implement and needs less power to operate. It send and receive the data up to the 2.4GHz or 900 MHzZigBee Module Small size, light weight, easy for embedded development. One to one communication of this module is up to 1KM,

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FIGURE 5 -F8913 Embedded ZigBee Module

5.4 Raspberry pi

Raspberry-pi develop in United Kingdom is a single board computer.it runs multiple programs simultaneously.The home appliances will connect to the Raspberry Pi with help of relay driver which will perform On/Off actions on the basis of given instructions.The system will connect to the internet via Wi-Fi and an interface will be developed to control home appliances from a remote location.a Raspberry Pi device can also be connect with an Android App or iOS app which you can develop on your own using some applications (ADT).By using this application, we will be able to monitor and control the home appliances from any part of the world with ease. We can also include a PIR sensor with this project to make it switch ON automatically the appliances whenever a person enters the room and switch OFF the appliances whenever the person leaves the room. [8]

FIGURE 6:- Raspberry pI

5.5 Relay

A relay is an electrical devicethat can be turned on or off, letting the current go through or not, and can be control with low voltages, like the 5V provided by the Arduino pins.Controlling a relay module with the Arduino is very simpleas controlling any other output. Relay module has two channels .Below shown moduleis powered with 5Voltes, which can be used with an Arduino. There aremany other relay modules they are powered using 3.3V, which is ideal for other microcontrollers. [9] It provides complete isolation between the low-voltage and high-voltage load control. Itcan turn on/off controls of electrical appliances like fans, lights and air-conditioners etc.[10]

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FIGURE 7:- Relay circuit

5.6 Wifi (ESP-01 module)

ESP-01 is a modulewhis is available in the market. It act as both Wi-Fi access point and a WiFi client. It is pre-programmed with AT commands, so we can easily access and configure it using a microcontroller.[2]

FIGURE 8:- ESP-01 ESP8266 Module

CONCLUSION

Home automation system provides easy and attractive interface and makes the system more flexible and secured. We are using smart phone devices to integrate with the home automation system. Wi-Fi is used to communicate between the raspberry pi and the android / iOSapplication to control the devices. The three main modules are raspberry pi, wifi, relays. We have hide the complexity of the project by making the application simple

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