Home Automation systems using smart Phone

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ABSTRACT. The world is moving fastly towards automation. People have less time to handle any work so automation is simple way to handle any device or machine will work to our desire. This paper aim is to develop and design a home automation using Arduino and NodeMCU module. Home automation system gives a simple and reliable technology with Android application. Home appliances like fan, Bulb, AC, automatic door lock is controlled by home automation system using Arduino Uno and NodeMCU. The paper mainly focuses on the monitor and control of smart home by Android phone and provide a security based smart home, when the people does not present at home. This paper motive is controlled home appliances in smart home with user friendly, design at low cost, simple installation.
Keywords: InternetofThings**,** smarthome**,** home automation,Android smartphone, Arduino.

I. INTRODUCTION

Now days everyone has smart phone and wants to control everything from smart phone. Everyone knows how to control mobile phone so it easy to use and understand. Lights, fan ,switches , refrigerator are controlled through Bluetooth based remote using Arduino and NodeMCU module. The designing of home automation are going to become simpler and more popular because most of people uses smart phone now days. In this device we are using Arduino which is most commonly used device for automation. Arduino is a hardware which is used to connect computer and the project model so that we can control it by using Arduino code accordingly. Arduino is a microcontroller it is just like human brain it processes information and then it perform some Logical and mathematical operation on that information. Arduino is connected with the Bluetooth module which receives the information from user. Arduino also connected relay, which receives information from

Arduino and perform the operation as switch. Bluetooth technology is Wireless radio transmissions in a short distance providing a necessary technology to create intelligence and controllability. This generates personal area network in home environment, where all these appliances can be interconnected and monitored using a microcontroller with Arduino using smart phone. Home automation involves a degree of computerized or automatic control to certain electrical and electronic systems in a building.

II. METHODOLOGY

Home automation describes a system of networked, controllable device that work together to make your home more comfortable, customized, efficientand secure. In this device there are five main parts Arduino, NodeMCU module, Relay drivers, android application and step-down transformer.[1] Firstly we provide power to the step down transformer, it step down the input voltage and given to the Arduino with VIN pin. The Bluetooth module is also connected with Arduino to Rx and Tx pin that provides the information to the microcontroller. Microcontroller reads the information and send to the relay drivers which work as switch. In Arduino we upload the program as per requirement then it performs some mathematical and logical operation to control the relay drivers.
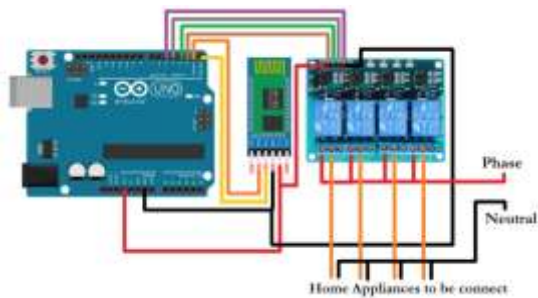
Fig2(a)-circuit diagram of home automation.

Android application are connected to the ArduinoNodeMCU. In the figure 2(b) there are two switches which is connected to relay drivers and four relay are connected to the home appliances.

Fig.2(b)-Mobile android application.

III. ARCHITECTURE OF THE DEVICE

This venture centres around the robotization of machines with the assistance of an android application. In this day and age, enhancement is the primary thought process . Any framework created goes for streamlining the human endeavours to a negligible and our framework goes for doing likewise. The architecture of this device as shown in figure 3(a).
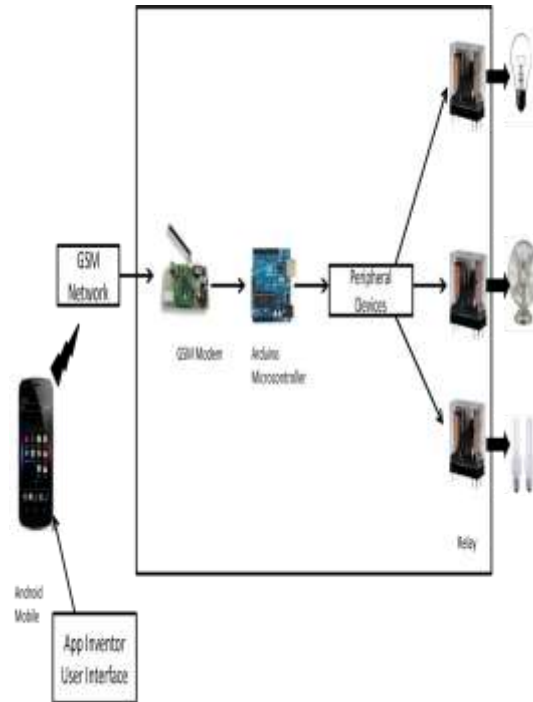
The user will communicate to Android application through the Arduino Uno via Bluetooth module. This model is very resilient and gaugeable, maximum efficiency, safety and securely added smart home appliances with least amount of human effort . The Bluetooth signal having most efficient energy to connect any signal without loss of information with least harmonics .Home automation system main part consists of Arduino with microcontroller. The people must have mobile application with proper connection. It should be used as multi appliances works as together. The Arduino board is configured for each home appliances using coding in microcontroller. By the help of Microcontroller, we can control the electromagnetic relay which works as a switch to receive a signal from the Arduino through Bluetooth module HC-05. When the signal transmit from transmitter as datasheet to relay then the relay works as switch and control many appliances of smart home(multitasking) .There are three main parts of this home automation which is given below.
1.Arduino Uno
2.NodeMCU ESP8266
3. Relay Drivers

IV. DESCRIPTION OF HARDWARE
1. Arduino Uno: -

Arduino Uno is a microcontroller chip dependent on the Atmega328(datasheet) with 14 computerized I/o pins, in which 6 pins can be

utilized as yields, 6 pins are utilized as simple information sources. It has 16 MHz clay resonator ,a USB association, a power jack and a reset button.The microcontroller has 32kB of ISP flash memory, 2kB RAM and 1kB EEPROM. The board provides serial communication capability via UART, SPI and 12C.Because of well design in the form of Arduino it is easy to understand. In Arduino we use high level of programming language like C language, C++ language ect. It is easy to understand and user friendly language. It has much advantage like multitasking, automation, time domain etc.Arduino Uno fig4 (a) is given below.

Fig 4(a)- Arduino Uno

2. NodeMCU ESP8266: -

the   ESP8266 based NodeMCU development board. It is an open source platform for developing Wi-Fi based embedded systems and it is based on the popular ESP8266 Wi-Fi Module, running the Lua based NodeMCU firmware. NodeMCU was born out of the desire to overcome the limitations associated with the first versions of the ESP8266 module which was not compatible with breadboards, it was difficult to power and even more difficult to program. The NodeMCU board is easy to use, low cost and that quickly endeared it to the heart of makers, and it is one of the most popular boards today.

Fig 4(b) NodeMCU ESP8266.

3. Relay Drivers:-

Relay is an electromagnetic switch which is used to defer two circuits electrically and connect magnetically. When arduinotransmit the signal then relay driver receive signal and start its work.They are frequently used to interface an electronic circuit (working at low voltage) to an electrical circuit which works at extremely high voltage. For instance, a hand-off can make a 5V DC battery circuit to switch 230V AC mains circuit. In this way a little sensor circuit can drive, say, a fan or an electric knob. A transfer switch can be separated into two sections: information and yield. The info area has a loop which creates attractive field when a little voltage from an electronic circuit is connected to it. This voltage is known as the working voltage. Generally utilized transfers are accessible in various arrangement of working voltages like 6V, 9V, 12v, 24V and so on.In a basic hand-off there are three contactors: ordinarily shut (NC), regularly open (NO) and normal (COM). At no info express, the COM is associated with NC. At the point when the working voltage is connected the transfer curl gets charged and the COM changes contact to NO. Diverse transfer setups are accessible like SPDT and DPDT which have distinctive number of changeover contacts. By utilizing legitimate blend of contactors, the electrical circuit can be turned on and off. Relay circuit shown in fig4(c).
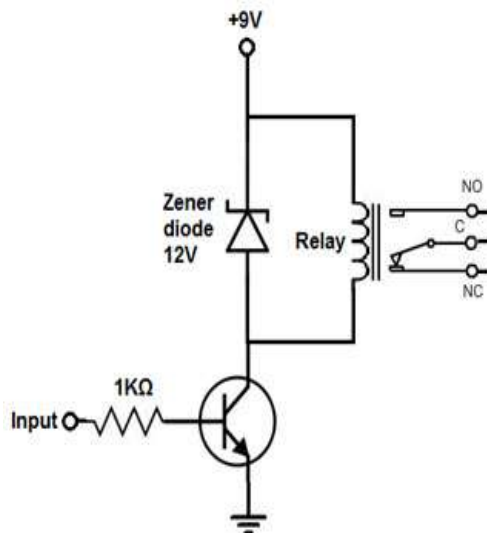
Fig 4(c) Relay circuit diagram

So as to drive the hand-off, we use transistor and just less power can be utilized to get the transfer driven. Since, transistor is an intensifier so the base lead gets adequate current to make increasingly current stream from Emitter of Transistor to Collector. In the event that the base once gets control that is adequate, at that point the transistor lead from Emitter to Collector and power the transfer. When the power is transmit to the relay works as a switch due to electromagnetic effect so that we can switch ON or OFF our home appliances.

The figure 4(d) of relay is given below.

Fig 4(d) Relay module

V.ADVANTAGE

1. Everything is automated so it is easytouse.
2. It is control by mobile application, so no extra training is required.
3. We can change controlling system as our requirement.
4. It works on Arduino based system so we can easily understand how it works.
5. It saves our time.
6. Every home appliance can control by one android application.
7. Easy installation and user friendly.

VI. RESULT

According to the proposed plan the final outcome of this paper leads to the development of a home automation. Through this project, an automation system has been created so that we can easily control home appliances like as light, fan, tube light, AC, bulb, etc. One of the objectives of this project is also to get us a smart automation and low cost project. In this paper we have also provided information about Arduino Uno, NodeMCU controller and relay module. And the information about their work is given. Along with the component of home automation, its advantage has also been discussed. The system is easy and secured for access from ant user or intruder. Final outcome of the project is given below in fig 5(a)(b)(c).
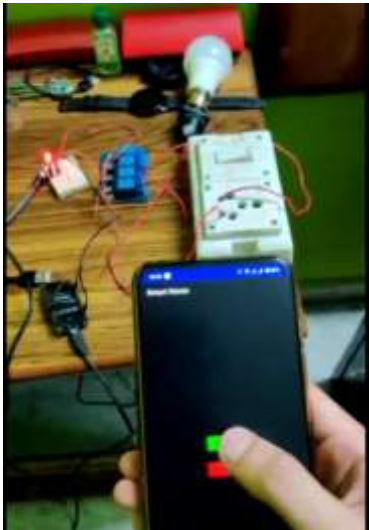

Fig 5(a) Arduino with NodeMCU module

Fig 5(b) when light is off.

Fig 5(c) Home Automation

VII. CONCLUSION

Based on all the systems surveyed and their advantages and drawbacks, this paper presents the features to be possessed by an ideal system for home automation with remote access. An ideal system should be available from all over the world to a user and in real time. A GSM network is identified as a candidate for this. However, the data channel of GSM must be used, to provide internet access. Only the Internet can ensure that access can be made available at all times. This will give rise to a standard access method for the home appliances using the Internet protocol. The user interface should be a web application that has an associated mobile application. So that people of all kinds can access the system. Such a system should also have the feature of being easy to install. Only then can

automated homes become commercially viable. There should be a lot of thought put into the design of the user interface for these apps. Plug and play capabilities will be an added bonus for the system. Ease of adding a new device to an automated house will play an important role in taking forward the systems commercially.

Future scope for the home automation systems involves making homes even smarter. Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions. More energy can be conserved by ensuring occupation of the house before turning on devices and checking brightness and turning off lights if not necessary. The system can be integrated closely with home security solutions to allow greater control and safety for home owners. The next step would be to extend this system to automate a large scale environment, such as offices and factories.

It can be concluded from the above discussion that Home automation is a special kind of device which controls home appliances with using extra effort. And in this paper, we demonstrated how the home automation is made, discussed about methodology and what its application can be. And in the future, on the new technology can be included which reduces human effort, which is being researched, we also talked about it. And we've created a that type of device which is compact in size, low cost, more capacity, long life and more distant signal receivers . The need of this research paper is to create a device which saves the electricity and improve human life style.

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