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Home Automation Using Microcontroller (Arduino Uno)

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***Abstract*—Automation of the surrounding environment of a modern human being allows increasing his work efficiency and comfort and improves time complexity. There has been a significant development in the area of an individual's routine tasks and those can be automated. In the present times, we can find most of the people clinging to their mobile phones and smart devices throughout the day. Hence with the help of his companion – a mobile phone, some daily household tasks can be accomplished by personifying the use of the mobile phone. Analyzing the current smart phone market, novice mobile users are opting for Android based phones. It has become a second name for a mobile phone in layman terms. Home Automation System (HAS) has been designed for mobile phones having Android platform to automate an 8 interfaced microcontroller which controls a number of home appliances like lights, fans, bulbs and many more using on/off relay. This paper presents the automated approach of controlling the devices in a household that could ease the tasks of using the traditional method of the switch. The most famous and efficient technology for short range wireless communication- Bluetooth is used here to automate the system**

Keywords— Arduino Uno, Algorithm, Bluetooth Module, Programming, Flow Chart

I. INTRODUCTION

Due to the recent advancement in wireless technology , automation is playing and important role in day to day life of human beings. There is a recent advancement in wireless technology such as GSM, WI-FI and Bluetooth ,automation is gaining importance in the growing market .Home automation represents a great research opportunity in creating new fields in engineering, and computing. However, end users, especially the disabled and elderly due to their complexity and cost, do not always accept these systems. Home automation not only refers to reduce human efforts but also energy efficiency and time saving. The main objective of home automation and security is to help handicapped and old aged people who will enable them to control home appliances and alert them in critical situations. The system is intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation[3].

II. OBJECTIVES

A. To implement home automation and monitoring using advanced technology.

B. Use of smart phone to control home appliances from remote location.

C. Real time monitoring and controlling of home appliances from remote location.

D. Power saving and improving overall power efficiency.

- *A. To Implement Home Automation And Monitor Using Advanced Technology*

Recent development in technologies such as WI-FI,GSM and BLUETOOTH has opened wide scope for automation. Moreover with the development of technologies such as IOT(internet of things) has added to efficiency of this system. Thus enabling users to control their home appliances from far of places.

- *B Use of Smart Phone To Control home Appliances From Remote location.*

The home automation using microcontroller and smart phone can be installed with ease. Smart phone has become an important component in our day to day life. The app used for home automation can be easily downloaded from the android app market which is pre installed in every smart phones.

- *C . Helpful For Elderly People.*

Today we are living in 21st century where automation is playing important role in human life. Home automation allows us to control household appliances like Light, door, fan, AC etc. It also provides home security and emergency system to be activated.

- *D. Power Saving And Improves Overall Efficiency*

The home automation system tends to reduce the power loss through smart switching of electrical appliances and thus increasing the overall efficiency.

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III. SCOPES

The project aims at designing a prototype for controlling the home appliances that can be controlled wirelessly via an application. An application is run on android device. The system can be used in wide range of areas .The system integrated with different features can be applied in the following fields:-

- The system can be used in home, small offices to the big malls.
- The system can be used from home to offices to control the electrical appliances.
- For remote access of appliances in internet or intranet.
- The home/office appliances can be controlled in intra-network or can be accessed via internet.
- For the development of technology friendly environment.
- The system incorporates the use of technology and making smart home automation. By the use of day to day gadgets we can utilize them for different prospective.
- Memory can be used to store the appliance status during power failure[2].

IV. SOFTWARE AND PROGRAMMING USED

- Eclipse Android SDK(Software Development Kit)
- Arduino ID
- Embedded C/C++
- Java & XML

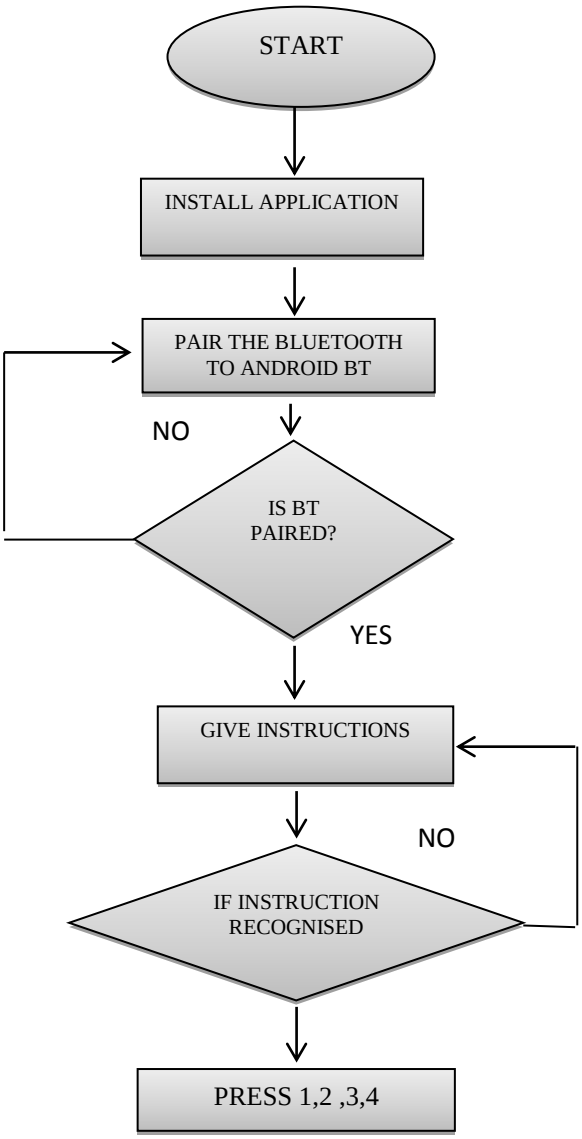
V. ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. Simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started An Arduino board consists of an 8-bit Atmel AVR microcontroller with complementary components to facilitate programming and incorporation into other circuits. An important aspect of the Arduino is the standard way that connectors are exposed, allowing the CPU board to be connected to a variety of interchangeable add-on modules known as **shields**. Official Arduinos have used the megaAVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. A handful of other processors have been used by Arduino compatibles. Most boards include a 5 volt linear regulator and a 16 MHz crystal oscillator (or ceramic resonator in some variants), although some designs such as the LilyPad run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory, compared with other devices that typically need an external programmer[4].

At a conceptual level, when using the Arduino software stack,all boards are programmed over an RS-232 serial connection, but the way this is implemented varies by hardware version. Serial Arduino boards contain a simple inverter circuit to convert between RS-232-level and TTL-level signals. Current Arduino boards are programmed via USB, implemented using USB-to-serial adapter chips such as the FTDI FT232. Some variants, such as the Arduino Mini and the unofficial Board uno, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. (When used with traditional microcontroller tools instead of the Arduino IDE, standard AVR ISP programming is used.

The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The Diecimila, now superseded by the Duemilanove, for example, provides 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs. These pins are on the top of the board, via female 0.1 inch headers. Several plug-in application shields are also commercially available. The Arduino Nano, and Arduino-compatible Bare Bones Board provide male header pins on the underside of the board to be plugged into solderless breadboards[6].

VI. FLOW CHART



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VII. ALGORITHM USED

```
char ch;
void blub1On(){
digitalWrite(6,1);
digitalWrite(7,0);
}
void blub2On(){
digitalWrite(8,1);
digitalWrite(9,0);
}
void blub1Off(){
digitalWrite(6,0);
digitalWrite(7,1);
}
void blub2Off(){
digitalWrite(8,0);
digitalWrite(9,1);
}

void setup() {
// put your setup code here, to run once:
pinMode(6,OUTPUT);
pinMode(7,OUTPUT);
pinMode(8,OUTPUT);
pinMode(9,OUTPUT);
Serial.begin(9600);
blub1Off();
blub2Off();
}

void loop() {
// put your main code here, to run repeatedly:
if(Serial.available()>0)
{
ch=Serial.read();
switch(ch)
{
case '1':blub1On();
Serial.print("Bulb1 On");
break;
case '2':blub2On();
Serial.print("Bulb2 On");
break;
case '3':blub1Off();
Serial.print("Bulb1 Off");
break;
case '4':blub2Off();
Serial.print("Bulb2 Off");
break;
case '5':blub1On();
blub2On();
Serial.print("Both On");
break;
case '6':blub1Off();
blub2Off();
Serial.print("Both Off");
break;
}
}
}
```

VIII. ADVANTAGES

- *It is robust and easy to use system.*
- *No extra training is required for new users. It is user friendly.*
- *All the control would be in your hands .*
- *A wide range of appliances can be controlled within the range of Bluetooth.*
- *There is a scope for future advancement through the use of IOT.*

I X. ACKNOWLEDGEMENT

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X. CONCLUSION

This project is based on Android and Arduino platform both of which are FOSS (Free Open Source Software)[5]. So the overall implementation cost is very cheap and it is affordable by a common person. Looking at the current scenario we have chosen Android platform so that most of the people can get benefit.

XI. REFERENCES

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