PROFESSIONAL TRAINING REPORT

at

Sathyabama Institute Of Science And Technology

(DEEMED TO BE UNIVERSITY)

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree inComputer Science and Engineering

By

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SATHYABAMA INSTITUTE
OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

(Established under Section 3 of UGC Act, 1956)

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SCHOOL OF COMPUTING

BONAFIDE CERTIFICATE

This is to certify that this Professional Training Report is the bonafide work **AMAN SINHA** (**Reg.No.3511025**) who underwent the professional training in "**IOT HOME AUTOMATION"** under our supervision from Feb 2018 to April 2018.

Internal Guide

Mrs. S.L. JANY SHABU,M.Tech.

Head of the Department

Dr.S.MURUGAN, M.E., Ph.D.,

Submitted for Viva voce Examination held on_____

Internal Examiner **External Examiner**

DECLARATION

I, **AMAN SINHA** (**Reg.No.3511025**) hereby declare that the Professional Training Report on "**IOT BASED HOME AUTOMATION USING BLUETOOTH HC-05"** done by me under the guidance of guide **Mrs. S. L. Jany Shabu,M.Tech.,** professor, Dept of CSE at Sathyabama University is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Computer Science and Engineering.

DATE:

PLACE: **SIGNATURE OF THE CANDIDATE**

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr.M. Lakshmi, M.E., Ph.D., Dean,** School of Computing and **Dr.S.Murugan, M.E.,Ph.D., Head of the Department, Dept. of Computer Science and Engineering** for providing me necessary support and details at the right time during the progressive reviews.

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I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of **Computer Science and Engineering** who were helpful in many ways for the completion of the project.

TRAINING CERTIFICATE

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CERTIFICATE OF COMPLETION

This is to certify that AMAN SINHA

has done INPL RAINING from 01/02/2018 to 30/04/2018.

During the training period the performance of the trainee

was found to be Good.

Project Manager

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ABSTRACT

This project reviews home automation using Bluetooth. Home automation becomes very popular among researcher.

Past two decades researchers are working with home automation. Home automation using wireless device becomes popular.

Several wireless devices are available like Bluetooth, Zigbee and GSM. Researchers are targeting Bluetooth based home automation because of its cost.
Many mobile phones have an inbuild Bluetooth. This paper discussed about various techniques involved to control the home appliances, controller used and number of devices controlled.

Home automation is the usage of information technology and computer for controlling home appliances and various other devices.

It can be simple control of a light bulb to a complex network based on computer or microcontroller which can have varying levels of automation and intelligence.
It means that one can control devices from any corner of the world.

LIST OF FIGURES

CHAPTER -1

INTRODUCTION

Home automation or domotics is building automation for a home, called a smart home or smart house. A home automation system will control lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems. When connected with the Internet, home devices are an important constituent of the Internet of Things.A home automation system typically connects controlled devices to a central hub or "gateway". The user interface for control of the system uses either wall-mounted terminals, tablet or desktop computers, a mobile phone application, or a Web interface, that may also be accessible off-site through the Internet.While there are many competing vendors, there are very few worldwide accepted industry standards and the smart home space is heavily fragmented. Manufacturers often prevent independent implementations by withholding documentation and by litigation. The home automation market was worth US$5.77 billion in 2013, predicted to reach a market value of US$12.81 billion by the year 2020. Nowadays, we have remote control for our television sets and other electronic systems, which have made our life real easy. Have you ever wondered about home automation which would give facility of controlling of tube lights, fan and other electric appliances at home using a remote control? Off-course,Yes! but are the available options cost-efficient? If the answer is No, we have found a solution to it. We have come up with a new system called Arduino based home automation using Bluetooth. This System is super-cost efficient and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smart phone.

Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using Bluetooth. With the help of this system you can control your home appliances from your mobile phone. You can turn on/off your appliances within the range of Bluetooth.

1.1 PROJECT AIM

The aim of the project is to design and construct a home automation system that will remotely switch on or off any household appliances connected to it, using a microcontroller, or Bluetooth based android application.

1.2 PROJECT OBJECTIVE

The objective of this project is to implement a low cost, reliable and scalable home automation system that can be used to remotely switch on or off any household appliance, using a microcontroller to achieve hardware simplicity, low cost short messaging service for feedback from any phone to toggle the switch state.

1.3 PROJECT SCOPE AND LIMITATION

This project work is completed on its own in remotely and automatically switching on or off of an electrical appliance not limited to household appliances and sends a feedback message indicating the new present state of the appliance.

CHAPTER-2

Description of the project

This project is one of the important Arduino Projects. Arduino based home automation using Bluetooth project help the user to control any electronic devices using Device control app on their Android smartphone. The android app sends commands to the controller – Arduino , through wireless communication , namely Bluetooth. The Arduino is connected to the main PCB which has two relays as shown in the block diagram. These relays can be connected to different electronic devices. As per block diagram, Device 1- Led light, Device 2- Fan.

When the user presses ‘A’ or ‘a’ on the command space on the app for the device 1, the Led light will be switch ‘on’. The Led light will get switch ‘off’ by pressing ‘B’ or ‘b’.

Similarly, When the user presses ‘C’ or ‘c’ on the command space on the app for the device 2, fan will be switch ‘on’. Fan will get switch ‘off’ by pressing ‘D’ or ‘d’.

This project of home automation using Bluetooth and Arduino can be used for controlling any AC or DC devices. In the demonstration , we have used DC fan and DC led light .To drive this fan and light , a step down transformer is connected provided by external power supply.

2.1 Required Hardware

The list of components mentioned here are specially for controlling for different loads.

- Arduino Uno with Atmega 328P microcontroller
- HC-05 Bluetooth Module
- 10 kResistor
- 12V Relay X 2
- Bread board
- Connecting wires
- Smartphone or tablet
- Transformer
- Power supply
- Capacitor

2.1 Software Required

- Arduino Compiler
- Proteus 7.1
- Android application

2.2 Arduino Uno

An Arduino is actually a microcontroller based kit which can be either used directly by purchasing from the vendor or can be made at home using the components, owing to itsopen source hardware feature.

It is basically used in communications and in controlling oroperating many devices. It was founded by Massimo Banzi and David Cuartielles in 2005.

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial

converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino1.0.

The Uno and version 1.0 will be the reference versions of Arduino, moving forward.

Technical Specification

- Microcontroller: ATmega328P
- Operating Voltage: 5v
- Input Voltage: 7-20v
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 20 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB of which 0.5 KB used by bootloader
- SRAM: 2 KB
- EEPROM: 1 KB

ARDUINO ARCHITECTURE

Arduino's processor basically uses the Harvard architecture where the program code and program data have separate memory. It consists of two memories- Program memory andthe data memory.

The code is stored in the flash program memory, whereas the data is storedin the data memory.

The Atmega328 has 32 KB of flash memory for storing code (of which

0.5 KB is used for the bootloader), 2 KB of SRAM and 1 KB of EEPROM and operates witha clock speed of 16MHz.

The most important advantage with Arduino is the programs can be directly loaded to

the device without requiring any hardware programmer to burn the program.

This is donebecause of the presence of the 0.5KB of Bootloader which allows the program to be burnedinto the circuit. All we have to do is to download the Arduino software and writing the code.

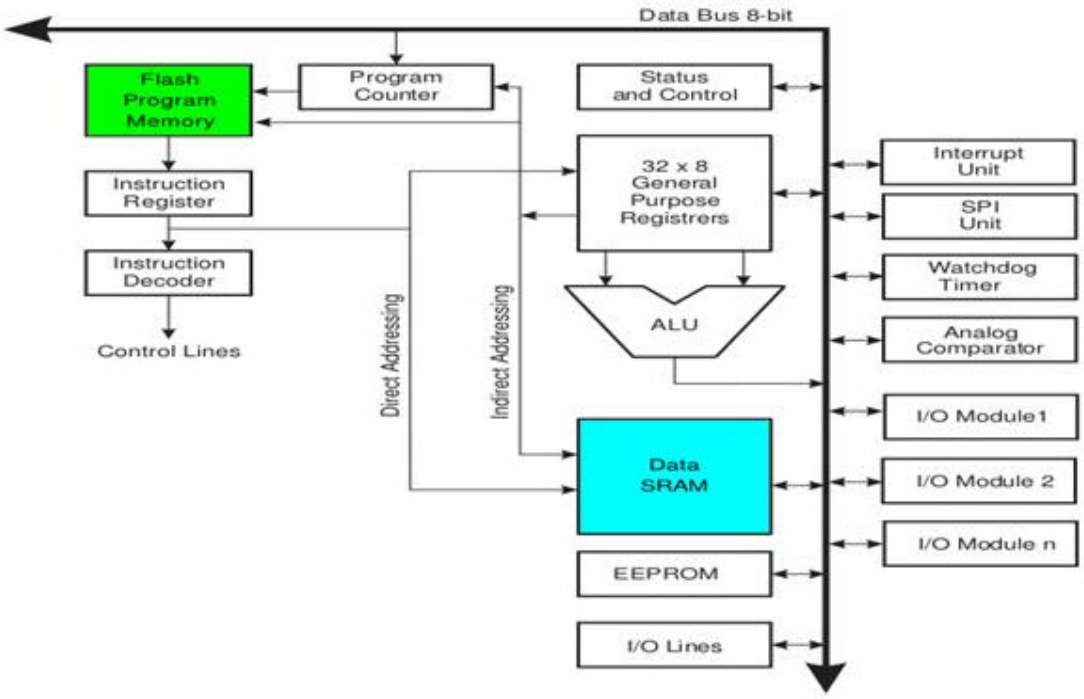

Fig. 2.2.1

Arduino Pin Diagram

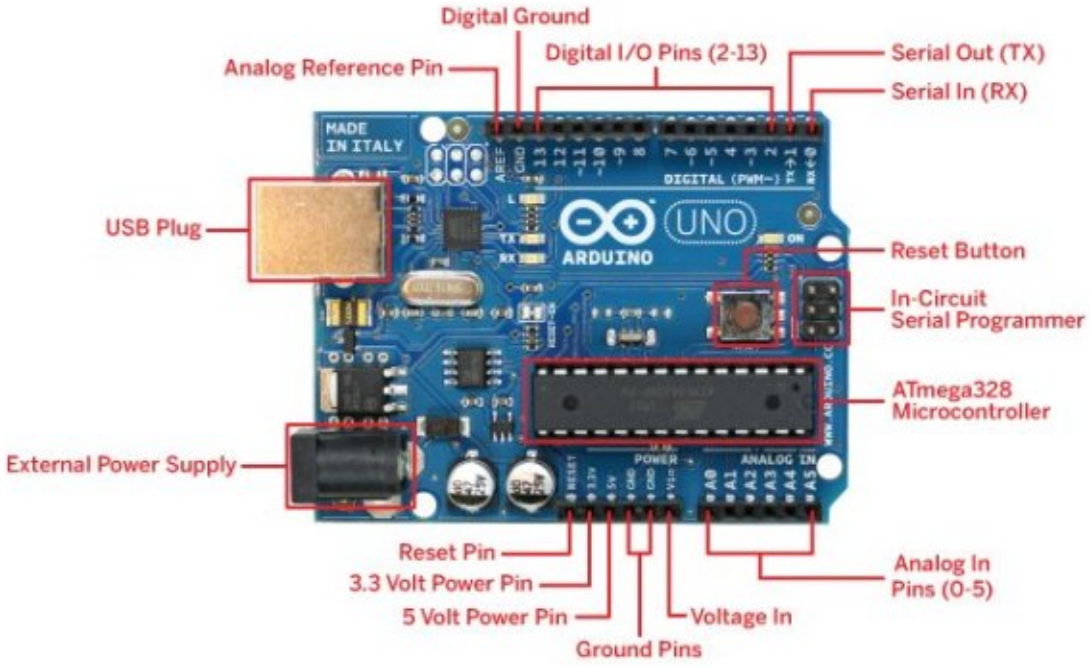

Fig. 2.2.2

2.3 Bluetooth HC-05

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate)3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

MODULE

The Bluetooth module HC-05 is a MASTER/SLAVE module.By default the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project, etc.

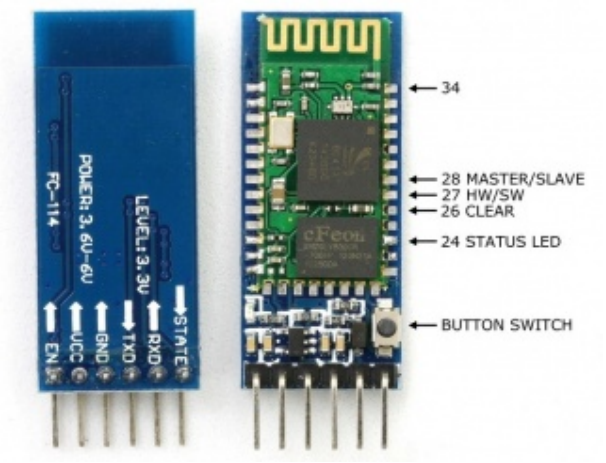

Fig.2.3.1

HC-05 Module interfacing with Arduino UNO

Hardware and Software Required

- HC-05 Bluetooth Module
- Arduino Uno
- Arduino IDE(1.0.6V)

Hardware Connections

As we know that Vcc and Gnd of the module goes to Vcc and Gnd of Arduino.The TXD pin goes to RXD pin of Arduino and RXD pin goes to TXD pin of Arduino i.e.(digital pin 0 and 1).The user can use the on board Led.But here,led is connected to digital pin 12 externally for betterment of the process.

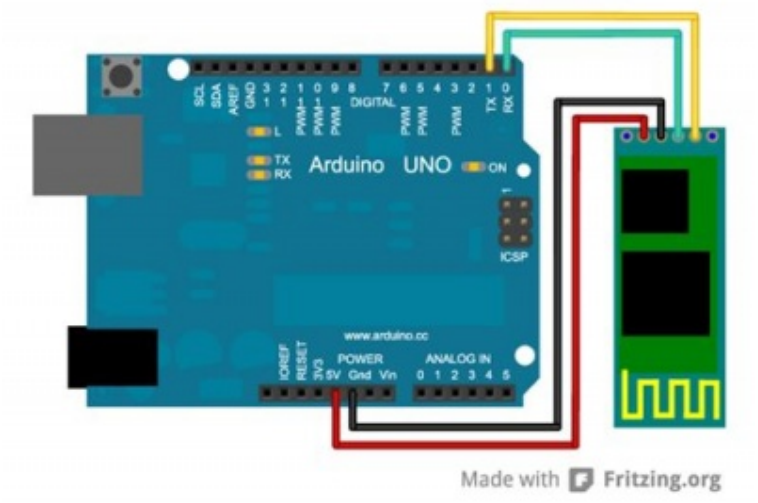

Fig.2.3.2

2.4 Relay

We know that most of the high end industrial application devices have relays for their effective working. Relays are simple switches which are operated both electrically and mechanically. Relays consist of a n electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays.

Fig.2.4.1

The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. The application of relays started during the invention of telephones. They played an important role in switching calls in telephone

exchanges. They were also used in long distance telegraphy. They were used to switch the signal coming from one source to another destination. After the invention of computers, they were also used to perform Boolean and other logical operations. The high end applications of relays require high power to be driven by electric motors and so on. Such relays are called contactors.

FEATURES

- They are quick acting and can be reset fast.
- They are simple in construction.
- They are reliable.
- The values can be easily set. No special programming device is required.
- People can be trained on these relays easily.

2.5 Power Supply

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

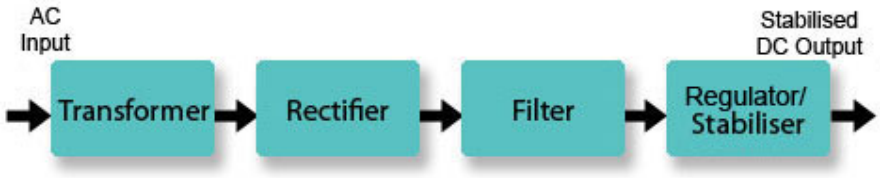

Fig.2.5.1

2.6 Transformers

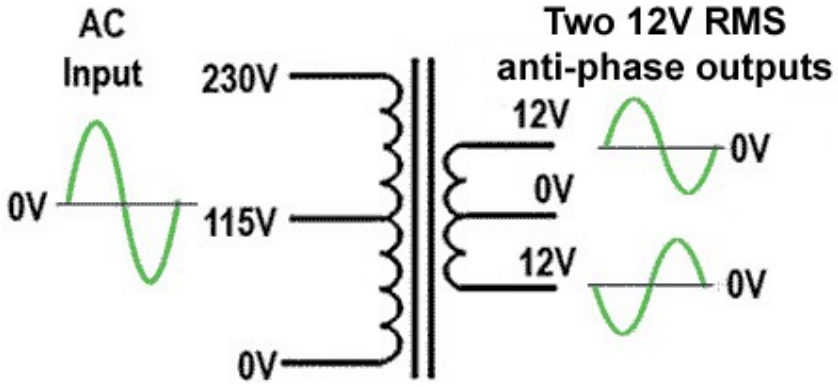

Fig.2.6.1

Basic power supply the input power transformer has its primary winding connected to the mains (line) supply. A secondary winding, electro-magnetically coupled but electrically isolated from the primary is used to obtain an AC voltage of suitable amplitude, and after further processing by the PSU, to drive the electronics circuit it is to supply.

The transformer stage must be able to supply the current needed. If too small a transformer is used, it is likely that the power supply's ability to maintain full output voltage at full output current will be impaired. With too small a transformer, the losses will increase dramatically as full load is placed on the transformer.

As the transformer is likely to be the most costly item in the power supply unit, careful consideration must be given to balancing cost with likely current requirement. There may also be a need for safety devices such as thermal fuses to disconnect the transformer if overheating occurs, and electrical isolation between primary and secondary windings, for electrical safety.

2.7 UART

The Universal Asynchronous Receiver/Transmitter (UART) controller is the keycomponent of the serial communications subsystem of a computer.

UART is also a commonintegrated feature in most microcontrollers. The UART takes bytes of data and transmits theindividual bits in a sequential fashion.

At the destination, a second UART re-assembles thebits into complete bytes.Serial transmission of digital information (bits) through a single wire or othermedium is much more cost effective than parallel transmission through multiple wires.Communication can be “full duplex” (both send and receive at the same time) or “halfduplex” (devices take turns transmitting and receiving).

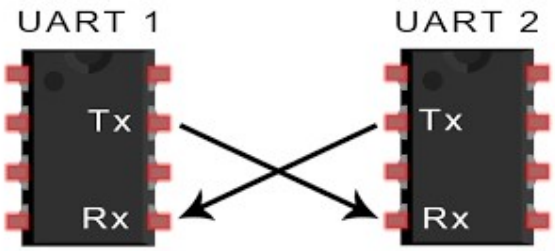

Fig.2.7.1

CHAPTER -3

3.1 DESIGN and IMPLEMENTATION

A low cost and efficient smart home system is presented in our design. This system has two main module: the hardware interface module and the software communication module. At the heart of this system is the Arduino Mega 2560 microcontroller which is also capable of functioning as a micro web server and the interface for all the hardware module. All communication and controls in this system pass through the microcontroller.

Designing the Circuit

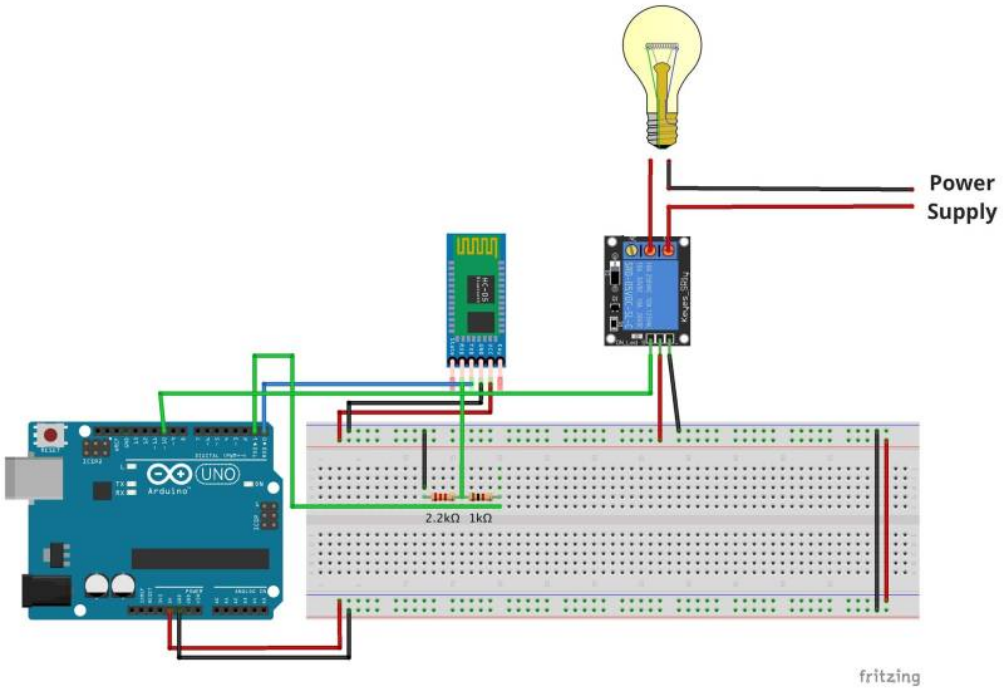

Fig.3.1.1

3.2 Technical specification for project

1. Android mobile or smart phone which should have the android app installed int it.

2. Bluetooth receiver module – our project will connect to the smart phone using Bluetooth technology.

3. Controller or main processing circuit – in this project , Arduino Uno is the main controlling / processing unit. Also, this project can be developed using PIC18F4550, AVT AT mega32 and 8051 series.

4. LCD Display is optional but shows important messages like device status once command is received from Bluetooth.

5. Relay to control devices – We have used 12 volt single push throw relays.

6. Output devices – For the demo purpose, we connected a DC devices to a relay (12 volt DC fan). You can connect an AC/DC devices to the relays.

3.3 PROGRAM CODE

```
void setup() {
Serial.begin(9600);
pinMode(6,OUTPUT);
pinMode(8,OUTPUT);
}
void loop() {
if(Serial.available()>0)
  {
    char z=Serial.read();

    if(z=='A'||z=='a')
    {
digitalWrite(6,1);
Serial.println("Light On");
    }
    else if(z=='B'|| z=='b')
    {
digitalWrite(6,0);
Serial.println("Light Off");
    }
    else if(z=='C'||z=='c')
    {
```

```
digitalWrite(8,1);
Serial.println("Fan On");
    }
    else if(z=='D'||z=='d')
    {
digitalWrite(8,0);
Serial.println("Fan Off");
    }
  }
}
```

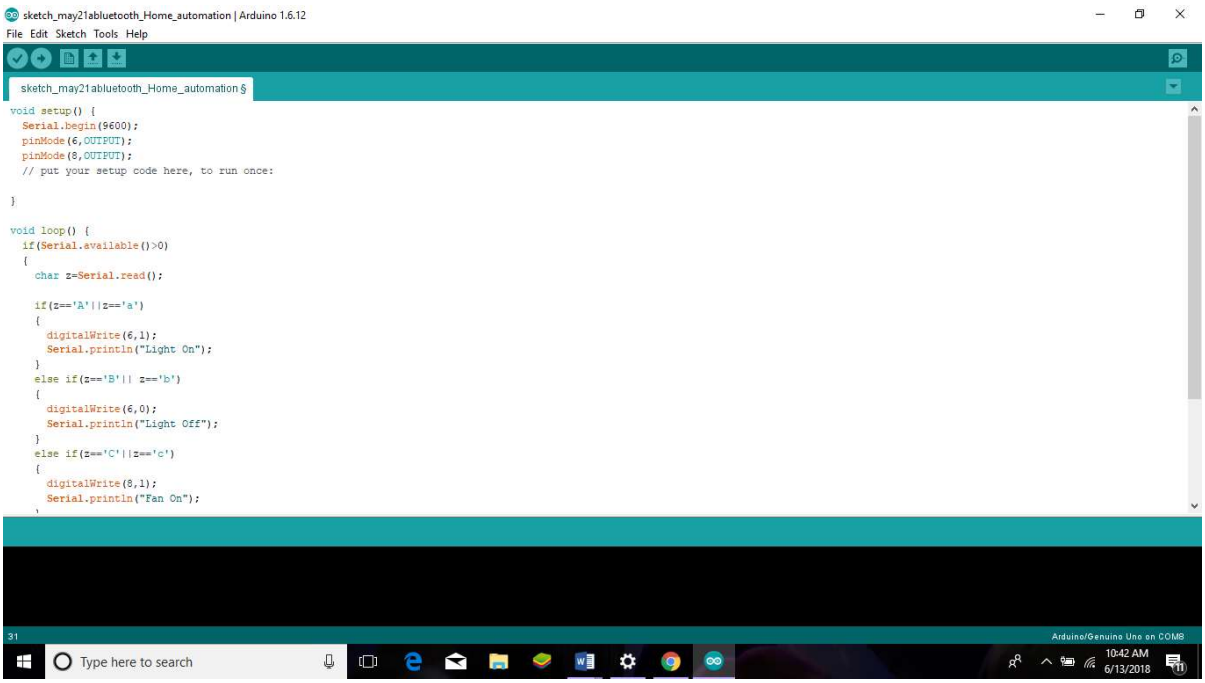

Fig.3.3.1

CHAPTER-4

4.1 Pros of Home Automation

Security

Tap your finger to turn on the lights when you get home so you worried about what's hiding in the shadows, or in your pathways. Or automate to turn on when you aren't home to look like you are to ward off potential robbers. Door locks are another automated home product that can increase your home security.

Worried that the kids didn't lock the doors before they ran off to play? Or that someone will discover your not-so-secret hiding place for the extra key? Take control of your home safety from a simple app. With some products, you can even get an alert every time someone enters your home.

Energy Efficiency

Increase your home's energy efficiency by remotely powering off systems and appliances when they aren't in use. In addition to the standard home automation products that give you active control, some products actively monitor systems and arm the homeowner with knowledge, insight and guidance to achieve greater control and energy efficiency.

Savings

Home automation literally pays off. When you are able to use home systems and appliances only when needed, the savings will be apparent in the first utility bill. No more wasting money on lights left on when you aren't home, or spending money on gas to drive home because you forgot to lock the door. Monetary savings are apparent, but you'll also be saving time. No wasted trips home, no running through the house turning everything off, no time spent worrying about what was or wasn't turned off.

Convenience

Don’t you hate having to rely on neighbors to watch your house when you’re gone? With home automation, convenient control of your home is at your fingertips. You don’t have to trust someone else with your most valued possessions.

Comfort

Ever leave for work in the morning when it was a comfortable 68° outside only to come home to a sweltering house because the temperature shot up to 90°? Connected home products like the Wi-Fi Thermostats let you conveniently adjust your home temperature from the mobile app so your family is always comfortable.

Peace of Mind

One of the biggest hidden benefits that comes with home automation is peace of mind. No more worrying if you turned off the lights, locked the door or turned off the television. For people who have a lot on their plates, being able to easily check these items off the to-do list and stop the obsessive worrying, home automation is reassuring and definitely worth the investment.

4.1 Cons of Home Automation

Installation

Depending on the complexity of the system, installing a home automation device can be a significant burden on the homeowner. It can either cost you money if you hire an outside contractor or cost you time if you venture to do it yourself.

Complex Technology

Automating everything in life may sound extremely appealing, but sometimes a good old-fashioned flip of the switch is a lot easier than reaching for your smart phone to turn lights on and off. Before you decide which system is right for you, think about how far you really want to take home automation in your household.

System Compatibility

Controlling all aspects of home automation from one centralized platform is important, but not all systems are compatible with one another. Your security system, for example, may require you to log in to one location to manage settings, while your smart thermostat may require you to log in to another platform to turn the air conditioner on and off. To truly leverage the convenience of home automation, you may need to invest in centralized platform technology to control all systems and devices from one location.

Cost

Even though the price of home automation systems has become much more affordable in recent years, the cost to purchase and install a device can still add up. Consumer Reports offers a wide range of information and insights – including costs – on the best home automation systems on the market.

4.2 Application:

Put off the Bathroom Fan Automatically

We all have a tendency to leave the bathroom fans on. Also many a times we forget to put it off which consist us a lot of electricity wastage. Now if you have a home automation system you can probably set a timer inside the bathroom that will automatically stop the fan at the set time. This way the fan will go off even if you forget to put it off manually. If you are worried that the fan will go off when a person is inside the bathroom then you can fix a motion detector too so that the fan does not go off when there is motion inside the room.

Turn Your Webcam into a Security Camera

Instead of installing a surveillance camera you can always use the webcam for keeping track on your children as it can successfully perform the activity of taking note of all activities. Also it is cheap and very minute and the activities can be checked with the help of the internet.

Install a Wireless Intercom

You are busy eating your food and suddenly you see the vegetables are over. You call out to your spouse to give you some who is busy in some work. You have to scream at the top of your voice which is very embarrassing. Instead of shouting you could simply attach a wireless intercom and call out to her and ask her for the vegetable. In this way you can save your energy and time too.

Capture Party Moments without using your Digital Camera or DSLR

The best way to capture party moments without your DSL would be with the help of a webcam. Set the time and let it go on capturing videos and images. There are software's available for windows. The software helps in saving the captured pictures as JPEG files. In that case you no more need to worry to take your camera along if you have a digital camera with you.

4.3 Future Development of the Project

- Arduino based device control Bluetooth on Smartphone project can be enhanced to control the speed of the fan or brightness of the light etc.

- Home automation and device controlling can be done using internet of things using advance technologies.

- We can replace Bluetooth by GSM modem so that we can achieve device controlling by sending SMS using GSM modem.

- Automation can be done in different fields like Hospital Automation, Service Automation etc.using the same technology.

CHAPTER 5

5.1 CONCLUSION

HomeAutomation is undeniably a resource which can make ahome environment automated. People can control their electricaldevices via these HomeAutomation devices and set up thecontrolling actions in the computer. We think this product havehigh potential for marketing in the future. At the moment thecomponents are a bit to high to be able to produce these devicesfor a interesting price.
The home automation system has been experimentally proven to work satisfactorily by connecting sample applications to it and the applications were successfully controlled from a wireless mobile device.

I learned many skills like soldering, wiring the circuit and other tools that I used for the project and was able to work together as team during this project.

The Bluetooth client was successfully tested on a multitude of different mobile phones from different manufactures, thus proving its portability and wide compatibility. Thus,a low cost home automation system was successfully designed, implemented and tested.

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Some of the referred books are:

- Getting started with IOT by Cuino Pfister
- Uniq technologies Module