

**DESIGN AND DEVELOPMENT OF A SMART HOME WITH  
ENHANCED SECURITY**

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**9 September 2021**

## **APPROVAL**

This Project titled “**Design and Development of a Smart Home with Enhanced Security**”, submitted by **Md. Al-Amin Rahman**, ID No: **152-15-5805** and **Foyshal Ahammed**, ID No: **153-15-6543** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 9 September 2021.

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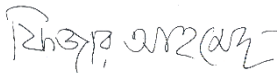
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## DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Md. Tarek Habib, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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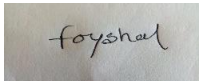
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## ACKNOWLEDGEMENT

First we express our heartiest thanks and gratefulness to almighty God for His divine blessing makes us possible to complete the final year project/internship successfully.

We really grateful and wish our profound our indebtedness to our Supervisor **Md. Tarek Habib Assistant Professor**, Department of CSE Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of “*Android Application Development*” to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism , valuable advice ,reading many inferior draft and correcting them at all stage have made it possible to complete this project.

We would like to express our heartiest gratitude to Professor Dr. Touhid Bhuiyan sir, Head of Department of CSE, for his kind help to finish our project and also to other faculty member and the staff of CSE department of Daffodil International University.

We would like to thank our entire course mate in Daffodil International University, who took part in this discuss while completing the course work.

Finally, we must acknowledge with due respect the constant support and patients of our parents.

## **ABSTRACT**

Home automation is changing into in style thanks to its varied advantages. Home automation refers to the management of home appliances and domestic features by native networking or by remote. AI provides USA the framework to travel period of time call and automation for Internet of Things. The work deals with discussion regarding totally different intelligent home automation systems and technologies from a varied options standpoint. The work focuses on construct of home automation wherever the monitoring and management operations square measure facilitating through good devices installed in residential buildings. Heterogeneous home automation systems and technologies thought-about in review with central controller based mostly (Arduino or Raspberry pi), web based, email based mostly, Bluetooth-based, mobile-based, SMS based, ZigBee based mostly, twin Tone Multi Frequency-based, cloud-based and therefore the Internet with performance. On the other hand it can also include our home security such as access control system and alarm system. Besides it is a worth it's financially if we want to use it for long run.

## TABLE OF CONTENTS

<b>CONTENTS</b>	<b>PAGES</b>
Board of Examiners	ii
Declaration	iv
Acknowledgements	v
Abstract	vi
<b>CHAPTER</b>	
<b>CHAPTER-01: INTRODUCTION</b>	<b>13-20</b>
1.1 A Microcontroller timeline	13
1.2 Some common microcontroller & their internal Architecture	14
1.3 What is an Arduino	16
1.4 Arduino Models	17
1.5 Uno board	17
1.6 What is an android	19
1.7 Versions of Android	20
<b>CHAPTER-02: FEASIBILITY STUDY</b>	<b>21-22</b>
2.1 Function of microcontroller	21
2.2 Types of microcontroller	21
2.3 Microcontroller structure	22

<b>CHAPTER-03: ANALYSIS</b>	<b>23-28</b>
3.1 Requirement Analysis	23
3.2 Bluetooth module	23
3.3 5V relay	24
3.4 Prototype board or breadboard	25
3.5 Connecting wires	25
3.6 Servo motor	26
3.7 Mechanism	27
3.8 Software Requirement	27
3.9 Project cost	28
<b>CHAPTER-04: DESIGN SPECIFICATION</b>	<b>29-32</b>
4.1 Structure Diagram	29
4.2 Circuit Diagram	30
4.3 Flow chart	30
4.4 Android Device	31
4.5 Output Design	32
<b>CHAPTER-05: IMPLEMENTATION</b>	<b>33-47</b>
5.1 Coding	33
5.2 Parallel programming	33
5.3 Serial programming	34
5.4 Arduino IDE	35
5.6 Compiling & Uploading	37
5.7 Testing Arduino	38
5.8 Testing Bluetooth	39



5.9 Relay board	39
5.10 Hardware setup	41
5.11 Working Moment	43
5.12 Coding Arduino Uno	45
5.13 Compiling sketch	47
<b>CHAPTER-06: CONCLUSION</b>	<b>48</b>
6.1 CONCLUSION	48
<b>CHAPTER-07: FUTURE WORKS</b>	<b>49</b>
7.1 FUTURE WORKS	49
<b>APPENDIX</b>	<b>49</b>
<b>REFERENCE</b>	<b>50</b>

## LIST OF FIGURES

NAME OF FIGURES	PAGES
Fig 1.1: Inside of a microcontroller	14
Fig 1.2 Intel Microcontroller	15
Fig 1.3: Block diagram	15
Fig 1.4: Uno Board	18
Fig 1.5: Android Symbol	19
Fig 2.1 The basic structure and block diagram of a microcontroller	22
Fig 3.1: Bluetooth module	23
Fig 3.2 5V relay	24
Fig 3.3 Prototype board or breadboard	25
Fig 3.4 Connecting wires	26
Fig 3.5 Servo Motor	26
Fig 4.1 block diagram of Smart home automation	29
Fig 4.2 Circuit Diagram of Smart home automation	30
Fig 4.3 Flow chart of Smart home automation	31

Fig 4.4 Graphical interface of Android Device	32
Fig 4.5 Output design	32
Fig 5.1 Arduino Ide	36
Fig 5.2 Pasting code in Arduino	36
Fig 5.3 Testing Arduino	38
Fig 5.4 Testing Bluetooth	39
Fig 5.5 Relay Connection	40
Fig 5.6 Hardware setup Working	41
Fig 5.7 Hardware setup	42
Fig 5.8 Working Moment	43
Fig 5.9 Working Moment	44
Fig 5.10 Compiling Sketch	47

## **LIST OF TABLES**

<b>NAME OF TABLES</b>	<b>PAGES</b>
Table 1.1: Version of Android	20
Table 3.1: Project cost	28

# Chapter-1

## Introduction

### 1.1 A Microcontroller timeline

The year of 1971 first microcontroller call Intel 4004 discharged and it was 4-bit. Besides Intel 8008 and alternative a lot of capable micro-processor changing into out there over ensuing different period of time. Moreover each processor needed a chip called external and this chip is appointments working a system, increasing the value of entire system and creating this not possible to our economically that computerize the tackle. A book that credits called TI engineers city Daniel Boone also archangel airman they make primary microcontroller successfully in year of 1971. So the results of that they create and the name was TMS a thousand and it became commercially out there the of 1974. It can do some of things and linked read-only memory, also read or write our memory. On the other-hand it processor and it put down and with a chip and aimed at a system called embedded. It partly in answer to the presence TMS a thousand of it's single-chip. Intel company manifested a automatic data processing system that can optimized a single chip for management application, besides 8048 Intel chip with industrial element initial shipping in the year of 1977. It join random access memory and fixed storage in a chip that contain both RAM and storage. The chip can notice of it's manner within above a number like on billion laptop keyboards and alternative varied appeals. Then Luke J. Valenter president of Intel declared that in their company's history microcontroller is the winner and then they expend their budget over a 25 in several division's. Now a days top most microcontrollers had cooccurring duplicate. There are many verity like read-only storage program memory that has a rock crystal window and it cover the package to permit it. Also it can erased by outpouring to actinic radiation and it can be used like a prototype. The opposite has two option a mask programmed fixed storage that manufacture to get giant series or a promenade duplicate that can solely the programable on time. Typically it was import for OTP and called one-time programmable. The promenade had sort of memory for identically because read-only storage. However as a result it can expose ultraviolet light and it couldn't be deleted. A versions named effaceable is needed for it's ceramic package and it also have a window make with quartz. And then it was dearer for OTP version. It created opaque plastic within a low-cost packages. Inerasable variants to make they needed quartz rather that low costly glass. So it can clearness the ultraviolet. Besides the glass is basically turbid to ultraviolet but the most value get for ceramic

package. EEPROM memory introduced on 1993 and allowed microcontrollers to be deleted electrically and this process was quick without an upscale package. PRN to read-only storage, permitting each speedy prototyping in a programming system. EEPROM is inexpensive and it has 9 microcontrollers. A equivalent year the company name Atmel introduce us the primary microcontroller that is non-volatile storage. Many firms followed them and they also make microcontroller. They made different microcontroller. 8-bit microcontroller is most cost usefully microcontroller. It's cost is 0.25USD and a few 32-bit microcontroller cost is US\$1. Now microcontroller is chip for it's cost and we use it in many purposes. Many commercial industries are built there own microcontroller for there own purposes. In the future we can use generally MRAM because it has semiconductor wafer method and it's cost is very low.

## 1.2 Some common microcontroller & their internal Architecture

There are many things attached in a microcontroller. Fig 1.1 shows us insides of microcontroller and fig 1.2 shows us what actually outside view of a microcontroller. Besides 1.3 shows us the block diagram of microcontroller.

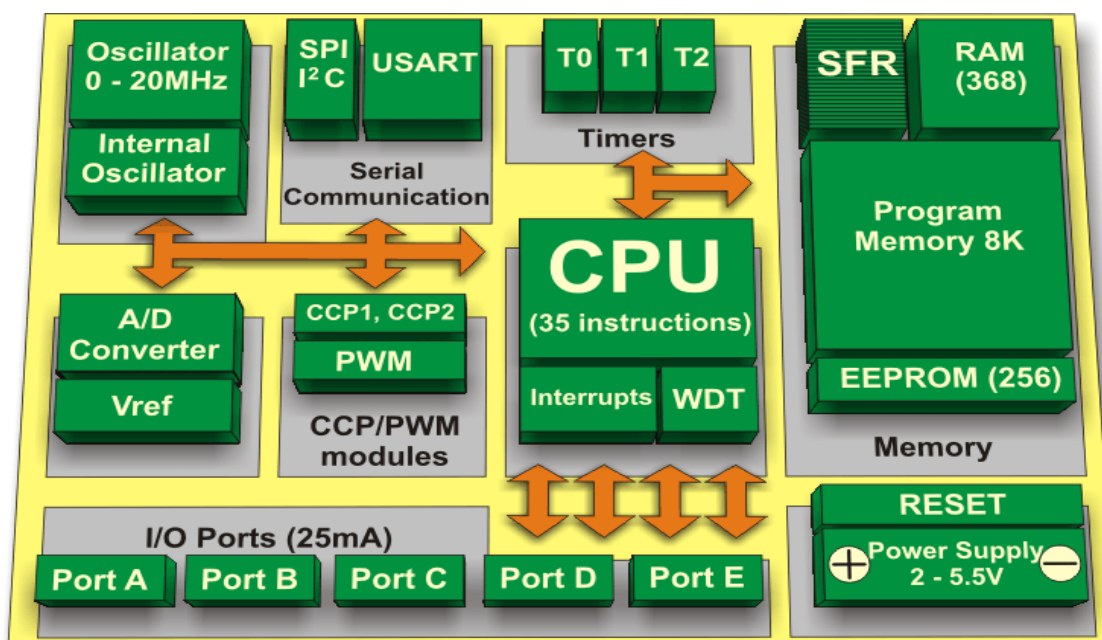


Fig: 1.1 Inside of a microcontroller



Fig: 1.2 Intel Microcontroller

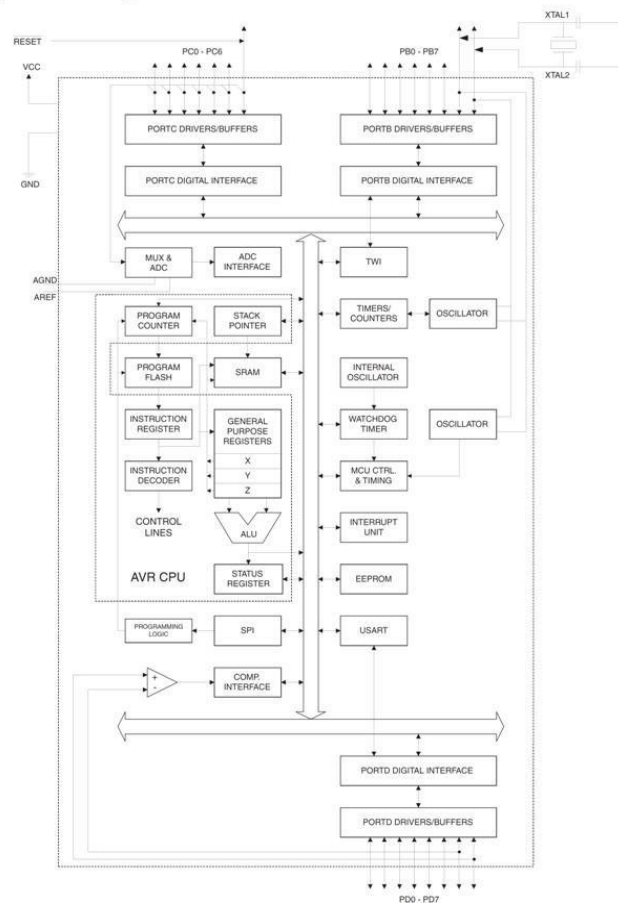


Fig 1.3: Block diagram

## 1.3 What is an Arduino?

We know that the Arduino Nursing ASCII text file physics platform supports easily managed hardware and code. The Arduino board is ready to measure squares for browsing inputs - a light on a detector also it can a finger on a button, or a message that can be twitted - and it switches between nursing output associates - a motor-activated, associate nursing crystal modifier, one line of business. By collecting instructions from the board's microcontroller we can tell our board what to do and what not to do. Arduino programming language (based on cable), and Arduino code (IDE), try to work in an acceptable way. Over the years, hundreds of thousands of Arduino has become, and the more complex scientific and everyday purposes. We know that a global community of creators - students, hobbyists, programmers and professionals - have almost integrated this ASCII text file platform, grading their activities up to an incredible amount of accessible data that would be great for beginners and experts alike. We know that the Arduino Ivory was born at the Interaction Style Institute as a soft tool for rapid prototyping, which was in favor of students when they had no background in physics and programming. Nowadays as it has reached a wider community, the Arduino board has begun to move dynamically to adapt to new demands and challenges, separating products from clean 8-bit boards for IoT applications, clothing, 3D printing and an embedded environment. However all Arduino board square measurements are completely open source, giving users the ability to create them in a variety of ways and ultimately specifying what they want. The code is an ASCII text file and also it is rising through the users and contribute worldwide. Thanks to its intuitive and accessible clints skills, the Arduino has been used in thousands of different come-and-go applications. Also the Arduino code is very light to use who are beginners, but multipurpose enough for leading users. On the other-hand this can runs on waterproof, a Windows and a Linux. Educators and students use it to create this scientific instruments because its cost is low, and they are proves the principles of chemistry and the principles of physics, then they start with programming and it also can start with AI (artificial intelligence). The people who design and designers create interactive prototypes, musicians and artists manage it for their installation and to experiment with brand new musical instruments. The manufacturers, of course, use this as an example to create several seats that appear in the Creator Fire. Arduino can be a key tool to find young things. So anyone will follow the step-by-step process of decorating kids, hobbies, mechanics, programmers, or start sharing ideas online with other members who are in Arduino community. Arduino program code could also be written in known programming language. We can



use it after compile and then it produces computer code for where we want to use a specific processor. Atmel creates a development environment for its microcontroller, AVR Studio and so new Atmel Studio. The Arduino project can give the Arduino Integrated Development Environment (IDE), so it can be a cross-stage solicitation and it written under a programming language and the programming language is Java. It is derived from the IDE for language method and cable. It has a code editor that includes text cutting and pasting, wanting and replacing text, automatic indenting, brace mailing and syntax highlighting, providing an easy-click method associated with the Arduino board nursing transfer program. For Arduino, a program written with IDE (known as Integrated Development Environment) is called Sketch. So the Sketch Unit event is fixed on the computer as a text file with the .ino file extension. Arduino Code (IDE) on the other hand has saved the sketch with pre-1.0-it .pde extension writing. The Arduino IDE supports separate rules of code structuring using the C and C ++ languages. So the Arduino IDE provides a code library where the wiring project is located, it has many common input and output methods. What is needed for more user-written code is just a pair of basic functions, measuring square to square and therefore the main program loop, compiling that unit and connecting it to a program's Stub Main () Nursing Associate with a potentially cyclical programming bovid toolchain. Limit IDE distribution. But the Arduino IDE program works to convert main code into a data file and then it carries hex encrypted text which is loaded into the Arduino board and it called the loader program inside the board code.

## **1.4 Models of Arduino**

A growing range of Arduino boards area unit out there. Some area unit designed for special applications, whereas others area unit designed with diff processors and memory configurations. Some boards area unit thought of official Arduino boards bcz they're branded & supported by Arduino.cc.

## **1.5 Uno board**

The Arduino Uno may even have a board called microcontroller and it is supported by the ARmega328. In this board 14 digital input/output, ½-dozen analog inputs. It also has a 16 megacycle per second generator, USB affiliate, an impact jack, an it is associate with ICSP header, and also single button. It has everything the microcontroller wants to support we can connect it

simply to a computer that is portable and also we need a USB cable or force it with an AC-to-DC adapter or start clear out the battery. Fig 1.4 Uno board is completely different from all previous boards so it does not use FTDI USB-to-serial driver chip. Rather, it prefers Atmega8U2 programmed as a USB-to-serial device. "Uno" suggests that one is named in Italian to mark the upcoming Anhach of Arduino OneH. Uno and version one.0 target Arduino's reference version, moving forward. We know that Uno is the most current of the AN series on the USB Arduino board and therefore the reference model of the Arduino platform; For comparison with the former metaphase.

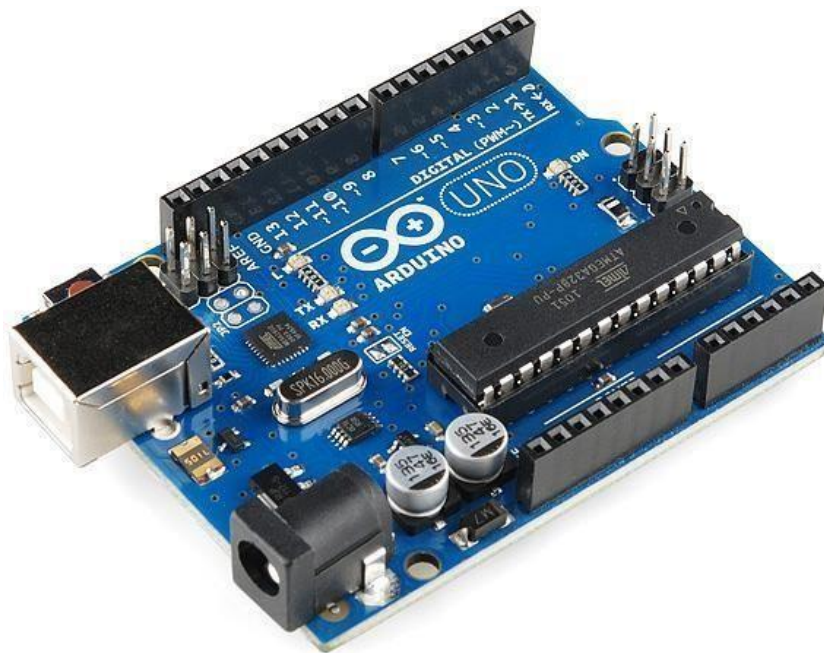


Fig 1.4: Uno Board

## 1.6 What is an android?

It is a operating system and it based on a modified version of a operating system name Linux Kernel and also various open source software. It's design is good and specially built for touchscreen mobile device like smartphones and tablets. This operating system is built by Google. We can access many

thing because of it. Google includes many services in it such as search, YouTube, Gmail etc. We also can search to find our own location. And fig 1.5 show's a android symbol.



Fig 1.5: Android Symbol

## 1.7 Version Of Android

Version	Code name	Release date	API level	DVM/ART	Distribution	First devices to run version
7.1	Nougat	October 4, 2016	25	ART	0.4%	Pixel, Pixel XL
7.0		August 22, 2016	24	ART	4.5%	Nexus 5X, Nexus 6P
6.0	Marshmallow	October 5, 2015	23	ART	31.2%	
5.1	Lollipop	March 9, 2015	22	ART	23.0%	Android One
5.0		November 3, 2014	21	ART 2.1.0	9.0%	Nexus 6
4.4	KitKat	October 31, 2013	19	DVM (and ART 1.6.0)	20.0%	Nexus 5
4.3	Jelly Bean	July 24, 2013	18	DVM	1.5%	Nexus 7 2013
4.2		November 13, 2012	17	DVM	5.1%	Nexus 4, Nexus 10
4.1		July 9, 2012	16	DVM	3.5%	Nexus 7
4.0	Ice Cream Sandwich	December 16, 2011	15	DVM	0.9%	Galaxy Nexus
2.3	Gingerbread	February 9, 2011	10	DVM 1.4.0	0.9%	Nexus S

Fig: Table 1.1 List of Android Version Table

## **Chapter-2**

### **FEASIBILITY STUDY**

#### **2.1 Function of microcontroller**

Microcontroller could also be a single chip little computer created through VLSI fabrication. A microcontroller in addition called associate embedded controller as a results of this controller and it can support the area unit where the circuits are situated and typically designed or it can embedded in the devices of their mange. There are many microcontroller are available in many varieties such as microprocessor(4-bit, 8-bit, 16-bit, 32-bit, 64-bit and 128-bit). We will be ready to notice mi8crocontrollers altogether various type of devise late that are electronic. Any instrument that measures, stores, calculate, control also display data have a chip called microcontroller. The most important of this microcontroller is single use and it can trade. We will be ready to in addition notice many things. Keyboard, mouse, printer, headphone etc all have a microcontroller inside it and work differently. In restraint devices, microcontrollers have the flexibility to store measurements, making it easier for users to routinely structure and store choices and to direct messages and waveforms. Consumer products that use microcontrollers squeeze digital camcorders, also use optical players, various machines, robots, LCD / LED device show units.

#### **2.2 Microcontroller various types:**

There are many verities of microcontroller present in the world is given below:

- A processors made by ARM core.
- A microcontroller do his job with a targeted application is called ARM cortex-M cores.
- 8-bit version Atmel AVR and 32-bit version AVR32
- A microcontroller used in PSoC name Cypress semiconductors M8C core
- Another is Freescal ColdFire and it contains 32-bit
- A factory made microcontroller Intel 8051 and it has NXP semiconductors.
- XC-800 8-bit and XE166 16-bit made by Infineon
- PIC technology and it has many types such as PIC16 (8-bit) , PIC33/24 (16-bit)
- Optical phenomenon automation

- RL78 (16-bit) MCU , RX (32-bit) MCU made by Renesas Electronics
- A microcontroller which made with semiconductor called Laboratories Pipelined 8051 (8bit) and also has a 32-bit ARM
- TI MSP430 made by 16-bit and MSP432 and C2000 both made by 32-bit
- TLCS-870 made by Toshiba. It's measurement is used in very slim vary of application or unit of measurement.

Tons of various microcontroller used by measurement type application processors. Microcontroller value in market is so high. So there are many company who are wiling to mass produce of this chips. It sold value is also high because of many technology run by microcontroller.

### 2.3 Microcontroller structure

Fig 2.1 shows us the inside of a basic microcontroller structure.

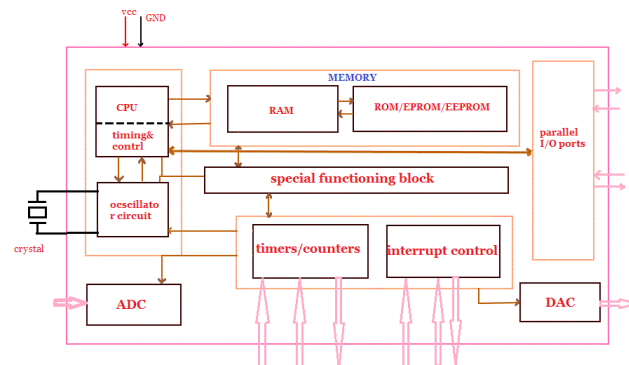


Fig: 2.1 A microcontroller block diagram and basic structure

# Chapter-3

## Analysis

### 3.1 Requirement Analysis

#### Hardware Requirement

1. Arduino
2. A 5v Bluetooth module.
3. Relay (5V)
4. Breadboard (Prototype board)
5. Wires (for Connecting)
6. Servo motor

### 3.2 Bluetooth module

We need a Bluetooth module called HC-05. We use it in serial protocol module. It designed for clear seral association which is wireless that we need in our setup. We use serial port module because it is qualified Bluetooth which we need and also it has V2.0 + EDR and it's speed is 3Mbps. This Bluetooth HC-05 shows in fig 3.1 has a radio wireless (2.4 GHz) and a baseband. We can use it for CSR bluecore because it has 4-external signal chip processor and bind with a technology called CMOS with AFH. It's footmark is 12.7mm x 27mm. We can modify it's design or overall development cycle.



Fig 3.1: HC-05 Bluetooth module look

### 3.3 5V relay

We used 5V relay for an automatic control circuit and we can control a high-current while we using low-current signal. It is an automatic switch. It can use as a helper when we use a electrically operate a switch. It's input voltage ranges is from 0 to 5V we see in fig 3.2. We can also use alternative like solid-state relays. When we need to measure a low-power signal, also circuits, it controlled them by one signal. We can use basic relay for long distance telegraph circuits like amplifiers. They are coming back from a signal continuously and then retransmitted it an another circuit.

It used extensively in phone and also early computers because it can carry the operation of logic. Relay can handle the high power current when it directly use to management a electric motor or alternative contactor. On the other-hand solid-state relays can manage the power circuits when it deal with no moving components instead it employing a conductor to perform change. It can helped when a multiple operational coils is overload or faults. In fashionable power system it still protect the digital instruments and maintain a designation called 'protective relays'. When it comes with magnetic latching it need on pulse of coil power. IT also can redirected those pulse. In relay there is no impact from identical input whenever the power are interrupted to transmit power then the magnetic latching relays can help their. There are one or twin coils in magnetic latching relays. In devices we get one coil. Relay can operation one direction for applied power in one polarity and it also can reset the polarity when direction is changed. When we use coil in a twin coil device it is used in a reset coil traffics and can be exchanged. On the other-hand in AC controlled magnetic bolt have on coil and it use to steering diodes in reset commands and operate.

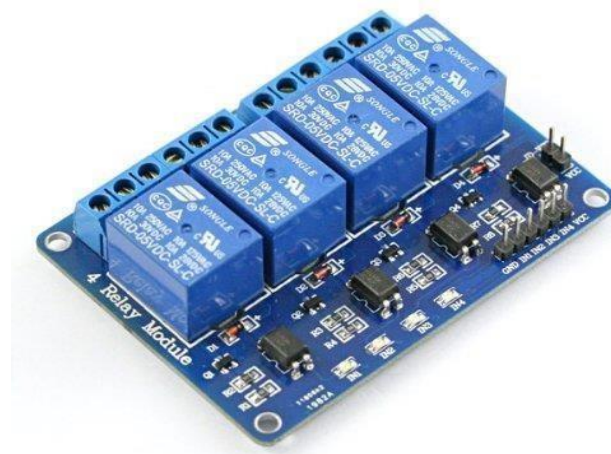


Fig: 3.2 5V relay



### 3.4 Prototype board or breadboard.

A board that build for various prototyping and it using electronics is called breadboard. There are many electronics devices that can not connect all devices. But we need many electronics devices. So we use breadboard and it gives us the opportunity to decrease the use of many electronics devices. We can connect electronics devices by using wire within in breadboard fig 3.3 and connect many devices. So we can easily create a connection through wires when we need to by breadboard.

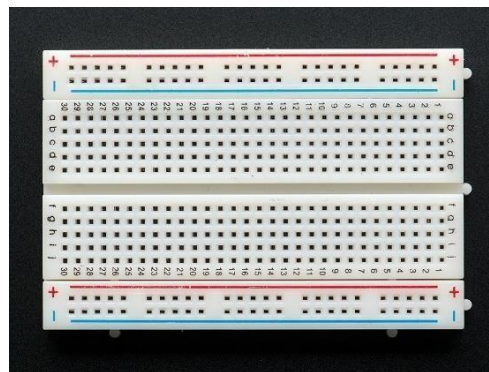


Fig: 3.3 Prototype board or breadboard

### 3.5 Connecting wires.

A wire is generally cylindrical and it made by rod of metal. This wire contain the connection of electrical devices. It passes the electricity and make a telecommunications signals. It made by metal through a hole and covered with soft plastic. It comes with many sizes. The metal of the wire is copper or aluminum because there are good for passing electricity easily. It has many verities. The wire has two sides. This sides can be male- male fig 3.4 or male-female or female-female. We used this wire for our GND and 5V connection.



Fig: 3.4 Wires (for Connecting)

### 3.6 Servo motor

It is a rotary actuator or can be linear actuator uses for control position. This control position is angular or linear. On the other-hand it can velocity and acceleration. It has a suitable motor and some sensor for maintain it's position. Servo motor has three wire. We use it for our door-lock system. We connect it's wire in breadboard and Arduino Uno board. The wires goes to GND, 5V and digital pin in Arduino. This servo motor fig 3.5 also used in robot. It can rotate robots movement like hand movement, circle movement etc. We also can used it for various motor application and utilized in a awfully closed loop. So it is a very useful motor in modern era.



Fig: 3.5 Complete Servo Motor

### **3.7 Mechanism**

Servo motor has a closed loop system and it conduct footing recompose manage of it's own motion and a position called final. It's input management are often a symptom , it can be digital or it can be analog and it illustrating the mark commanded a shaft called output shaft. This servo motor fondling with a encoder to produce it's location and also recompose it's speed. It can also measured it's position solely. Then position of output that we measured is connect with the position of command. This thing happen because we need to pass our measurement in the controller by external input. The motor can rotate either direction if we miscalculation our signal we can bring our output shaft in the compatible position by using PRN. This approach can reduces our error to zero and on the other-hand the motor can be stopped. We can use position-only sensing by potentiometer and manage our motor. The motor can rotates either full speed or can be stopped. This method can not use in big industrial company who need to control their machines motion. But this thing can forms in low-cost servos which is used for models that are guided. Also we use servomotors in optical rotary encoders which is manage the motor speed by output shaft and various speed drive. Besides it can increase the PID management formula and gives us quickly and minimum overshooting.

### **3.8 Software Requirement**

1. Arduino IDE : Arduino .
2. Eclipse for Android programming
3. Java
4. Android SDK

## Project cost

NO	Description	Unit	Price	Total
1	Arduino uno	2	650	1300
2	Relay board	1	450	450
3	Bluetooth	1	650	650
4	5v relay	5	25	125
5	Light	3	30	90
6	Others			1500
				4115 BDT

Fig: 3.1 Project cost Table

# Chapter-4

## Design

### 4.1 Structure Diagram

Smart home automation system's block diagram in fig 4.1

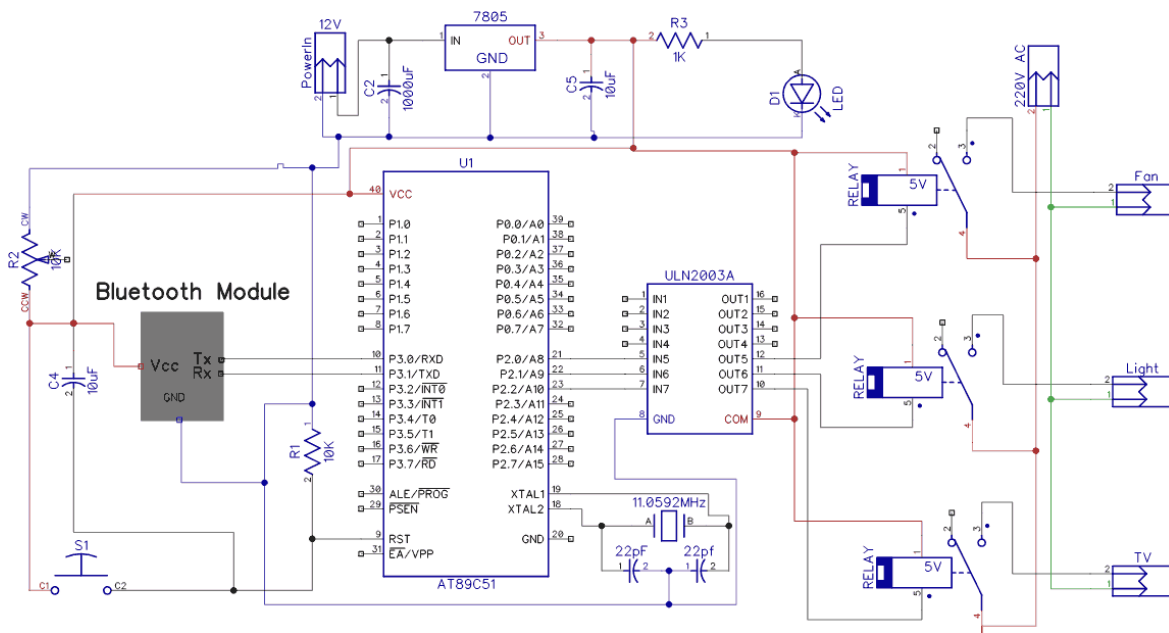


Fig: 4.1 block diagram of Smart home automation

## 4.2 Circuit Diagram

First we need to connect all our hardware to Arduino uno board. We need pass the current for all our hardware. So we use for passing current GND and 5V. We need to connect all our GND and 5V in Arduino uno board. All are devices such as Bluetooth, relay, servo motor has to connect our Arduino board but Arduino do not have many GND and 5V so we use breadboard for connecting GND and 5V. After that Bluetooth's Rx – Tx and for our three light's connecting wire are connected with Arduino uno we see this in figure 4.2.

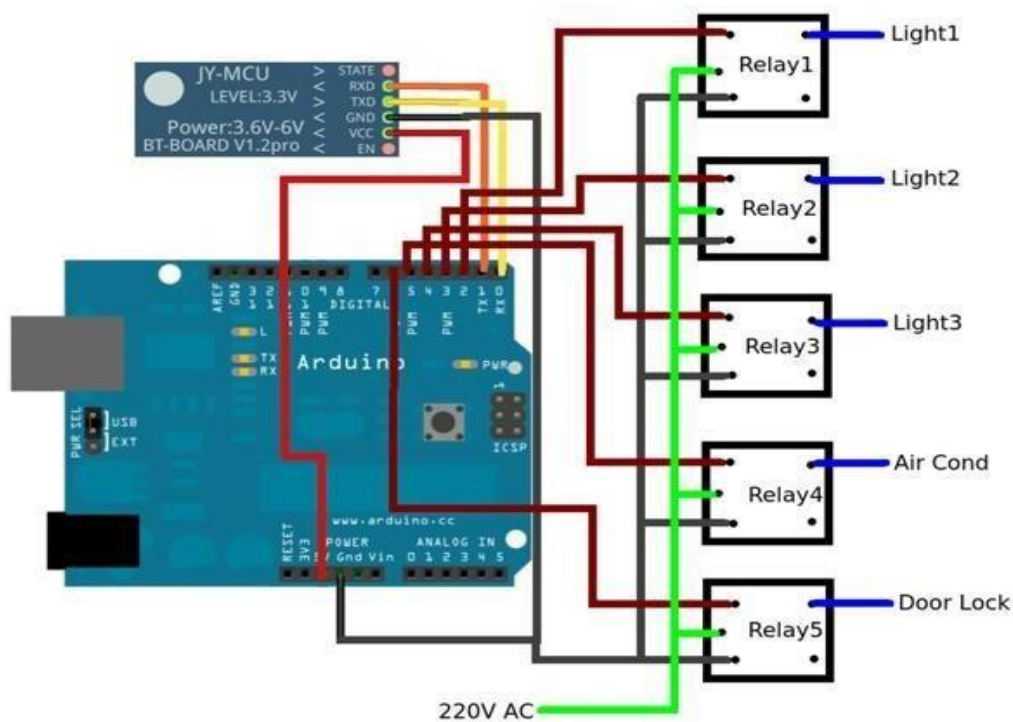


Fig: 4.2 Main Circuit Diagram

## 4.3 Use case Diagram

A user can control the control panel through android device. Clicking the option user can see light and our security system are working.

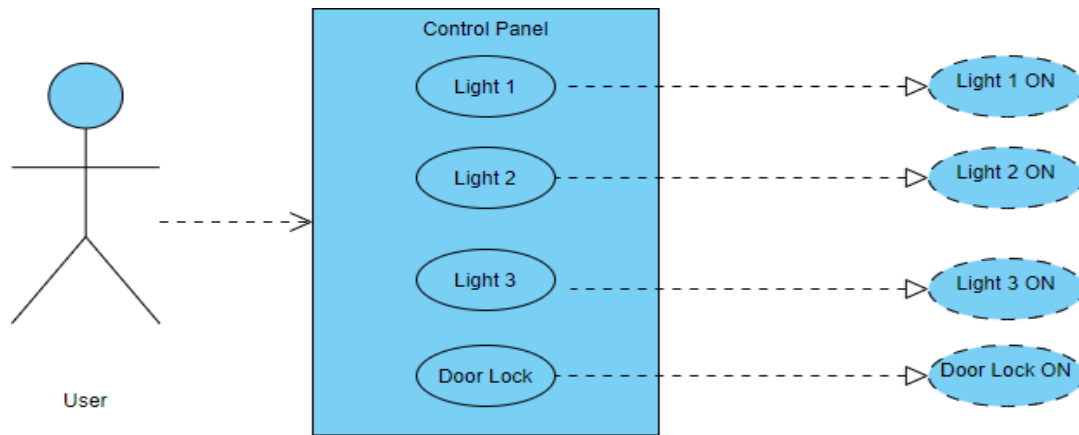


Fig: 4.3 Use case diagram of Smart home Automation

#### 4.4 Android Device

We are controlling our project by using a android device. In figure 4.4 it shows our android control panel. We can click light 1, light 2 or light 3, after clicking that our light will ON. But first we need to write our Bluetooth name HC-05 in Bluetooth name section then press Ok to connect with Bluetooth. After that we will control our syste

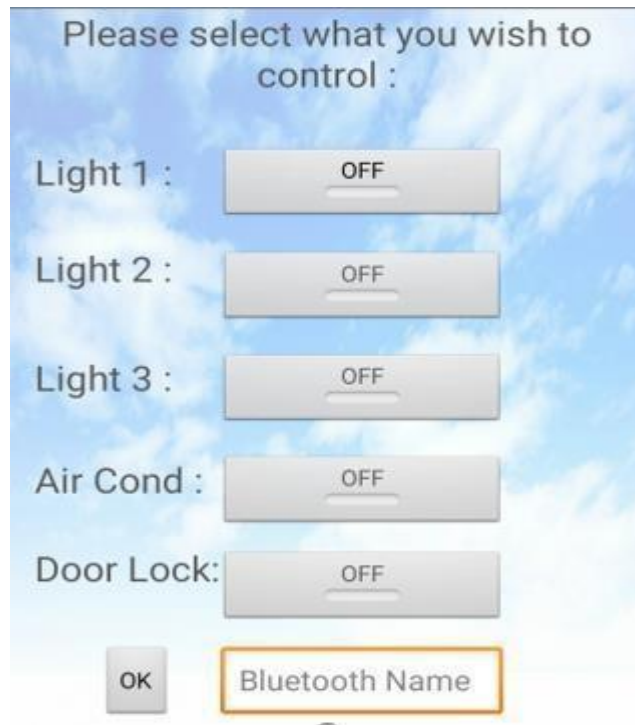


Fig:4.4 Graphical interface of Android Device

#### 4.4 Output Design

Here we see a android UI that connect with Bluetooth in figure 4.5. First it connect with Bluetooth module then the Bluetooth module pass the signal in Arduino to relay. This way we are established our connect to our hardware.

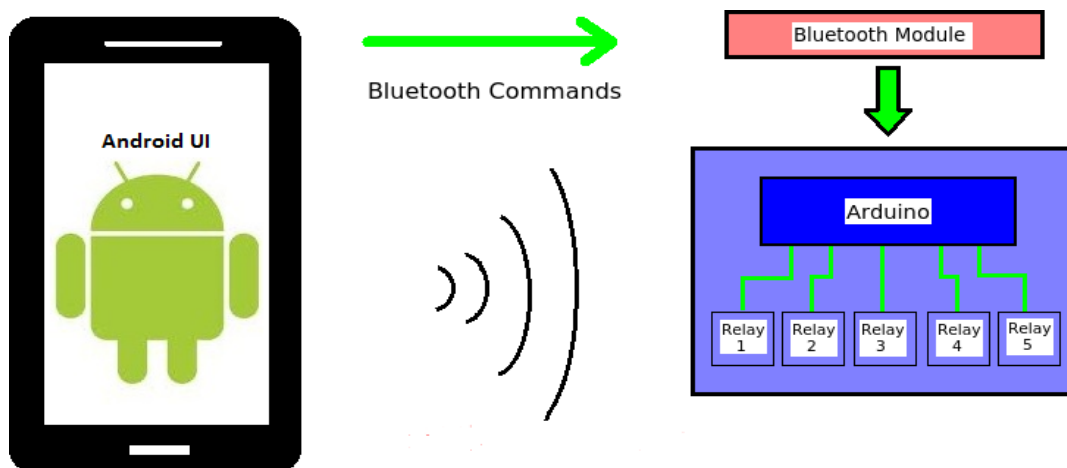


Fig: 4.5 Output design



## **Chapter-5**

### **IMPLEMENTATION**

#### **5.1 Coding**

We can use two way to install our software

1. One is Parallel programming
2. And the other is Serial programming

#### **5.2 Parallel programming**

It computing have even be a mode of computation throughout that we need a lot calculation and also need a processes that can be execution a unit of mensuration assigned at identical time. We can divided a giant issues into a smaller ones and it can resolved in identical time. There are many parallel computing present such as bit-level task correspondence. Also parallel computing have data and instruction-level. We use correspondence for several years but we can do it in superior computing. It is hard for us to physically write so alternative we use frequency scaling and this method is very easy. Now a days power consumption caused by computers get priority in recent years. So we use parallel computing with multi-core processors. This thing is closely associated with coinciding computing also we use it mensuration frequently but it usually conflated. So normally we use 2 unit mensuration distinct. We use a posses correspondence where as no concurrency. So here we use parallel computing and it can divided it's process in multiple subtasks and when all the process done the divided process combined and gives us the results. The various processes is in coinciding computing normally don't address connected tasks. When they distributed computing then the separate tasks really like a varied nature. And they need some inter-process for their communication throughout execution. In parallel computing we roughly classified it that supports correspondence by hardware. In multi-core and multi-processor computers that has multiple methodology parts such as intervals one machine, MPPs, where as clusters and grid. This all are used in multiple computers and it figure on identical task. We use specialize parallel portable computer architectures of measurement in ancient processors and we used it for fast specific tasks. However in some cases correspondence is clear to the pc user such as bit-level or instruction-level correspondence, but it is hard expressly parallel algorithms to use concurrency by notable folks and also tougher to jot down

than ordered ones. Because of this concurrency introduce us many new categories of potential code bugs. In this way the race conditions unit of measurement are the foremost common. In parallel programming if we need to get smart parallel program performance the only obstacles is communication and synchronization between the numerous subtasks unit.

### **5.3 Serial programming**

We know that in-system programming, additionally raised as in-circuit serial programming, is the placement of some programmable rational devices, microcontrollers, and numerous embedded devices where programming will take place before the chip needs to be set up across the system. Area units for the programming of microcontroller devices are a number of mutually incompatible in-system programming protocols, PIC microcontrollers, AVRs, and jointly physical events mechanical devices. Initially and has been applied by conductor technology for device programming. The primary advantage of this feature is that it allows electronic device manufacturers to integrate programming and testing into a manufacturing segment and economizes rather than requiring a separate programming stage before grouping the system. This will probably enable manufacturers to program the chips in their own system instead of buying preprogrammed chips from the manufacturer or distributor, it will be able to use the code typically, ISP-supported chips have internal instruments for the required programming voltage to deliver voltage from the old system, and computer Communicating with the user via serial protocol or making changes within the production center. The microcontroller area unit is usually sold on an electrical circuit board and does not regularly receive equipment or space for associate degrees in external programming simply on a unique laptop. Typically, ISP-supported chips have internal devices that transmit the required programming voltage from the system's ancient supply voltage and communicate with the PC user via a serial protocol. Most programmable logic devices use a variant of the protocol, thus facilitating easy integration with machine-driven testing methods. Different devices typically use protocols or protocols owned by older standards. In systems advanced enough for medium-sized large adhesive logic, designers can probably implement a JTAG-controlled programming theme for non-JTG devices such as storage and microcontrollers, allowing the entire programming and checking process to be done in one low place.

## 5.4 Arduino IDE

For this, a program is additionally written for any language compiler that generates code for the target processor. Atmel provides a development environment for its microcontroller, AVR Studio, and so new Atmel Studio. The project provides Arduino Integrated Development Atmosphere (IDE), which will be a cross-platform application written in the fictional language Java. Also, it has emerged from IDE as an integrated development environment for language methods and cables. It includes a code editor including text cutting and pasting, wanting and replacement text, automatic indenting, braces, matching, and syntax lightweight, Nursing-based Associate provides a straightforward one-click method for compiling AND transfer programs abroad. It has a message box for booting, a text console, a toolbar with buttons for common functions, and a sequence of operations menus. It is known that a program written with IDE for Arduino is called Sketch. Events as text files with file extension.no The sketch unit is saved on the laptop computer. It has a code and its code (IDE) with pre-1.0 saved sketch extension .pde. IDE C and C ++ support special rules of victimization code structuring. On the other hand, Arduino provides a code library from the cable project, which has many common input and output methods. The user's written code requires only two basic functions, to start sketching and so the maximum program loop, that unit is integrated into a practicable cyclic program with the Bovid toolchain with Stub Main (), a program associated with compiled nursing, to boot like a fence. IDE distribution. In addition to the Arduino IDE job, the program loads the executable code into the Arduino board by a loader program into akeyboard code to convert it into a secret file on the dot illustration system. Fig 5.1 and 5.2 shows us how open and paste a code in Arduino ide.

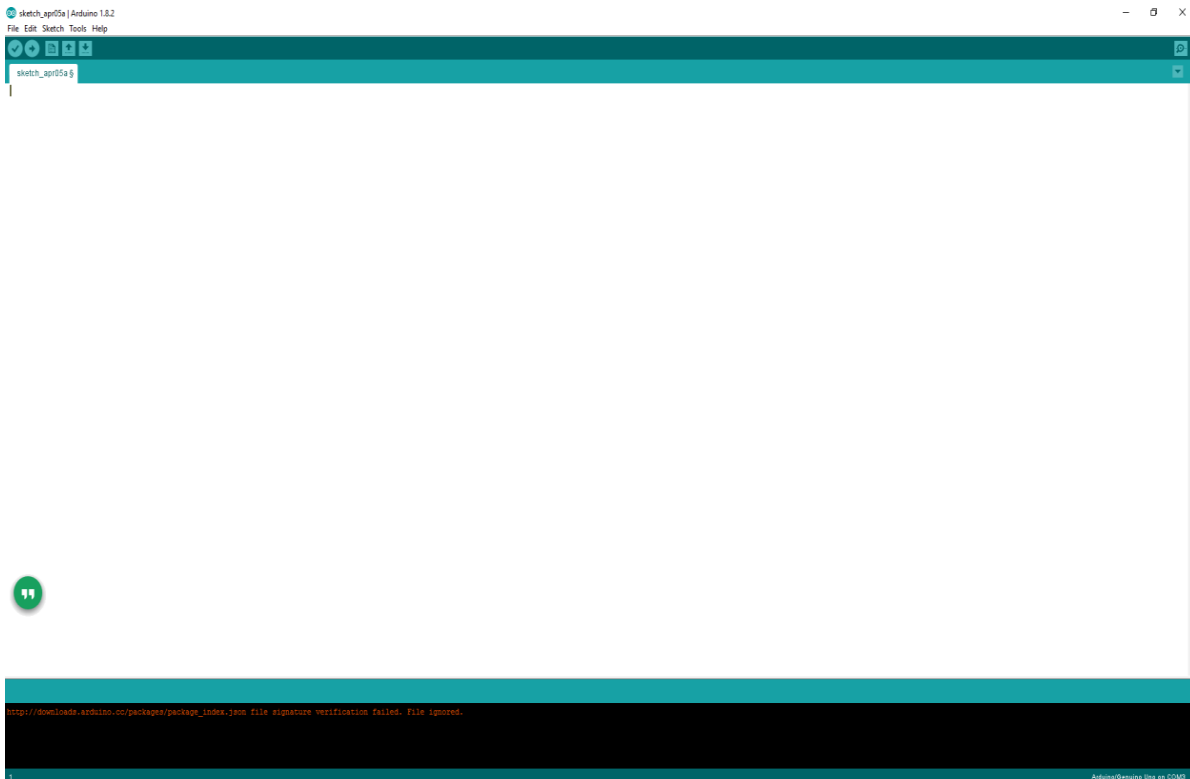


Fig: 5.1 Arduino Ide

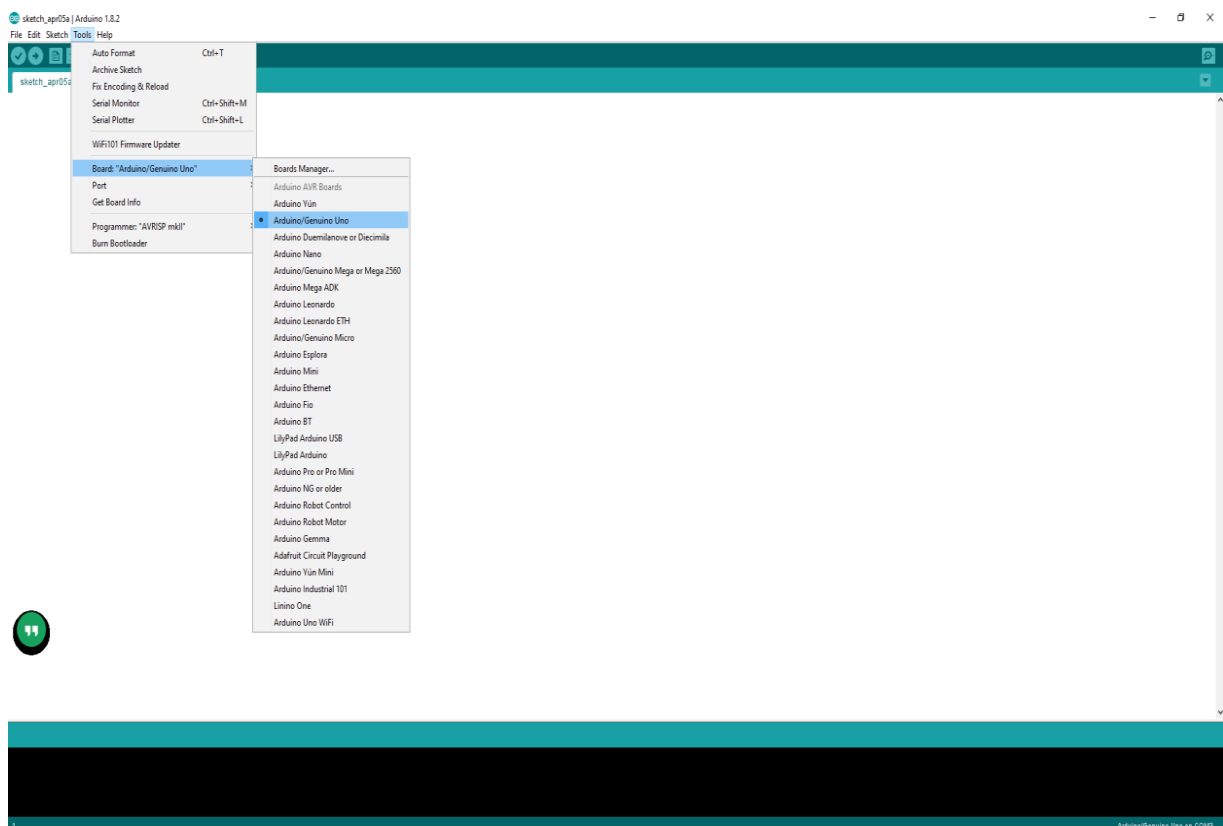


Fig: 5.2 Pasting code in Arduino

## 5.5 Compiling & Uploading

Programming with Arduino / Genuino Uno (Arduino Software Package (IDE)). Then we select Arduino / Genuino Uno in the Tools then go to the Board menu. The Arduino / Genuino Uno has a microchip called ATmega328 pre-programmed with the help of a bootloader that allows us to process new code without the use of an associated external hardware-software engineer. It communicates using the initial STK500 protocol. You can then use Atmel's FLIP software package (Windows) or DFU Software Engineer (Mac OS X and Linux) to load a replacement code. Otherwise, you will use the ISP header of an associate external software engineer (overwriting the DFU bootloader). Power

The Arduino / Genuino Uno board will be powered via a USB connection or a collaborative external power supply. The power supply is mechanically selected. External means non-USB power will again come back from the Associate AC-to-DC adapter or battery. It will then be connected by attaching a 2.1mm center-positive plug into the power jack of the board. The leads from a battery will be inserted into the power connection gnd and the rule pin header. The board will arrange for an associate external supply of six to twenty volts. If equipped but 7V, however, the 5V pin can provide 5 volts and so the board may be unstable. If the victim is over 12V, the transformer may overheat and damage the board. Moreover, the proposed may vary so it is seven to twelve volts.

The power pins are as follows:

- 1st is Vin. This is an input voltage of the Arduino / Genuino board and offers external power once it falls victim (as opposed to 5 volts from USB affiliates or other power sources). We will pass the voltage through this pin or if the voltage offers voltage through the power jack then access it through this pin.
- The second is 5V. It is a pin that outputs a controlled 5V from the controller on the board. This board is powered by a DC power jack (it can be 7 - 12V), it is a USB device that gives us 5V, or the VIN pin on the board gives us 7 to 12V. Bypassing the controller when giving voltage through 5V or 3.3V pins and it damages our board.
- 3rd is 3V3. Board.board emu supply was generated by onboard controller. The most current draw is Fifty MA.
- 4th GND. Ground pins.

• 5th is IOREF. This is also a pin This pin is located on the Arduino / Genuino board and gives the voltage reference that we need and through it the microcontroller works. It is properly designed with an ieldal and the ieldal can browse the IOREF pin voltage and also select the appropriate power offer which can change the voltage translator to our needs or outputs when we want to work with 5V or 3.3V.

### 5.6 Testing Arduino

The light of Arduino uno board shown in fig 5.3 is on and it also blink. here the picture

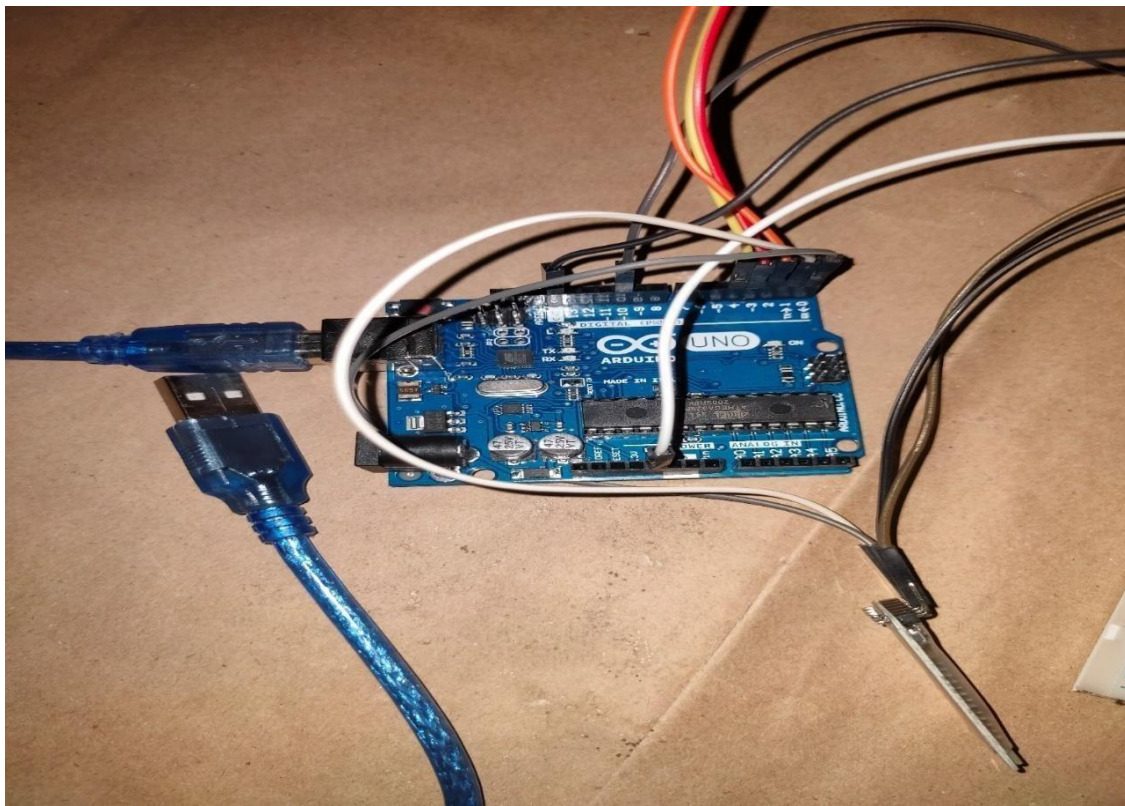


Fig: 5.3 Testing Arduino

## 5.7 Testing Bluetooth

The LED is on in fig 5.4



Fig: 5.4 Testing Bluetooth

## 5.8 Relay board

A relay is connected to an electrically operated switch. Numerous relays use an associative magnet to mechanically operate a switch, but completely different operational principles use square measurements, such as solid-state relays. The primary relays were set in a long-distance telegraph circuit and then it could be amplified: they give a sequential signal when returning from a single circuit so that it can re-transmit it to a completely different circuit. It was used in most parts of the phone exchange and collectively it was used in the primary computer to perform logical operations. A type of relay that can handle the high power required for direct operation.

A whole bunch of nursing electric motor associates or completely different is called a contactor. Solid-state relay management power circuits without any moving components, instead of using a conductor for switching. Relays with graduated operational characteristics and usually multiple



operational coil square wave measure protects accustomed electrical circuits from overload or fault; Measuring these functions performed by digital instruments in fashionable electrical systems, still known as "protective relays", magnetic latching relays require one pulse coil power to move their contacts to one side, and the other, red directed pulse to switch them. Repeated pulses from the same input have no effect. Magnetic latching relays are useful in applications where power should not be interrupted and able to transfer communications. Magnetic latching relays can have single or dual coils. The relay will work in one direction in a single coil device. It happen when electricity is applied to one pole and then it will be reset when the pole is reversed. We know that a dual coil device the contacts will be converted when polarized voltage is applied to the reset coil. Fig 5.5 we see that the connection of realy.

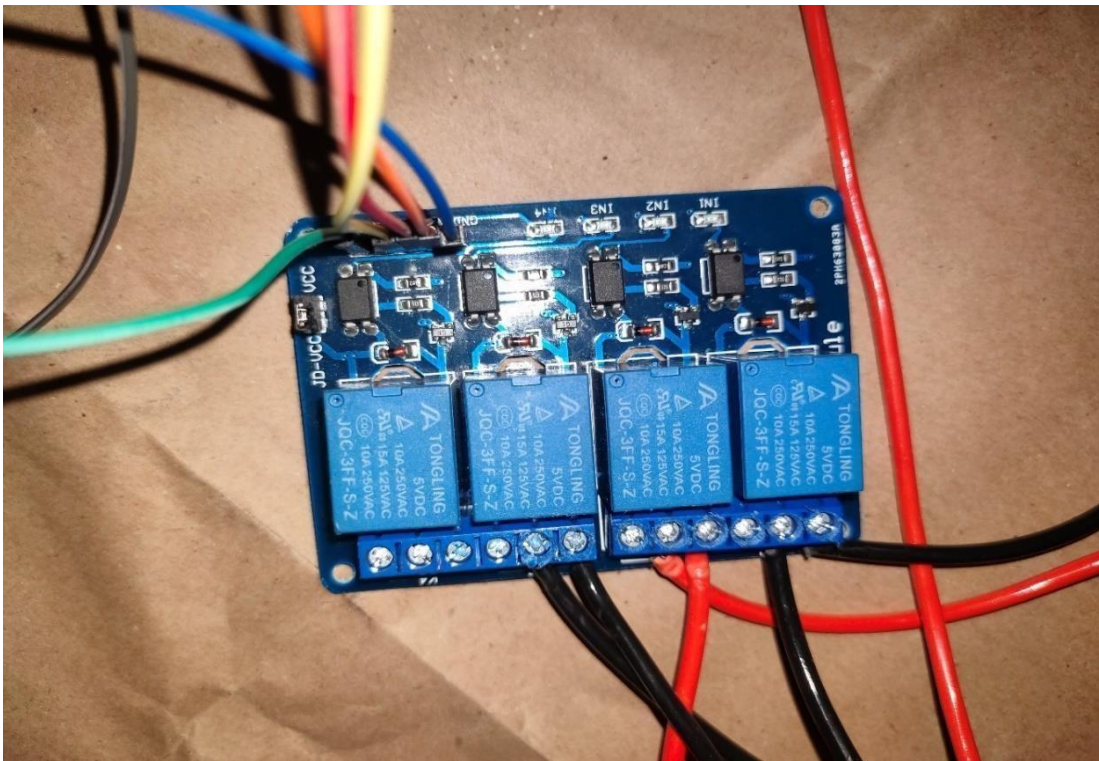


Fig: 5.5 Relay Connection



## 5.9 Hardware setup

Our project is working in fig 5.6

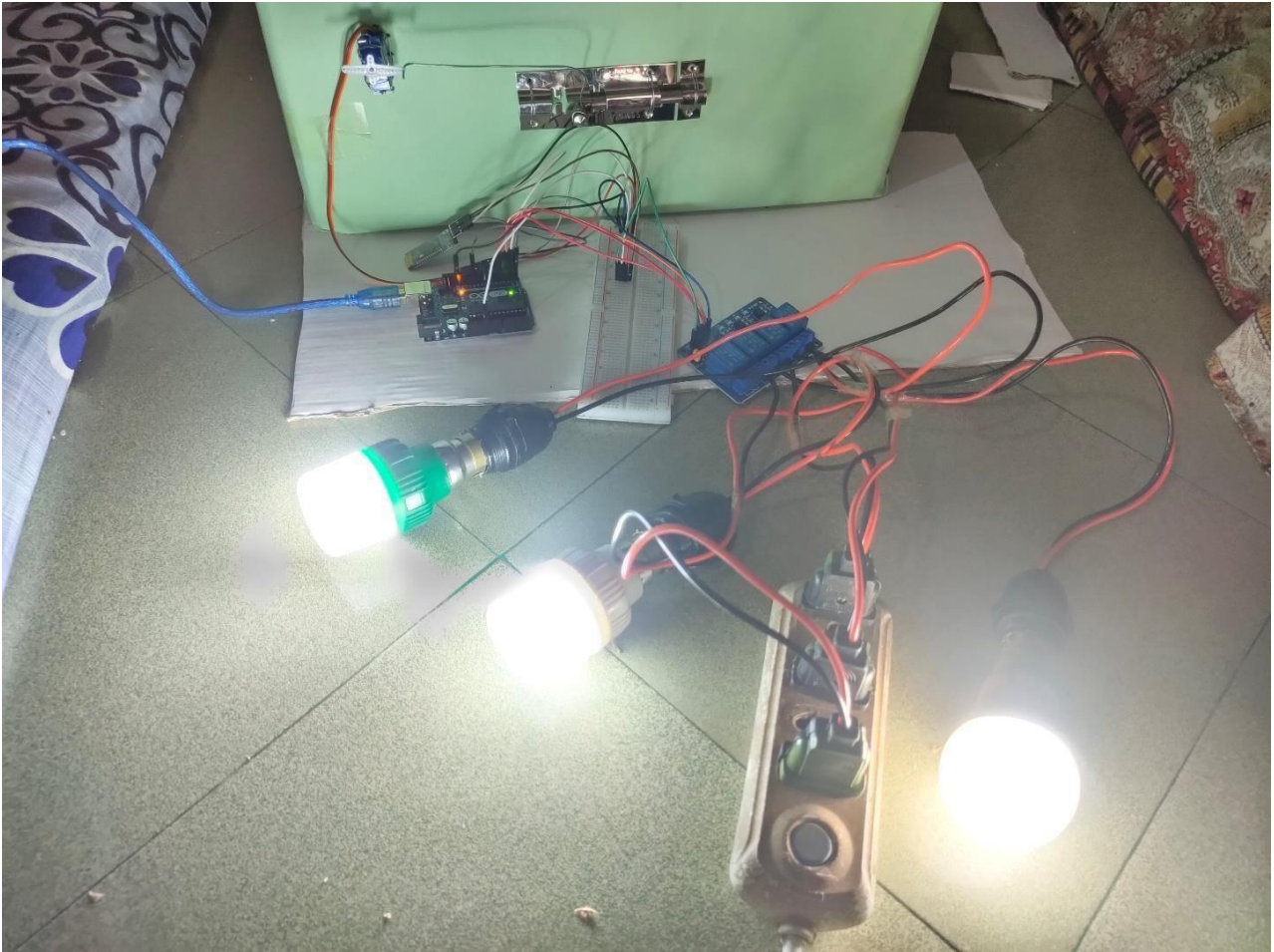


Fig: 5.6 Working the hardware setup

We see in fig 5.7 the offline state of our project

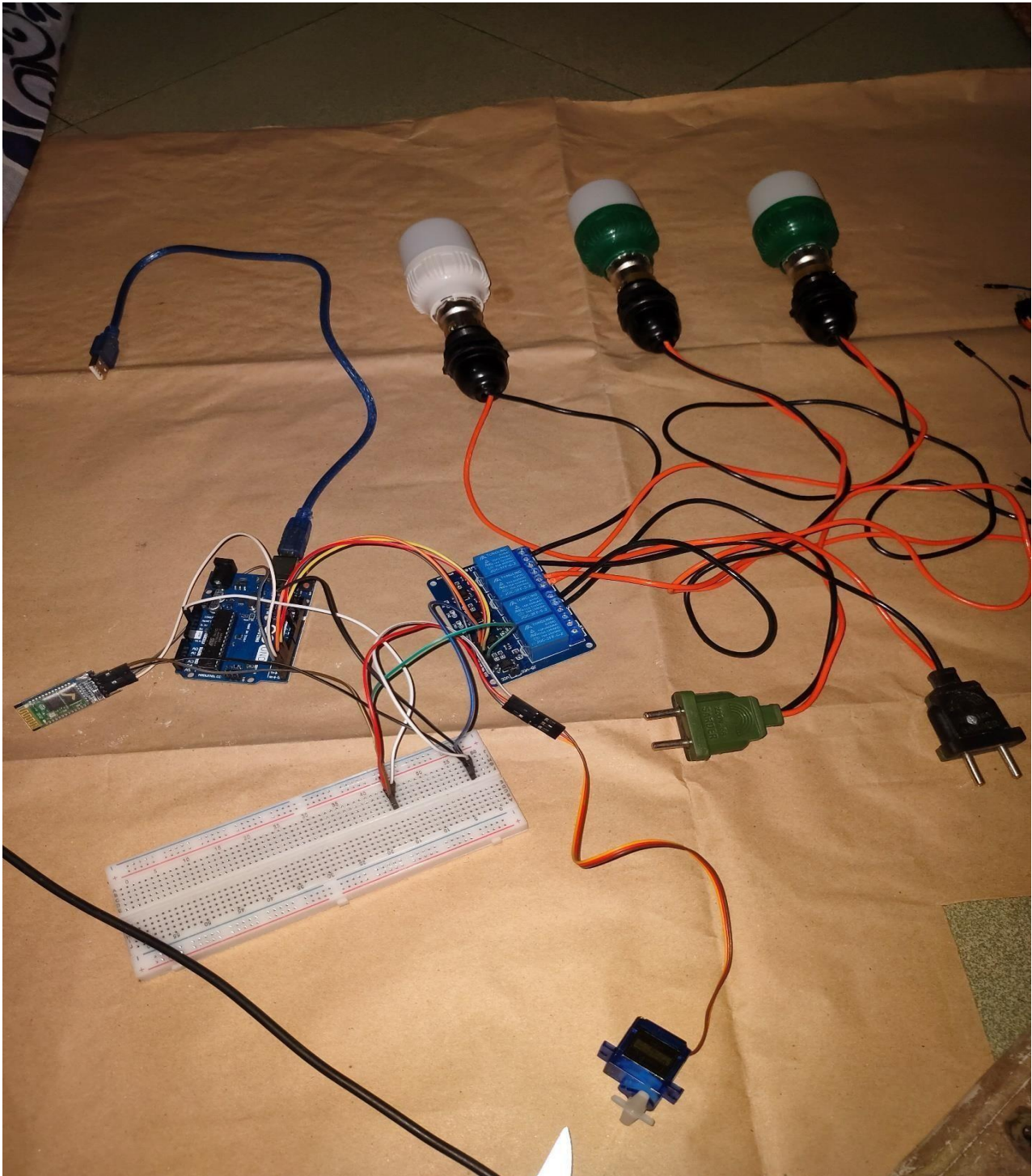


Fig: 5.7 Offline Hardware look



### 5.10 Working Moment :

Fig 5.8 shows the working moment of our project.



Fig: 5.8 Working Moment



Fig 5.9 also the working moment of our project

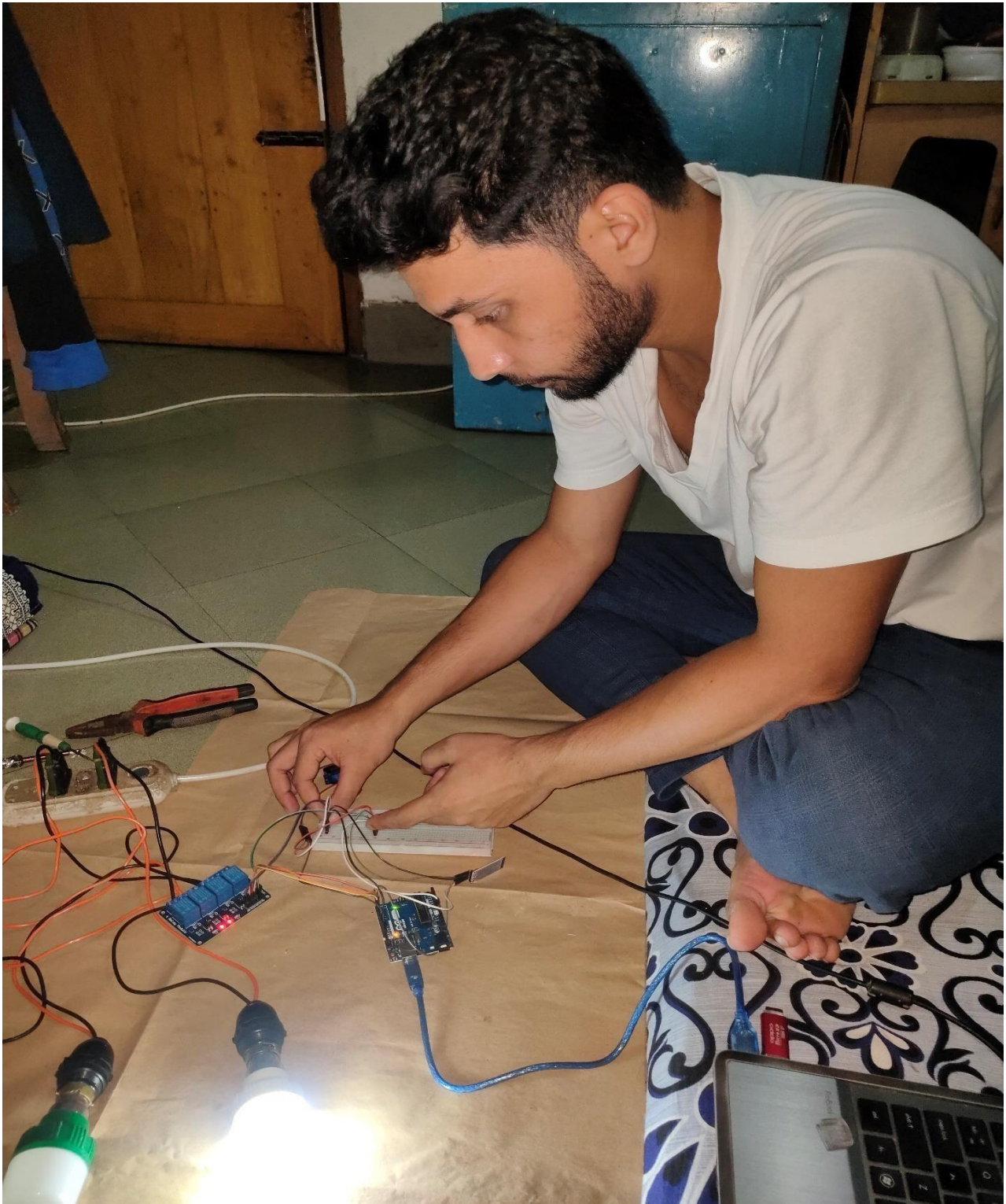


Fig: 5.9 Working Moment

## 5.11 Coding Arduino Uno

```
byte val;
#include <Servo.h>
Servo myservo;
int pos = 0;
void setup()
{
  Serial.begin(9600);//Change the baud rate value depending on the default baud rate of your
  bluetooth module, for Bluesmirf-115200 and for JY-MCU-9600

  pinMode(2, OUTPUT);//Light1 pin
  pinMode(3, OUTPUT);//Light2 pin
  pinMode(4, OUTPUT);//Light3 pin
  myservo.attach(10);

}

void loop()
{
  int a=0;
  if(Serial.available())
  {
    val=Serial.read();
    Serial.println(int(val));//Display received value on Serial Monitor

    if(int(val)==49)//Turn Light1 ON
      digitalWrite(2,HIGH);

    else if (int(val)==50)//Turn Light1 OFF
      digitalWrite(2,LOW);

    if(int(val)==51)//Turn Light2 ON
  }
  © Daffodil International University
```

```

digitalWrite(3,HIGH);

else if(int(val)==52)//Turn Light2 OFF
    digitalWrite(3,LOW);

if(int(val)==53)//Turn Light3 ON
    digitalWrite(4,HIGH);

else if(int(val)==54)//Turn Light3 OFF
    digitalWrite(4,LOW);
if (int(val)==57)//turn servo on
{ myservo.write(0);
  delay(1000);

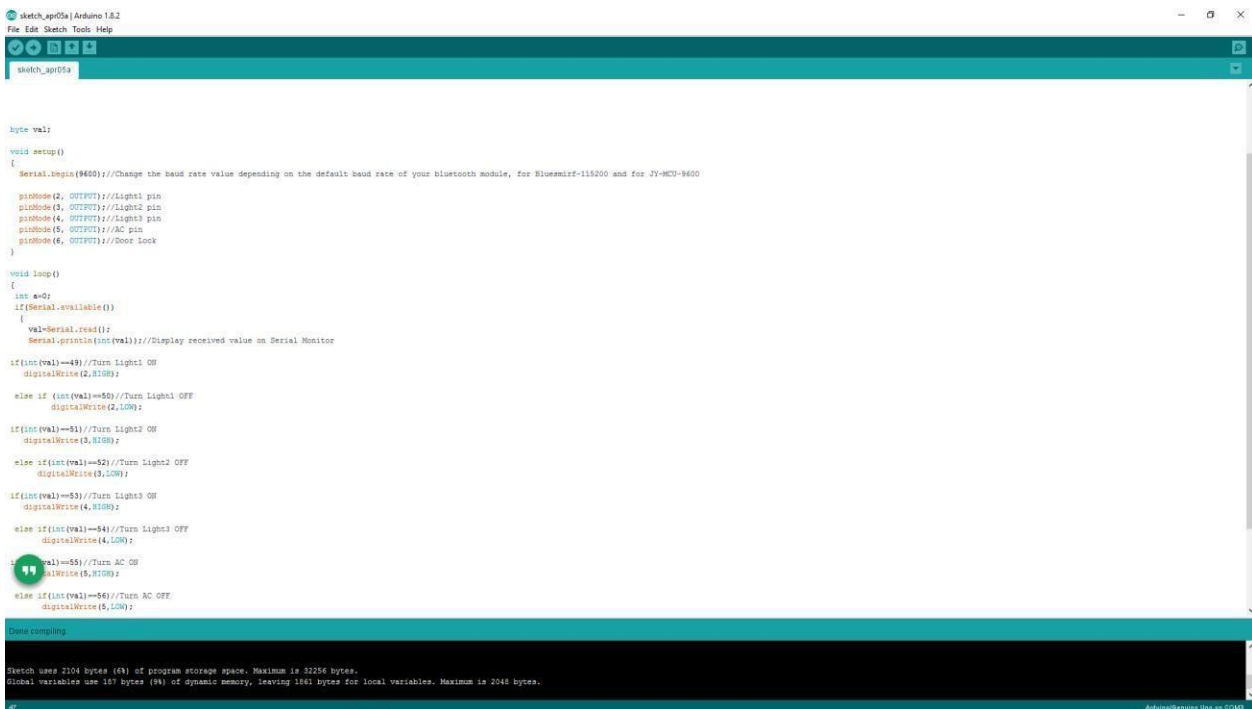
  Serial.println("Door Locked");}
else if(int (val)==48)//turn servo off

{ {myservo.write(90);
  delay(1000);
  Serial.println("Door UnLocked");}
}
}
}
}

```

## 5.12 Compiling sketch

In fig 5.10 compiling our code in Arduino.



```
sketch_apr05a | Arduino 1.8.2
File Edit Sketch Tools Help

Sketch_apr05a

byte val;

void setup()
{
  Serial.begin(9600); //Change the baud rate value depending on the default baud rate of your Bluetooth module, for Bluemirf-115200 and for JY-MCU-9400

  pinMode(2, OUTPUT); //Light1 pin
  pinMode(3, OUTPUT); //Light2 pin
  pinMode(4, OUTPUT); //Light3 pin
  pinMode(5, OUTPUT); //AC pin
  pinMode(6, OUTPUT); //Door lock
}

void loop()
{
  int a=0;
  if(Serial.available())
  {
    val=Serial.read(); //Display received value on Serial Monitor
    Serial.println(val);
  }
  if(int(val)==49) //Turn Light1 ON
    digitalWrite(2,HIGH);
  else if (int(val)==50) //Turn Light1 OFF
    digitalWrite(2,LOW);
  if(int(val)==81) //Turn Light2 ON
    digitalWrite(3,HIGH);
  else if (int(val)==82) //Turn Light2 OFF
    digitalWrite(3,LOW);
  if(int(val)==53) //Turn Light3 ON
    digitalWrite(4,HIGH);
  else if (int(val)==54) //Turn Light3 OFF
    digitalWrite(4,LOW);
  if(int(val)==55) //Turn AC ON
    digitalWrite(5,HIGH);
  else if (int(val)==56) //Turn AC OFF
    digitalWrite(5,LOW);
}

Done compiling

Sketch uses 2104 bytes (6%) of program storage space. Maximum is 32256 bytes.
Global variables use 167 bytes (9%) of dynamic memory, leaving 1861 bytes for local variables. Maximum is 2048 bytes.
```

Fig: 5.10 Compiling Sketch

## **Chapter-6**

### **CONCLUSION**

#### **6.1 CONCLUSION**

Our project can connected relays and Arduino to controls various appliances. We connect our relay in Arduino board and also the Bluetooth is connected in Arduino to established our project connection. When we connect our phone or tablet in Bluetooth then we are attached to our Arduino board. We push our code to the Arduino board. Then Arduino board pass this code to another devices for connect all devices like one. We pass our signal via Bluetooth and Arduino sent this signals to the relay. It passing through 5V by digital pin and then relay activate. When the relay is activate we command a signal and Arduino pass this command signal to relay and then it feedback our command and connect other connection which are connected in relay. If we ON our light the signal pass through Arduino to relay and our light is ON. After that if we click OFF the light is turned OFF.

The servo motor also connected to Arduino board by digital pin 10. If we ON our door lock the signal pass through Arduino and then our door lock is ON. On the other-hand if we click OFF our door lock it turn our door lock OFF.



## **Chapter-7**

### **FUTURE WORKS**

#### **7.1 FUTURE WORKS**

1. In future I have planned to upgrade the design more flexible and more usable in commercial use
2. I also add temperature and many more feature in future
3. I'm also going to make my own android apps

### **APPENDIX**

#### **7.2 Project Reflection**

In this era day by day we are follow the path of Digital world and Smart Mechanics. Home automation is one of the smart mechanics. It gives us many things such as controlling our own home electrical instrument and also give us to control our security system that gives us security.

We started our journey to make an hardware based software system. And we spent a lot of time to make this Project. At last after many hard work we are able to achieve our goal. Our system is cost saving, also secure our home and easy to control our home electrical system. This is a smart and useful system in modern era of digital revolution. This system will attract users with its attractive, easy, simple and user-friendly

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