

**FINAL YEAR PROJECT REPORT ON
DIGITAL HOME AUTOMATION**

BY

Debashis Monadal

ID: 142-15-3709

Shaikh Kamrul islam

ID: 142-15-3814

MD.Obaidul Hasan

ID: 142-15-3559

This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Ms. Nasrin Akter

Lecturer

Department of CSE

Daffodil International University

Co-Supervised By

Rubaiya Hafiz

Lecturer

Department of CSE

Daffodil International University



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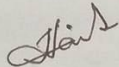
APPROVAL

This Project titled “**Digital Home Automation**” submitted by **Shaikh Kamrul Islam**, ID: 142-15-3814, **Debashis Mondal**, ID: 142-15-3709 and **Md.Obaidul Hasan**, ID: 142-15-3559 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 6th May 2018.

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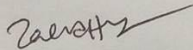
Dr. Syed Akhter Hossain
Professor and Head

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



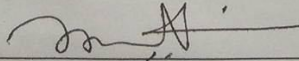
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Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Internal Examiner

Md. Zahid Hasan
Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Internal Examiner

Dr. Mohammad Shorif Uddin
Professor
Department of Computer Science and Engineering
Jahangirnagar University

External Examiner

@Daffodil International University

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Nasrin Akter, Lecturer, Department Of CSE, Daffodil International University, Dhaka.** We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:

Nasrin Akter
8/05/2018

Ms. Nasrin Akter

Lecturer

Department of CSE

Daffodil International University

Submitted by:

Debashis

Debashis Mondal

ID: 142-15-3709

Department of CSE, DIU

Daffodil International University

Co-supervised by:

Rubaiya
8.05.2018

Rubaiya Hafiz

Lecturer

Department of CSE

Daffodil International University

Kamrul

Shaikh Kamrul Islam

ID: 142-15-3814

Department of CSE, DIU

Daffodil International University

Obaidul

MD. Obaidul Hasan

ID: 142-15-3559

Department of CSE, DIU

Daffodil International University

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ABSTRACT

With the progression of innovation, the quantity of electronic gadgets in our everyday lives has expanded to make our life more straight forward and easy. So a need to build an all-inclusive Remote Framework that will effortlessly control every one of these gadgets from a separation won't just lessen the multifaceted nature of dealing with the quantity of gadgets at the same time with voice command by the mobile device, yet in addition spare power. Our project exhibits the general plan of Digital Home Automation (DHA) with minimal effort and remote framework. This framework is made to help and give bolster with a specific end goal to satisfy the requirements of elderly and debilitated in our home. The shrewd home mechanization in the framework makes the living at home simple. The voice mode is utilized to control the home contraption. The primary control framework executes remote innovation to give remote access from the advanced mobile phone. The outline remains the subsisting electrical switches and gives more security control on the switches with low voltage actuating technique. The switches status is synchronized in all the control framework whereby each utilizer interface betokens the credible time subsisting switches status. The framework expected to control electrical apparatuses and gadgets in-house with moderately minimal effort outline, easy to understand interface and simplicity of establishment.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The "Digital Home Automation" framework is connected with the expressions "Smart and Intelligent Home". The home computerization framework has been utilized to control home apparatuses and gadgets consequently or on the other hand remotely with or without web. Digital Home Automation Systems (DHAS) are produced with the gift of present day science particularly in the field of building and figuring. Home computerization framework incorporates control of lighting, home apparatuses, entryways, security locks also save us from risky situation in our home or kitchen using different frameworks by central control gadget or by utilizing cell phone from home or some other remote place. This framework is intended to make life simple and agreeable, to guarantee effective utilize vitality and keeping up the security arrangement of home or the remote reconnaissance of kids or on the other hand elderly individual at home. DHAS have been enhanced hugely and ended up well known for broad highlights.

1.2 Background

The "Home Automation" thought has existed for quite a while. The articulations "Splendid Home", "Adroit Home" took after and has been used to show the possibility of frameworks organization machines and contraptions in the house. Home computerization Structures addresses an amazing exploration opportunity in making new fields in building, and preparing. It consolidates united control of lighting, mechanical assemblies, security locks of doors and portals and diverse structures, to give upgraded comfort, imperativeness efficiency and security system. It is getting the opportunity to be acclaimed nowadays and enter quickly in this creating business segment. In any case, end customers, especially the disabled and elderly due to their versatile quality and cost, don't for the most part recognize these systems.

Because of the progression of remote innovation, there are a few diverse of associations are presented, for example, GSM, WIFI, and Bluetooth. Every one of the association has their own particular one of a kind details and applications. Among the four famous remote associations that actualization.

Likewise, the greater part of the present workstation/journal or Cell phone accompany worked in Bluetooth connection. It will in a roundabout way decrease the cost of this framework.

1.3 Overview

Bluetooth Controlled Home Mechanization Framework is intense, adaptable and extremely simple to utilize. It is planned and created to make our life less demanding. In the event that we check out us we will find that innovation is making its place all over. From morning to night, we are utilizing such a significant number of innovations, in short it is a piece of our life now and it is extremely difficult to live without it too.

Home mechanization is winding up increasingly prevalent step by step because of its various favorable circumstances and that is the reason we picked this plan to make it more clients inviting and much accessible in our nation as well. We endeavored to control this Home Automation thought with Bluetooth in light of the fact that relatively every individual in our general public utilizing different sorts of advanced cells and Bluetooth is an essential element of it. As everybody has a Bluetooth gadget, it will be less exorbitant for them to utilize a Bluetooth based home computerization framework since you don't need to purchase any sort of remote for this Home Automation venture the extent that you have a PDA.

Our undertaking Bluetooth Controlled Home Mechanization is fundamentally an equipment item intended to control relatively every computerized segments in your home, for example, fans, lights, air conditioning and etc. Our last objective with this item is to bring our nation one stage ahead in innovation and client's fulfillment.

1.4 Automation

Automation is the utilization of control frameworks and data innovation to control gear, modern apparatus and procedures, lessening the requirement for human intercession. In the extent of industrialization, robotization is a stage beyond automation. Motorization furnished human administrators with apparatus to help them with the physical prerequisites of work while computerization extraordinarily diminishes the requirement for human tactile and mental necessities also.

Computerization assumes an undeniably imperative part in the worldwide economy and in every day encounter. Designers endeavor to join robotized gadgets with numerical and authoritative apparatuses to make complex frameworks for a quickly growing scope of uses and human exercises. Numerous parts for people in modern procedures by and by lie past the extent of computerization. Human-level example acknowledgment, dialect acknowledgment, and dialect generation capacity are well past the abilities of current mechanical and PC frameworks. Undertakings requiring subjective evaluation or amalgamation of complex tactile information, for example, aromas and sounds, and also abnormal state assignments, for example, vital arranging, right now require human ability.

Automation has had an eminent effect in an extensive variety of profoundly unmistakable enterprises past assembling. Once universal phone administrators have been supplanted to a great extent via computerized phone switch sheets and voice-mail. Restorative procedures, for example, essential screening in electrocardiograph or radiography and research facility examination of human qualities, blood plasmas, cells, and tissues are completed at significantly more prominent speed and exactness via robotized frameworks. Mechanized teller machines have decreased the requirement for bank visits to get money and do exchanges. When all is said in done, mechanization has been in charge of the move on the planet economy from agrarian to modern in the nineteenth century and from mechanical to administrations in the twentieth century.

1.5 Home Automation

Home mechanization may assign a developing routine with regards to expanded computerization of family unit machines and highlights in private homes, especially through electronic implies that take into account things impracticable, excessively costly or basically unrealistic in late decades. Home robotization incorporates all that a building mechanization gives like atmosphere controls, entryway and window controls, and what's more control of media home theaters, pet nourishing, plant watering et cetera. In any case, there exists a distinction in that home computerization stresses more on solaces through ergonomics and simplicity of activity.

1.6 Managing the System

- We build up a Bluetooth based digital home automation structure with Arduino UNO board and an android application.
- Bluetooth controlled digital home automation structure gives us a easy strategy with android application advancement.
- Remote errand is refined by any kind of Mobile/Tablet etc with Android OS, upon a GUI (Graphical UI) based touch screen.

1.7 Benefits of Digital Home Automation

As of late, remote frameworks like Bluetooth have turned out to be increasingly basic in home systems administration. Likewise in home and building automated frameworks, the utilization of remote advancements gives a few focal points that couldn't be accomplished utilizing a wired system as it were.

- Reduced establishment costs:** Bluetooth Controlled the Home Computerization frameworks is substantially more spending neighborly in light of the fact that no link is fundamental in this framework.
- Easy sending, establishment, and scope:** Remote hubs can be mounted anyplace. In neighboring or remote spots, where cabling may not be doable by any stretch of the imagination. Subsequently, remote innovation likewise amplifies the secured territory.

iii. System adaptability and simple expansion: Conveying a remote system is particularly favorable when, because of new or changed prerequisites, augmentation of the network is necessary.

1.8 Project Goal

The goal of this undertaking project is to plan and develop a home automation framework that will remotely turn on or off any apparatus associated with it, utilizing a microcontroller.

1.9 Project objectives

Main Objectives of our project:

- 1) To create and plan a controller circuit that can control home apparatuses with Bluetooth.
- 2) To remote checking of home.
- 3) Flexibility and accommodation framework outline with client validation.
- 4) Optimized utilization of asset for remote checking.
- 5) Flexibility and accommodation.
- 6) Save time and in addition cost.
- 7) Optimized utilization of asset for better security.
- 8) Provide safety from gas leakages which is dangerous for our daily life.
- 9) Make our daily life easier and user friendly.

1.10 Project Scope and Limitation

This undertaking work is finished individually in remotely and consequently turning on and off of any electrical apparatus not restricted to family unit machines. It doesn't execute control of various apparatuses or programmed identification of flaws in the controlled machine.

CHAPTER 2

ANALYSIS OF THE SYSTEM

2.1 System Definition

This system consists of three components and is controlled by a Bluetooth module with Arduino and Google voice recognition. In this Arduino-based project, we can control our daily use home apparatus via Arduino with HC05 Bluetooth Module and call-based LPG gas leakage and provide safety in various areas like home, industries, hotels, hospitals etc. We want to make a home automation system with this technology to reduce cost and human effort.

2.2 Proposed System Features

This home automation system and security will be able to have the following features for the end users:

1. Lighting Switches On and Off: Lighting systems can be programmed to switch certain lights on or off. We can do this in two ways.

- **Automatically:** This means that lights can be set to switch off or dim in certain lighting conditions (for example where natural light is adequate), reducing lighting costs. On the other hand, lights can be set to switch on consequently when one goes into a room or a dim stairwell, making the home more secure and dispensing with the need to fumble for light switches. What's more, lighting can be set to be dimmer or brighter, with specific lights being brighter than others, to make particular dispositions. For instance, one can pre-program settings for romantic evenings in, dinner parties, or normal evenings at home with the family.

- **Manually:** This means user can turn the lights off and on using a mobile device via voice command manually.

2. Fan Switches On and Off:

•**Automatically:** This means that fan can be set to switch on or off in certain conditions (for example where temperature is hot or cool). Alternatively, fan can be set to switch on automatically when temperature is hot or turn off when temperature is cooler. For example, one can pre-program settings for different weather.

•**Manually:** This means user can turn the fan off and on by using a mobile device as a remote control manually.

3. TV/Computer/Air Conditioner:

This means that TV/Computer/Air conditioner can be set to switch on/off via voice command using google voice recognition and it takes control of the TV/AC power switch using Bluetooth.

4. LPG gas Leakage and Security system:

The main objective of this part of our project is to sense the gas if it leaked accidentally and then notify the user by calling to his/her mobile phone using gsm module. To make user notify, that's why we can take necessary step as soon as possible and we can save or reduce our loss of gas leakage.

Applicable this part:

1. Gas leakage detector (Domestic).
2. Combustible gas detector (Industrial).
3. Gas detector (Portable).
4. Homes
5. Factories etc.

2.3 System Requirement

1. Arduino Board or Any Compatible Board.
2. HC-05 Bluetooth Module.
3. Arduino UNO.
4. AT89S51 microcontroller.
5. Generic Breadboard.
6. Gas sensor-MQ6.
7. Stepper motors.
8. GSM module.

CHAPTER 3

FEASIBILITY STUDY

3.1 Introduction

Feasibility analysis (FA, also called feasibility study) is utilized to evaluate the qualities and shortcomings of a proposed task and present headings of exercises which will enhance a venture and accomplish wanted.

3.2 Feasibility Study

A feasibility study was carried toward the start of this venture and the accompanying is a concise investigation of it under five interrelated composes:

i) Technical: From a technical point of view, resources required for the development of this project were already available from the university which includes integrated development environment (IDE), Bluetooth module (HG-05), four channel transfer board, Arduino and an android application to pass charges for controlling this framework. Absence of related knowledge and learning of the improvement stage utilized would have been a confinement yet our past involvement in comparative programming dialects we utilize the Arduino stage for the advancement of this venture.

ii) Economical: The maximum available budget for this project was 7000 BDT (Seven thousand taka only), which was more than sufficient as the cost that would be Arduino UNO, relay board, Bluetooth module HC-05, GSM Cheap, Gas Sensor MQ6, AT89S51 microcontroller and other electronics equipment. For information only the approximate market value of those equipment is less than 2000 BDT. The control software was already built and can be found in the Google play store at no cost (Free).

iii) Schedule: To manage the workflow of the project efficiently and for certain milestones were set at the beginning of the project with predefined timescales for the design, development, testing and documentation of all the stages involved during the lifecycle of this project.

iv) Operational: Evaluation of the operational feasibility of this project was a key factor in deciding the methodologies used in design, development and deployment of this project for it to work in a given environment. After the preliminary research, various proactive measures were devised in case certain elements in the project.

v) Legal: The legal aspects of this project are very limited as this is an academic project of one academic year only but nonetheless it has been taken into account that during the course of this project any private and confidential data about a person or organization will not be stored or used in an inappropriate manner. The university's codes of practice for the use of human volunteers, risk and ethics have been strictly followed. Any material derived or quoted from the published or unpublished work of other persons has been duly acknowledged.

CHAPTER 4

METHODOLOGY

In designing a Digital home automation system, one or more suitable platforms are used in order to build a reliable and flexible system that can be easily operated and adapted for a new household appliance. In this way, with the end goal of this undertaking some particular think decisions were made on the kind of stages, equipment segments and method of activity of the home computerization framework.

4.1 Preliminary Considerations

Before the genuine plan of the task work, particular consider decisions in choice of proper usage stages and equipment segments were made. Need was given to minimal effort accessibility, unwavering quality, adaptability and straightforwardness in every one of these choices.

4.1.1 Selection of Implementation Platform

There are many platforms over which a home automation system can be implemented. Of the currently available platforms: Arduino, Powerline, AT89S51 microcontroller, Bluetooth, Android Device, Infrared, GSM and Microcontroller; Bluetooth Module and Microcontroller were found most appropriate due to their low cost availability, reliability and simplicity when used for an individual control home automation system which my project work is on.

4.1.2 Selection of Hardware Components

Each platform has a set of hardware components over which it is implemented. For AT89S51 microcontroller, there are DB-9 and DB-25 connection cables, but DB-9 cable was found most appropriate because it is cheaper, more readily available, less bulky and just sufficient for the designed system when compared with DB-25. For

Bluetooth, there are many more Bluetooth module, but Bluetooth module HC-05 was chosen due to its low cost availability, ability to understand voice commands and availability. Finally, for Microcontroller, the popular ones are those produced by Microchip, ATMEL, Motorola and Texas Instruments, of all these Microchip manufactured Arduino microcontroller was found most suitable due to its low cost availability.

4.2 System Design

The designed home automation system uses Arduino microcontroller, HC-05 Bluetooth module, android Device between the microcontroller and Bluetooth module. As illustrated in the block diagram shown in figure 4.1, when the HC05 receives the required signal, it communicates to the Arduino, the Arduino controls the relay state via a application and this in turn determines the state of the connected appliance, whether switched on or off via voice control.

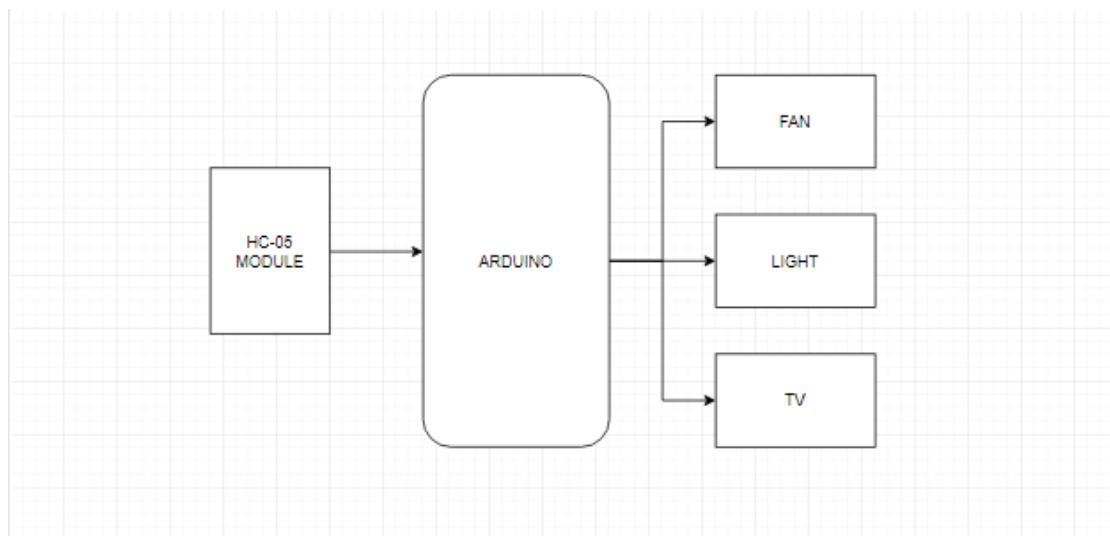


Figure 4.1: System Design of Digital home automation.

Gas leakage is one of the common reasons for fire breakouts. A leakage turns out to be cause of terrible accident particularly in closed buildings. Many of the hotels and restaurants do not keep any security measures to detect gas leakage due to lack of

enforcement of standards and pre-assumption that installing such precautionary systems will be costly. This 4.2 figure shows a gas leakage detection project based on Arduino UNO. The low cost project uses MQ6 gas sensor which can be calibrated to detect leakage levels based on surroundings. The installation generates a call using gsm to alert the user if there is any detection of a dangerous leakage.

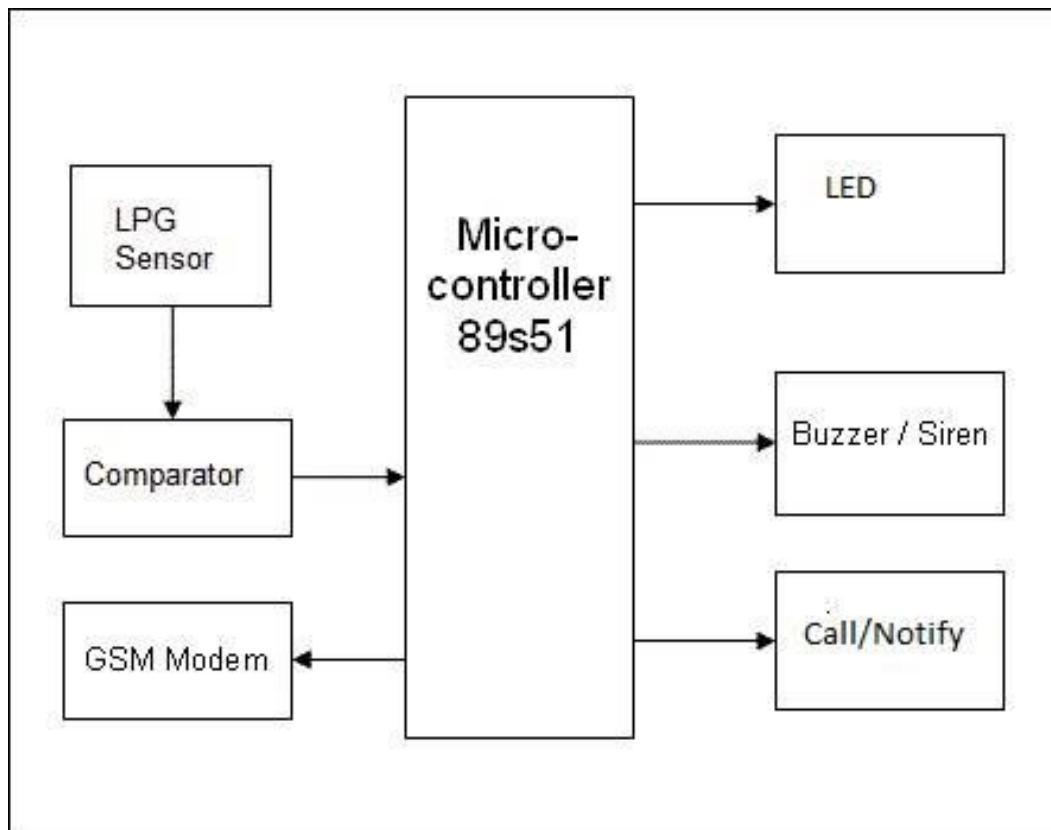


Figure 4.2: Design of Gas leakage Security system.

When there is a gas leakage, at first the mq-6 gas sensor sensed the gas and then the stepper motor opens the window to bypass the gas. During this process a phone call will be made by GSM module to the user and warn user.

4.3 What Is Arduino?

Arduino is an open-source prototyping stage in light of easy to-use gear and programming. Arduino sheets can read inputs - light on a sensor, a finger on a catch, or a Twitter message - and change it into a yield - impelling a motor, turning on a Drove, dispersing something on the web. we can direct your board by sending a plan of rules to the microcontroller on the board.

To do all things considered we use the Arduino programming dialect (in light of Wiring), and the Arduino Programming (IDE), in view of Preparing.

Arduino was conceived at the Ivrea Interaction Design Organization as a simple apparatus for quick prototyping, the Arduino board began changing to adjust to new needs. All Arduino sheets are totally open-source, engaging clients to manufacture them autonomously and in the end adjust them to their specific needs. The product, as well, is open-source, and it is becoming through the commitments of clients overall. We used figure 4.3 Arduino Uno device to complete our project work.

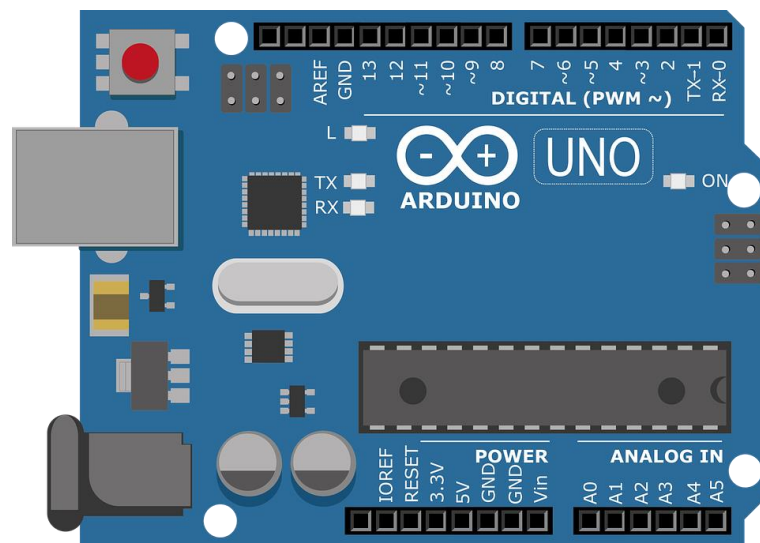


Figure 4.3: Shows a Arduino Uno board which is the core component of this project [1]

Features of the Arduino UNO:

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- Flash Memory: 32 KB of which 0.5 KB used by boot loader
- SRAM: 2 KB (ATmega328)

4.4 Why Use ARDUINO

There are various distinctive microcontrollers and microcontroller stages open in publicize for physical enlisting.

For instance, Parallax Essential Stamp, Net media's BX-24, Phi gets, MIT's Handy board, Beagle Board, and various others offer equivalent handiness. These mechanical assemblies take the messy purposes of enthusiasm of microcontroller programming and wrap it up in an easy to-use package. Arduino in like manner streamlines the path toward working with microcontrollers, notwithstanding it offers some favored point of view for educators, understudies, experts.

Cross-arrange - The Arduino drivers and programming continues running on Mac, Windows, and Linux working structures and they are thoroughly common license.

Clear board - Various microcontroller sheets are irrefutably enormously complex with a huge amount of included parts like LCDs, gets, LEDs, 7-segments, etc showing all that it can do. Arduino has indisputably the base. Need more? Get a shield. There are numerous Arduino shields, from LCD to Wi-Fi, yet it's up to the customer to incorporate that.

Direct programming condition - The Arduino programming condition is definitely not hard to-use for novices, yet adequately versatile for forefront customers to abuse as well. There are libraries to do essential things, like twiddle pins or debounce gets and tremendous measures of question wrapped libraries to do complex things, for example,

staying in contact with SD cards, LCD screens, parsing GPS. For teachers, it's favorably in perspective of the Getting ready programming condition, so understudies making sense of how to program in that condition will be OK with the look and feel of Arduino. Arduino is a fundamental structure planned for creative people with pretty much nothing or "no prior learning of contraptions. Above all, it has a to a great degree welcoming disposition towards students and tries not to freeze them unnecessarily."

Open source and broad hardware - The designs of the Arduino sheets are discharge under a Creative Commons permit, so any circuit fashioners can influence their own rendition of the module, to investigate and enhancing it. Indeed, even generally unpracticed clients can assemble the breadboard variant of the module keeping in mind the end goal to saw how it functions and spare cost. Figure 4.4 shows distinctive kinds of Arduino equipment.

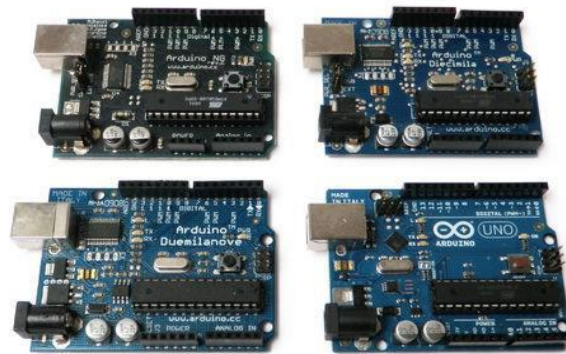


Figure 4.4: Different types of Arduino [2].

4.5 HC-05 Bluetooth Module

The Bluetooth module (Figure: 4.5) HC-05 is an MASTER/SLAVE module. By default the production line setting is SLAVE. The Part of the module (Mater or Slave) can be arranged just by COMMANDS. The slave modules can't start an association with another Bluetooth gadget, yet can acknowledge connections. Master module can start an association with other devices. The client can utilize it basically for a serial port

substitution to set up association amongst MCU and GPS, PC to our inserted venture, and so forth.

Hardware Features:

- Typical -80dBm sensitivity.
- Up to +4dBm RF transmit power.
- 3.3 to 5 V I/O.
- PIO (Programmable Input/Output) control.
- UART interface with programmable baud rate.

Software Features:

- Searching network for connect device to control home appliance.
- Automatically connect to the previous device on power as default.
- Permit pairing device to connect as default.
- Default auto pairing pincode is 1234.

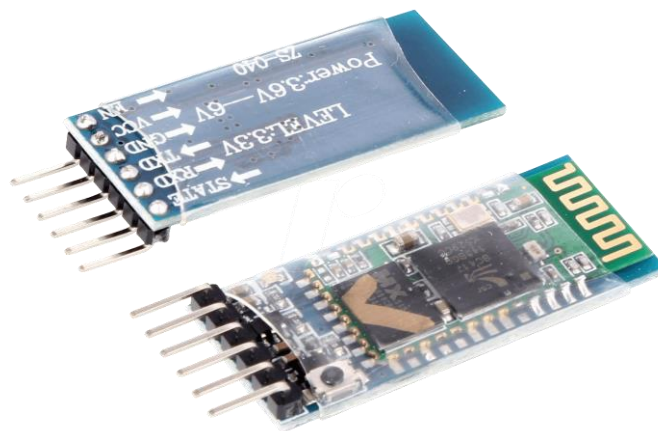


Figure 4.5: Hc-05 Bluetooth Module [4]

This HC-05 Bluetooth module is used to create virtual connection between our apparatus and mobile phone. After a successful connection we can operate almost all devices with our mobile.

4.6 AT89S51 Microcontroller

The AT89S51 is a low-control, unrivaled CMOS 8-bit microcontroller with 4K bytes of In-System Programmable Flash memory. The device is manufactured using Atmel's high-thickness nonvolatile memory advancement and is flawless with the business standard 89S51 rule set and stick out. The on-chip Flash allows the program memory to be remade in-structure or by a customary nonvolatile memory programming engineer. By joining a versatile 8-bit CPU with In-System Programmable Flash on a strong chip, the Atmel AT89S51 is a competent microcontroller which gives a significantly versatile and monetarily insightful response for some introduced control applications. The AT89S51 gives the going with standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, Watchdog clock, two data pointers, two 16-bit clock/counters, a five-vector two-level meddle with plan, a full duplex serial port, on-chip oscillator, additionally, clock equipment. Besides, the AT89S51 is sketched out with static method of reasoning for assignment down to zero repeat and support two programming selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, clock/counters, serial port, and interfere with a structure to continue working. The Power-down mode saves the RAM substance however hardens the oscillator, impairing all other chip limits until the accompanying outside upset or gear reset. This Microcontroller Figure 4.6 is used in our gas leakage system.



Figure 4.6: AT 89S51 Microcontroller [5].

The at89s4051 has two programming modes: parallel and ISP. In parallel mode, we have to control the chip with a 5V input (Vcc) however utilize a 12V signal on the RST/Vpp stick. Dealing with two distinctive voltage levels on a similar stick is irritating (can be proficient with a transistor). We chose to utilize the slower ISP programming mode.

Features of AT89S51:

- Compatible with MCS®-51 Products
- 4K Bytes of In-System Programmable (ISP– Endurance: 10,000 Write/Erase Cycles)
- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 128 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Two 16-bit Timer/Counters
- Six Interrupt Sources
- Full Duplex UART Serial Channel
- Low-power Idle and Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog Timer
- Dual Data Pointer
- Power-off Flag
- Fast Programming Time
- Flexible ISP Programming (Byte and Page
- Green (Pub/Halide-free) Packaging Option

4.7 MQ-6 Gas Sensor

This is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 (Figure 4.7) can detect gas concentrations anywhere from 200 to 10000ppm. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

This sensor Figure (4.7) comes in a package similar to our MQ-6 gas sensor, and can be used with the breakout board below



Figure 4.7: MQ-6 LPG gas sensor [6].

This mq-6 lpg gas sensor is used to sense the gas from the environment. It is connected with microcontroller of the Arduino with pins.

Note: The sensor becomes very hot after a while, don't touch it!

4.8 GSM Module

A GSM module is a chip or circuit that will be utilized to build up the correspondence between a cell phone or a figuring machine and a GSM framework. The modem (modulator-demodulator) is a basic part here supply circuit and correspondence interfaces (like RS-232, USB 2.0, and others) for PC. A GSM module can be a committed modem gadget with a serial, USB or Bluetooth association, or it can be a cell phone that gives GSM modem abilities. This module (Figure 4.8) is used to call the user when critical situation arises.



Figure 4.8: GSM Module [7]

This module is used to warn the user by calling him/her within 30 seconds from sensing the gas. The green led will turn on when it called the user.

4.9 Stepper Motor

Engines change over electrical vitality into mechanical vitality. A stepper engine changes over electrical heartbeats into particular rotational developments. A stepper engine is a brushless DC electric engine that partitions a full revolution into various equivalent advances. Stepper engines deal with the guideline of electromagnetism. Figure 4.9 is utilized to open the window in our task.

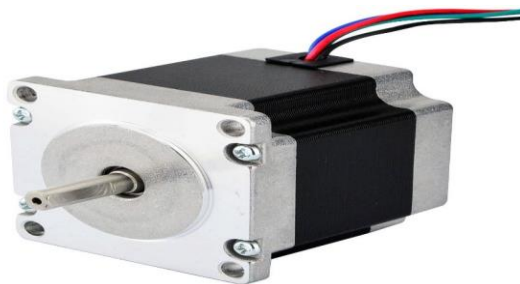
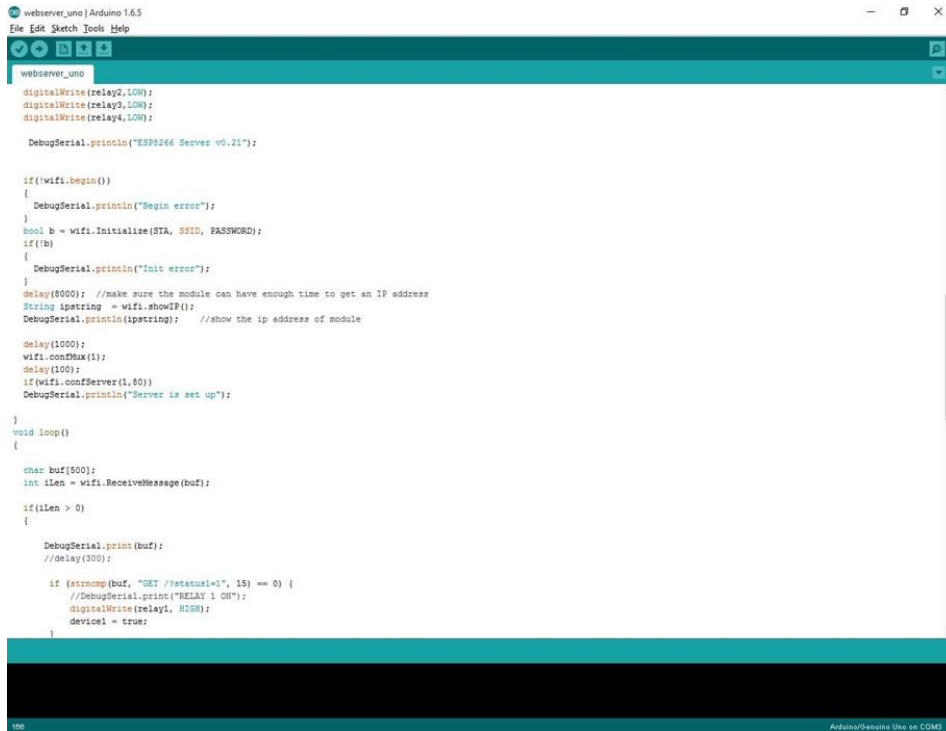


Figure 4.9: Stepper Motor [8]

This motor is utilized to open the window of the house and the gas will be avoided. At the point when the sensor sense the gas a flag naturally sent to the motor and it opens the window until the point that the gas is completely skirted to the outside.

4.10 Arduino IDE

For this circumstance we can use particular IDE like Microsoft's visual studio anyway we picked this since this IDE is impressively more organized with Arduino than visual studio. Arduino IDE is also extraordinarily straightforward and easy to use. In the going with 4.10 we showed a screen catch from Arduino IDE.



```
webserv_arduino | Arduino 1.6.5
File Edit Sketch Tools Help

webserv_arduino
digitalWrite(relay2,LOW);
digitalWrite(relay3,LOW);
digitalWrite(relay4,LOW);

DebugSerial.println("ESP8266 Server v0.21");

if(!wifi.begin())
{
  DebugSerial.println("Begin error");
}
bool b = wifi.initialize(STA, SSID, PASSWORD);
if(!b)
{
  DebugSerial.println("Init error");
}
delay(8000); //make sure the module can have enough time to get an IP address
String ipstring = wifi.showIP();
DebugSerial.println(ipstring); //show the ip address of module

delay(1000);
wifi.config();
delay(100);
if(wifi.configServer(1,80))
DebugSerial.println("Server is set up");
}

void loop()
{
  char buf[500];
  int iLen = wifi.ReceiveMessage(buf);

  if(iLen > 0)
  {
    DebugSerial.print(buf);
    //delay(300);

    if (strcmp(buf, "GET //status=1", 15) == 0) {
      //DebugSerial.print("RELAY 1 ON");
      digitalWrite(relay1, HIGH);
      device1 = true;
    }
  }
}
```

Figure 4.10: demonstrates a screen capture of Arduino IDE [11].

CHAPTER 5

DESIGN AND IMPLIMENTATION

5.1 Introduction

The plan of this project included coupling a few equipment segments and testing at the distinctive phases of the usage.

Firstly, a flow chart as shown in figure 5.1 was developed for the design indicating the processes involved.

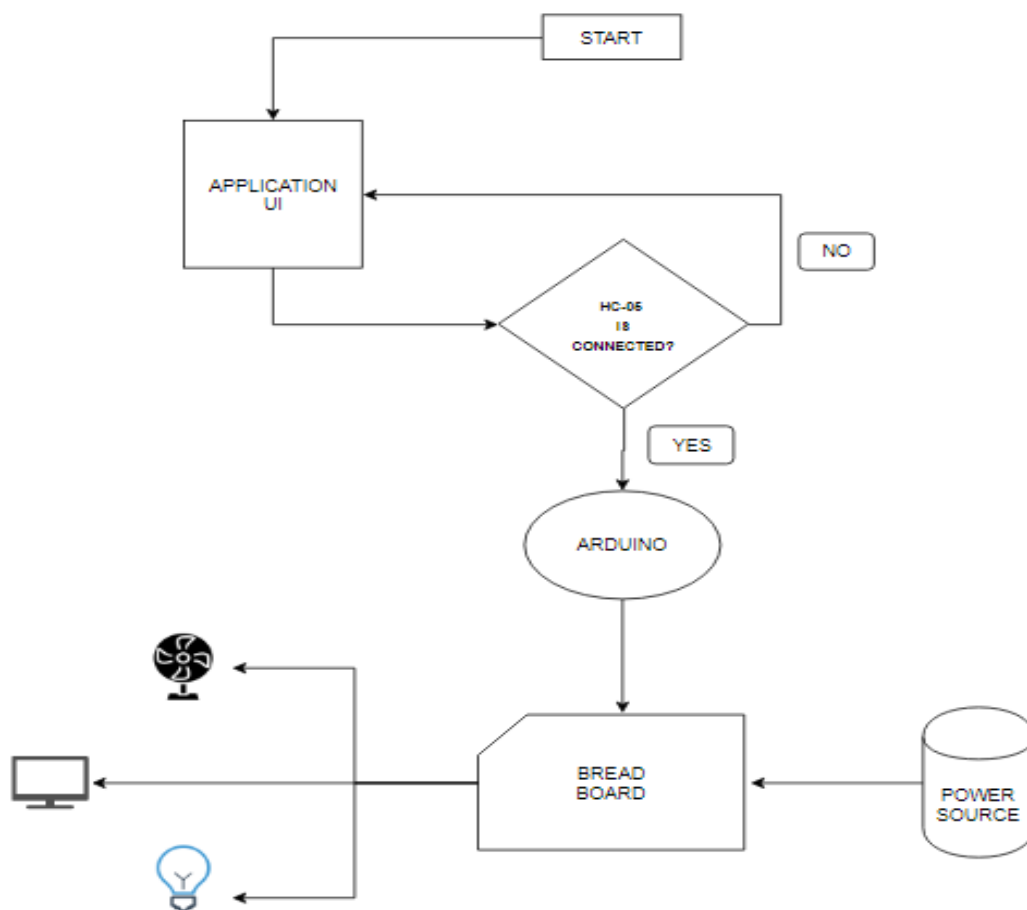


Figure 5.1: Flowchart Home automation using HC-05 module [9].

Figure 5.1, Shows the working procedure of Home Automation using voice control command. Shortly describe about that flow chart.

- First, Install AMR_voice control software from play store, which is free.
- Second, connect HC-05 to Android device.
- If connected, then provide voice command to turn on/off electronic instrument.
- For example: when we tell “light on” then our light has been turned on or when we tell “light off” then light turn off.

In this way, we can control our home apparatus though our android device. This project will make our daily life easier.

This circuit is basic and little. There are just associations with be made between the Arduino and Bluetooth module. We can associate the Bluetooth module to the Arduino utilizing an arrangement of jumper wires and a connector. At that point we can control our parts utilizing voice summons.

Connect an LED, FAN, TV positive to pins of the Arduino through a resistance. Connect its negative to GND, and we're done with the circuit.

5.2 Layout

The following figure 5.2 shows the full wiring layout of the system.

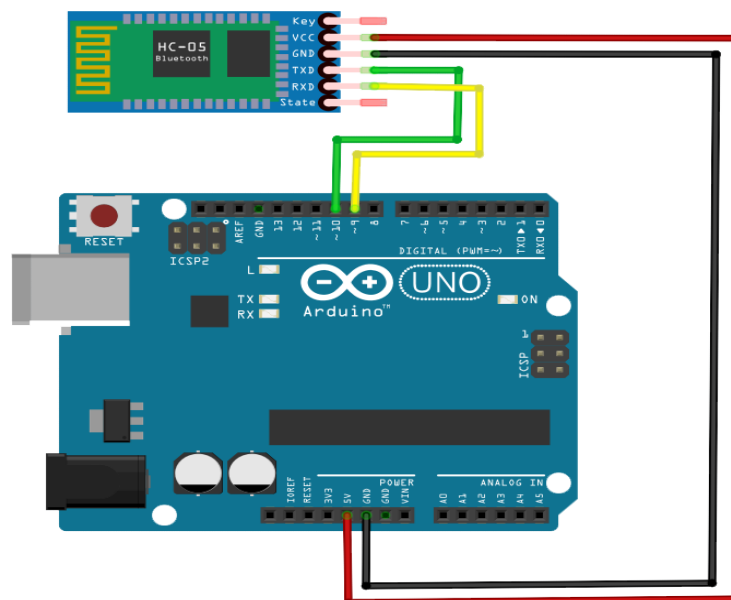


Figure 5.2: Connection procedure of Arduino with Bluetooth module [12].

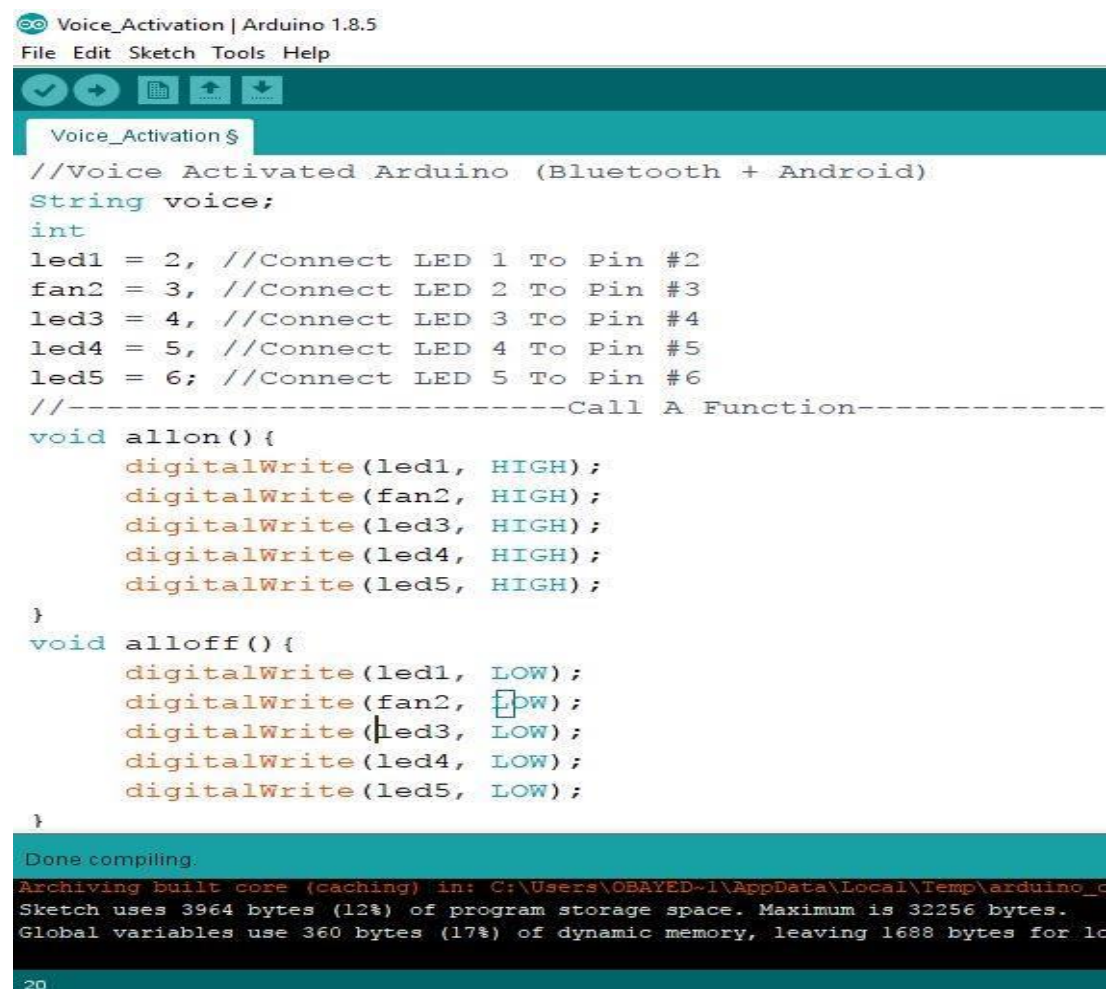
In this figure 5.2, we see how to connect HC-05 to our Arduino board. According to our following figure we connect

Arduino Pins	Bluetooth Pins
RX (Pin 0)	TX
TX (Pin 1)	RX
5V	VCC
GND	GND

Note: Don't connect RX to RX and TX to TX on the Bluetooth and Arduino. You will receive no data. Here, TX means transmit and RX means receive.

5.3 Arduino Code Explanation

Coding Part of Home Automation:



```
Voice_Activation | Arduino 1.8.5
File Edit Sketch Tools Help

Voice_Activation $
//Voice Activated Arduino (Bluetooth + Android)
String voice;
int
led1 = 2, //Connect LED 1 To Pin #2
fan2 = 3, //Connect LED 2 To Pin #3
led3 = 4, //Connect LED 3 To Pin #4
led4 = 5, //Connect LED 4 To Pin #5
led5 = 6; //Connect LED 5 To Pin #6
//-----Call A Function-----
void allon(){
  digitalWrite(led1, HIGH);
  digitalWrite(fan2, HIGH);
  digitalWrite(led3, HIGH);
  digitalWrite(led4, HIGH);
  digitalWrite(led5, HIGH);
}
void alloff(){
  digitalWrite(led1, LOW);
  digitalWrite(fan2, LOW);
  digitalWrite(led3, LOW);
  digitalWrite(led4, LOW);
  digitalWrite(led5, LOW);
}

Done compiling.
Archiving built core (caching) in: C:\Users\OBAYED-1\AppData\Local\Temp\arduino_...
Sketch uses 3964 bytes (12%) of program storage space. Maximum is 32256 bytes.
Global variables use 360 bytes (17%) of dynamic memory, leaving 1688 bytes for l...
20
```

Figure 5.3: shows some coding part of the digital home automation system.

5.4 AMR_Voice Software:

Installing Procedure of AMR_Voice Software: 5 Simple Steps to Use AMR_Voice software:

- I. Download the app from Google Play Store.
- II. Tap on options menu then select "Connect Robot"
- III. Click on BT-Module (in my case it's the HC-05)
- IV. Wait until it says Connected to BT-Module (HC-05)
- V. Tap on the microphone icon and state your command!

Application UI for Voice Command:

Figure 5.4 shows AMR_Voice control application UI

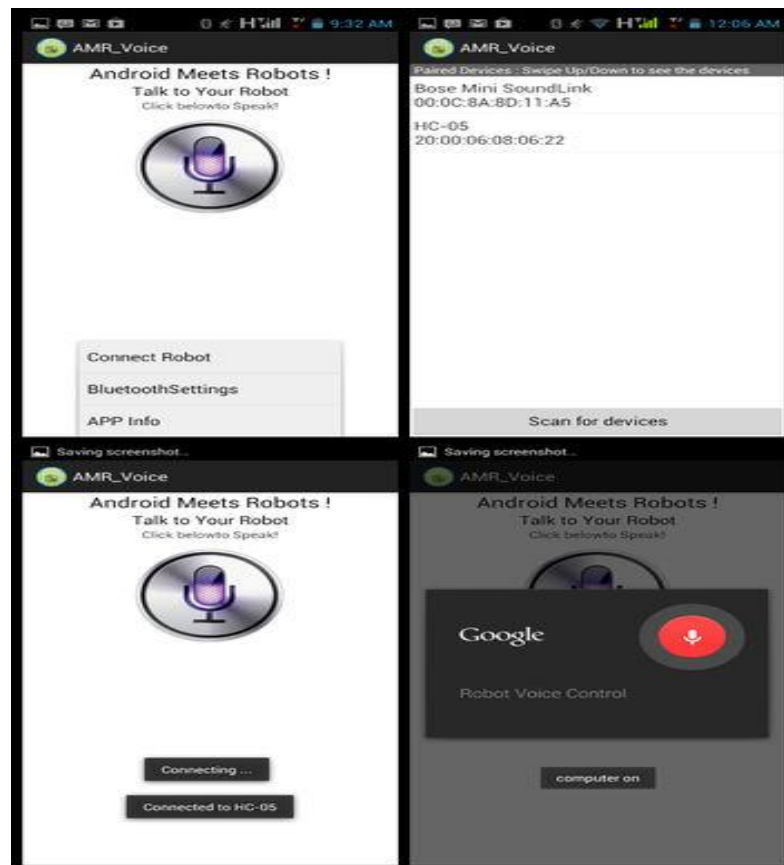


Figure 5.4: Amr_voice control software [10]

To provide voice command, we need android device for installation AMR_Voice control and after installation software we follow this procedure according figure

5.5 Gas leakage system:

In our project we have a gas leakage system where the gas will be automatically detected when there is a leakage and therefor a call will be made by gsm module to warn the user. In Figure 5.5(a) we have a flow chart of this security system.

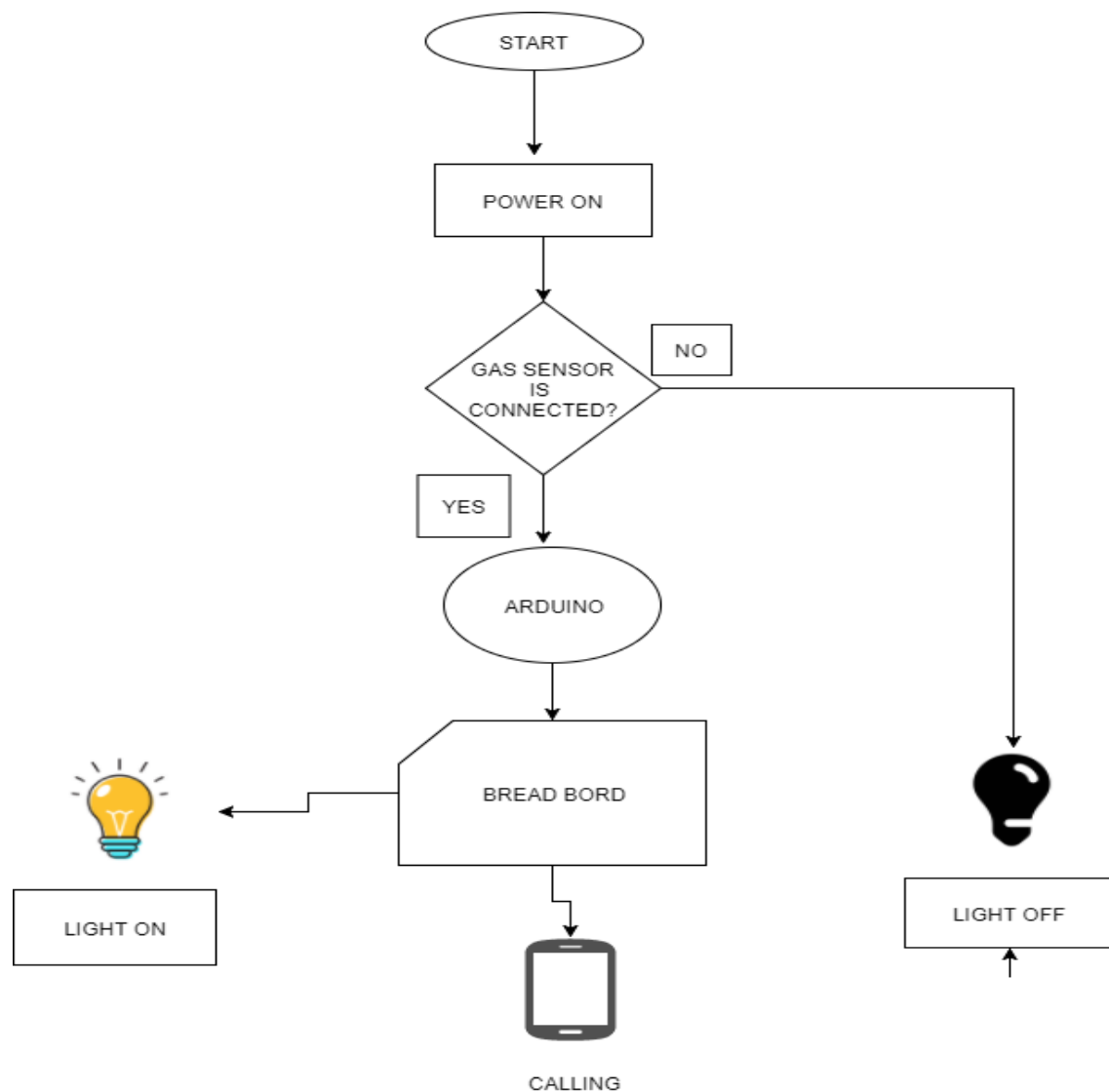


Figure 5.5.1: flowchart of gas leakage system [9].

Here in figure 5.5(b) shows how the pins of mq-6 connected with Arduino board.

In this outline (Figure : 5.5) we can see that after power on, if the gas sensor distinguishes the gas then gsm module associated with Arduino if gas is in remain in room then naturally window open and close and attempt to expel gas from kitchen or room and if gas spillage speed is high at that point consequently call to the client number and tell by bell. The red light will be on when the gas sensor sense gas and window is open attempt to evacuate gas and the green light will on when the room is secured from gas spillage.

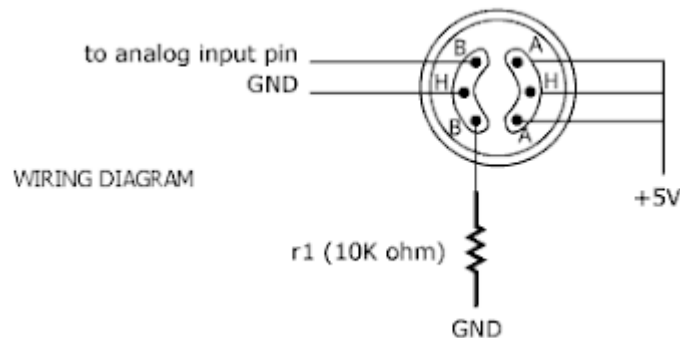


Figure 5.5.2: shows the MQ-6 pins connection with Arduino [6].

The connections are pretty easy, see the image above.

- Vcc & GND pins of sensor --> Arduino GND
- Signal (middle pin) --> Arduino Pin 2
- 4.7K Resistor between signal pin and 5V pin

From VCC of mq-6 we connect it with +5v port of Arduino board. Then we connect MQ-6 GND pin to Arduino's GND port. Now another pin of MQ-6 is connected with arduino's analog pin.

5.6 Real life problem and implementation:

1. Student injured in Mymensingh gas explosion dies in March 29, 2018:

A gas cylinder exploded on the third floor of RS Tower, a six-storey residential building in the Jamirdia Masterbari neighborhood of Bhaluka, killing Shaheen's classmate Towhidul Islam Topu on the spot. Shaheen, a student of Khulna University of

Engineering and Technology, succumbed to his injuries around 11pm at Dhaka Medical College Hospital, said Bacchu Miah, sub-inspector of DMCH Police Outpost. A Shaheen and his other two classmates Hafeez and Deepto were hospitalized with severe injuries.

2. 5 of a family burned in Dhaka cause of gas leak explosion September 22, 2017:

In this explosion five members of a family, including three children, are undergoing treatment at the burn unit of Dhaka Medical College and Hospital after they sustained burn injuries in an explosion caused by “gas line leak” The incident took place at the ground floor of a five-storey building at Shampur around 3:00am.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

It is evident from this dare to work that an individual control home computerization system can be proficiently delivered utilizing negligible exertion locally open portions and can be used to control assorted home machines going from the security, lights, the TV to the cooling structure and even the entire house lighting structure. Stunningly better, the fragments required are nearly nothing and few that they can be packaged into a little inconspicuous holder.

The executed home mechanization structure was attempted different conditions and it worked as anyone might expect to kill on and the lights viably.

Finally, this home mechanization structure can be moreover realized over Bluetooth, Infrared and WAP organize absent much change to the framework yet still have the ability to control a variety of home machines. Consequently, this structure is versatile and adaptable.

The fundamental favorable position of the basic gas spill identifier is its straightforwardness and its capacity to caution its partners about the spillage of the LPG gas. GSM module is there to send prompt call to the partners in regards to the gas break and accordingly it brings down the force of mishaps. GSM module in this gadget guarantees better security with respect to the gas spills.

6.1 Limitations

A cell phone is an absolute necessity to have segment for controlling this framework at this stage. Likewise, this kind of task needs a compartment which we don't have now.

When we want to turn on/off (ex: light, fan, computer) with our system by voice command if our pronunciation isn't correct then it will not work properly.

Sometime gas leakage system takes more time than usual, to get rid of this we need some components which is much more costly at this time.

6.2 Future Work

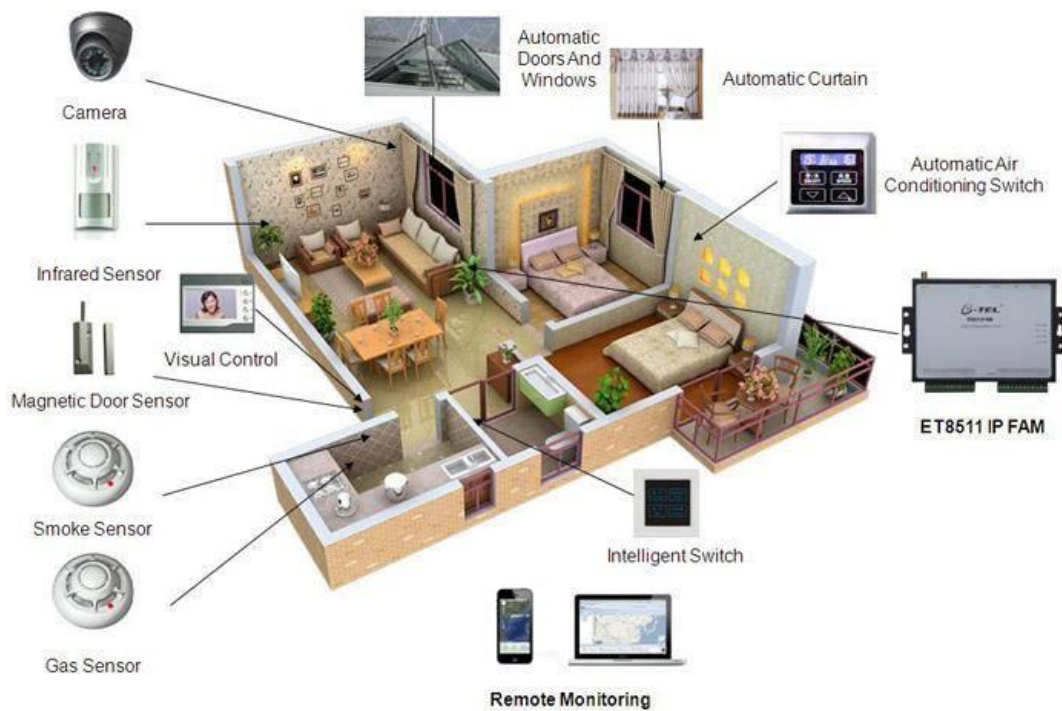


Figure 6.2: Future Work of Digital Home Automation [3]

We want to connect all appliances of home, office, industry, university etc. where is important place in our daily life. That make our life easier and reduce our wasted time and cost.in figure 6.2 is demo future vision of our project.

- 1) Controlling other home appliances by this system.
- 2) Better user friendly user interface.
- 3) Removing disadvantages stage by stage.
- 4) In future we can add a method where this system can automatically take steps against this gas leakage problem and save a lot of lives.
- 5) We want to reduce the accident of our country that was caused by gas leakage by improving our system

REFERENCES

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APPENDIX

```
sketch_apr03a $
#include <Servo.h>
#include <SoftwareSerial.h>
SoftwareSerial sim(2, 3); // RX TX
Servo myservo; // create servo object to control a servo

void setup() {
  Serial.begin(19200);
  while (!Serial) {
    ; // wait for serial port to connect. Needed for native USB port only
  };
  Serial.println("Started");
  sim.begin(19200);
  sim.print("AT\r\n");
  pinMode(10,OUTPUT);//GREENLED
  pinMode(12,OUTPUT);//REDLED
  myservo.attach(9); // attaches the servo on pin 9 to the servo object
  myservo.write(0);
}

void loop() {
  float sensorVoltage;
  float sensorValue;

  sensorValue = analogRead(A0);
  sensorVoltage = sensorValue/1024*5.0;
```

Figure A1: Gas Leakage Detection Coding Part 1

```
sketch_apr06a $

if(sensorVoltage<1.50)
{digitalWrite(10, HIGH);
digitalWrite(12,LOW);
myservo.write(0);
}

//SIM800

if (sim.available()) {
  Serial.write(sim.read());
}
if (Serial.available()) {
  sim.write(Serial.read());
}
if(Serial.available())
{
  delay(1000); // wait to let all the input command in the serial buffer
  // read the input command in a string
  String cmd = "";
  while(Serial.available())
  {
    cmd += (char)Serial.read();
  }
  // send to the sim
  sim.println(cmd);
}
|
```

Figure A2: Gas Leakage Detection Coding Part 2

```

Voice_Activation | Arduino 1.8.5
File Edit Sketch Tools Help

Voice_Activation $
//Voice Activated Arduino (Bluetooth + Android)
String voice;
int
led1 = 2, //Connect LED 1 To Pin #2
fan2 = 3, //Connect LED 2 To Pin #3
led3 = 4, //Connect LED 3 To Pin #4
led4 = 5, //Connect LED 4 To Pin #5
led5 = 6; //Connect LED 5 To Pin #6
//-----Call A Function-----
void allon() {
    digitalWrite(led1, HIGH);
    digitalWrite(fan2, HIGH);
    digitalWrite(led3, HIGH);
    digitalWrite(led4, HIGH);
    digitalWrite(led5, HIGH);
}
void alloff() {
    digitalWrite(led1, LOW);
    digitalWrite(fan2, LOW);
    digitalWrite(led3, LOW);
    digitalWrite(led4, LOW);
    digitalWrite(led5, LOW);
}
}

Done compiling.
Archiving built core (caching) in: C:\Users\OBAYED-1\AppData\Local\Temp\arduino_
Sketch uses 3964 bytes (12%) of program storage space. Maximum is 32256 bytes.
Global variables use 360 bytes (17%) of dynamic memory, leaving 1688 bytes for l
20

```

Figure A3: Home Automation Via Bluetooth Device Coding part 1

```

Voice_Activation | Arduino 1.8.5
File Edit Sketch Tools Help

Voice_Activation $
}
//-----Loop Code-----//
void loop() {
    while (Serial.available()){ //Check if there is an available byte to read
        delay(10); //Delay added to make thing stable
        char c = Serial.read(); //Conduct a serial read
        if (c == '#') {break;} //Exit the loop when the # is detected after the word
        voice += c; //Shorthand for voice = voice + c
    }
    if (voice.length() > 0) {
        Serial.println(voice);
    }
    //-----Control Multiple Pins/ LEDs-----//
    if(voice == "*all on") {allon();} //Turn Off All Pins (Call Function)
    else if(voice == "*all off") {alloff();} //Turn On All Pins (Call Function)

    //-----Turn On One-By-One-----//
    else if(voice == "*TV on") {digitalWrite(led1, HIGH);}
    else if(voice == "*fan on") {digitalWrite(fan2, HIGH);}
    else if(voice == "*computer on") {digitalWrite(led3, HIGH);}
    else if(voice == "*bedroom lights on") {digitalWrite(led4, HIGH);}
    else if(voice == "*bathroom lights on") {digitalWrite(led5, HIGH);}
    //-----Turn Off One-By-One-----//
    else if(voice == "*TV off") {digitalWrite(led1, LOW);}
    else if(voice == "*fan off") {digitalWrite(fan2, LOW);}
    else if(voice == "*computer off") {digitalWrite(led3, LOW);}
    else if(voice == "*bedroom lights off") {digitalWrite(led4, LOW);}
    else if(voice == "*bathroom lights off") {digitalWrite(led5, LOW);}
    //-----Reset the variable after initiating
    voice="";}
}

Done compiling.
Archiving built core (caching) in: C:\Users\OBAYED-1\AppData\Local\Temp\arduino_
Sketch uses 3964 bytes (12%) of program storage space. Maximum is 32256 bytes.
Global variables use 360 bytes (17%) of dynamic memory, leaving 1688 bytes for

```

Figure A4: Home Automation Via Bluetooth Device Coding part 2



Figure A5: Home Automation Project Outlook interface part 1



Figure A6: Home Automation Project Outlook interface part 2

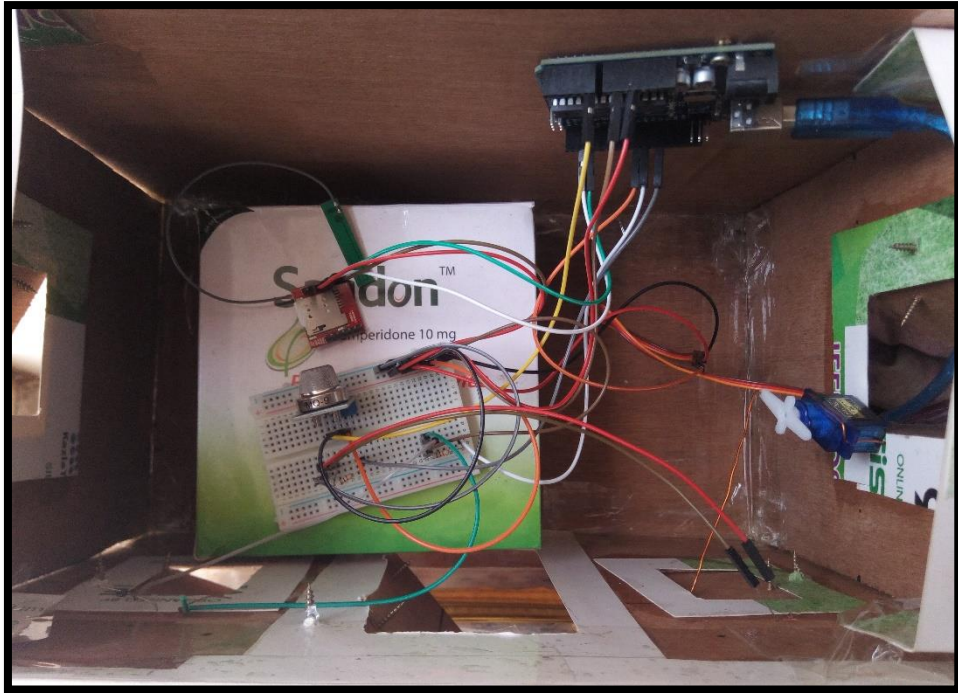


Figure A7: GSM Base Gas Detect Circuit Connection part 1



Figure A8: Automated Home