

HOME AUTOMATION

**A Project and Thesis submitted in partial fulfillment of the requirements for the
Award of Degree of
Bachelor of Science in Electrical and Electronic Engineering**

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31 October 2019

Certification

This is to certify that this project and thesis entitled “**Home Automation**” is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on 30 January 2012.

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List of Abbreviations

PIR	Passive Infrared sensor
LCD	Liquid Cristal Diode
GSM	Global System for Mobile Communication
ATM	Automatic teller Machine
LDR	Light Dependent Resistor
LED	Light Emitting Diodes
AC	Alternating Current
DC	Direct Current
GPRS	General Packet Radio Service
HTTP	Hyper Text Transfer Protocol
FTP	File Transfer Protocol
SIM	Subscriber Identification Module
AVR	Automatic Voice Recognize

List of Symbols

λ	Wavelength
λ_B	Bragg wavelength
n_{eff}	Effective index
z	Position along the grating
n	Mode index
f	Fundamental Frequency
ω	Angular frequency
M	Modulation Index
T	Fundamental Time Period

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ABSTRACT

In 21st century is the time of savvy innovation. It is technological generation. Today advancement has transformed into a planned bit of people's lives. We can think about these machines as the beginning of home computerization. Presently we can control TV, light, fan, icebox and so on with Android telephones. This undertaking is about simple and modest home mechanization framework and security framework. This is making android telephone the most required component of the present life. Home mechanization was conceivable with the assistance of this little gadget. The quick advancement of remote correspondence motivated us to use mobile phones to remotely control a family unit machine. In this undertaking we utilized the Arduino ATmega328P Microcontroller. It is associated with the all parameters and controls those parameters. For remote control we can utilize a GSM module for sign transmission. We can utilize some info and yield gadget. Info gadgets as Gas distinguish sensor, Motion sensor, LDR sensor, Fire alert sensor and yield gadgets is Light, fan, TV. At whatever point any shortcoming happen in this framework then microcontroller sense that and send warning from GSM module. In the event that gas sensor detects any gas or smoke it gets a high sign and send it microcontroller then microcontroller discover it and send us notice from GSM module. In the movement sensor zone in the event that any versatile items are discover the sensor, at that point microcontroller get high sign and send warning. We can utilize the LDR for outside light control, when night the lights on naturally and when day the lights off consequently. In different gadgets like lights, fan, TV is on/off from Android application. At the point when the framework runs the lights are off. On the off chance that we need to on light, at that point we can utilize an Android application. At the point when we press light on then GSM module get the order and send to microcontroller to on lights. Correspondingly fan or TV controlled from Android application. This is very important for the our modern technology and if you do not work to technically we always behind the other technical or smart people. So we always remember to work smartly and smart home is the symbol is this technology.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The 21st century is the time of savvy innovation. It was said that cutting edge life is unfathomable without power yet it this platitude has changed. Presently we state day by day life is impossible without web. Present day innovation has progressed to another degree of programmed and shrewd frameworks. There is no compelling reason to present the headway of innovation in current occasions. As we probably am aware, the headway has gone far and nearly has come to its pinnacle of modernization. Today advancement has transformed into a planned bit of people's lives. It has and continues influencing various pieces of step by step life and has allowed better social affiliation, effortlessness of transportation, the ability to appreciate fervor and media and has helped in the headway in pharmaceutical. One of the most significant gadgets of present day times is Smartphone. Another significant component of current age is the web. The way to step into the universe of programmed control framework is the mix of Smartphone and the web.

In this way, with the assistance of these two and microcontrollers home computerization was conceivable. In the event that we look couple of years back, individuals have been utilizing clothes washer, water radiators, hair dryer and so on for family unit tasks. Not in each house in Bangladesh yet in western nations these machines are utilized every day for family unit tasks. We can think about these machines as the beginning of home computerization. Presently we can control TV, light, fan, icebox and so on with Android telephones. This undertaking is about simple and modest home mechanization framework and security framework. The amount of Smartphone customers in Bangladesh has extended by 3.1 million to 8.2 million out of 2015, as demonstrated by an ebb and flow report appropriated by Counterpoint Technology Market Research (Dhaka Tribune). Study demonstrates that

seventy five percent of the piece of the overall industry is Android and a sum of one hundred and 6,000,000 android Smartphone were dispatched in the second 50% of 2012. Android Smartphone turned into the top working framework in the market in the here and now worldwide and it progressed toward becoming the most prevalent Working framework known to man. This is making android telephone the most required component of the present life. Home mechanization was conceivable with the assistance of this little gadget. The quick advancement of remote correspondence motivated us to use mobile phones to remotely control a family unit machine. Android controlled home framework isn't basic in Bangladesh yet is accessible in certain workplaces somewhat. The quick improvement of remote correspondence motivated us to use mobile phones to remotely control a family unit machine. There is no real meaning of implanted framework. PC controlled gadgets can be named as inserted frameworks. With the introduction of better gear and better programming, mobile phones have ended up being fit devices and have transformed into a basic bit of people's step by step lives. According to Li et al. (2016) there are three periods of home computerization. Right off the bat, remote innovation with intermediary server. Model: Next Zigbee computerization. Computerized reasoning controls electrical gadgets. Model: Amazon Echo. The most recent innovation is robot cooperating with human. Model: Robot Rovio, Roomba. We have great and modest offices to remote systems and as yet creating in Bangladesh. The second and third era from above, aren't accessible in Bangladesh. It doesn't imply that we don't need it. The legislature and a few associations are attempting to build up our nation in high innovation. Presently high innovation isn't bound inside couple of highlights. What takes high innovation to next level is programmed framework. That is the reason the interest of programmed electronic gadget is expanding. To achieve that, home computerization is important.

1.2 Background

The "Home Automation" idea has existed for a long time. The expressions "Savvy Home", "Insightful Home" pursued and has been utilized to present the idea of systems administration apparatuses and gadgets in the house. Home mechanization Systems speaks to an extraordinary research opportunity in making new fields in building and Computing. Home mechanization Systems incorporates brought

together control of lighting, home machines, security framework and different frameworks. To give improved us comfort, vitality proficiency and security framework. Home computerization Systems getting to be prominent these days and enter rapidly in this developing business sector. Because of the progression of remote innovation, there are a few distinctive of correspondence are presented, for example, GSM. Every one of the association has their very own extraordinary determinations and applications. This task advances the structure of home computerization and security framework utilizing GSM and Android application. The Arduino microcontroller and different parts and gadgets can be associated. The home machines are associated with the info/yield ports of Arduino microcontroller alongside the electrical extension and their status is passed to the Arduino microcontroller.

1.3Objective

- To plan a control framework for home mechanization utilizing GSM module.
- To plan a circuit that can effectively control various apparatuses controlled to the shrewd control framework.
- To plan a circuit that can consequently turn ON and OFF the home apparatuses utilizing cell phone through applications.

1.4Methodology

- First the necessities of the venture was painstakingly examined to structure the home computerization framework.
- The philosophy of this task configuration can be partitioned into two segments; equipment and programming executions.
- Information were gathered from references books and sites to discover the conceivable improvement.
- Required parts have been obtained from nearby market.

CHAPTER 2

Literature review

2.1 Summary

Home automation is such a project. But with the project that has worked before, we are trying to do a slightly different type of work where we add a lot of things to our project as an exception.

The project that is different than the previous ones, we have added a lot to this project. Projects that are slightly different from other projects, have been created on many projects with home automation such as fingerprint, password, door lock, biometric method, sometimes call method. But the project that is different than the previous ones, we have added a lot to things to make this project and therefore that are slightly different from other projects.

Face Lock is a smart lock, and even better security system but we didn't do it. Only the face lock on which it is locked can turn on or off. Many times the face lock appears wrong. That can't be high security, even if the lock can only open it is a problem. No other member of the family can lock on this off We will remove the face lock system for this problem. We work here to open and close the door via GSM which can only be done by giving instructions on how we can turn on or off the SMS via our phone. The entire job is processed through by arduino.

We are very comfortable to use this project and such projects are made in developed countries and they are enjoying the benefits of this. So we did a lot of research and we decided to create such a smart project.

We started searching on various online sites and we found that there were many projects, so we thought about doing something exceptional and how to make the whole house under automation. Then we started working with different plans. First

we saw how to control a house completely with Arduino and we started working on it. While working, we found that homes locked with fingerprints and voice do not often finish high security and these are very expensive.

We started using GSM to reduce costs. Using GSM, we can easily lock and unlock the door via SMS, so not only the fan lights of the house can even run up to the motor. Which we can't do with fingerprints or voice locks. But with Arduino, these tasks can be done very easily and cost less.

This project makes us aware of the use of electricity. There are times when we have gone to the office to turn on the house fan or lamp but we cannot turn it off. But via SMS, we can turn off the fan or light very easily via SMS. Use it to reduce our power consumption and make it a projector.

2.2 An Early Thought on Entrepreneurship

Three analysts of Malaysia proposed an electronic indoor air quality framework with GSM and Arduino. The framework comprises of gas sensor, temperature and dampness sensor, molecule dust sensor and remote sensor organize (WSN) hub as a remote transmitter. A personal computer goes about as the base station.

As indicated by Chen Shih-Chung, the frameworks proposed by him is structured that can be effectively be adjusted for different applications, for example, control of machines in machining enterprises, car industry, exploring versatile remote hubs, robotizing workplaces and so forth.

There are not many home computerization frameworks that utilization ZigBee or Bluetooth for the remote association. With the assistance of Wi-Fi and because of the presentation of IPv6the association of practically boundless number of implanted gadgets is conceivable.

Al-Ali and Al-Rousan exhibited a plan and actualized Java-based mechanization framework through World Wide Web. It has an independent inserted framework board incorporated into a PC-based server at home.

Andrew, the essayist of the book "Raspberry Pi Home Automation with Arduino", acquainted Raspberry Pi and digger with use it for home mechanization. He portrayed the utilization of Raspberry Pi with Arduino for Linux working framework. The book portrays some home machines programmed control. First he depicted how to introduce all the important hardware and every single required condition. Right off the bat, he gave the historical backdrop of Arduino and Raspberry Pi with all attachments, required shield details and every single important port with power supply. We had the option to discover important information of Arduino since were utilized it. Genuine instances of thermometer, opening and shutting of window ornament dependent on light and temperature information are given. The again, he didn't demonstrate any model identified with security of home.

An article of Singapore by the writers Thomas Gonnot, Won-Jae Yi, Ehsan Monsef and Jafar Saniie demonstrated a convention standard for home robotization framework called Home Automation Device Protocol (HADP). Wi-Fi, Bluetooth 4.2, ZigBee IP, 6LoWPAN, IEEE 802.15.4 principles, and Ethernet system layer supporting IPv6 convention were their parts. Mostly they proposed a convention on the off chance that this that. So it associated numerous gadgets together utilizing WIFI association.

Once more, there is another article to forestall robbery in home byP. Satya Ravi Teja, V. Kushal, A. SaiSrikar titled "Photosensitive security framework for burglary identification and control utilizing GSM innovation". They did it utilizing LDR (Light Dependent Resistor) based sensor which goes about as an electronic eye for distinguishing the robbery or endeavor, and a flagging method dependent on SMS utilizing GSM (Global Systems for Mobile correspondences) innovation. It is additionally peaceful modest.

The points we have seen in the above discussion have all been tested earlier. It is good to mention that the above tests have been tested for the structure of the house or the controlling structure. To ensure the safety of the home, we put it away in the face structure because we feel it is not protective of us. So we've eliminated this method. We have tried to control the entire house with Arduino so as to ensure our safety. We have used a variety of components to protect the home that can be controlled through Arduino. Even our safety is guaranteed.

CHAPTER 3

PROJECT PARAMETERS

3.1 Introduction

In any case the venture, how about we get the possibility of the considerable number of segments that we utilized for the undertaking. It is essential to know all the data about both equipment and programming details. The parts we are utilizing are as per the following:

1. Arduino UNO (ATmega328)
2. Sensors:
 - a. Gas Sensor MQ-2 (SEN 00091)
 - b. PIR Motion Detector (HC – SR501)
 - c. LM 35 Temperature Sensor
 - d. Light Dependent Resistor (LDR) sensor
3. GSM Shield SIM800L
4. LCD Display with header (16x2)
5. Breadboard
6. Adapter (AC to DC 12V)
7. Buzzer
8. LED Light

3.2 Arduino NANO (ATmega328)

3.2.1 Introduction to Arduino ATmega328 Microcontroller

Microcontroller Arduino NANO

This is a microcontroller board dependent on the Atmega 328 microcontroller; it keeps running at 16 MHz and has 1 equipment sequential port, 6 ADC inputs, 14 computerized I/O sticks and keeps running on 5volt power [9]. A microcontroller is a scaled down PC in a chip of silicon and can acknowledge guidelines and adhere to those directions. To change the activity of the microcontroller, we just need to compose another arrangement of guidelines or program. The Atmega 328 microcontroller is an extremely flexible gadget that is sufficient for the job expected in this venture, which is to screen and control the remainder of the equipment. It can give 40mA of drive current to any gadget associated with its ports. The board additionally has an on-board 5volt

controller, which means it can keep running from a power supply significantly higher than 5 volts.

SIM800L GSM MODULE The SIM800L is a 2G module that can work on the regular GSM groups. It requires a 4 volts supply and has a serious number of highlights that make it valuable for the venture. A portion of these are:

1. Voice Communications;
2. SMS service;
3. GPRS communication;
4. HTTP protocol;
5. FTP Protocol;

This module will operate under the control of the microcontroller to send alert messages to reassigned numbers, thus summoning assistance in the event of a fire.

Function of Arduino NANO

Characterizing Arduino

An Arduino is really a microcontroller based unit which can be either utilized legitimately by obtaining from the merchant or can be made at home utilizing the parts, attributable to its open source equipment highlight. It is fundamentally utilized in correspondences and in controlling or working numerous gadgets. It was established by Massimo Banzi and David Cuartielles in 2005.

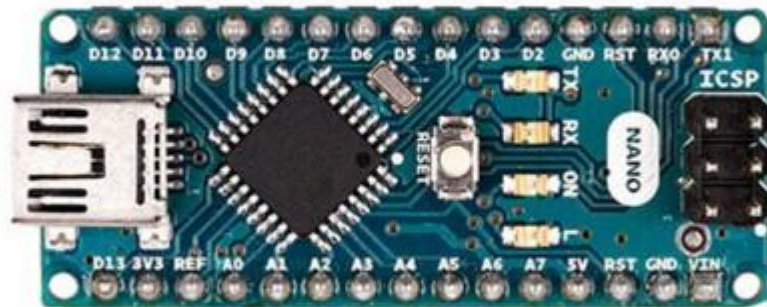


Figure 3.1: Arduino Architecture

Arduino's processor fundamentally utilizes the Harvard engineering where the program code and program information have separate memory. It comprises of two recollections Program memory and the information memory. The code is put away in the glimmer program memory, though the information is put away in the information memory. The Atmega328 has 32 KB of flash memory for storing code (of which 0.5 KB is used for the bootloader), 2 KB of SRAM and 1 KB of EEPROM and operates with a clock speed of 16MHz.

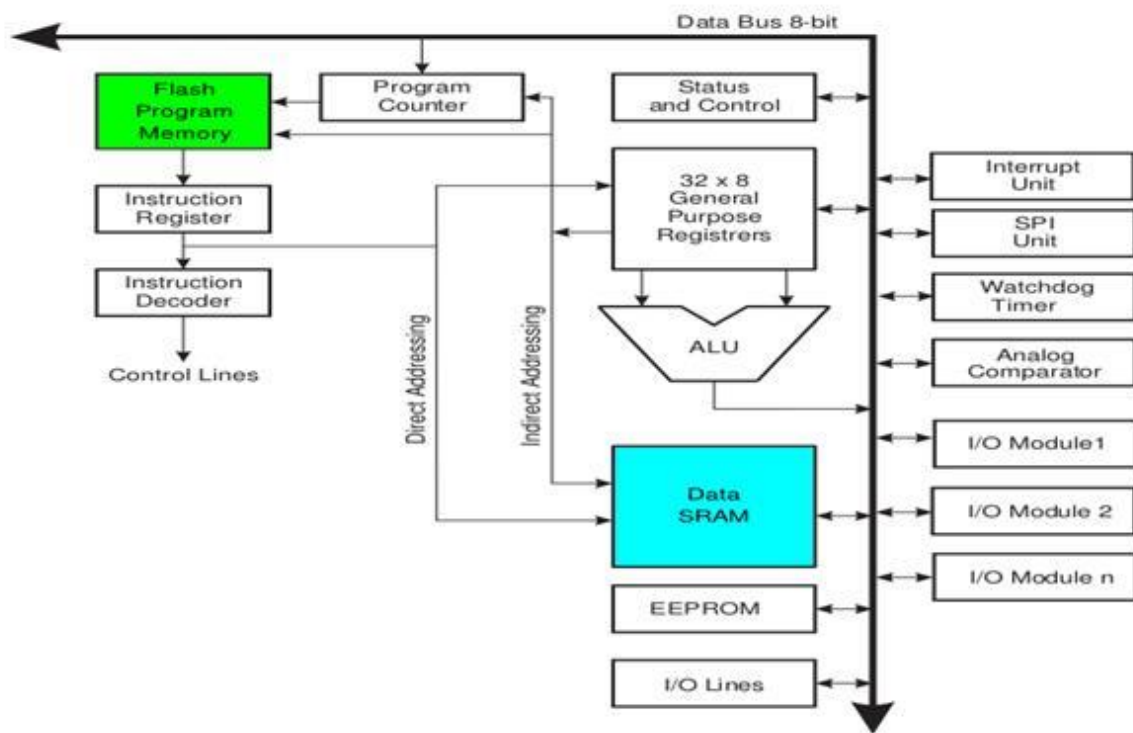
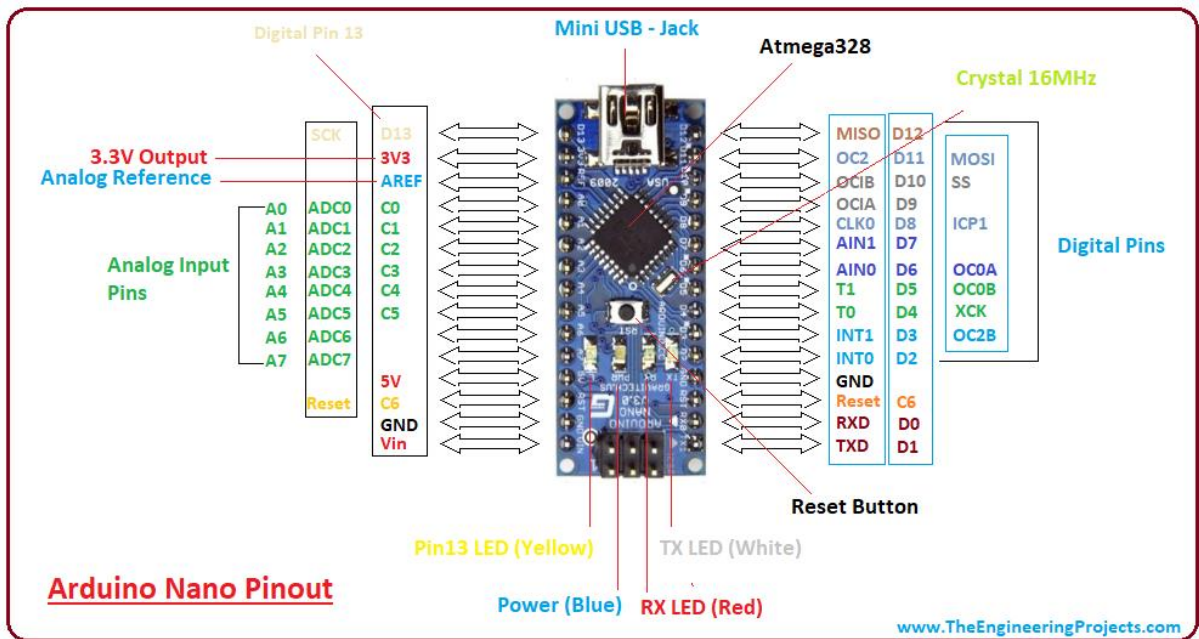


Figure 3.2: Arduino Pin Diagram

A typical example of Arduino board is Arduino Uno. It consists of ATmega328- a 28 pin microcontroller.



Power Jack: Arduino can be control either from the pc through a USB or through outer source like connector or a battery. It can work on an outer stockpile of 7 to 12V. Power can be applied remotely through the stick Vin or by giving voltage reference through the IORef stick.

Digital Inputs: It comprises of 14 advanced data sources/yield sticks, every one of which give or take up 40mA current. Some of them have uncommon capacities like pins 0 and 1, which go about as Rx and Tx individually , for sequential correspondence, pins 2 and 3-which are outer interferes with, pins 3,5,6,9,11 which gives pwm yield and stick 13 where LED is associated.

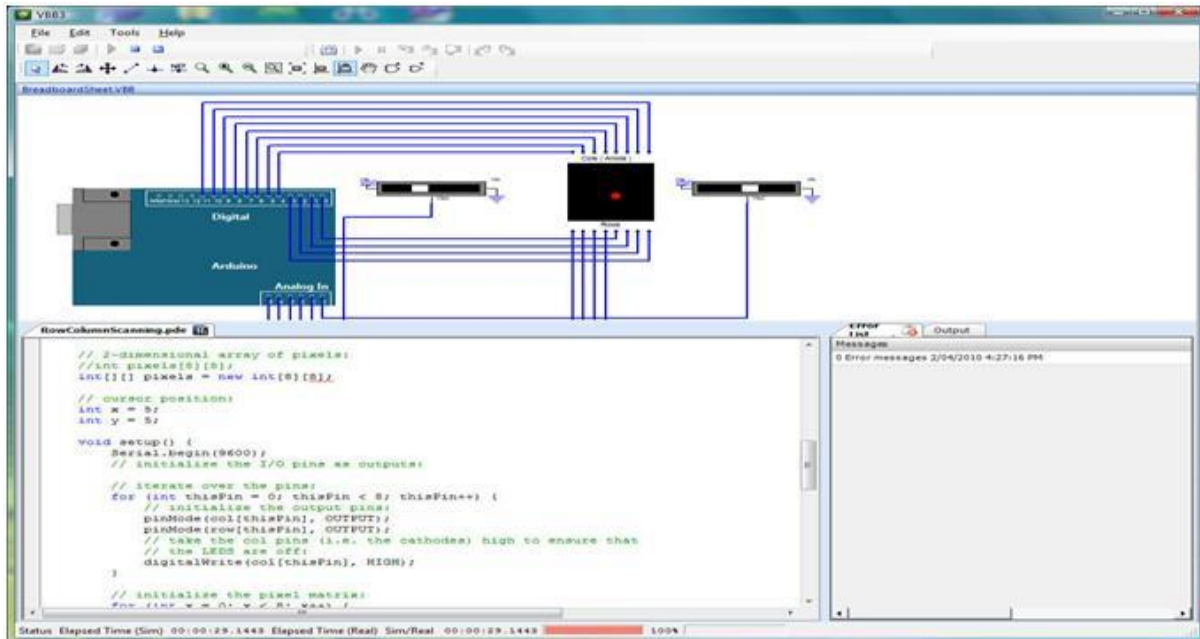
Analog inputs: It has 6 analog input/output pins, each providing a resolution of 10 bits.

AREf: It provides reference to the analog inputs

Reset: It resets the microcontroller when low.

How to program an Arduino?

The most important advantage with Arduino is the programs can be directly loaded to the device without requiring any hardware programmer to burn the program



This is done in light of the nearness of the 0.5KB of Bootloader which enables the program to be scorched into the circuit. We should simply to download the Arduino programming and composing the code.

The Arduino tool window consists of the toolbar with the buttons like verify, upload, new, open, save, serial monitor. It also consists of a text editor to write the code, a message area which displays the feedback like showing the errors, the text console which displays the output and a series of menus like the File, Edit, Tools

5 Steps to program an Arduino

- Programs written in Arduino are known as sketches. A basic sketch consists of 3 parts
 1. Declaration of Variables
 2. Initialization: It is written in the setup () function.
 3. Control code: It is written in the loop () function.
- The sketch is spared with .ino augmentation. Any activities like confirmaing, opening a sketch, sparing a sketch should possible utilizing the catches on the toolbar or utilizing the device menu.
- The sketch ought to be put away in the sketchbook index.
- Chose the correct board from the device menu and the sequential port numbers.
- Click on the transfer catch or pick transfer from the apparatuses menu. Analog these lines the code is transfer by the bootloader onto the microcontroller.

Few of basic Aduino functions are:

- **Digital Read (pin):** Reads the digital value at the given pin.

- **Digital Write** (pin, value): Writes the digital value to the given pin.
- **Pin Mode** (pin, mode): Sets the pin to input or output mode.
- **Analog Read** (pin): Reads and returns the value.
- **Analog Write** (pin, value): Writes the value to that pin.
- **Serial begin** (baud rate): Sets the beginning of serial communication by setting the bit rate.

How to Design your own Arduino?

We can likewise structure our own Arduino by following the schematic given by the Arduino seller and furthermore accessible at the sites. All we need are the accompanying segments A breadboard, a drove, a power jack, an IC attachment, a microcontroller, couple of resistors, 2 controllers, 2 capacitors..

- The IC attachment and the power jack are mounted on the board.
- Add the 5v and 3.3v controller circuits utilizing the blends of controllers and capacitors.
- Add legitimate power associations the microcontroller pins.
- Connect the reset stick of the IC attachment to a 10K resistor.
- Connect the gem oscillators to pins 9 and 10
- Connect the promoted the proper pin.
- Mount the female headers onto the board and interface them to the individual sticks on the chip.
- Mount the line of 6 male headers, which can be utilized as a chose to transfer programs.
- Upload the program on the Microcontroller of the readymade Aduino and after pry it off and spot back on the client unit.

7 Reasons why Arduino is being preferred these days

1. It is reasonable.
2. It accompanies open source equipment highlight which empowers clients to build up their very own unit utilizing effectively accessible one as a kind of perspective source.
3. The Arduino programming is perfect with a wide range of working frameworks like Windows, Linux, and Macintosh etc.
4. It likewise accompanies open source programming highlight which empowers experienced programming designers to utilize the Arduino code to converge with the current programming language libraries and can be broadened and changed.
5. It is anything but difficult to use for learners.
6. We can build up an Arduino based task which can be totally remain solitary or ventures which include direct correspondence with the product stacked in the PC.
7. It accompanies a simple arrangement of associating with the CPU of the PC utilizing sequential correspondence over USB as it contains worked in power and reset hardware.

3.3 Brief Introductions to the Sensors.

Introductions and overview of the sensors we used are given below:

3.3.1 Gas Sensor MQ 2:

MQ2 gas sensor can be utilized to recognize the nearness of LPG, Propane and Hydrogen, additionally could be utilized to identify Methane and other burnable steam, it is with minimal effort and reasonable for various application

Features:

- Operating Voltage is +5V
- Can be used to Measure or detect LPG, Alcohol, Propane, Hydrogen, CO and even methane
- Analog output voltage: 0V to 5V
- Digital Output Voltage: 0V or 5V (TTL Logic)
- Preheat duration 20 seconds
- Can be used as a Digital or analog sensor
- The Sensitivity of Digital pin can be varied using the potentiometer

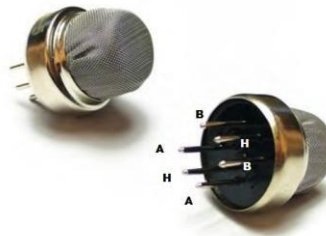


Figure 3.3: MQ 2 Gas Sensor.

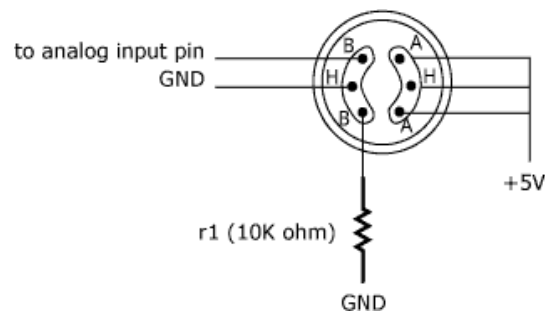


Figure 3.4: Pin out diagram of gas sensor.

Description:

Table 3.1: Description of Gas sensor

For Module		
1	Vcc	This stick controls the module, ordinarily the working voltage is +5V
2	Ground	Used to interface the module to framework ground.
3	Digital Out	You can likewise utilize this sensor to get advanced yield from this stick, by setting an edge worth utilizing the potentiometer
4	Analog Out	This stick yields 0-5V simple voltage dependent on the force of the gas.
For Sensor		
1	H -Pins	Out of the two H pins, one stick is associated with inventory and the other to ground.
2	A-Pins	The A pins and B pins are tradable. These pins will be attached to the Supply voltage.
3	B-Pins	The A pins and B pins are interchangeable. One stick will go about as yield while the other will be destroyed to ground.

3.3.2 PIR Motion Detector (HC – SR501):

Table 3.3: Pin Configuration of Motion Sensor.

Pin Number	Pin Name	Description
1	Vcc	Information voltage is +5V for run of the mill applications. Can run from .4.5V-12V
2	High/Low Output (Dout)	Computerized beat high (3.3V) when activated (movement identified) advanced low(0V) when idle(no movement identified)
3	Ground	Associated with ground of circuit



Figure 3.5: (a) PIR Motion Detector (Top view). (b) PIR Motion Detector (bottom view).

PIR Sensor Features:

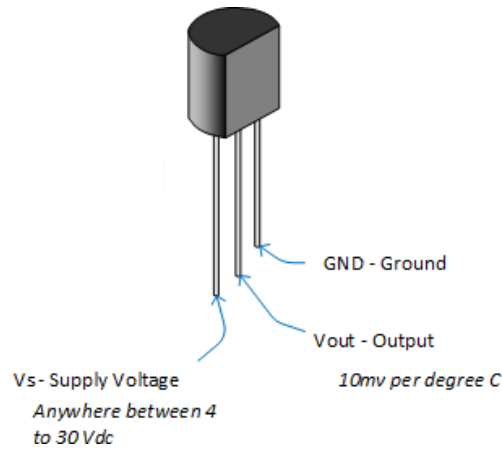
- Wide run on info voltage differing from 4.V to 12V (+5V prescribed)
- Output voltage is High/Low (3.3V TTL)
- Can recognize object development and human development
- Has to working modes - Repeatable(H) and Non-Repeatable(H)
- Cover separation of about 120° and 7 meters
- Low control utilization of 65mA
- Operating temperature from - 20° to +80° Celsius.

PIR Sensor Applications:

- Automatic Street/Garage/Warehouse or Garden Lights
- Burglar Alarms
- Security cams as motion detectors
- Industrial Automation Control

3.3.3 LM35 Precision Centigrade Temperature Sensors:

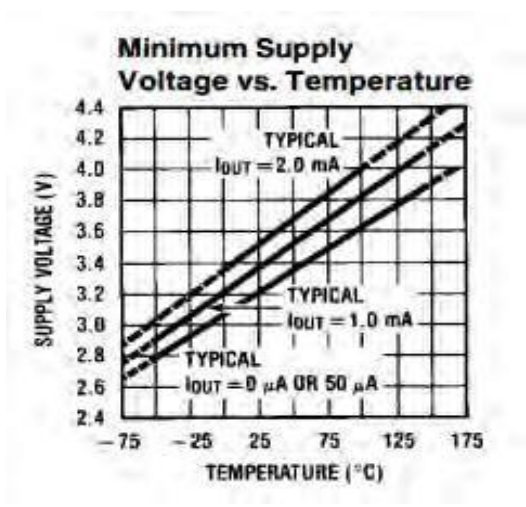
LM35 is an accuracy incorporated circuit temperature estimating gadget. Its yield is voltage which is direct to the temperature. LM35 gadget draws just 60 μ A from the stock, it has low self-warming of under 0.1°C in still air.



(a)

(b)

Figure 3.6: (a) Pin configuration of LM35 temperature sensor. (b) The graph shows linear relationship of applied voltage and temperature.



FEATURES: This sensor is easy to use because it is already calibrated into Celsius. It is very low costing. It can take -55o to +150oC range. It takes only 0.1W for 1mA load.

LM35 Temperature Sensor Applications:

- Measuring temperature of a specific domain
- Providing warm shut down for a circuit/segment
- Monitoring Battery Temperature
- Measuring Temperatures for HVAC applications..

3.3.4 LDR lighting sensor:

The Light Dependent Resistor (LDR) is simply one more uncommon sort of Resistor and henceforth has no extremity. Which means they can be associated toward any path. They are breadboard well disposed and can be effectively utilized on a perf board moreover. s

The image for LDR is similarly as like Resistor yet adds to internal bolts as appeared previously. The bolts demonstrate the light flag.

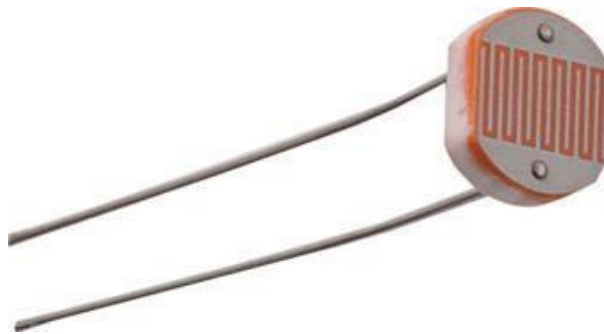


Figure 3.7: LDR sensors.

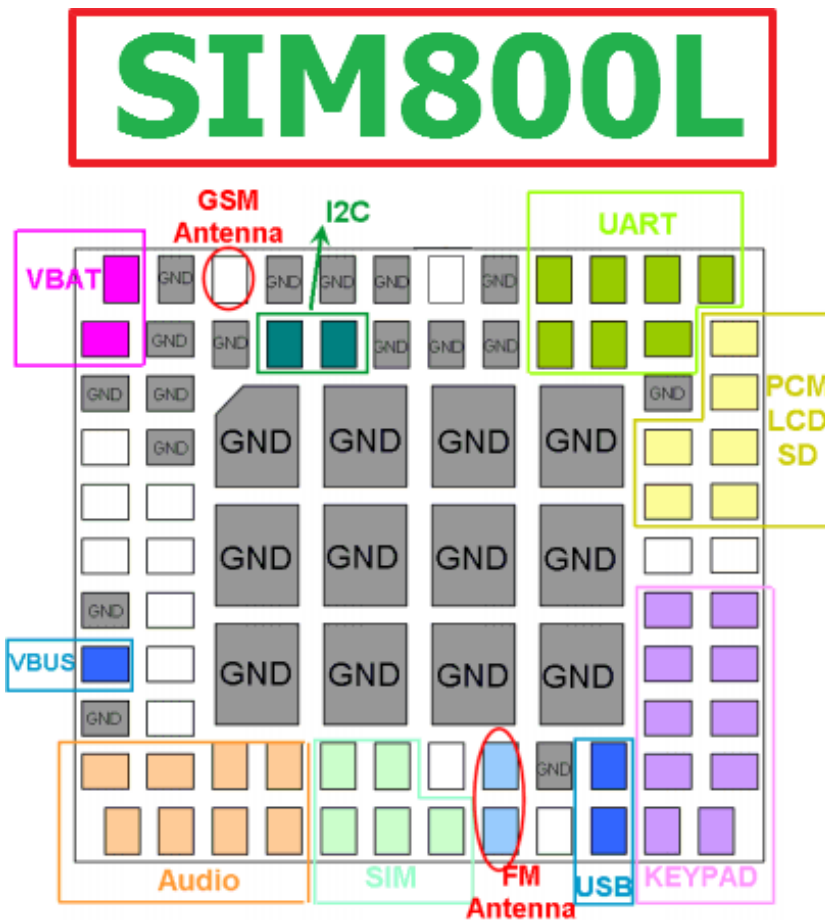
LDR Features

- Can be utilized to detect Light
- Easy to use on Breadboard or Perf Board
- Easy to use with Microcontrollers or even with typical Digital/Analog IC
- Small, modest and effectively accessible

Applications:

- Automatic Street Light
- Detect Day or Night
- Automatic Head Light Dimmer
- Position sensor
- Used alongside LED as deterrent indicator
- Automatic room Lights
- Automatic Rear view reflect

3.4 GSM SIM800L Module:



Description:

SIM800L is a quad-band GSM/GPRS module, that deals with frequencies GSM850MHz, EGSM900MHz, DSC1800Mhz and PCS1900MHz. SIM800L highlights GPRS multi-space class 12/class 10 (discretionary) and supports the GPRS coding plans CS-1, CS-2, CS-3 and CS-4.

Figure 3.8: Pin out of SIM800L Module.

Features:

1. Support 5x5x2 keypads
2. One full modem sequential port, client can arrange two sequential ports
3. One USB, the USB interfaces can troubleshoot, download programming
4. Audio channel which incorporates two amplifier input; a recipient yield and a speaker yield
5. Programmable broadly useful information and yield

SIM800L Arduino Circuit:

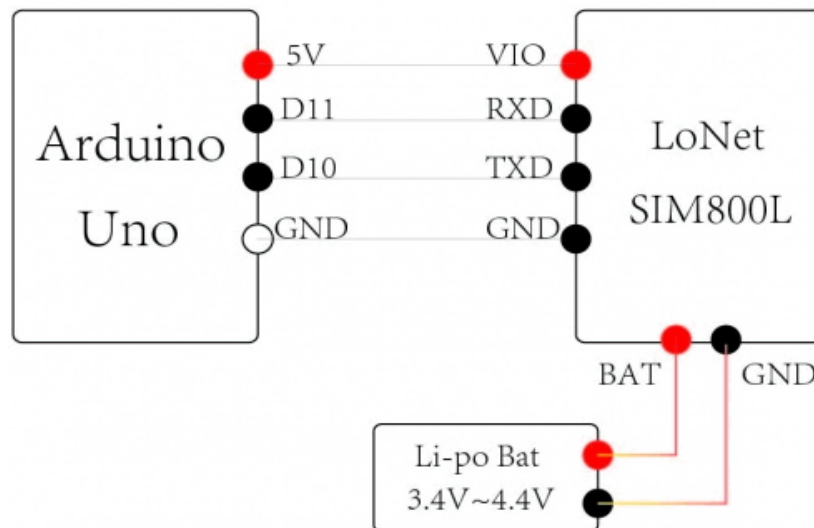


Figure 3.9: SIM800L Arduino Circuit.

3.5LCD (Liquid Crystal Display)

LCD (Liquid Crystal Display) screen is an electronic presentation module and locate a wide scope of uses. A 16x2 LCD show is fundamental module and is regularly utilized in different gadgets and circuits. It is accessible in a 16 stick bundle with backdrop illumination, differentiate change work and each dab network has 5×8 speck goals.

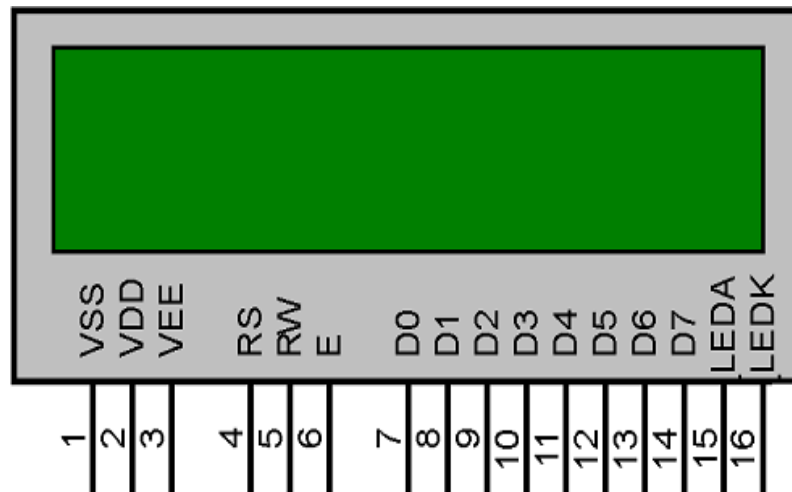


Figure 3.10: Liquid Crystal Display

A **16x2 LCD** implies it can show 16 characters for each line and there are 2 such lines. In this LCD each character is shown in 5x7 pixel lattice. This LCD has two registers, in particular, Command and Data. The direction register stores the order guidelines given to the LCD. A direction is a guidance given to LCD to do a predefined undertaking like instating it, clearing its screen, setting the cursor position, controlling presentation and so forth. The information register stores the information to be shown on the LCD. The information is the ASCII estimation of the character to be shown on the LCD. Snap to become familiar with inside structure of a LCD.

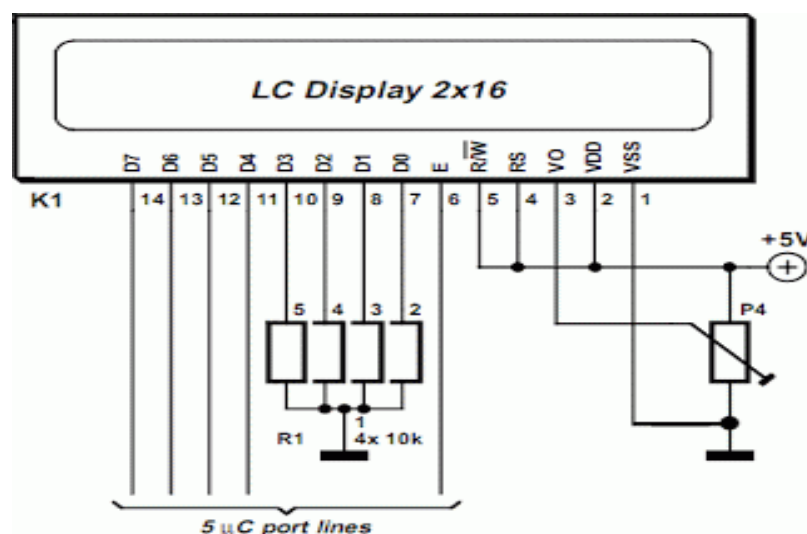


Figure 3.11: Connection diagram of LCD

3.5.1 Pin Description of LCD:

Table 3.4: Pin Description of LCD

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	V _{CC}
3	Difference alteration; through a variable resistor	V _{EE}
4	Chooses order register when low; and information register	Register
5	Low to keep in touch with the register; High to peruse from the register	Read/write
6	Sends information to information pins when a high to low heartbeat is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4

3.6 Buzzer:

This module is a minimal effort caution signal called Piezo Buzzer. This gadget is the alert for this framework. It starts ringing when temperature increments high and smoke is distinguished. It additionally starts ringing when PIR sensor is high.



Figure 3.12: Piezo Buzzer.

CHAPTER 4

Hardware and Software Implementation

4.1 Hardware Implementation:

An Arduino board comprises of an Atmel 8-piece AVR microcontroller with integral segments to encourage programming and fuse into different circuits. A significant part of the Arduino is the standard way that connectors are uncovered, permitting the CPU board to be associated with an assortment of compatible extra modules known as shields. A few shields speak with the Arduino board straightforwardly over different pins, yet numerous shields are separately addressable through an I²C serial transport, enabling numerous shields to be stacked and utilized in parallel. Official Arduinos have utilized the mega AVR arrangement of chips, explicitly the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. A bunch of different processors have been utilized by Arduino compatibles. Most sheets incorporate a 5 volt direct controller and a 16 MHz precious stone oscillator (or clay resonator in certain variations), albeit a few structures, for example, the LilyPad keep running at 8 MHz and abstain from the locally available voltage controller because of explicit structure factor confinements. An Arduino's microcontroller is additionally pre-customized with a boot loader that improves transferring of projects to the on-chip streak memory, contrasted and different gadgets that normally need an outside developer. This makes utilizing an Arduino increasingly direct by permitting the utilization of a customary PC as the developer.

At a calculated level, when utilizing the Arduino programming stack, all sheets are customized over a RS-232 sequential association, yet the manner in which this is executed differs by equipment variant. Sequential Arduino sheets contain a level shifter circuit to change over between RS-232-level and TTL-level sign. Current

Arduino sheets are modified by means of USB, executed utilizing USB-to-sequential connector chips, for example, the FTDI FT232. A few variations, for example, the The Arduino board uncovered the majority of the microcontroller's I/O pins for use by different circuits. The Diecimila, Duemilanove, and current Uno give 14 advanced I/O pins, six of which can create beat width adjusted sign, and six simple information sources. These pins are on the highest point of the board, by means of female 0.10-inch (2.5 mm) headers. A few module application shields are likewise economically accessible.

The Arduino Nano, and Arduino-perfect Bare Bones Board and arduino sheets may give male header sticks on the underside of the board to be connected to solderless breadboards.

There are numerous Arduino-good and Arduino-inferred sheets. Some are practically identical to an Arduino and might be utilized conversely. Many are the essential Arduino with the expansion of typical yield drivers, frequently for use in school-level training to disentangle the development of surreys and little robots. Others are electrically identical however change the structure factor, here and there allowing the proceeded with utilization of Shields, now and again not. A few variations utilize totally various processors, with shifting degrees of similarity.

Parts can be partitioned into two classes: sensors and modules. Every one of them are portrayed underneath:

4.1.1 Sensors:

All sensors are associated with the microcontroller through wires. All information voltages are applied from the microcontroller with the PC. They are portrayed underneath with chart. In this segment equipment usage of all sensors are portrayed beneath.

4.1.2 Gas Sensor:

In the MQ arrangement of gas sensors, there is a little warmer inside with an electro-substance sensor. Interface both A pins together and B sticks together at that point apply VCC to the coupled An or B stick. We applied GND through factor resistor RL (2K to 47K Ohms) to staying coupled An or B pins. The radiator pins H and H associated with VCC and GND. A and B pins shouldn't be interconnected. The sensor fundamentally relies upon the warming of the curl the radiator utilizes 5VDC stock. The sensor is legitimately associated with the Arduino Mega. The yield is a simple sign; it is perused with a simple info. Gas sensor yield stick is associated with arduino mega advanced stick 22.

4.1.3 PIR Motion Detector:

The equipment execution incorporates two variants of utilizations with various power exchanging yields and power supply: transfer power yield rendition and triac power yield adaptation. In this framework we have utilized 2 PIR sensors; one for the bizarre movement recognition inside the room and another for programmed light ON and OFF when somebody goes into the room. PIR security sensor is associated with advanced stick 26.

4.1.4 LM35 Precision Temperature Sensor:

There are only three pins. The output pin (pin 2) is connected to the analog input of Arduino board.

4.2 GSM SIM800L Module:

This module has 6 sticks in which two pins are VCC and GND. The rest are 3VR, 3VT (3 volts RX and TX) and 5VR, 5VT (5 volts RX and TX). The associations are as per the following:

VCC to 5V GND to GND

5VR to advanced stick 5VT to computerized stick

Prior to working with the GSM, we need to check the accompanying conditions:

- a. Insert SIM: Placing the SIM card in the card holder set apart in the figure. Ensure there is balance in the SIM card.
- b. Connect the reception apparatus: We fix the RF receiving wire to the SMA radio wire connector and fix it by pivoting the nut.
- c. Connect the pins: We associate the pins as per our schematic chart.
- d. Power the modem: We control the modem for appropriate power supply (>1A). We have utilized a connector for the power supply.
- e. Check the status of LED:
- f. PWR LED: Red LED lights right away
- i. STS LED: Green LED lights following 1-2 seconds

4.3 16x2 LCD Display:

A register select (RS) stick that controls where in the LCD's memory information will compose is associated with simple stick 9. An Enable stick that empowers keeping in touch with the registers is associated with simple stick 8. Data pins (D4 - D7) are associated with comparing simple pins (4, 5, 6, 7). Power stock pins +5V and GND is associated in the breadboard.

Pin configuration table: All connections of the sensors and modules are given below:

LCD Display pins:

Table 4.1: Pin connection of LCD display with microcontroller.

SL	Arduino UNO	LCD
1	4	D7
2	5	D6
3	6	D5
4	7	D4
5	8	En
6	9	Rs

4.4 Software implementation:

The Arduino Mega2560 can be customized with the Arduino programming. The Atmega2560 on the Arduino Mega comes pre burned with a bootloader that enables you to transfer new code to it without the utilization of an outer equipment software engineer. It imparts utilizing the first STK500 convention (reference, C header files). You can likewise sidestep the bootloader and program the microcontroller through the ICSP

(In-Circuit Serial Programming) header The Arduino coordinated improvement condition (IDE) is a cross-stage application written in Java, and is gotten from the IDE for the Processing programming language and the Wiring ventures. It is intended to acquaint programming with specialists and different newcomers new to

programming improvement. It incorporates a code editorial manager with highlights, for example, language structure featuring, support coordinating, and programmed space, and is likewise equipped for assembling and transferring projects to the board with a solitary snap. A program or code composed for Arduino is known as a "sketch".

Arduino projects are written in C or C++. The Arduino IDE accompanies a product library called "Wiring" from the first Wiring undertaking, which makes numerous normal info/yield tasks a lot simpler. Clients just need characterize two capacities to make a runnable cyclic official program

Arduino C Programs

- ❖ Arduino calls these “sketches”
 - Basically C with libraries
- ❖ Program structure
 - Header: declarations, includes, etc.
 - setup()
 - loop()
- ❖ Setup is like Verilog initial
 - executes once when program starts
- ❖ loop() is like Verilog always
 - continuously re-executed when the end is reached

4.4.1 Sensors:

A sensor is an electronic gadget that reacts to any change in physical marvel or ecological factors like warmth, weight, dampness, development and so on. The sensors are on the whole simple to-computerized sensors. These sensors produce nonstop yield signal. PC can't peruse or investigate persistent qualities so every one of the sensors should be adjusted as for some reference worth or standard for exact estimation. After that the sign created by the sensor is analyzable. One of the most significant attributes of sensors is that the yield should change directly with the info. The working procedure of the sensors we utilized is given beneath:

4.4.2 Gas Sensor (SEN 00091):

The sensor takes three minutes time before the perusing ends up stable. This is customized with the capacity analogWrite() and delay. At the point when gas is recognized it makes an impression on the versatile through GSM module and rings the alarm..

4.4.3 PIR Motion Detector (HC – SR501):

The primary piece of the calculation is to concentrate on estimating voltage from PIR sensor. It additionally incorporates input estimation filtration SWSD_DeInit () and SNSD_Init () utilized for deinitialization and introduction, at that point discover the yield voltage by filtration of sign from PIR sensor

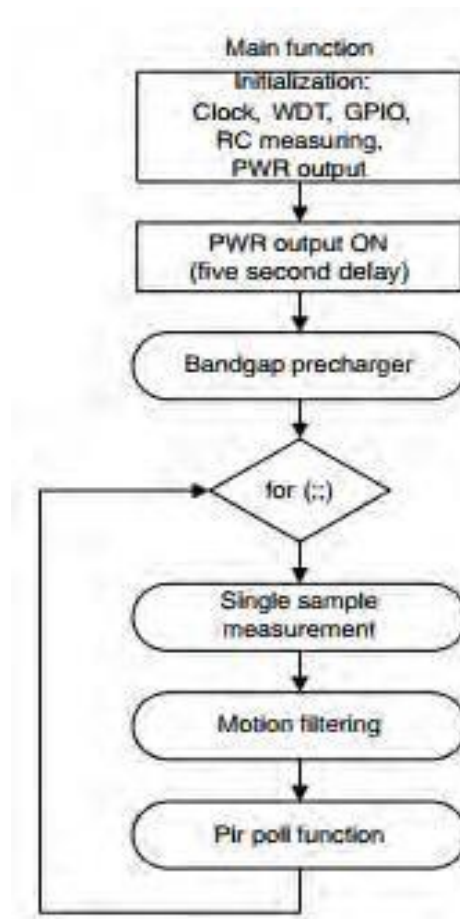


Figure 4.1: Motion detection software flowchart.

4.4.4 LM 35 Precision Temperature Sensor:

This sensor peruses the temperature of the room and shows it to the LCD screen. The framework sends instant message through GSM to the Android telephone. The temperature is appeared in Celsius. It begins with the capacity analog Read() and the equation for Celsius is

ADC value=sample*1024/reference esteem

4.5 GSM SIM800L Module:

Essential AT directions: To change sending mode the capacity is: my Serial. println ("AT+CMGF=1");

To peruse SMS in content mode the capacity is: my Serial. println ("AT+CNMI=2,2,0,0,0");

In this framework the GSM fills in as bidirectional information transmitter. It has two kinds of capacities: sender and collector.

We have utilized the GSM to control any home apparatuses from a separation. The Bluetooth works just in Personal Area Network (PAN). We can control every single home apparatus from outside the house through GSM. It works like a Bluetooth however in a bigger system zone. Through Android we can control lights, fans, forced air system, TV, entryway and so on by means of GSM. It gets the client's instant message and passes it to the microcontroller to control any apparatus inside the house.

For the security framework, the GSM sends instant message dependent on every one of the sensors utilized in this framework. In the event that the PIR sensor gets any surprising development inside the house, the client gets an instant message. This implies there is somebody inside the house without the client. The GSM additionally assumes a significant job in fire disturbing framework with the assistance of LM35 temperature sensor and the gas sensor. At the point when the

temperature ascends exceptionally high and CO (carbon monoxide) is recognized, the framework sends instant message through GSM.

The gas part ranges are referenced above in the segment presentation segment. Additionally, when the residue level of the room builds, the client gets instant message. These remote correspondences are done both inside and outside the house. In this way, the client can get data from every one of the sensors. It needn't bother with any of the Android Application or the Voice Control Application. Here the GSM goes about as a sender.

4.6 Android Application:

In this framework we have the Android application to control all the home machines. From Android telephone we select any home apparatus from the alternatives that show up in the App then we select ON or OFF. This should be possible just when the client is inside the house. There ought to be Wi-Fi association for the App. The client can't run the App from outside the house regardless of whether there is web association in the telephone. It is connected with the Bluetooth module. It permits building up point-to-point association with Bluetooth bolster gadgets. This innovation is known by Android's help for the Bluetooth system stack which grants to trade information remotely.

The Android Software Development Kit (SDK) gives every single essential instrument to create Android Application (API). This application is a Java based program. The Android utilizes .apk record to introduce the application. The code is written in Android Studio IDE. All apparatuses catches rundown will show up first. At that point the client needs to pick an alternative. Later the activity button ON and OFF shows up. There are 2 designs of the code structure, two Class code and client authorization code. These are written in Android Studio IDE. The code is composed by the presence of the choices in the telephone.

4.7 Applications

- ❖ Oscilloscope: Open-source oscilloscope
- ❖ Arduino home: a MIDI controller gadget that imitates the home
- ❖ Arduino: an excursion PC that uses the on-board diagnostics interface found in most present day vehicles
- ❖ The Humane Reader and Humane PC from Humane Informatics: minimal effort electronic gadgets with TV-out that can hold a 5,000 book library (for example disconnected Wikipedia assemblages) on a smaller scale SD card

CHAPTER 5

WORKING PRINCIPLE

5.1 Working Principle

In this undertaking we utilized the Arduino ATmega328P Microcontroller. It is associated with the all parameters and controls those parameters. For remote control we can utilize a GSM module for sign transmission. We can utilize some info and yield gadget. Info gadgets as Gas distinguish sensor, Motion sensor, LDR sensor, Fire alert sensor and yield gadgets is Light, fan, TV. At whatever point any shortcoming happen in this framework then microcontroller sense that and send warning from GSM module. In the event that gas sensor detects any gas or smoke it gets a high sign and send it microcontroller then microcontroller discover it and send us notice from GSM module. Likewise LCD show will be demonstrate what gadget deficiency distinguished. Again if burst into flames the temperature sensor sense it and send warning to the telephone.

In the movement sensor zone in the event that any versatile items are discover the sensor, at that point microcontroller get high sign and send warning. We can utilize the LDR for outside light control, when night the lights on naturally and when day the lights off consequently. In different gadgets like lights, fan, TV is on/off from Android application. At the point when the framework runs the lights are off. On the off chance that we need to on light, at that point we can utilize an Android application. At the point when we press light on then GSM module get the order and send to microcontroller to on lights. Correspondingly fan or TV controlled from Android application.

5.2 Block Diagram of Smart Home Automation System

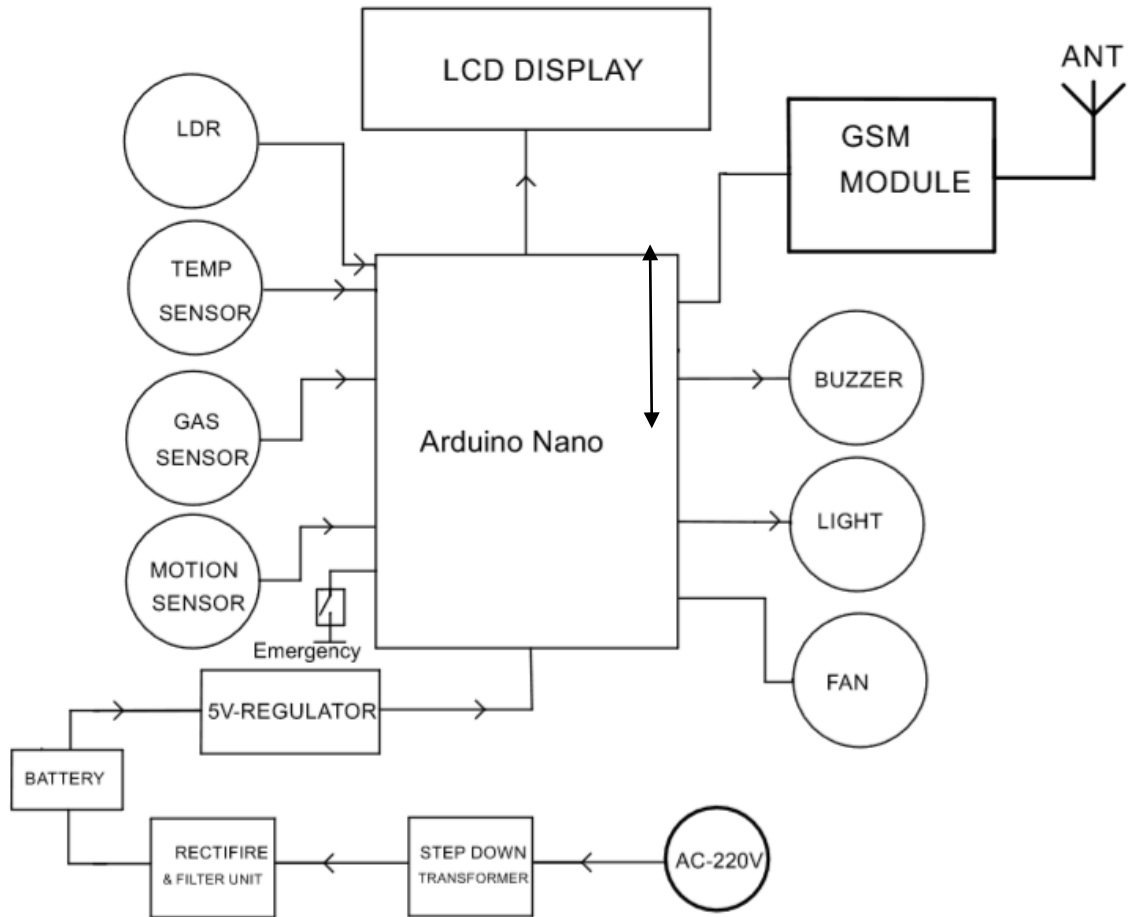


Figure 5.1: Block Diagram of Smart Home Automation System.

5.3 Circuit Diagram of Smart Home Automation System

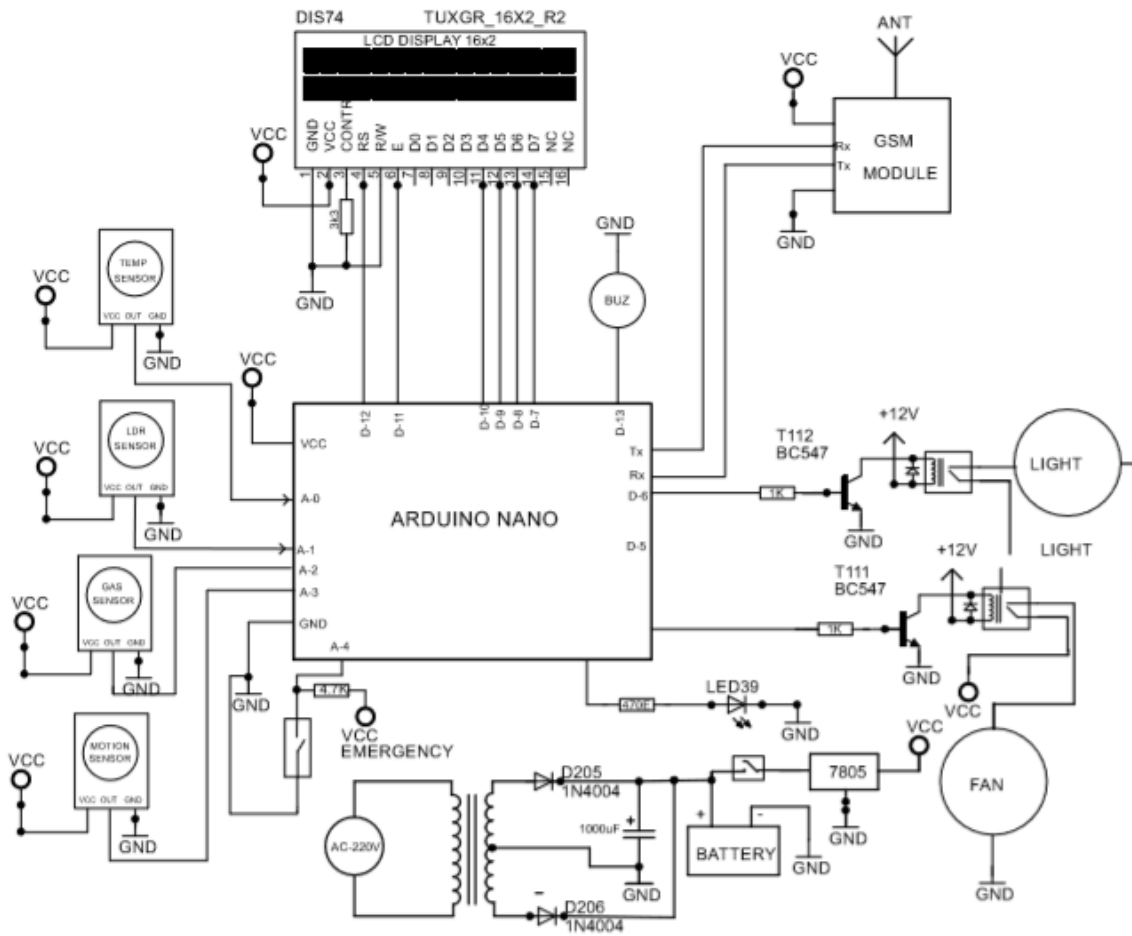


Figure 5.2: Circuit Diagram of Smart Home Automation System.

5.4 Microcontroller and control unit

A control unit is a principle part of the framework that controls its activity. In this gadget Microcontroller ATmega328 is utilized as the controller unit which controls the transfer. The ATmega328 gives UART TTL (5V) sequential correspondence, which is accessible on computerized pins 0 (RX) and 1 (TX). An ATmega2560 on the board channels this sequential correspondence over USB and shows up as a virtual com port to programming on the PC. The firmware utilizes the standard USB COM drivers, and no outer driver is required.

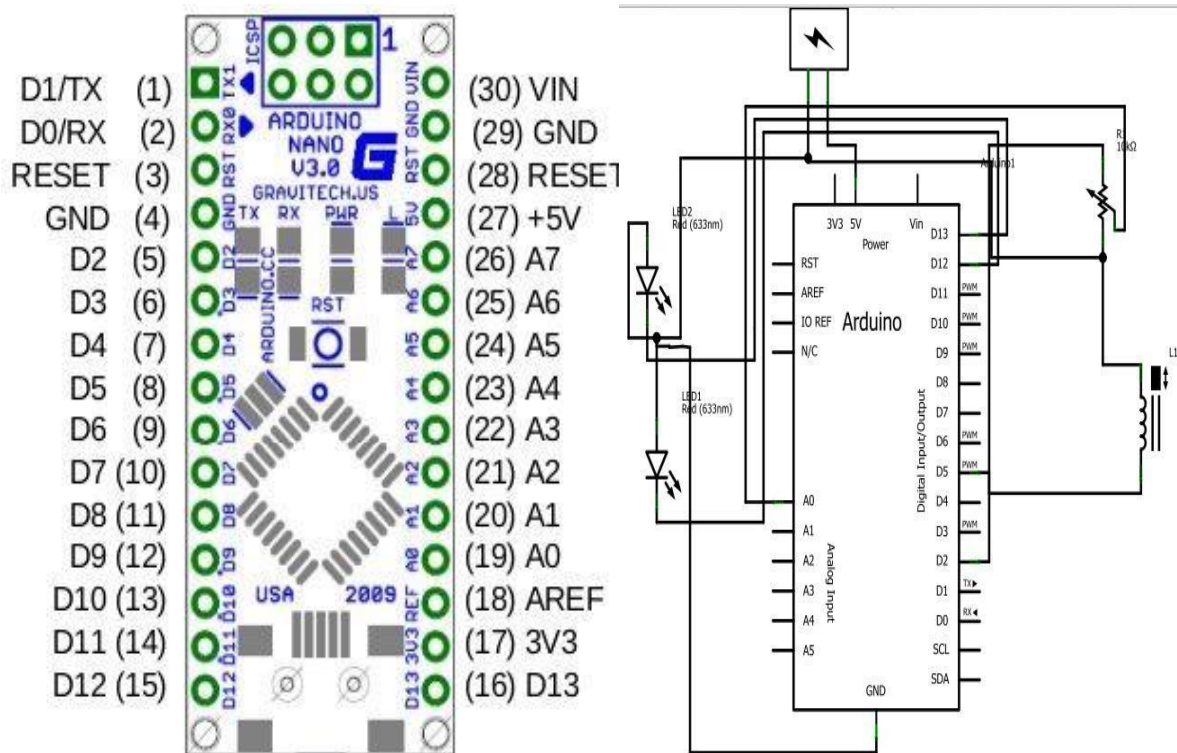


Figure 5.3: ATmega2560 Microcontroller.

5.5 Apparatus

1. Arduino UNO (ATmega328P)
2. Sensors:
 - a. Gas Sensor MQ-2 (SEN 00091)
 - b. Motion Detector (HC – SR501)
 - c. LM 35 Temperature Sensor

- d. Light Dependent Resistor (LDR) sensor
- 3. GSM Shield SIM800L
- 4. LCD Display with header (16x2)
- 5. Breadboard
- 6. Adapter (AC to DC 12V)
- 7. Buzzer
- 8. LED Light

5.6 Advantages

- First and first establishment cost is least to build up the framework.
- For building up the framework clients need to introduce the little circuit board containing a minimal effort microcontroller, movement sensor and so on.
- Its program establishment is extremely simple.
- Home robotization is conceivable to chop down power bill; since it spares vitality.
- It is clear that the present world is busier than in days what went previously. It spares the time. and foremost installation cost is least to establish the system.
- For developing the system users need to install the little circuit board containing a low cost microcontroller, motion sensor etc.
- Its program installation is very easy.
- Home automation is possible to cut down electricity bill; since it saves energy.
- It is obvious that today's world is busier than in days what went before. It saves the time.

5.7 Applications

- This framework is intended to help and offer help so as to satisfy the requirements of old and impaired in home.
- Smart Home Automation framework utilized for controlled home parameters and security reason.
- By a few alterations this task can be utilized in any Institution.
- Smart Home Automation system used for controlled home parameters and security purpose.

By some modifications this project can be used in any Institution.

5.8 List of Components with price:

Table 5.1: List of Components with price

SL no	Components	Price in TK
1	Arduino UNO	1,150.00
2	GSM Module	2,800.00
3	LCD Display	400.00
4	Power supply	500.00
5	PIR Motion sensor	300.00
6	Gas leak sensor	400.00
7	Temperature sensor	200.00
8	sample Fan	300.00
9	Buzzer	120.00
10	LEDs	100.00
11	sample PCB	800.00
12	Other parts	1,500.00
13	Accessories cost	2,000.00
	Total	10,570.00
	Market price=	20,000.00

CHAPTER 6

RESULTS AND ANALYSIS

6.1 Results

In the wake of associating and programming every one of the parts with the, we led the investigation. We have run every one of the segments as per the proposed framework. We have structured a model of a house setting inside room and outside entryway. All modules and microcontroller are kept together with a ton of wires.

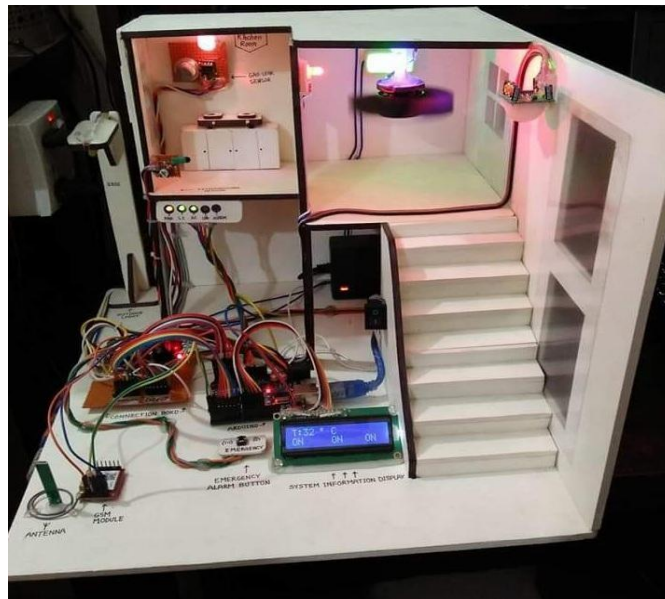
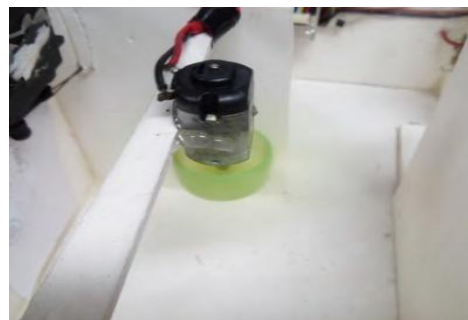


Figure 6.1: view of the home automation system showing different sensors and modules placed in the required places.

- Fan is turned ON and OFF using text command



- Light is turned ON and OFF using text command



Figure 6.3: (a) Light (LED) OFF. (b) Light ON.

An instant message is sent in the versatile when temperature is extremely high; temperature is estimated through LM35 sensor. To test fire ready framework, we have utilized a lighter and hold it close to the LM35. The LCD show indicates "gas spillage" when smoke and hurtful gas is recognized. Simultaneously it is told with instant message. LCD show indicates burglary discovery from the second PIR sensor. Interloper alarm is told through instant message as well. At the point when every one of the sensors are high the Piezo Buzzer starts ringing. When there is fire inside the house warning of both high temperature and smoke is sent through SMS.

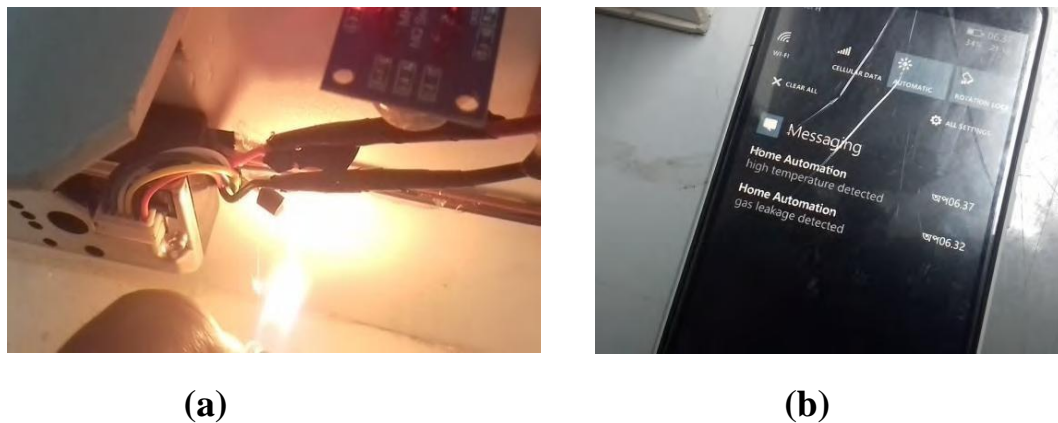
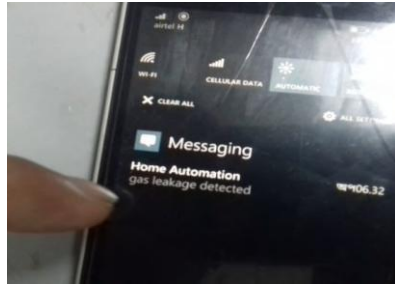


Figure 6.4: (a) Testing fire near the temperature sensor. (b) Notification of fire.

The system sends text and also displays it to the monitor when there is gas leakage inside the house.



(a)



(b)

Figure 6.5: (a) Notification in mobile. (b) Warning in the LCD display.

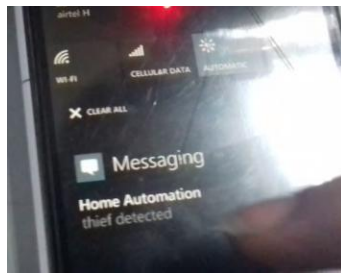
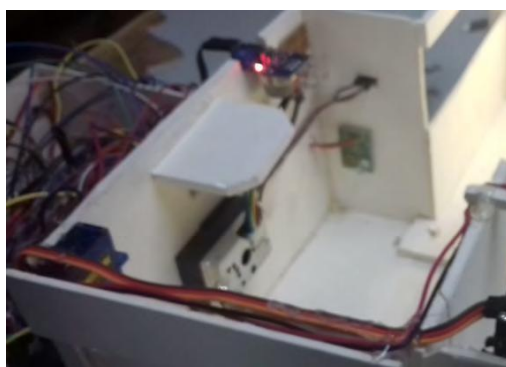


Figure 6.6: (a) Testing the PIR sensor for detecting intruder. (b) Thief detection mobile notification. (c) LCD display showing thief detected.

Another element of this undertaking is programmed lights on and off. When PIR sensor recognizes nearness of an individual inside the house, the light turns on naturally. The light turns off when the individual leaves.



(a)



(b)

Figure 6.7: (a) Light is off when no one is inside the room. (b) Light is on when someone enters the room.

6.2 Analysis

Our project is not a complete project. If we want to do this project for a bigger house, we need to complete this project on a larger scale. If we look at this project, some important things will come up. After completing all the projects we can see that our voltage and current are not equal in all elements. In this project we have used a lot of devices which resulted in high resistances. If too high voltage is given to this project the whole project can be destroyed.

The wiring we have used in this project can reduce the power consumption but the resistance requires a constant power supply. GSM module requires 3A current. Otherwise no communication will be possible. The test that we run shows that it is possible to communicate very quickly with mobile.

To keep up a predictable power supply, we expected to incorporate DC-DC buck converter and a connector. There will be an issue if there is no power or web.

All sensors need time to give a consistent getting like, temperature and development sensor. Again, in dealing with substance heading, it has most outrageous 4 seconds delay. The affectability of the sensors can be changed by the need of the customer. The whole program is written in a single Arduino IDE so it is amazingly basic for the customer to change any kind of limit. Overall the usage of this automation structure is basic, versatile and trustworthy. We can without a lot of a stretch incorporate extra features with structure.

6.3 Discussion:

We have tried everything from starting this project to implementing it to make it cheaper so that users can use the project more easily. We did this project in such a way that a home controller could control it very easily. In the future, we will get some cheaper and newer devices that will be very good for the project. This is what we have tried on the project that can work for very good control and protection. We have tried this project with the latest device so that we can have all kinds of opportunities. The system is very easy to install only it requires a cable. Home automation is definitely a secure system through which controllers can control electrical devices. We think this project will be of great use in the future for home automation. We had the time and money limitation to do this project yet I tried to make a good project as far as possible. There are good and bad aspects of every project. We want to look at the good side, excluding the bad aspects of our project so that such projects can be made at a lower cost in the future. This projects have responded extensively to Western countries and they have been using them extensively. We want this project to be launched in every home in our country and everyone should use it at a low cost.

6.4CONCLUSION:

Our project is based entirely on microcontrollers. As a result, our hardware costs less and the other components are less. As a result, our project is reduced in cost. Finally we can say that, in this project hardware and other components are less expensive, the project is very easy to use and comfortable and low in cost, making our project useful for everyone. We can successfully done this project by the help of our supervisor and we are very thankful to our teacher.

References

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Programming Code

```
#define BUZ 13

#define STRL 3

#define PUMP 2

#define TEMPIN A0

#define LDRPIN A1

#define GASPIN A2

#define MPIN A3

#define EPIN A4

int LDR,GAS=0,MOTION,EMERGENCY;

int tp;

void setup()

{

    pinMode(BUZ, OUTPUT);

    pinMode(STRL, OUTPUT);

    pinMode(Fan, OUTPUT);

    pinMode(Light, OUTPUT);

    pinMode(TV, OUTPUT);

    pinMode(PUMP, OUTPUT);
```

```
pinMode(TEMPIN, INPUT);  
  
pinMode(GASPIN, INPUT);  
  
pinMode(MPIN, INPUT);  
  
pinMode(LDRPIN, INPUT);  
  
pinMode(EPIN, INPUT);
```

```
lcd.setCursor(0,0);  
  
lcd.print(" WELCOME TO ");  
  
lcd.setCursor(0,1);  
  
lcd.print(" DIU ");  
  
delay(1500);
```

```
SendMessage1();
```

```
}
```

```
////////////////////////////////////////////////////////////////
```

```
////////////////////////////////////////////////////////////////
```

```
void loop()
```

```
{
```

```
SENSOR();
```

```
DISPLAY1();
```

```
CONTROL();
```

```
}
```

```
////////////////////////////////////////////////////////////////
```

```
////////////////////////////////////////////////////////////////
```

```
void DISPLAY1()
```

```
{
```

```
    lcd.setCursor(0,0);
```

```
    lcd.print("T:");
```

```
    lcd.setCursor(2,0);
```

```
    lcd.print(tp);
```

```
    lcd.setCursor(5,0);
```

```
    lcd.print((char)223);
```

```
    lcd.setCursor(6,0);
```

```
    lcd.println(" C ");
```

```
}
```

```
////////////////////////////////////////////////////////////////
```

```
void SENSOR()
```

```
{
```

```
    LDR = analogRead(LDRPIN);
```

```
    MOTION = analogRead(MPIN);
```

```
    tp = analogRead(TEMPIN);
```

```
    tp = (tp / 10);
```

```
    GAS=analogRead(GASPIN);
```

```
    EMERGENCY=analogRead(EPIN);
```

```
}
```

```
////////////////////////////////////////////////////////////////
```

```

void CONTROL()
{
    //////////////////////////////////////

    if(tp > 42)
    {
        almstp =1;

        SendMessage9();

        alarm();

    }

    if(MOTION > 450)
    {

        almstp =2;

        SendMessage11();

        alarm();

    }

    if(LDR > 420)

        digitalWrite(STRL, HIGH);

    if(LDR < 400)

        digitalWrite(STRL, LOW);

    if(GAS > 300)
    {

        almstp =3;

```

```
SendMessage10();

alarm();

}

if(EMERGENCY > 100)

{

  almstp =4;

  SendMessage12();

  alarm();

}

}
```

```
void alarm()

{

  if(almstp==1)

  {

    lcd.setCursor(0,1);

    lcd.print("FIRE DETECTED ");

    digitalWrite(PUMP, HIGH);

  }

  if(almstp==2)
```



```

{
    lcd.setCursor(0,1);

    lcd.print("SMOKE DETECTED ");
}

if(almstp==3)

{
    lcd.setCursor(0,1);

    lcd.print("GAS DETECTED ");
}

if(almstp==4)

{
    lcd.setCursor(0,1);

    lcd.print("EMERGENCY ");
}

}

////////////////////////////////////

void SendMessage1()          // fan on

{

    Serial.println("AT+CMGF=1");

    delay(100);

    Serial.println("AT+CMGS=\"+8801797951212\"\r");
}

```

```

delay(100);

Serial.println("system ready...");

delay(100);

Serial.println((char)26);

delay(2000);

}

void SendMessage9()           // FIRE DETECTED

{

Serial.println("AT+CMGF=1");

delay(100);

Serial.println("AT+CMGS=\"+8801797951212\"\r");

delay(100);

Serial.println("FIRE DETECTED");

delay(100);

Serial.println((char)26);

delay(2000);

}

void SendMessage10()          // GAS GETECTED

{

Serial.println("AT+CMGF=1");

delay(100);

Serial.println("AT+CMGS=\"+8801797951212\"\r");

```

```

delay(100);

Serial.println("GAS DETECTED");

delay(100);

Serial.println((char)26);

delay(2000);

}

void SendMessage11()           // SMOKE DETECTED

{

Serial.println("AT+CMGF=1");

delay(100);

Serial.println("AT+CMGS=\"+8801797951212\"\r");

delay(100);

Serial.println("SMOKE DETECTED");

delay(100);

Serial.println((char)26);

delay(2000);

}

void SendMessage12()           // EMERGENCY

{

Serial.println("AT+CMGF=1");

delay(100);

Serial.println("AT+CMGS=\"+8801797951212\"\r");

delay(100);

```

```
Serial.println("EMERGENCY");  
  
delay(100);  
  
Serial.println((char)26);  
  
delay(2000);  
  
}
```