

**GSM BASED GAS LEAKAGE, FLAME DETECTION AND PROTECTION
SYSTEM**

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

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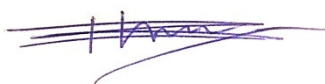
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APPROVAL

This Project titled “ **GSM Based Gas Leakage, Flame Detection And Protection System** ”, submitted by **Bijon Roy**, ID No: 142-15-3770 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 Tuesday, 01 June 2021.

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ABSTRACT

Currently, we often see that our life are threatened by an accident of fire. Often, the news of a fire kills many people and causes a lot of financial loss. One of the reasons for catching fire is carelessness and lack of adequate protection. This project will describe how it is possible to prevent accidents by gas leakage, fire detection and protection. The study will detect liquid petroleum gas (LPG), natural gas using an MQ-6 gas sensor & detect flame using an infrared (IR) flame sensor. This project will use a GSM module which sends alerts via phone call. For safety purposes I will use a servo motor that will automatically open the windows and use a submersible mini water pump that will spray water on the flame. The whole system is controlled by a microcontroller and Arduino has been used to collect and calculate data for the project's desired output. The project will send a message to the customer via phone call detecting gas leakage and fire. Send alerts to attendees via the burger, as well as turning off the green light, turn on the red light will send additional alerts. If a gas leak is detected, the protection window will automatically open so that the gas is released and when the flame is detected, the water pump will turn on and spray water on the flame. Above all, the project will be able to prevent fire-related accidents through gas leakage and fire detection, warning and protection.

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LIST OF ABBREVIATIONS

GSM	Global System for Mobile GSM
SMS	Short Message Service
SIM	Subscriber Identity Module
LED	Light Emit ting Unit
LPG	Liquefied petroleum gas
IR	Infrared
IC	Integrated Circuit
CPU	Central Processing Unit
DC	Direct Current
AC	Alternative Current
GND	Ground
GPS	Global Positioning System
USB	Universal Serial Bus
IDE	Integrated Development Environment
PWM	Pulse- Width Modulation

CHAPTER 1

INTRODUCTION

1.1 Introduction

The "GSM base gas leakage, flame detection and protection system" framework is connected with the expressions "Smart and Intelligent Home Security". Gas leakage, flame detection and protection framework has been utilized to control home apparatuses and gadgets consequently or on the other hand remotely with or without web. GSM base gas leakage, flame detection and protection system are produced with the gift of present-day science particularly in the field of building and figuring. GSM base Gas leakage, flame detection and protection framework incorporate detected flame and gas leak also save us from risky situation in our home or kitchen using different frameworks. This framework is intended to make life simple and agreeable, to guarantee effectively 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.

1.2 Background

Nowadays, getting one's property and exchange against fire is having the opportunity to be progressively basic. Noticing business and private ranges all-round is a fruitful system to decrease individual and property adversities because of fire catastrophe.

Home gas spillage, fire discovery could be a matter of incredible concern, and hence numerous endeavors are given in most created nations to the plan of programmed discovery frameworks. A fire alert framework ought to dependably and in a convenient way inform building tenants almost the nearness of fire markers, such as smoke or tall temperatures. A fire locator is as a rule actualized as a smoke sensor due to its early fire location capability, quick reaction time and moderately moo taken a toll. Other alternatives for the fire location are based on gas sensors or temperature sensors fire locators that utilize a single sensor, by and large a smoke sensor, and display tall false-alarm rates due to temperature changes.

In mastermind to foresee fires from occurring or limit their effect, accurate and early area is essential, and customized fire area is having the opportunity to be outstandingly crucial to reduce the fire inside the structure and industry. Customized fire alert structure gives constant perception and noticing. A vital perspective of fire security is to recognize a making fire emergency in a helpful manner, and to alert the structure's inhabitants and fire crisis associations. This is frequently the piece of fire area and ready structures.

Generally, fire finders are sketched out to answer at an early mastermind to one a greater amount of the four significant qualities of burning, warm, smoke, fire or gas. No single kind of locater is suitable for a wide range of premises or flames. Warm finders respond to the temperature rise related with a fire and smoke locater respond to the smoke or gas made because of fire.

1.3 Overview

GSM base gas leakage, flame detection and protection system Framework is intense, adaptable and extremely simple to utilize. It is planned and created to make our life security 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 gas leakage, flame detection and protection system thought with GSM base in light of the fact that relatively every individual in our general public utilizing different sorts of advanced cells and GSM base is an essential element of it. As everybody has a GSM base devise, it will be less exorbitant for them to utilize a GSM based home computerization framework since you don't need to purchase any sort of remote for this venture the extent that you have a PDA.

Our undertaking GSM base gas leakage, flame detection and protection system is fundamentally secure an equipment item intended in your home, for example gas leakage, flame detection and protection automatically window open, water pump start

and phone call. 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 usage of control structures and information development to control gear, current mechanical assembly and methods, diminishing the prerequisite for human intervention. In the degree of industrialization, automation is a phase past computerization. Mechanization outfitted human heads with mechanical assembly to assist them with the actual essentials of work while computerization phenomenally decreases the prerequisite for human material and mental necessities too.

Computerization expects a certainly basic part in the overall economy and in consistently experience. Planners attempt to join robotized contraptions with mathematical and definitive mechanical assemblies to make complex systems for a rapidly developing extent of employments and human activities. Various parts for individuals in current systems eventually lie past the degree of computerization. Human-level model affirmation, tongue affirmation, and lingo age limit are well past the capacities of current mechanical and PC structures. Endeavors requiring abstract assessment or blend of complex material data, for instance, smells and sounds, and furthermore strange state tasks, for instance, fundamental masterminding, at the present time require human capacity. Automation has had a prominent impact in a broad assortment of significantly unquestionable undertakings past gathering. When widespread telephone overseers have been displaced generally through mechanized telephone switch sheets and phone message. Therapeutic methodology, for instance, fundamental screening in electrocardiograph or radiography and exploration office assessment of human characteristics, blood plasmas, cells, and tissues are finished at altogether more unmistakable speed and precision through robotized structures. Motorized teller machines have diminished the prerequisite for bank visits to get cash and do trades. At the point when everything is said in done, motorization has been responsible for the proceed onward the planet economy from agrarian to current in the nineteenth century and from mechanical to organizations in the 20th century.

1.5 GSM base gas leakage, flame detection and protection system

This system is controlled by a GSM module with Arduino. In this Arduino based Project we can protect our daily use home apparatus via Arduino with GSM Module and call Flame, LPG gas leakage detection and provide safety in various areas like home, industries, hotels, hospitals etc. If gas leak is detected, the green light will go off and the red light will turn on. The emergency exit door, the window opens automatically, servo motor on and emergency window become open. if gas leaked accidentally and then notify the user by calling to his/her mobile phone using GSM module. When the flame is detected, the mini water pump will turn on and spray water on the fire. GSM base flame, gas leakage detection and protection system made for human security and reduce cost.

1.6 Managing the System

In a system, there needs to be a network communication among devices and management application. Management system of this project:

- We build up a GSM base gas leakage, flame detection and protection system structure with Arduino UNO board.
- GSM base gas leakage, flame detection and protection system gives us a safety environment.
- Automatically window will be open for leakage gas passing and water pump start for flame. Phone call has given notification for alert security.

1.7 Benefits of the system

Lately, GSM have ended up being progressively essential in-home frameworks organization. Similarly, in home and building robotized structures, the usage of security headways gives a couple of central focuses that couldn't be refined using a wired framework so to speak.

- i. **Reduced establishment costs:** GSM base flame, gas leakage detection and protection system frameworks is substantially more spending neighborly in light of the fact that no link is fundamental in this framework.
- ii. **Easy sending, establishment, and scope:** Distant centers can be mounted wherever. In adjoining or distant spots, where cabling may not be feasible in any way shape or form. Therefore, far off development in like manner intensifies the got an area.
- iii. **System adaptability and simple expansion:** Conveying a security 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 GSM base gas leakage, flame detection and protection system framework that will save our home, kitchen, Industries.

1.9 Project objectives

Main Objectives of the project:

1. To create and plan a controller circuit that can be GSM base gas leakage, flame detection and protection system.
2. Safety from Flame which is dangerous for our daily life.
3. Protecting against gas leakage which is one of the least common causes of fire and a serious threat to our lives
4. Making our daily lives simple, secure, cost effective and user friendly.

1.10 Project Scope and Limitation

The think about limits itself in identifying the nearness of normal gas and fluid petroleum gas within the discuss at a near remove from the conceivable source of gas spill.

It is accepted that the volume of discuss within the room is more prominent than the volume of gas show.

For fire, the sensor utilized is able of identifying fire in its line of locate.

The framework moreover requires to be introduced in a zone with strong organize flag. The GSM, after sending the desired number of call needs resetting through the physical button from the Arduino board. This will initialize the framework and the GSM as well.

CHAPTER 2

BACKGROUND

2.1 IOT Basics

The term "Internet of things" was begun by Kevin Ashton of Procter & Gamble, afterward MIT's Auto-ID Center, in 1999, [1] in spite of the fact that he inclines toward the express "Internet for things"[2]. At that point, he seen Radio-frequency distinguishing proof (RFID) as basic to the Internet of things, which would permit computers to oversee all person things [3].

IOT alludes as Internet of things. The things are the physical objects (individuals, gadgets, sensors, or any exercises) that are interconnected and connecting with each other over the Internet [3]. These things collect data from the environment any time and [4] share each other in any put and it gives us consent to get to and control them remotely. These gadgets make a way to communicate with each other through diverse mediums and conventions such as Wi-Fi, cellular organize, Bluetooth, Neighborhood Range Arrange, Partisan Organize etc.[5].

The collected data by the gadgets has sent to the cloud server through web and put away within the server. This server makes the data to the specified arrange of the clients by a few explanatory handle. The users are able to see the comparing result within the WEB server and control the gadgets at their possess willing. So the web of things makes our life more ease, secure, cheap, and comfortable. For illustration, one can effectively control a switch of a fan or light remotely. People can get information around traffic conditions of the streets so that he or she employments another course to urge the required goal.

2.2 Main Component of IOT System

From the past segment, it is evident that there are some principal components of an Online of things framework (IOT). These diverse parts are unitedly finished a specific errand. Those are given bellows:

1. **Things (gadget/ sensor):** these are the electronics devices (sensor) that collect information from the encompassing environment within the frame of electrical, optical or computerized data. [6] Hence, these information are not comprehended by human being, information is changed over into electrically to be comprehended to the machine or human.
2. **Gateway:** IOT needs a secure and valuable way to communicate each component. This door reprocesses and channels information some time recently being sent to the cloud and sent controlling command from Client interface to things [7]. This portal gives a secure way to communicate among things to things (sensor), things to cloud infrastructure and cloud foundation to clients interface through cellular arrange, obsequious arrange, Bluetooth etc. network medium. This distinctive medium has particular stars and cons such as control utilization, extend transfer speed. So it is vital to require the fitting network.
3. **Cloud:** billions of information is created by the sensor in each time as well as his information have to be collect, oversee and store in genuine time. The cloud is the extreme arrangement for the reason. Cloud foundations have gigantic volume to store information, colossal information processing speed, and simple openness, on time demand.
4. **Analytics:** the billions of sensor information isn't comprehend to human. So it must change over those data into a reasonable organize that can be translated and used for the required contraption. Enormous data analytics tools utilize to achieve this errand [8]. This experiences information has critical affect to require choice to do the pointed purpose.
5. **User interface:** It is a device that interconnects a user with the IOT system. A good user interface is very important to get required consequences. So User interface designer should fulfill the required specification of the user. Various kinds of apps and software are being installed in the smart phone and computer to get access to the IOT system.

2.3 IOT for GSM Based Gas Leakage, Flame detection and Protection system

From the beginning of written history people have discovered that early response to flames had positive comes to fruition in controlling those flames. At the point when someone found a fire the fire units and fire workplaces were frightened by meandering gatekeepers using hand ringer ringers or church sextons ringing church tolls or assembling plant steam yells. Incredibly, these systems didn't give particularly much detail and consistently organized the fire division to the misguided region. Fire and smoke spread inside the structure can be impacted by various segments, for example, the math, estimation, arrangement and usage of the structure [9]. In orchestrate to supply fire security inside the structure, it is especially critical to recognize fire at its initial organize. The premier basic fire and smoke disclosure systems join the use of point sort finders (for example ionization smoke finders, photoelectric finders, warm finders), line sort finders and so forth These area techniques dependent on the use of fire checks such smoke and warm.

Fire may be a chemical response known as combustion. It is characterized by the fast oxidation of a combustible material went with by discharge of vitality within the frame of warm. In arrange for start to happen, the nearness of both a fuel and a heat vitality source is required. When the two come in, conjunction with the suitable extents, either by a need of partition or by a few sort of dynamic interaction, a fire happens. The guideline of the proposed circuit is determined from the physical standards of ionization. Fire finders utilizing two-wire strategy to decrease the divider arrangement, improve reliability, and ease of development and establishment. This portrays the in general structure of the fire discovery framework and control computer program within the plan.

The venture gives a gas spill location with fire checking capabilities and a model of the essential caution framework. The inquire about employments Arduino to gather and calculate information for the required yield of the extend. The whole system is controlled by a microcontroller. The ponder employments an MQ-6 gas sensor that's able of recognizing fluid petroleum gas (LPG), normal gas, butane, and coal or town gas, and an infrared (IR) fire sensor that resources light sources of wavelengths inside

the amplify of 0cm – 300cm .The extend gets gas spills, fires and sends messages to the client through phone call and sends cautions to the participants through the Berger, as well as cautioning the ruddy light by squinting the green light. In case a gas spill is recognized, a window will be opened for assurance so that the gas is discharged and no flares are display. When the fire is recognized, the water pump will turn on and splash water on the fire.

2.4 Feasibility Study

Feasibility analysis (FA, likewise called achievability study) is used to assess the characteristics and inadequacies of a proposed errand and present headings of activities which will improve an endeavor and achieve needed. A practicality study was conveyed at the beginning of this endeavor and the going with is a compact examination of it under five interrelated creates:

- 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), GSM module, LPG gas sensor (MQ-06), Infrared IR Flame Sensor, four channel transfer board and Arduino UNO. 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, Infrared IR Flame Sensor, GSM Cheap, Gas Sensor MQ6, AT89S51 microcontroller and other electronics equipment. For information only the approximate market value of those equipment is less than 3000 BDT.
- iii. Schedule:** To deal with the work process of the task productively and for specific achievements were set toward the start of the undertaking with predefined timescales for the plan, improvement, testing and documentation of the relative multitude of stages required during the lifecycle of this venture.

iv. **Operational:** Assessment of the operational possibility of this undertaking was a vital factor in choosing the systems utilized in plan, improvement and sending of this task for it to work in a given climate. After the starter research, different proactive measures were concocted in the event that specific component in the project.

v. **Legal:** The legitimate parts of this venture are exceptionally restricted as this is a scholarly undertaking of one scholastic year just however regardless it has been considered that throughout this task any private and secret information about an individual or association won't be put away or utilized in a wrong way. The college's codes of training for the utilization of human volunteers, danger and morals have been carefully followed. Any material got or cited from the distributed or unpublished work of different people has been appropriately recognized.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 System Definition

This system consists of three components and is controlled by a GSM module with Arduino. In this Arduino-based project we can protect our daily use home apparatus via Arduino with GSM Module and call Flame, LPG gas leakage detection and provide safety in various areas like home, industries, hotels, hospitals etc.

We want to make 'GSM base flame, gas leakage detection and protection system' to human security and reduce cost.

3.2 Proposed System Features

This GSM base flame, gas leakage detection and protection system will be able to have the following features for the end users:

3.2.1 Security Light On and Off

Here two color led lights, green means save mode and red means danger mode. When the gas leak is detected, the green light will go off and the red light will turn on. Red light will alert you in the middle. Buzzer will be turned on for attraction alert.

3.2.2 Emergency door, window opens automatically

When the gas is leaked, the gas spreads everywhere, resulting in the possibility of fire. Because of this, the emergency exit door, the window opens automatically. When gas sensor detected gas leakage, servo motor on and emergency window become open.

3.2.3 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 spillage finder (Domestic).
2. Combustible gas finder (Industrial).
3. Gas finder (Portable).
4. Houses
5. Factories and so forth

3.2.4 Flame detected and Security system

The main objective of this part of our project is to sense the flame if it fired accidentally and then notify the user by calling to his/her mobile phone using gsm module. When the flame is detected, the mini water pump will turn on and spray water on the fire. 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 flame

3.3 System Requirement

1. Arduino Board or Any Compatible Board.
2. Arduino UNO.
3. Infrared IR Flame Sensor.
4. AT89S51 microcontroller.
5. Generic Breadboard.
6. Gas sensor-MQ6.
7. Stepper motors.
8. Submersible mini water pump - 3-6v dc.
9. GSM module.

CHAPTER 4

DESIGN SPECIFICATION

In planning a GSM base gas spillage, fire identification and insurance framework, at least one reasonable stage is utilized to fabricate a solid and adaptable framework that can be handily worked and adjusted for another family unit machine. Along these lines, with the ultimate objective of this endeavor some specific think choices were made on the sort of stages, hardware fragments and technique for movement of the home computerization system.

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 numerous stages over which a GSM base gas spillage, fire identification and insurance framework can be actualized. Of the right now accessible stages: Arduino, Powerline, AT89S51 microcontroller, Flame, Android Device, Gas sensor, Infrared, GSM and Microcontroller; GSM, Gas sensor, Flame and Microcontroller were discovered generally fitting because of their ease accessibility, unwavering quality and effortlessness when utilized for an individual control GSM base gas spillage, fire discovery and assurance framework which my undertaking work is on.

4.1.2 Selection of Hardware Components

Every stage has a bunch of equipment parts over which it is executed. For AT89S51 microcontroller, there are DB-9 and DB-25 association links, yet DB-9 link was discovered most proper in light of the fact that it is less expensive, all the more

promptly accessible, less massive and only adequate for the planned framework when contrasted and DB-25.

For LPG gas sensor, there are a lot more Gas module, yet LPG gas sensor MQ-06 was picked because of its minimal effort accessibility, capacity to comprehend and accessibility. At last, for Microcontroller, the famous ones are those delivered by Microchip, ATMEL, Motorola and Texas Instruments, of all these Microchip fabricated Arduino microcontroller was discovered generally reasonable because of its minimal effort accessibility.

4.2 System Design

The planned GSM base Flame discovery and insurance framework utilizes Arduino microcontroller, Infrared IR Flame Sensor module and Micro dc 3-6v miniature sub siphon. As outlined in the square graph appeared in figure 4.1, when the Infrared IR Flame Sensor gets the necessary sign, it conveys to the Arduino, this thusly decides the condition of the associated sub siphon, regardless of whether turned on or off.

The following figure 4.1 shows System Design of Flame detected Security system.

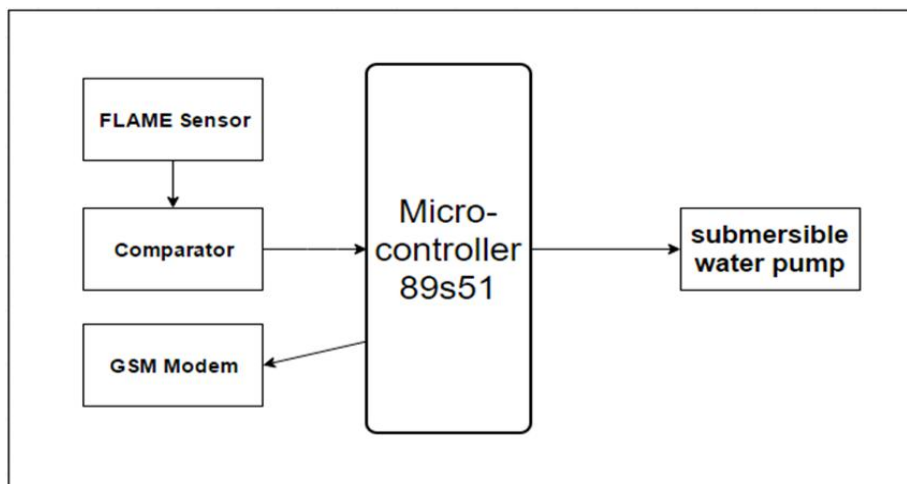


Figure 4.1: System Design of Flame detected Security system.

Gas spillage is one of the normal purposes behind fire breakouts. A spillage ends up being reason for horrendous mishap especially in shut structures. Large numbers of the lodgings and cafés don't keep any safety efforts to distinguish gas spillage because of absence of authorization of norms and pre-suspicion that introducing such prudent frameworks will be expensive.

This 4.2 figure shows a gas spillage discovery project dependent on Arduino UNO. The ease project utilizes MQ6 gas sensor which can be adjusted to recognize spillage levels dependent on environmental factors. The establishment produces a call utilizing gsm to caution the client if there is any location of a hazardous spillage. The following figure 4.2 shows Design of Gas leakage Security system.

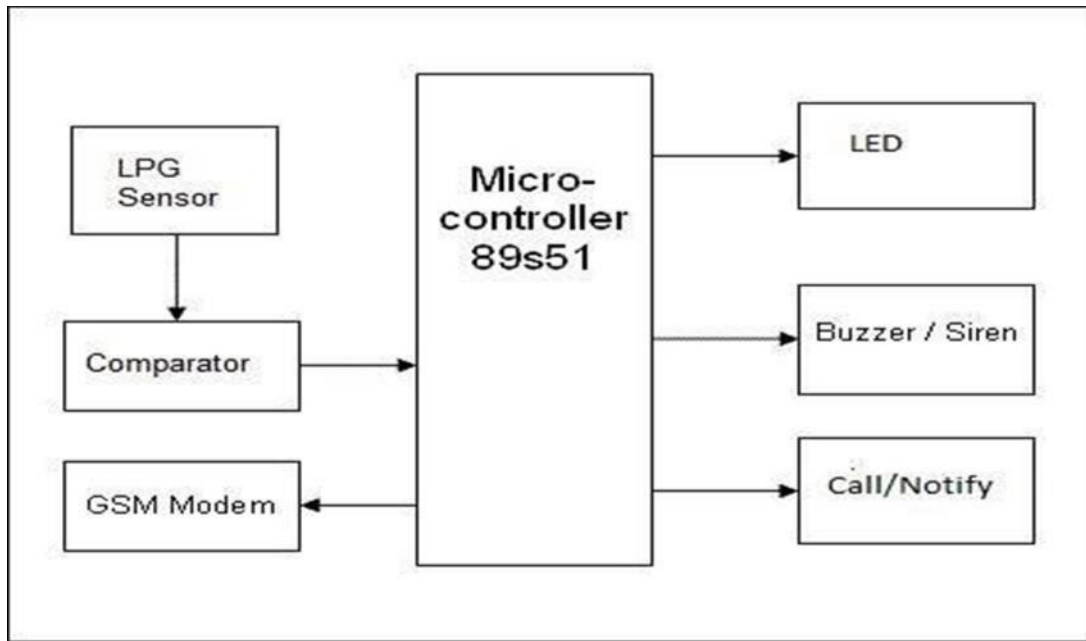


Figure 4.2: Design of Gas leakage Security system.

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 considering simple to-utilize stuff and programming. Arduino sheets can understand inputs - light on a sensor, a finger on a catch, or a Twitter message - and transform it into a yield - affecting an engine, turning on a Drove, scattering something on the web. I can coordinate your board by sending an arrangement of rules to the microcontroller on the board.

To do everything considered we utilize the Arduino programming lingo (considering Wiring), and the Arduino Programming (IDE), taking into account Preparing

Arduino was considered at the Ivrea Interaction Design Organization as a basic device for snappy prototyping, the Arduino board started changing to acclimate to new requirements. All Arduino sheets are absolutely open-source, drawing in customers to produce them self-sufficiently and in the end change them to their particular requirements. The item, also, is open-source, and it is turning out to be through the responsibilities of customers generally. We utilized figure 4.3 Arduino Uno gadget to finish our venture work.

The following figure 4.3 shows Arduino Uno board which is the core component of this project.

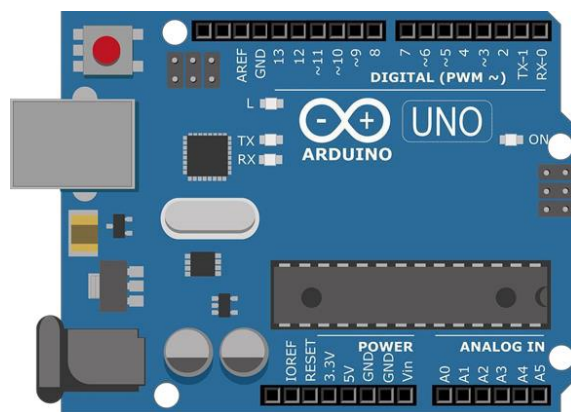


Figure 4.3: Shows an Arduino Uno board which is the core component of this project

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 different unmistakable microcontrollers and microcontroller stages open in advertise for actual enrolling. For example, Parallax Essential Stamp, Net media's BX-24, Phi gets, MIT's Handy board, Beagle Board, and different others offer identical handiness. These mechanical congregations take the chaotic reasons for energy of microcontroller programming and envelop it with a simple to-utilize bundle. Arduino in like way smoothes out the way toward working with microcontrollers, despite it offers some preferred perspective for teachers, understudies, specialists

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 certainly not difficult to-use for beginners, yet satisfactorily adaptable for bleeding edge clients to maltreatment too. There are libraries to do fundamental things, similar to fidget pins or debounce gets and enormous proportions of inquiry wrapped libraries to do complex things, for instance, remaining in contact with SD cards, LCD screens, parsing GPS. For instructors, it's well in context of the Getting prepared programming condition, so understudies sorting out how to program in that condition will approve of 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 plans of the Arduino sheets are release under a Creative Commons grant, so any circuit fashioners can impact their own version of the module, to explore and improving it. To be sure, even

by and large natural customers can amass the breadboard variation of the module remembering

the ultimate objective to perceived how it capacities and extra expense. Figure 4.4 shows particular sorts of Arduino hardware.

The following figure 4.4 shows Different types of Arduino.

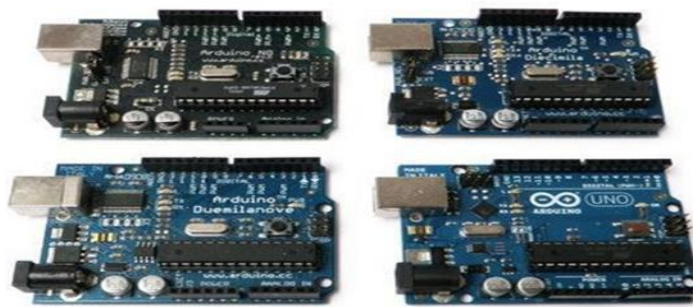


Figure 4.4: Different types of Arduino

4.5 Infrared IR Flame Sensor

A fire locator is a sensor intended to go over and answer to the presence of a fire or fire, allowing fire identification. Reactions to a recognized fire rely upon the establishment, however can envelop sounding a caution, deactivating a gas line (counting a propane or a natural gas line), and enacting a hearth concealment machine. While utilized in applications alongside business heaters, their job is to offer assertion that the heater is running appropriately; in those occurrences they make no immediate move past advising the administrator or control device. A fire finder can frequently react speedier and extra properly than a smoke or warmth indicator because of the components it utilizes to find the fire.

The following figure 4.5 shows Infrared IR Flame Sensor.



Figure 4.5: Infrared IR Flame Sensor

Incorporate a fire sensor (ir recipient), resistor, capacitor, potentiometer, and comparator lm393 in a coordinated circuit that is known as fire sensor module. It might run over infrared light with a frequency going from 0cm to 300cm. The far-infrared fire test changes over the gentle identified inside the type of infrared light into present day changes. Affectability is changed by means of the installed variable resistor with a recognition demeanor of 60 levels. Working voltage is somewhere in the range of three.3v and 5.2v dc, with a virtual yield to demonstrate the presence of a sign. Detecting is molded through a lm393 comparator.

Features:

- Infrared light wavelength rang 0cm to 300cm
- 3.3 to 5. V I/O.
- Sensing conditioned lm 393 comparator.

4.6 AT89S51 Microcontroller

The AT89S51 is a low-control, unmatched CMOS 8-bit microcontroller with 4K bytes of In-System Programmable Flash memory. The gadget is produced utilizing Atmel's high-thickness nonvolatile memory progression and is impeccable with the business standard 89S51 principle set and stick out. The on-chip Flash permits the program memory to be revamped in-structure or by a standard nonvolatile memory programming engineer. By joining an adaptable 8-cycle CPU with In-System Programmable Flash on a solid chip, the Atmel AT89S51 is a capable microcontroller which gives an altogether flexible and financially wise reaction for some presented control applications. The AT89S51 gives the going with standard highlights: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, Watchdog clock, two information pointers, two 16-cycle clock/counters, a five-vector two-level intrude with plan, a full duplex sequential port, on-chip oscillator, furthermore, clock hardware. Furthermore, the AT89S51 is outlined out with static strategy for thinking for task down to zero rehash and backing two programming selectable force saving modes. The Idle Mode stops the CPU while permitting the RAM, clock/counters, sequential port, and meddle with a construction to keep 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.

The following figure 4.6 shows AT 89S51 Microcontroller.



Figure 4.6: AT 89S51 Microcontroller

The at89s4051 has two programming modes: equal and ISP. In equal mode, we need to control the chip with a 5V information (V_{cc}) anyway use a 12V sign on the

RST/Vpp stick. Managing two unmistakable voltage levels on a comparable stick is bothering (can be capable with a semiconductor). We decided to use the more slow 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 an easy to-utilize condensed petrol gas (LPG) sensor, reasonable for detecting LPG (made out of generally propane and butane) focuses noticeable all around. The MQ-6 (Figure 4.7) can distinguish gas fixations somewhere in the range of 200 to 10000ppm. This sensor has a high affectability and quick reaction time. The sensor's yield is a simple opposition. The drive circuit is straightforward; you should simply control the radiator curl with 5V, add a heap opposition, and interface the yield 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

The following figure 4.7 shows MQ-6 LPG gas sensor.



Figure 4.7: MQ-6 LPG gas sensor

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 used to develop the correspondence between a phone or a figuring machine and a GSM structure. The modem (modulator-demodulator) is an essential part here inventory 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

The following figure 4.8 shows GSM Module.



Figure 4.8: GSM Module

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

Motors change over electrical imperativeness into mechanical essentialness. A stepper motor changes over electrical pulses into specific rotational turns of events. A stepper motor is a brushless DC electric motor that segments a full transformation into different identical advances. Stepper motors manage the rule of electromagnetism. Figure 4.9 is used to open the window in our errand.

The following figure 4.9 shows Stepper Motor.

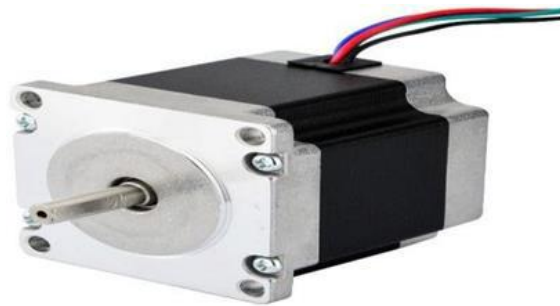


Figure 4.9: Stepper Motor

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 Submersible mini water pump - 3-5v dc

Micro dc three-6v micro submersible pump is a low value, little size submarine siphon engine which might be worked from a 2.5 ~ 6v strength supply. It might take in to 100 twenty liters with regards to hour with exceptionally low contemporary utilization of 220ma.

The following figure 4.10 shows Submersible mini water pump - 3-5v dc.



Figure 4.10: Submersible mini water pump - 3-5v dc

Essentially interface tube line to the engine outlet, lower it in water and energy it. Verify that the water level is ceaselessly higher than the engine. Dry run may likewise hurt the engine in light of warming and it will likewise deliver clamor.

4.11 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 4.11 showed a screen catch from Arduino IDE.

The following figure 4.11 shows demonstrates a screen capture of Arduino IDE.

```

webserver_uno | Arduino 1.6.5
File Edit Sketch Tools Help

webserver_uno
#include <Arduino.h>
#include <WiFi.h>
#include <ESP8266.h>

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

if(WiFi.begin())
{
  DebugSerial.println("Begin error");
}
bool b = WiFi.begin(SSID, PASSWORD);
if(!b)
{
  DebugSerial.println("Wifi error");
}
delay(5000); //make sure the module can have enough time to get an IP address
String ipString = WiFi.localIP();
DebugSerial.println(ipString); //show the ip address of module

delay(1000);
WiFi.begin();
delay(1000);
if(WiFi.softAPMode())
{
  DebugSerial.println("Server is set up");
}

void loop()
{
  char buf[500];
  int len = WiFi.receiveMessage(buf);
  if(len > 0)
  {
    DebugSerial.println(buf);
    //delay(1000);
    if (strcmp(buf, "GET /test.html", 15) == 0) {
      //DebugSerial.println("SEND 1 GET");
      digitalWrite(LED_BUILTIN, HIGH);
      digitalWrite(LED_BUILTIN, LOW);
    }
  }
}

```

Figure 4.11: demonstrates a screen capture of Arduino IDE

CHAPTER 5

IMPLIMENTATION AND TESTING

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.

The following figure 5.1 shows Flowchart of flame detected system.

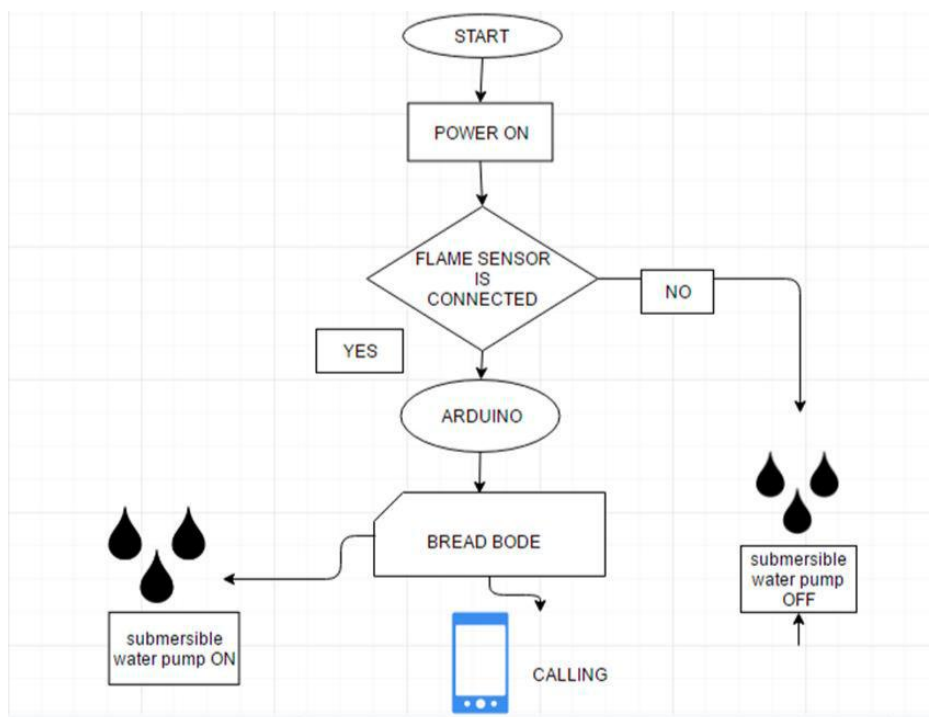


Figure 5.1: Flowchart of flame detected system

Shortly describe about that flow chart

- First, power on aurdino uno and connect extra power 5volt via port.
- Second, connect Infrared IR Flame Sensor with aurdino.

- If connected, then if the flame sensor detected the flame then flame module associated with Arduino if flame is in remain in room then naturally water pump on.
- If the flame sensor detected the flame then gsm module associated with Arduino if flame is in remain in room then naturally come phone call.

This is the way of GSM base flame detected system. 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 Flame module. We can associate the Flame module to the Arduino utilizing an arrangement of jumper wires and a connector.

Connect a Submersible mini water pump - 3-6v dc 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.

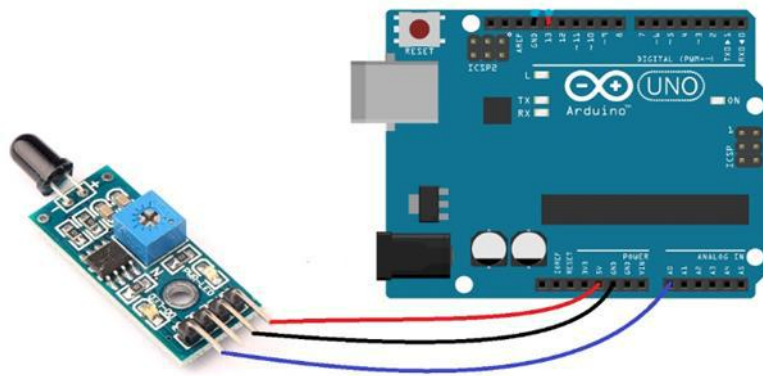


Figure 5.2: Connection procedure of Arduino with Flame module

In this figure 5.2, here see how to connect Infrared IR Flame module to our Arduino board. According to our following figure we connect

Arduino Pins		Flame sensor Pins
A0	————>	A1
5V	————>	VCC
GND	————>	GND

5.3 Arduino Code Explanation

Coding Part of Flame Detection System:

The following figure 5.3 shows some coding part of flame detection system.

```

flame_and_call | Arduino 1.8.10
File Edit Sketch Tools Help

flame_and_call $
#include <Servo.h>
#include <SoftwareSerial.h>
SoftwareSerial sim(2, 3); // RX TX
Servo myservo; // create servo object to control a servo
int flame;
void setup() {
  pinMode(7, OUTPUT);
  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() {
  delay(1000);
  float sensorVoltage;
  float sensorValue;
  flame=analogRead(A1);
  Serial.println(flame);
  if(flame<=200)
  digitalWrite(7, HIGH);
  else
  digitalWrite(7, LOW);
  sensorValue = analogRead(A0);
  sensorVoltage = sensorValue/1024*5.0;

```

Figure 5.3: shows some coding part of flame detection system.

5.4 Gas leakage system

In this project have a gas leakage system where the gas will be automatically detected when there is a leakage and therefore a call will be made by gsm module to warn the user. In Figure 5.4(a) have a flow chart of this security system.

The following figure 5.4.1 shows flowchart of gas leakage system.

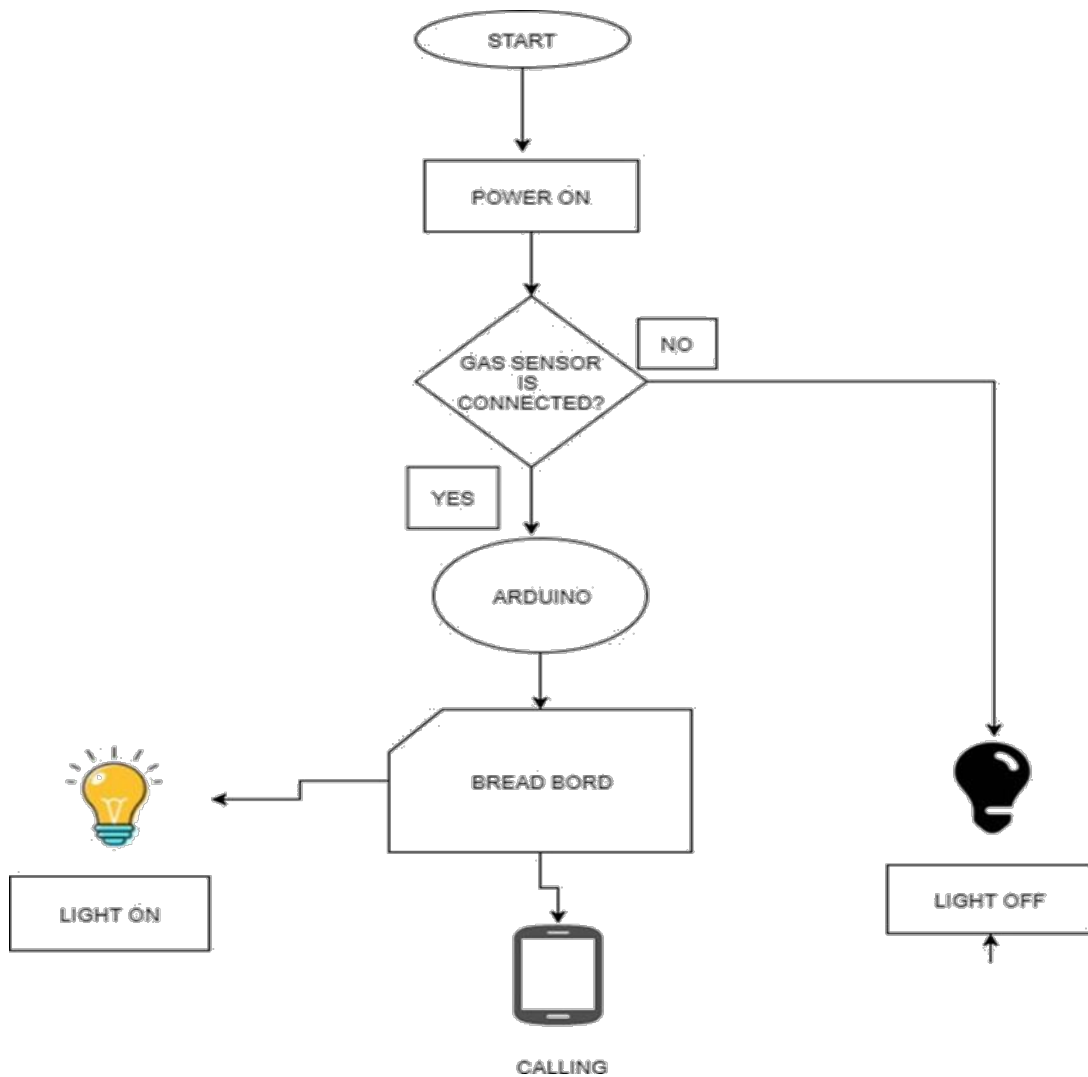


Figure 5.4.1: flowchart of gas leakage system

Here in figure 5.4.1 shows how the pins of mq-6 connected with Arduino board.

In this outline (Figure: 5.4.1) 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.

The following figure 5.4.2 shows the MQ-6 pins connection with Arduino.

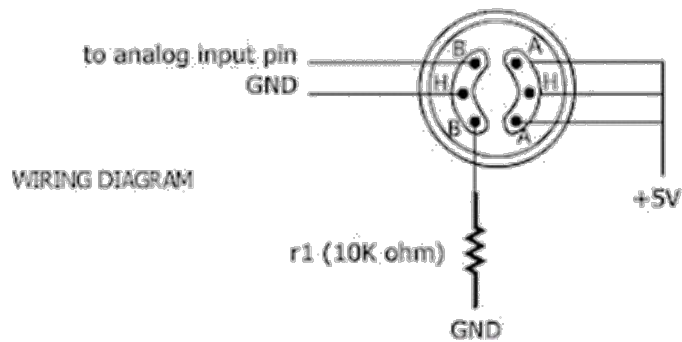


Figure 5.4.2: Shows the MQ-6 pins connection with Arduino

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.

5.5 Gas & Flame detected and Phone Call Testing

The following figure 5.5 shows Gas & Flame detected and Phone Call Testing.

Gas & Flame detected and Phone Call Testing							
No	Gas Detected	Time	Widows Open	Flame Detected	Time	Water pump on	Phone Call
01	YES	43 second	YES	YES	05 second	YES	YES
02	YES	47 second	YES	YES	03 second	YES	YES
03	YES	1.13 second	YES	YES	07 second	YES	YES
04	NO	-----	NO	NO	-----	NO	NO
05	NO	-----	NO	YES	02 second	YES	YES
06	YES	36 second	YES	NO	-----	NO	YES

Figure 5.5: Gas & Flame detected and Phone Call Testing

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

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

6.1 Impact on Society

Gas spillage is a significant issue and these days it is seen in numerous spots like homes, ventures, vehicles, transports, and so many. It is seen that because of gas spillage, perilous mishaps happen.

Step by step everything around us is updating. The utilization of Technology is expanding quickly. Each work and each issue individuals needs to do with the assistance of innovation. It will save human lives from fire mishap and keeps our home, office and industry protected from gas blast and the general public will stay fully informed regarding present day world and innovation.

6.2 Impact on Environment

The impact on environment of this project will be good because the project will save our nature and environment from Dangerous gases and fire accident. For this reason Nature will be beautiful and a safe environment will be created.

6.3 Ethical Aspects

Gas spill area procedures transformed into a concern after the effects of damaging gases on human prosperity were found. Preceding present day electronic sensors, early distinguishing proof systems relied upon less accurate markers. Through the nineteenth and mid 20th many years, coal diggers would convey canaries down to the sections with them as an early area structure against hazardous gases. Many individuals lost their lives in gas blasts and fire accidents. The results of this task will give a framework which will naturally identify gas spillage and give insurance from gas blast and fire mishap.

6.4 Sustainability Plan

Overall, software and hardware parts of the systems have been developed and tested by introducing a small amount of LPG near gas sensor module. One of the notable functions of this system is to add a sub system where wastage of gas and the uses of gas can be monitored using this system. The system is flexible as a greater number of sensors and relays can be added to it according to the whole LPG supply setup in those premises. This is an automatic gas detection, control and alert system. In future this system will have a feature where it can notify the emergency services if any accidents happen. A mobile app and web-based app for real time monitoring also will be added. In the user app for this system many smart features will be added. The overall features will make the system more safe for the users. The system will be optimized for use in many places like the car, the home, industries and many other places.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

The endeavor gives a model of a Gas Spill Discovery, Early Caution and affirmation Framework with Fire Observing Capability. The consider use Arduino UNO to get the necessary yield of the expand. The broaden constructed involves hardware and program progression. The contemplate occupations the Arduino lingo, which is just a bunch of C/C++ limits. The protectors made a gas spill and fire finder, which gauges the degree of gas and frequency of fire (light source) on a family and send an alert call containing the collected data and sent a call individuals in the event that the gas spill and additionally fire happens when they are missing from homegrown. Signal and bulb is related to the system in orchestrate to instigate the consideration of anyone show inside the territory of spill or fire.

The GSM module regardless, ought to be regularly checked to ensure that it is turned on, working genuinely, and has load balance. An issue regarding the module is that for various preliminaries, there's a deferral in sending as well as tolerating the messages. There are a couple of cases that the module doesn't work.

The paper fills in as a kind of perspective for watchers. With this, the makers propose to make a program equivalent to this utilizing a noise diminishment system for the gas and fire sensor and to design a savvy contraption using extremely fragile sensors that can be copied financially and be used by various. It is also recommended to use a more reliant GSM module to ensure that messages are spread each time the system resources a gas spill or potentially fire.

7.1 Limitations

As far as possible itself in perceiving the proximity of trademark gas, butane, and liquid oil gas inside the disk at a close to eliminate from the possible wellspring of gas spill. It is acknowledged that the volume of examine inside the room is more imperative than the volume of gas show. For fire, the sensor used is skilled of

distinguishing fire in its line of find and 180-degree see of the infrared Driven. The system also needs to be presented in an area with solid coordinate banner.

The GSM, after sending the desired number of call needs resetting through the physical button from the Arduino board. This will initialize the framework and the GSM as well.

7.2 Future Work

The following figure 6.2 shows Future Work of GSM base gas leakage, flame detection and protection system.



Figure 6.2: Future Work of GSM base gas leakage, flame detection and protection system.

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

- i. Controlling other home appliances by this system.
- ii. Better user friendly user interface.
- iii. Removing disadvantages stage by stage
- iv. 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.
- v. We want to reduce the accident of our country that was caused by gas leakage by improving our system.

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