

# IoT BASED GAS MONITORING SYSTEM USING ARDUINO

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**Abstract** - Recent trend is that the developments of Smart homes all round the world. Home automation has become very affordable and lots of people, industries has began to automate daily routines like light, fans, setting the temperature, etc.. A gas detector may be a device that detects the presence of gases in a neighborhood, often as a part of a security system. This factor results in a necessity of a gas detection system to be installed at such accident-prone locations for continuous monitoring of any quite leakage which can't be detected by the human senses. The proposed system will continuously monitor the environment for any leakage. just in case of any leakage detection, it'll alert the user via a buzzer and by using the Ethernet shield module and an Android application; it'll alert the user about the environmental conditions just like the gas level and temperature of that location of installation using social media sites like Twitter or via an email notification.

**Key Words:** Arduino, Servomotor, Internet of things (IoT), MQ2 sensor, Gas sensor, Gas Detector, Security System, Home Security, Blink app.

## 1. INTRODUCTION

Safety plays a crucial role in today's world as accidents are susceptible to happen anywhere. Places which make use of flammable and not easily detectable gases are susceptible to occurrence of accidental fires. the web of Things may be a futuristic technology during which interconnection of devices and therefore the Internet is proposed. The automation of the many daily chores are often change by this . Within the proposed gas detection system, we'll make use of IoT to detect leakage and alert the user along side preventing any longer leakage of the gas. Toxic gases are one that cause serious health impacts, but also are utilized in industries in large quantities. These gases need to be monitored; such increase within the normal level of them might be known and proper precautionary measures are often taken. Arduino are going to be wont to perform the specified task by interfacing gas sensor, buzzer and LCD to display, Ethernet shield to send alert message to the user via an Android application and servo motor to shut the gas valve. The system will detect the gas leakage by using gas sensor and it'll inform the Arduino board which can perform the further actions i.e. ringing buzzer, closing gas valve, turning on fan. The people within the neighborhood also can be included just in case of an emergency.MQ2 LPG gas sensor is employed for input. A 12V buzzer is connected along side the circuit to point the user offline [2]. The gas leakage event may involve danger for all times . There are many deaths round the world due to gas leakage. Thus, it's ensured that one doesn't need to worry about the gas leakage becoming so intense and out of control that it can causes damage to life or the encompassing environment and also notifying and alerting the workers or residents about the gas leakage. It gives a HIGH output when LPG, i-butane, propane, methane ,alcohol, hydrogen and smoke gas is sensed. A potentiometer is additionally used for controlling sensitivity of gas sensing. This module is extremely easy to interface with microcontrollers and arduino and simply available in market by name "LPG Gas Sensor Module"

## 2. PROBLEM STATEMENT

The need of a gas detection system isn't only to watch the environment continuously but also must prevent the further leakage of gas within the environment to attenuate the probabilities of fireside . Leakage of any sort of gas has become a drag in present times whether it's with regard to a domestic household, factory, kitchens in restaurants, canteens, etc. A gas leakage detection system makes use of gas sensors (depending on the need of the place). The proposed system makes use of an MQ2 sensor for detection of LPG leakage. The first objective of this project is to supply a completely unique means for safely detecting any malfunction of a pressurized facility so as to stop accumulation of combustible gases in order that damage or explosion thanks to such an accumulation of gases is prevented.

### Internet of Things (IOT)

The ability of varied things to be connected to every other through the web or it's network of physical devices (vehicles, building) connected to embedded device (software, sensor) through internet.IOT allows the thing to sensor collect remotely across network of infrastructure. IOT contains various domains , protocols , application. The interconnection of those embedded devices is predicted to inaugurate automation in nearly all fields, while also enabling advanced applications sort of a smart grid and expanding to the areas such as smart cities. At an equivalent time, IOT is strongly tied to the large data era thanks to the big data

that the “Things” can generate. For the interconnection of those devices, different wired or wireless standards exist. IOT provide various residential and enterprises solution through latest technology .It broadly covers M2M communication, smart grids, smart building, smart cities and lots of more application. Using IOT in smart cities/smart buildings can certainly provide reliable and efficient solutions because it will allow the user to interact with the entities.

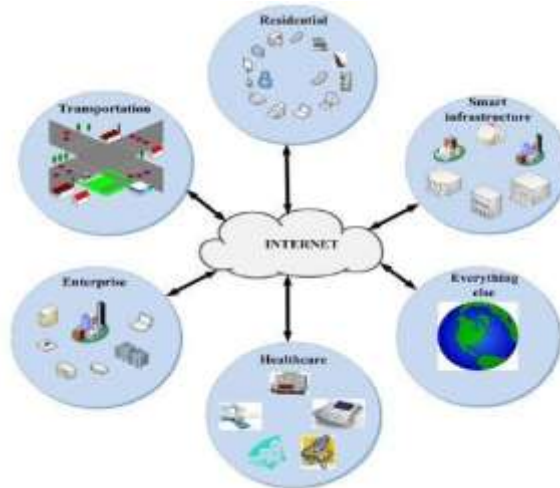


Fig: 1 Basic IOT Diagram

### 3. PROPOSED SYSTEM

The proposed system (fig. 1) makes use of ATmega 328 microcontroller. Arduino UNO board is employed as a base for the entire system. The system consists of an MQ-6 gas sensor attached thereto along side a thermostat. These two devices sense the gas levels and therefore the temperature of the environment where the system is installed and show the output i.e. the readings on an LCD display. An Ethernet shield is attached to the Arduino UNO board which is loaded within the program code for sending aware of the user. Once the gas levels increase above a pre- defined level (250 PPM for the proposed system), the device sends an alert notification to the user. The user can control devices attached to the system via a relay like, e xhaust fan, light bulb, buzzer/alarm and a motor for closing the gas valve. These devices are often switched on/off by the user using an Android application which supports the Arduino configuration (Blynk application).

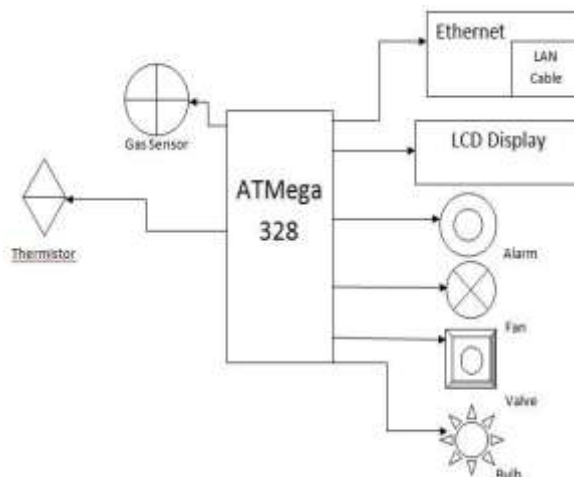


Fig 2. Proposed block diagram

#### MQ2 Sensor

A gas detector may be a device that detects the presence of gases in a neighborhood , often as a part of a security system. Gas Sensor (MQ2) module is beneficial for gas leakage detection (in home and industry). it's suitable for detecting H2, LPG, CH4, CO, Alcohol, Smoke or Propane. Due to its high sensitivity and fast response time, measurements are often taken as soon as possible. The sensitivity of the sensor are often adjusted by using the potentiometer.

## ETHERNET SHIELD:

An Arduino board are often connected to the web by using an Ethernet Shield. This shield is predicated on the Wiznet W5100 ethernet chip. A network (IP) stack capable of both TCP and UDP is provided by the Wiznet W5100. Upto four simultaneous socket connections are supported by it. The Ethernet library are often wont to write sketches which hook up with the web using the shield. By using long wire-wrap headers, which extend through the shield, the Ethernet shield are often connected to the Arduino board. By this, the pin layout are often kept intact and another shield are often stacked to the highest.

## ARDUINO:

Arduino may be a computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects which will sense and control objects within the physical world. Arduino programs could also be written in any programing language with a compiler that produces binary machine language . Atmel provides a development environment for his or her microcontrollers, AVR Studio and therefore the newer Atmel Studio, which may be used for programming Arduino. The Arduino project provides the Arduino integrated development environment (IDE), which may be a cross- platform application written within the programing language Java. A program written with the IDE for Arduino is named a "sketch". Sketches are saved on the event computer as files with the file extension .ino. The Arduino IDE supports the languages C and C++ using special rules to arrange code.

## ANDROID APPLICATION

Blynk may be a platform available with iOS and Android apps wont to control Arduino, Raspberry Pi and therefore the likes over the web . Blynk may be a digital dashboard which allows you to build a graphic interface for your project by simply dragging and dropping widgets

## 4. PROTEUS DESIGN SUITE:

The Proteus Design Suite is an Electronic Design Automation (EDA) tool including schematic capture, simulation and PCB Layout modules. The software runs on the Windows OS and is out there in English, French, Spanish and Chinese languages. The Proteus Design Suite may be a Windows application for schematic capture, simulation, and PCB layout design. All PCB Design products include an auto router and basic mixed mode SPICE simulation capabilities. Schematic capture in the Proteus Design Suite is used for both the simulation of styles and because the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations. The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. it's then co-simulated along side any analog and digital electronics connected thereto . this permits it's utilized in a broad spectrum of project prototyping in areas like control, temperature control and interface design.

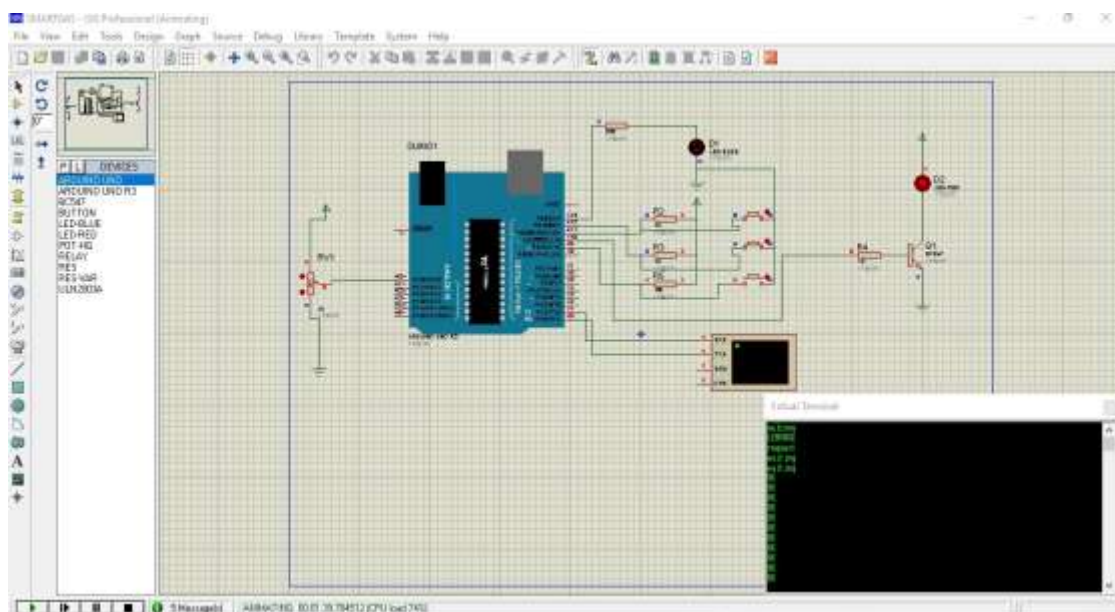


Fig 3. Design suite for proposed application

## 5. CONCLUSION

The proposed system makes the gas detection and its prevention easier for quite user, whether technically sound or not. This technique wirelessly transfers alert notification to the user and therefore the user can easily connect the devices through a Smartphone from any location. It's utilized in wide selection of applications in present day society and introducing a vast scope to the longer term . This easy control over the devices like exhaust fan makes the environment less accident- prone. Using the Arduino microcontroller also makes the system cheaper. Quick access and control makes the system very useful. It also uses to alert the consumers about the wastage of gas while removing the utensils from the burner by using an object detection sensor.

## 6. FUTURE SCOPE

In addition to the developed system, the systems are often enhanced by adding an impact element which controls the gas leakage if it exceeds the required upper explosive level for the varied gases within the plant area. This will be achieved by any gas leakage indication in any a part of the plant alerts the room then the control valve is shut off. Therefore preventing any hazard arising thanks to gas leakage.

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