IOT Based Fire and Gas Detection

V.Jayanth Reddy[1], D Shiva Rakesh[2], Mr. D Srikanth[3]

[3]*Assistant Professor, J B Institute of Engineering and Technology (JBIET), Hyderabad*
[12]*Student, J B Institute of Engineering and Technology(JBIET), Hyderabad*

Abstract—**Fire Detectors play a very important role in Industries, Shops, Malls, Residential complexes, parking areas, etc. They help in detecting fire or smoke at an early stage and can help in saving lives. Commercial Fire detecting systems usually have an alarm signaling, with the help of a buzzer or Siren. We have designed an IOT based Fire Alerting System using Temperature and a smoke sensor which would not only signal the presence of fire in a particular premise but will also send related information through IOT.**

Internet of Things (IoT) is basically the network of 'things' by which physical things can exchange data with the help of sensors, electronics, software, and connectivity. These systems do not require any human interaction. In this Arduino fire alarm system using temperature and smoke sensor using the IOT project, we can send LIVE information like Temperature, Smoke Value detected by a particular device to the Fire Department.

This project uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Full wave bridge rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

I. INTRODUCTION

FIRE AND GAS is that the abbreviation or short kind for liquefied oil gas. Like all fossil fuels, it's a non-renewable supply of energy. It is extracted from fossil oil and gas. The most compositions of FIRE AND GAS square measure Hydrocarbons containing three or four carbon atoms. The conventional parts of FIRE AND GAS so, square measure gas (ClHa) and alkane (CaHro). Tiny concentrations of alternative hydrocarbons may additionally be gift betting on the supply of the FIRE AND GAS and the way it's been created, parts apart from hydrocarbons may additionally be gift. FIRE AND GAS is extremely combustible and should thus be hold on off from sources of ignition and during a well-ventilated space, in order that any run will disperse safely. FIRE AND GAS vapors is heavier than air thus care ought to be taken throughout storage in order that any run won't sink to the bottom and find accumulated in a district that is low lying and tough to disperse. FIRE AND GAS gas is largely gas and alkane and it's scentless in its state of nature. The smell that we tend to notice once there's a run is really of a wholly totally different agent, referred to as alkyl radical Mercaptan. This substance is additional to the gas once it leaves the most storage terminals [1]. The prime aim of paper is to detect Gas leakage in home, hotels, schools and other domestic areas, and gives alert message to the surrounding people. Nowadays Gas sensors are being used globally in the field like safety, health, instrumentation etc. This paper is an implementation of the same using MQ-5 gas sensor and DHT11 temperature sensor. The MQ5 sensor is commonly used for detecting gas leakage for various applications and the DHTIL is used for measuring the humidity and temperature of surrounding area. The device also keeps displaying the leakage amount and humidity & temperature on an LCD display. The MQ6 gas sensor detects the concentration of gas in ppm and outputs analog value which can be converted to a digital signal using inbuilt Analog to Digital Convertor of Arduino. The paper allows the user to set the low, medium and dangerous level for leakage based on the same digital measure

II. BLOCK DIAGRAM

A. POWER SUPPLY:
All digital circuits require regulated power supply. In this article we are going to learn how to get a regulated positive supply from the mains supply.
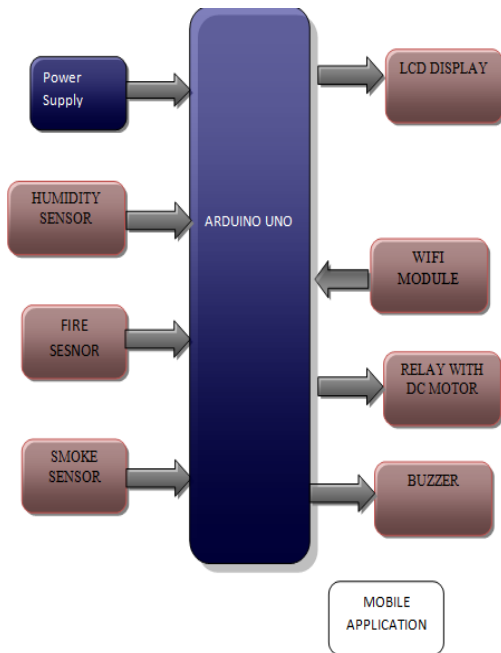
B. IC 7805:

7805 is an integrated three-terminal positive fixed linear voltage regulator. It supports an input voltage of 10 volts to 35 volts and output voltage of 5 volts. It has a current rating of 1 amp although lower current models are available. Its output voltage is fixed at 5.0V. The 7805 also has a built-in current limiter as a safety feature. 7805 is manufactured by many companies, including National Semiconductors and Fairchild Semiconductors.

The 7805 will automatically reduce output current if it gets too hot. The last two digits represent the voltage; for instance, the 7812 is a 12-volt regulator. The 78xx series of regulators is designed to work in complement with the 79xx series of negative voltage regulators in systems that provide both positive and negative regulated voltages, since the 78xx series can't regulate negative voltages in such a system.

The 7805 & 78 is one of the most common and well-known of the 78xx series regulators, as it's small component count and medium-power regulated 5V make it useful for powering TTL devices..

III. SYSTEM HARDWARE

A. GAS SENSOR

Gas sensors need to be calibrated and periodically checked to ensure sensor accuracy and system integrity. It is important to install stationary sensors in locations where the calibration can be performed easily. The intervals between calibrations can be different from sensor to sensor. Generally, the manufacturer of the sensor will recommend a time interval between calibrations. However, it is good general practice to check the sensor more closely during the first 30 days after installation. During this period, it is possible to observe how well the sensor is adapting to its new environment. Also, factors that were not accounted for in the design of the system might surface and can affect the sensor's performance.

If the sensor functions properly for 30 continuous days, this provides a good degree of confidence about the installation. Any possible problems can be identified and corrected during this time.
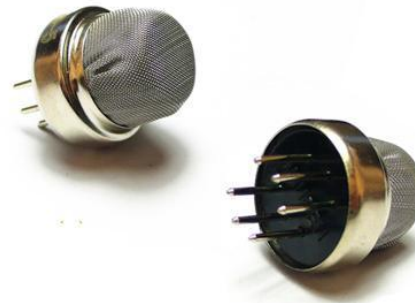

Fig3.1: Diagram of Gas sensor

B. RELAY

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit.

The traditional form of a relay uses an electromagnet to close or open the contacts, but other operating principles have been invented, such as in solid-state relays which use semiconductor properties for control without relying on moving parts. Relays with

calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults. in modern electric power systems these functions are performed by digital instruments still called protective relays.

Fig3.2: Diagram of Relay

C . WIFI MODULE

ESP8266:

The ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability, produced by Espressif Systems in Shanghai, China.. The chip first came to the attention of Western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at first there was almost no English-language documentation on the chip and the commands it accepted.[2] The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, the chip, and the software on it, as well as to translate the Chinese documentation.

The ESP8285 is an ESP8266 with 1 MiB of built-in flash, allowing the building of single-chip devices capable of connecting to Wi-Fi.
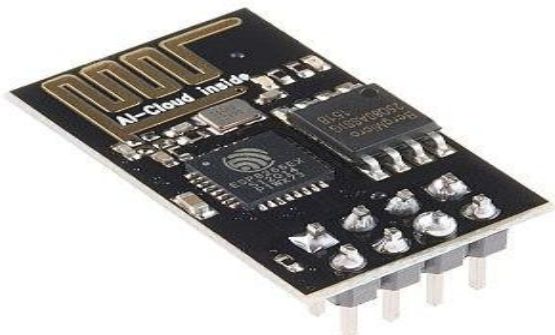

Fig3.2: Diagram of ESP8266

- Processor: L106 32-bit RISC microprocessor core based on the Tensilica Xtensa Diamond Standard 106Micro running at 80 MHz
- Memory:
  - 32 KiB instruction RAM
  - 32 KiB instruction cache RAM
  - 80 KiB user-data RAM
  - 16 KiB ETS system-data RAM
- External QSPI flash: up to 16 MiB is supported (512 KiB to 4 MiB typically included)
- IEEE 802.11 b/g/n Wi-Fi
  - Integrated TR switch, balun, LNA, power amplifierand matching network
  - WEP or WPA/WPA2 authentication, or open networks
- 16 GPIO pins
- SPI
- I²C (software implementation)
- I²S interfaces with DMA (sharing pins with GPIO)
- UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2

IV. ARDUINO CONTROLLER

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler

toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.
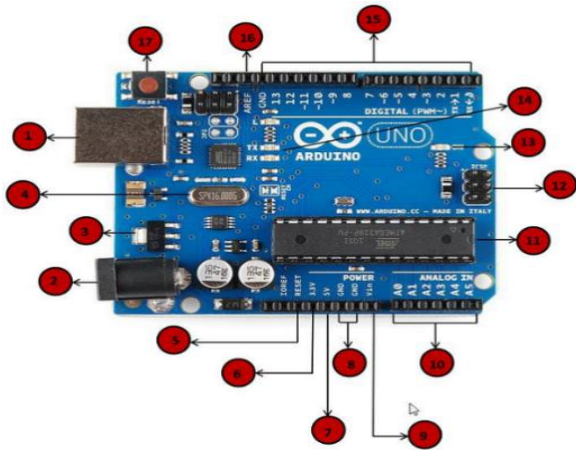

Fig.4.1: Hardware Image

Fig.4.2: Arduino Board

V. CONCLUSION

As we shorted out the problems faced by FIRE AND GAS gas consumers so we come up with some solutions to meet the few requirements of them, as we made our system is completely automate the process of refill booking without human intervention. Our system is also reasoned to help customers to upgrade their safety norms, act in accordingly with minimum requirements on environmental issues and mostly the basic function being prevented by major disasters and protect life and property from reputed Accidents. The primary objective of our project is to measure the gas present in the cylinder when weight of the cylinder is below the fixed load, this can be done using the weight sensors. The gas retailer gets the order for a new cylinder and the house owner (consumer) receives the message regarding the status and the secondary objective is to provide any malfunction in gas servicing system in order to prevent damage or explosion of FIRE AND GAS . Thus the system developed by us will somehow help the FIRE AND GAS Gas Consumers to lead a comfortable life.

REFERENCE

[1] Abhishek, P. Bharath, "Automation of Fire and Gas cylinder booking and leakge monitoring system," International Journal of Combined Research and Development (IJCRD), pp. 693–695, 2016.

[2] D. H. Priya and L. Babu, "Gas leakage system," International Journal of Scientific and Research Publications, p. 653, 2014.

[3] P. M. Vidya, S. Abinaya, G. G. Rajeswari, and N. Guna, "Automatic Fire and Gas leakage detection and hazard prevention for home security," in Proceeding of 5th National Conference on VLSI, Embedded and Communication & Networks on April, vol. 7, 2014

[4] K. Galatsis, W. Woldarsla, Y.X. Li and K. Kalantar-zadeh, "A Vehicle air quality monitor using gas sensors for improved safety", report in Recent Researches in Applications of Electrical and Computer Engineering.

[5] K. Galatsis, W. Wlodarsla, K. Kalantar-Zadeh and A. Trinchi, "Investigation of gas sensors for vehicle cabin air quality monitoring", National Conference on Synergetic Trends in engineering and Technology (STET-2014), International Journal of Engineering and Technical Research ISSN: 2321-0869

[6] Smart Gas Cylinder Using Embedded System", Issn (Online) 2321 – 2004 Issn (Print) 2321 – 5526, International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering Vol. 2, Issue 2, February 2014

[7] Design and Implementation of an Economic Gas Leakage Detector" A. MAHALINGAM, R. T. NAAYAGI,1, N. E. MASTORAKIS§ Department of Engineering Systems school of Engineering, University of Greenwich (Medway Campus)Chatham Maritime, Kent ME4

4TBUNITED KINGDOM, article in Recent Researches in Applications of Electrical and Computer Engineering.

[8]   Fraiwan, L.; Lweesy, K.; Bani-Salma, A.; Mani, N, "A wireless home safety gas leakage detection system", Proc. of 1st Middle East Conference on Biomedical Engineering, pp. 11-14, 2011.

[10] Johansson, A.; Birk, W.; Medvedev, A., "Model-based gas leakage Detection and isolation in a pressurized system