

IOT BASED LPG DETECTION AND INTERFACING WITH THINGSPEAK

Ragunath S¹, Yogeswaran A², Rohan Babu D³, Yaswanth P⁴

^{1,2,3,4}Student, Department of Electronics and Instrumentation, Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India

Abstract - Internet of Things (IOT) is the major revolution in this industry 4.0 trend. Its applications are spread through various fields, including Coal and Gas industries. In the Coal and Gas industries, the leakage of LPG is detected and constantly monitored using a microcontroller called Arduino-uno, ESP8266 Wifi module and LPG sensor(MQ-5). The aim of this project is to detect and monitor gas leakage effortlessly. It detects LPG using MQ-5 module. This automatically sends ALERT/SMS and e-mail to the control engineer, when the leakage is detected. The leakage recordings will be updated over ThingSpeak which can be viewed by the respective control engineer in that industry.

Key Words: IOT, ThingSpeak, MQ-5 gas sensor, Arduino-UNO.

1. INTRODUCTION

In home, LPG is used for various purposes, such as cooking, Heating, Lighting, etc. In industries, LPG gas leakage is one of the most unimaginable occurring. Therefore, one of the preventive methods to stop accidents related to gas leakage is to install a gas leakage detection device at permeable places. The aim of this project is to develop such a device that can automatically detect and send data to the cloud server, thus preventing accidents. [5]

A gas detector is to ease humans on detecting the presence of those dangerous gases within an area to prevent disaster. Nowadays, the gas detector has been innovated into various ways of detection, for example infrared thermal imaging gas leak detection, gas leakage detection with monitoring system, and wireless gas sensor network. This paper presents the design and development of a wireless gas leakage monitoring system by using Arduino and ThingSpeak

1.1 LPG Sensor (MQ-5)

Gas Sensor(MQ5) module is useful for gas leakage detection (in home and industry). It is suitable for detecting **H₂, LPG, CH₄, CO** Due to its high sensitivity and fast response time, measurements can be taken as soon as possible.

The sensitivity of the sensor can be adjusted by using the potentiometer. [2]



Fig 1: MQ-5 sensor

There are four pins coming out of MQ-5 sensor: **VCC** ↔ 2.5V ~ 5.0V; **GND** ↔ power supply ground; **A0** ↔ analog output; **D0** ↔ digital output

1.2 ESP8266 Wifi module

ESP8266 is the name of the microcontroller developed by Espressif Systems which is a company based out of Shanghai. This microcontroller has the ability to perform WIFI related activities hence it is known as a wifi module.



Fig 2: ESP8266 Wifi Module

2. WORKING

As for sensor output, we are using the MQ5 Gas sensor module. This module has two output possibilities – an analog out (A0) and a digital out (D0). The **Analog out** can be used to detect Gas leakage and to measure volume of Gas leakage in specific units (say ppm). The **Digital out** can be used to detect Gas leakage and hence trigger an alert system (sound alarm). The **Digital out** gives only two possible outputs – **High** and **Low**, hence its more suited for detection of gas leak than to measure volume of gas presence.

Next, the output from the sensor is fed to the arduino as input. Then as the IOT part is considered, we use

Thingspeak tool to record gas leakage data. **ThingSpeak** provides a very good tool for IoT based projects. By using ThingSpeak site, we can monitor our data and control our system over the Internet, using the Channels and webpages provided by ThingSpeak. ThingSpeak **‘Collects’** the data from the sensors, **‘Analyze and Visualize’** the data and **‘Acts’** by triggering a reaction.

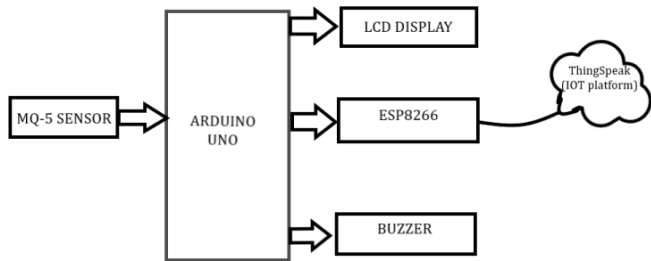


Fig 3: Block Diagram

We will use ThingSpeak to monitor leakage of gas online using the internet. We will also use **IFTTT** platform to connect ThingSpeak to email/message service so that alert message can be sent whenever there is a leakage of gas.[3]

2.1 Usage of Thingspeak

First of all create an account in Thingspeak. Now go to the ‘Channels’ menu and click on **New Channel** option on the same page for further process. Now you will see a form for **creating the channel**, fill in the Name and Description as per your choice. Then fill **‘Gas detection’** in Field 1 label, tick the checkboxes for the Fields. Also tick the check box for the ‘Make Public’ option below in the form and finally Save the Channel. Now your new channel has been created.

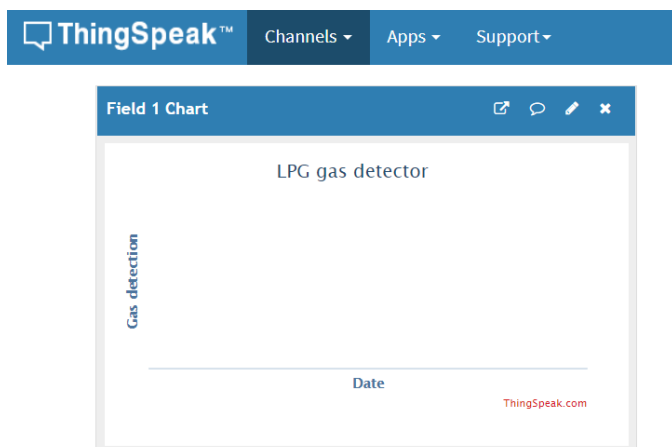


Fig 4: ThingSpeak channel chart

Then, we will use the ThingHTTP app of the server to trigger the IFTTT applet for data entry to Google sheets and send email/sms. ThingHTTP enables communication among devices, websites, and web services without having to implement the protocol on the device level. You can specify actions in ThingHTTP, which you want to trigger using other ThingSpeak apps such as React. To make New ThingHTTP, we will need an URL for triggering which we will get from IFTTT.

2.2 Configuring IFTTT

Login to IFTTT and search for **Webhooks** and click on it. Then Click on **Documentation**. Type **“LPG_trigger”** in the event box and copy the URL. We will use this URL in ThingHTTP. Now let’s make an Applet to link ThingHTTP to Google sheet and to send email/sms. After that we will jump to complete our ThingHTTP. Click on **+this** and search for Webhooks and click on it. Choose the trigger as **“Receive a web request”** Type the Event Name which is the same as what you write in the event box in the webhooks URL. Click on Create Trigger.

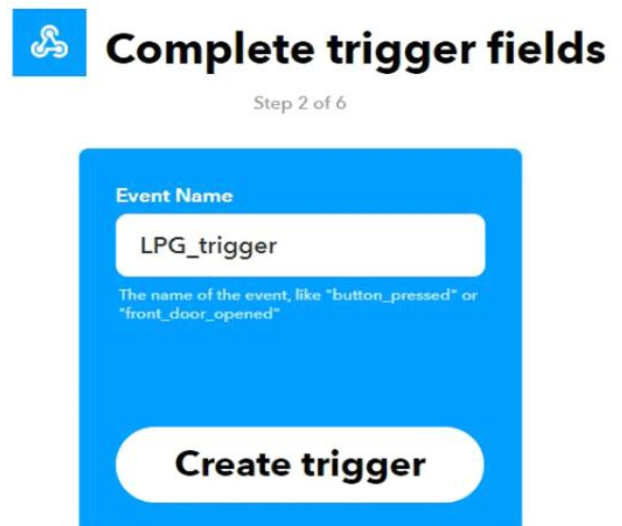


Fig 5: IFTTT Create trigger

After this, click on **‘Then That’** and then click on Email.

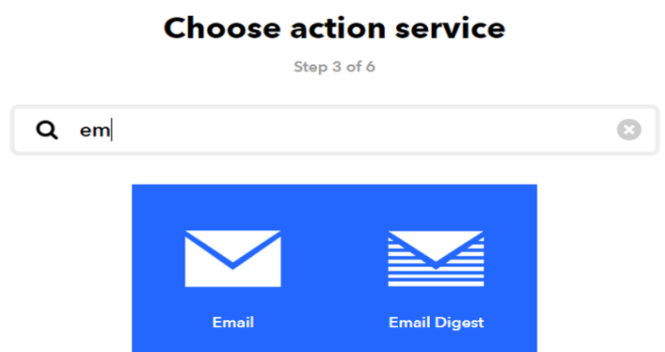


Fig 6: choose email service trigger

Now in Email, click on '*send me an email*' and enter the email subject and body and then click on create action.

3. RESULTS

When you are done with hardware component setup and you upload the code to the Arduino and open the Serial monitor to see what's going on. You will see data and graph of lpg value in the Thingspeak. If the leakage is detected, an emergency email will be received to your given mail.

4. CONCLUSION

LPG leakage detection is essential to prevent accidents and to save human lives. From this paper, we can clearly understand the importance of IOT in the coal and gas industries. It will make the continuous monitoring of LPG gas leakage very easy. This system also triggers buzzers to alert people when **LPG leakage** is detected. As the information is stored in the cloud anyone and anywhere in the world can access.

REFERENCES

- [1] G.B.C.V.K.G.S.V.H., B.N.V. Abhishek and P. Bharath, "Automation of lpg cylinder booking and leakage monitoring system", International Journal of Combined Research and Development (IJCRD), pp. 693-695, 2016.
- [2] P.M. Vidya, S. Abinaya, G.G. Rajeswari and N. Guna, "Automatic lpg leakage detection and hazard prevention for home security", Proceeding of 5th National Conference on VLSI Embedded and Communication & Networks on, vol. 7, 2014 April.
- [3] Attia, Hussain A., and Halah Y. Ali. "Electronic Design of Liquefied Petroleum Gas Leakage Monitoring, Alarm, and Protection System Based on Discrete Components." International Journal of Applied Engineering Research, vol. 11, no. 19, pp. 9721-9726, 2016.
- [4] Mahalingam, A., R. T. Naayagi, and N. E. Mastorakis. "Design and implementation of an economic gas leakage detector." Recent Researches in Applications of Electrical and Computer Engineering, pp. 20-24, 2012.
- [5] T.Soundarya, J.V. Anchitalagammai, G. Deepa Priya, S.S. Karthick kumar, "C-Leakage: Cylinder LPG Gas Leakage Detection for Home Safety," IOSR Journal of Electronics and Communication Engineering, vol. 9, no. 1, Ver. VI, pp. 53-58, Feb. 2014