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IoT Based Monitoring Device (Gas Leakage)

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Abstract: Due to few factors such as false alarm, faulty or aging systems, incorrect installation, lost connections and improper maintenance, fire detection and alarm in Fire and Gas (F&G) system problems are mostly caused.Besides that, the absentee of information being shared maybe a problem where which causes inaccurate data obtained to analyzed in Oil & Gas industry.This study's objective is to close the gap between those missing or inaccurate data collected in Fire and Gas system to prevent any misinformation being dropped out which may lead to major catastrophe.For this research, we are integrating IoT(Internet of Things) concept with a simple model of Fire and Gas system and mobile devices.Moreover, the data being collected can be analyzed by onshore teams where they are being informed through their mobile phones on how each system is functioning without the requiring to be on site.In this paper, we mainly focus on pipelines where gas pipelines which are faulty where most gas leakages often occur. In this paper, we have constructed the project using a MQ-2 gas sensor,Wi-Fi module(NodeMcu) which enables data being obtained by the gas sensor to be delivered in mobile phones by using Wi-Fi as a medium and Blynk application to monitor the data being collected for further analysis. The findings it will shows the current environment where excessive gas being leaked out from the faulty pipeline and also a notification message will be sent to the mobile phones.For the second objective, the gap of information being not reachable to acknowledge on the situation will be more narrow as information using IoT is being implanted. The limation in this project is lack of resources to allocated more installing in many location to detect gas being leaked.

Keywords: Internet Of Things (Iot), Fire & Gas System (F&Gsystem), Nodemcu (Wi-Fi Module)

1. Introduction

Francis Robbins Upton in relationship with Thomas Edison built up the first gas detector that always implicit history in 1890. Nonetheless, the development of gas detector was experiencing advanced

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consistently. In 1965, the first home gas detector that utilizing singular battery fueled was made by Duane D. Persall. Additionally, the detector likewise reasonable other than it very well may be introduced and supplanted effectively by the purchasers (Azmil et al., 2015). The fundamental capacity of gas detector is to show the necessary data for information translation due to getting input signal under certain conditions. The typical fire detection and alarm system is comprised of few devices such as fire detectors, signal box, control panel and alarm devices intended to warn the residents' at early stage. The system is developed to protect life and valuable properties. Different building will face different types of problems therefore the fire detection and alarm system must be designed specially based on the requirements for an efficient system.

According to Ulrich Hoefer (2012) the first programmed smoke alarm imagined in quite a while dependent on the estimation of the ionization current utilizing americium-241 as a radioactive source . The alpha radiation transmitted ionizes oxygen and nitrogen noticeable all around in the detecting chamber prompting a quantifiable ionization current which diminishes when smoke particles are available. Albeit these materials are moderately protected being used the acknowledgment at least in Europe diminished previously. Natural and medical problems happened and utilizing radioactive sources in fire finders got bothersome. In spite of the fact that ionization finders are even more delicate as customary photoelectric indicators ("point identifiers") these days most private fire locators depend on smoke recognition by light dissipating utilizing forward dispersing and additionally in reverse dispersing joined with the identification of warmth. Some utilization different frequencies (IR and blue) to diminish as far as possible and to stifle bogus alerts which by and large are because of residue or water fume. For explicit conditions there are additionally elective methods being used like fire indicators, straight optical finders, suctioning smoke alarms and direct warmth identifiers (utilizing raman dissipating in optical filaments) to give some examples. (Ulrich Hoefer, 2012).

Furthermore, information integrating with the Internet of things alludes to a kind of organization to associate anything with the Internet dependent on specified protocols through information sensing gear's to direct information exchange and communications in order to achieve smart recognitions, positioning, tracing, monitoring, and administration. (Patel, 2016).

Besides that, (Sieber, Enoksson, & Krozer,2012) stated the need of remote monitoring of numerous boundaries has prompted the improvement of remote sensors in numerous fields. Also, remote sensors and the development of WSANs encouraged the automation cycle, information assortment, move, processing, and storage. All the more as of late, these keen sensors have obtained the limit of performing machine-to-machine (M2M) communications, simplifying the communication and interoperation between devices, granting numerous possibilities in control systems and automation. An example, proposed an oxygen gas sensor for personal protective equipment without wireless transmissions; in the authors have developed a CO_2 gas sensor for remotely monitoring the levels of this gas, transferring the data throughthe General Packet Radio System (GPRS). (Sieber, Enoksson, & Krozer, 2012).

There are few requirements for an efficient fire detection and alarm system are being applied in Oil rigs. Most of the requirements able to avoid expensive systems, rapid accessibility, increase the sensitivity and increase availability.

This study is focused on simple requirements that maximise efficiency of fire and gas detection information's being gathered can be analysed by crews which are not required to be on site but through their mobile phones.

2. Materials and Methods

2.1 Materials

The materials needed and used in this project is NodeMcu as the main data processing unit to transfer the information which obeys the IoT concept of this project. This project consists of gas

sensor(MQ-2) are used to recognise gas such as methane being lurking in the surrounding and Buzzer to an alarm sound. Lastly, the Blynk app gave the user's to monitor the level of gas intensity by only using a mobile device. It is a simple, affordable and easy to install.

- IoT devices :
  - NodeMcu
  - Act as data processing/transferring unit in this project.
- Gas sensor(MQ-2) and buzzer :
  - Collecting methane gaseous from the surrounding.
  - To give a alarm sound to give a alert.
- Blynk App and mobile devices :
  - An application that monitors the intensity of gaseous being obtained.
  - Mobile devices that act as communication unit that interconnects the whole date in this project.

2.2 Methods

Schematic diagram of IoT based monitoring device(gas leakage)

First,we constructed the project based Schematic diagram in Figure 1 where Nodemcu is connected to power sources,MQ-2 gas sensor is set up and the pinheads are connected to NodeMcu input pins, a buzzer and Led lights. Furthermore, Blynk application can be establish once we have connected to a Wi-Fi. Based on Figure 2, shows that how the system works which gas being leaked from the faulty pipelines is detected from MQ-2 gas sensor which then sends the information to NodeMcu and NodeMcu will establish database storage using Wi-Fi which then can further seen by Blynk App. Users which are accessing Blynk App can evaluated data and analysed through their phone from time to time.In Figure 3, shows a flowchart of how the operational flow of the project.

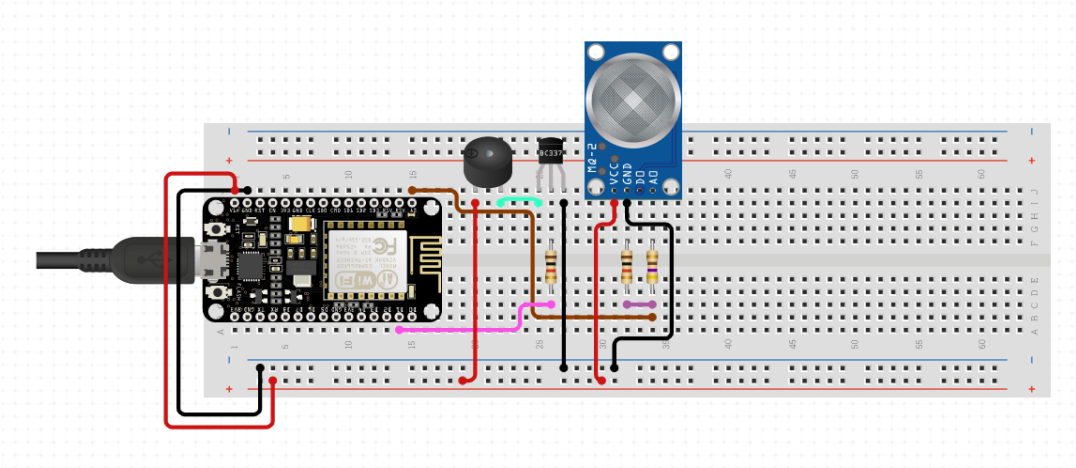

Figure 1 : Schematic diagram of IoT based monitoring device(gas leakage)

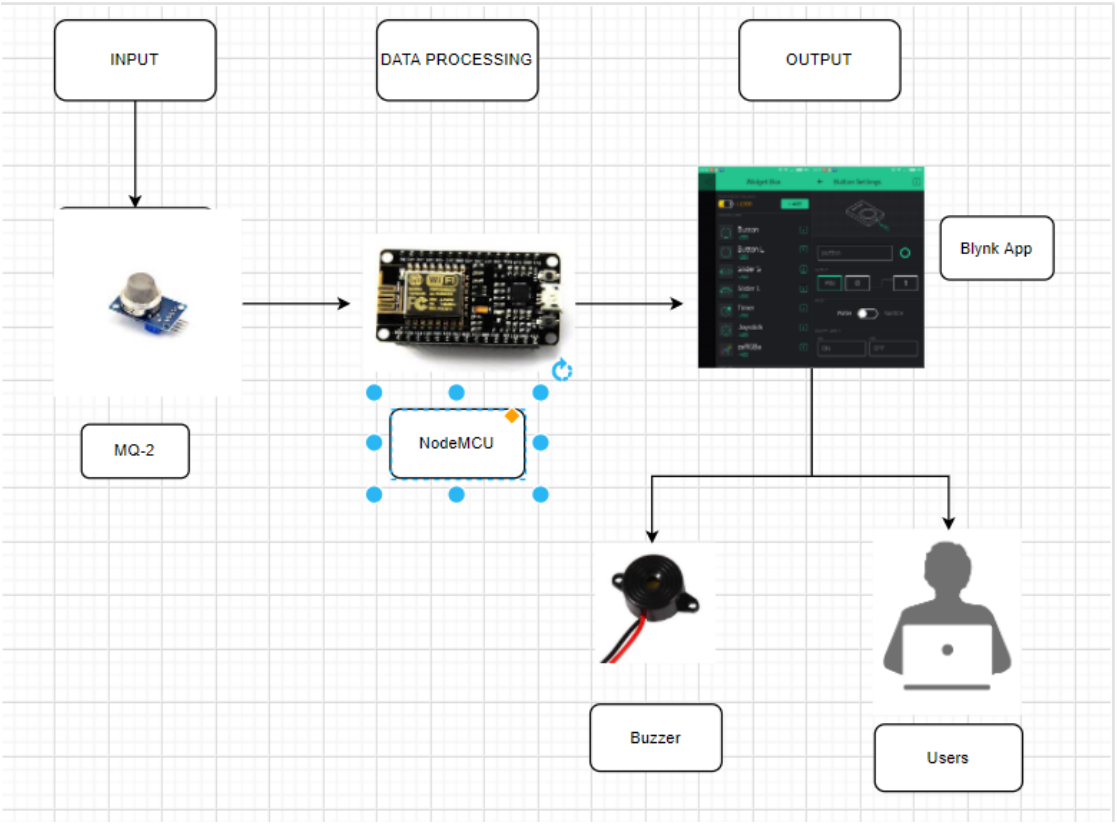

Figure 2: Block Diagram of IoT based monitoring device(gas leakage)

Operational flow chart Iot based monitoring device(Gas Leakage)

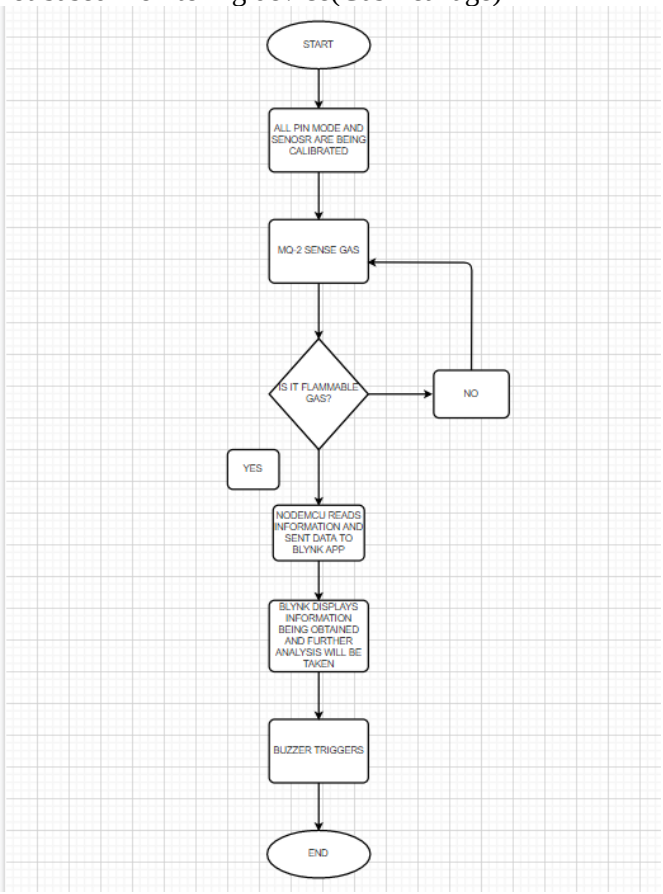

Figure 3 : Flow chart of automatic box folding machine

3. Results and Discussion

Firstly, we set up the hardware had been set up according to the schematic diagram.A Wi-Fi address has been fixed to be use by the smartphones.The detection gas by the gas sensor will be display in Blynk app can be seen by the Figure 4 which we used methane gas from a lighter. Furthermore, in the Blynk app shows graph of the intensity of gaseous presence in the. Together 2 LED lights that shows as indication of normal condition(NONE) and detection of methane gas leakage(GAS) where it will return to its normal state once there a no methane gaseous found to be accumulating.

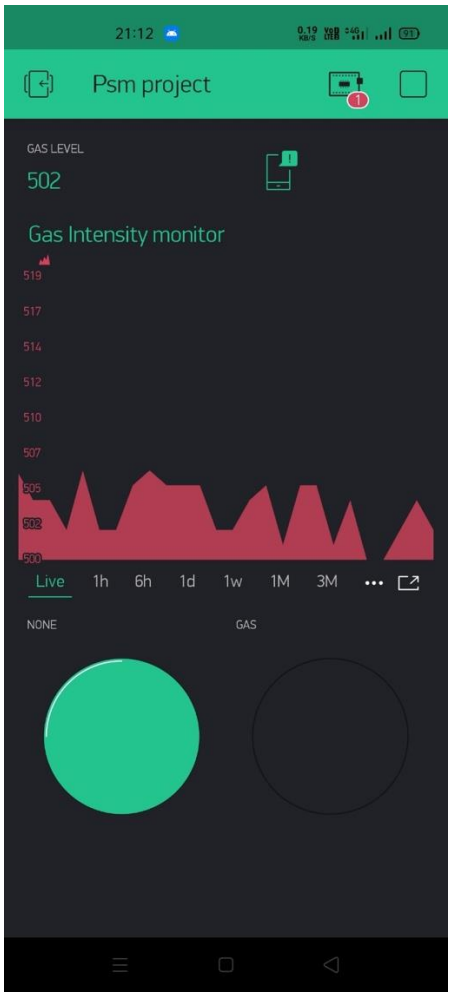

Figure 4: Blynk app display

3.2 Discussions

The gas intensity graph in Blynk provide us to monitor real-time data/live that will fluctuates and can be monitor from time period of per hour, day ,weekly,months and years. Its pretty fine because the presence of methane gas in the air is pretty low and did not reaches the threshold value(< 580) at normal conditions as shown in Figure 6 where no methane gas being accumulating.When we tested out with the methane gas leaking, the graph will spike till it reaches the threshold value(> 580) that indicates too much gas accumulating in the closed area and is dangerous. Figure 5 shows us such a case if it happens where a notification message will appear in your smartphones and also in Figure 6 shows the threshold of Gas being detected from time to time .

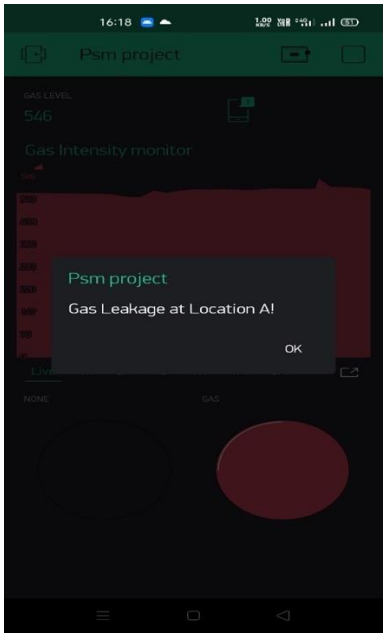

Figure 5 : Gas Detection with its notification message

Figure 6 : Graph of Gas Threshold

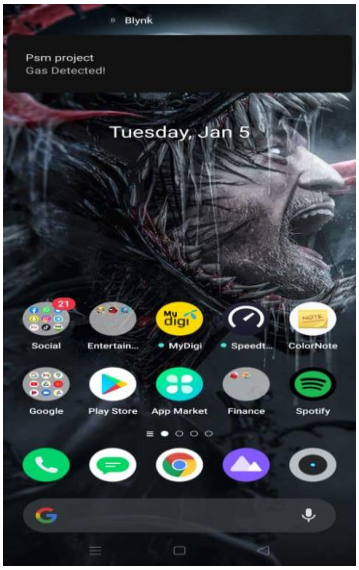

Figure 7 : Blynk notification message at home screen

Based on Figure 7, even without entering the Blynk App. A Notification message bar will be appearing on your Homepage with this being said, you don't really need to be access to the constantly to keep up with what is happening in the surrounding.The process had been done just by using Wi-Fi as medium of transferring data to our smartphones in just very minimal time.In such cases, this will gave us the advantage of collecting and analzying information with much quicker response to provide the suitable services according to the situation. Below is Figure 8 where shows us how the device is being tested with using a lighter which obtain methane gas in its capacity.

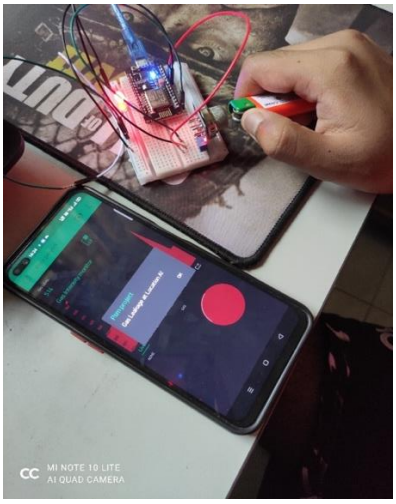

Figure 8 : Testing phase

4. Conclusion

This study is about constructing a simple Fire and Gas system which detects gas leakage with integrating IoT concept to bring closer the gap of misinformation being dropped in such big industry . We must be aware that even a minor data being mislooked can bring a fatal incident even being neglected. The objectives of this study had been achieved through the methodology and data analysis.The outcome was all information can obtained with the help of IoT by using Wi-Fi as a medium of transferring information which helps a lot in keeping up data from time to time.The second objective, we have establish a new ascpect where information can be collected remotely without requiring physically to examine every devices on site.

Acknowledgement

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