IoT based Smart Oil and Gas Monitoring System

Dr. A. Rajasekaran[1], T.V.K Chetan[2], T. Naveen[3], V. Bhargav Sai[4]

[1]Assistant Professor, Department of Electronics & Communication Engineering, SCSVMV, Kanchipuram, India
[2, 3,4]UG Scholar, Department of Electronics & Communication Engineering, SCSVMV, Kanchipuram, India

---

Abstract: *Gas is detecting innovation has among the topical research, ponder for rather now then . With the rationale for local death chamber cooking clothed to be simple and settling them is moreover abbreviated. Be that because it may, at that time are likewise sick impacts of utilizing these barrels. Spillage of residential gas is not just lethal to human and creature life, yet additionally aims colossal property misfortune. during this way, location and essential advances are to be considered to forestall unfortunate mishaps. Many accidents tendencies thanks to short circuits, gas leakages, Etc. won't permit a traditional person to enter the accident space, therefore on the size back any harm. Such accidents are a unit, increasing every day, owing to lack of awareness, precaution measures and content. Multiple sensors were used for detection method. This paper presents an intelligent security system helpful for several of the house and business application.*

Keywords: *IOT, Sensors, Android App.*

I. INTRODUCTION

Industries that look after pipeline networks (water, gas, oil, or the other fluid) spend large sums of cash. This early detection is typically derived from the massive cost that a severe break can generate as compared to the relatively inexpensive reparation of early-detected failures. Pipelines which are tools for transporting oils, gases, and other fluids, like chemicals, are employed as major utilities during a number of nations for long time [1]. Recently, many troubles have occurred in pipelines, and most of them are caused by aging, corrosion, cracks, and mechanical damages from third parties. albeit lasting activities for maintenance are strongly demanded, they have enormous budgets which will not be easily handled by related industries. Currently, the applications of robots for the upkeep of the pipeline utilities are considered together of the foremost attractive solutions available. In-pipe robots, which have an extended history of development in robotics, are often classified into several elementary forms consistent with movement patterns. it's been employed for the inspection of pipelines with large diameters. The wheel type is analogous to the plain mobile robot, and variety of commercialized robots are reported up to now. The robot with caterpillars rather than wheels. The wall press type, which features a number of benefits in climbing vertical pipelines, corresponds to the robot with a versatile mechanism for pressing the wall with whatever means they apply. The ADVANCES in wireless communication protocols and embedded design have led to the emergence of low-powered miniature-sized multifunctional sensor nodes for wireless sensor networks (WSNs) operating in fields starting from battlefield and environment monitoring to health and entertainment.

The sensor nodes are capable of detecting environment parameters within the sensing range and routing data over multi hops. to nodes within its communication range. Sensor nodes usually add collaboration to watch inaccessible areas. WSN coverage requirements may allow uniform node layout or necessitate denser deployment for higher surveillance. Mostly, the coverage requirement are often approximated with a finite set of points for normal structures. After deployment, the network reliability depends upon several parameters including connectivity, data routing delay, and sensor event detection accuracy.

LITERATURE SURVEY

SimpliMote includes support for variety of peripheral connections including pressure and temperature sensors. The sensed gas data and events like leakage and movement detection are sent using ZigBee interface. An LCD interface provides user interaction with SimpliMote. The device also includes an accelerometer. SimpliMote power source may be a rechargeable battery. The device is compatible with industrial temperature range (−40 to 85 °C) excluding the LCD display. In proposed system our main objective to monitoring gas, temperature, pressure reading These data's are transmitted using ZigBee through transmitter to receiver. At Receiver side another ZigBee is there to receive data And its values are displayed into LCD. We present a study on the event and testing of a wireless electronic nose network (WEN n) for monitoring real-time gas mixture, NH3 and H2S.The proposed WEN n **is predicated on an embedded PC, an electronic olfactory system and wireless sensor network (WSN) technology**. The WEN n utilized in this work takes advantage of recent advances in low power wireless communication platforms and uses micro-gas sensors with SnO2-CuO and SnO2-Pt sensing films for detecting the presence of target gases. **Each node within the network real-timely performs classification and concentration estimation of the binary gas mixtures using the fuzzy ART and ARTMAP neural networks. The computed results from the measured data set to a sink node via a ZigBee ready RF transceiver.**

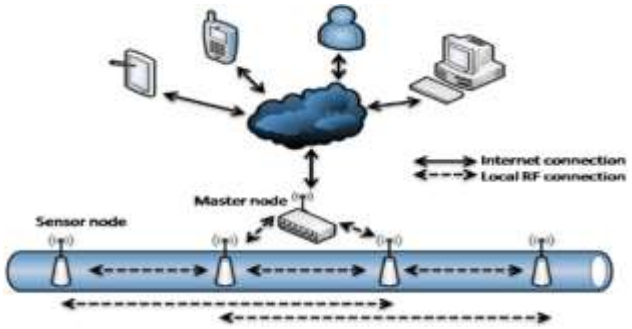

Fig 1 Conceptual System

III. INTERNET OF THINGS (IOT)

The ability of varied things to be connected to every other through the web or its 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.

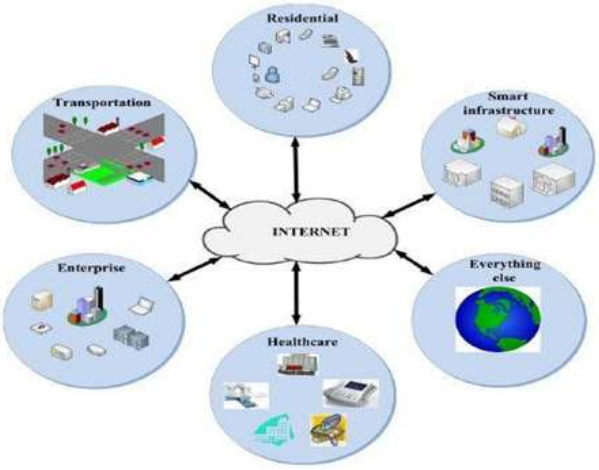

Fig 2 Basic IOT diagram

IV. BLOCK DIAGRAM

Transmitter

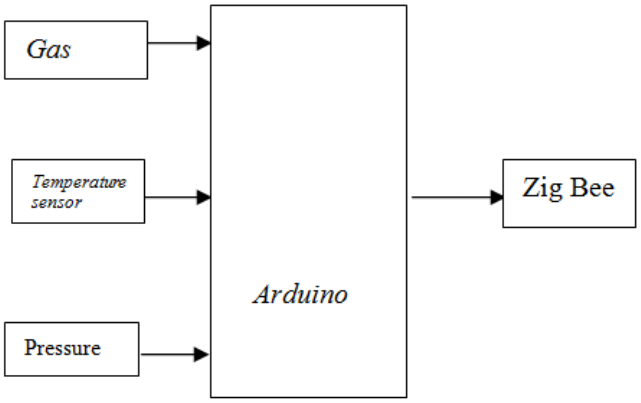

Fig 3.1 Block diagram of the system

Receiver

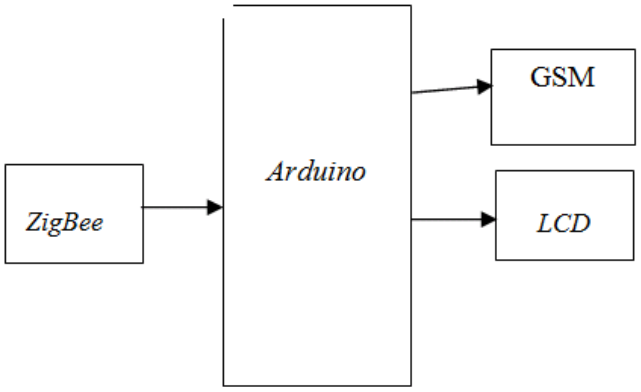

Fig 3.1 Block diagram of the system

V. METHODOLOGY

The proposed system contains pic microcontroller and it's interfaced to sensors like MQ2 sensor, LM35 sensor, pressure sensor. Which are the input of the system. Here the Wi-Fi-module is interfaced to those which give the power to speak with one another .The proposed method takes an automatic control action upon detection of gas. The regulator valve (motor) would be transitioned which completely stops the flow of gas leakage. Initially if there's a gas leakage then the electronic sensor i.e. the gas sensor that obeys the principle of LPG sensor senses any gas leakage from storage, if any leakage sensed then the output of this sensor goes high. This high signal is monitored by the microcontroller and it'll identify the gas leakage. If there's a leakage, the buyer is informed through internet in his device and a sign is shipped back to the microcontroller to turn off the valve. during this system, a sensor(load cell) is employed to monitor the weight of the gas cylinder ,if it goes below a critical value the sensor senses this condition and sends a notification

via internet to gas agency for booking a LPG. the thing detection sensor is employed to detect the presence of any vessel over the burner. If a vessel is not detected over a predetermined time, then an alarm goes off and the buyer is alerted.

VI. COMPONENTS DESCRIPTION

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.

Fig 4 MQ2 sensor

Arudino

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. The Arduino IDE supports the languages C and C++ using special rules to arrange code.

Pressure sensor

During the steam age, the demand for pressure measurement instruments increased. These were mechanical when pressure sensing devices ensure warning. They now use pressure transducers and pressure switches to live pressure electronically. were first developed and used Bourdon tube gages to push a needle and provides a visible pressure warning.

Fig 5 pressure sensor

LCD

LCD screen consists of two lines with 16 characters each. Each character consists of 5x7 matrix . It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. additionally , it's possible to display symbols that user makes abreast of its own.

TEMPERATURE SENSOR

The LM35 is one quite commonly used temperature sensor which will be wont to measure temperature with an electrical o/p comparative to the temperature (in ℃). **It can measure temperature more correctly compare with a thermistor.** This sensor generates a high output voltage than thermocouples and should not need that the output voltage is amplified. The LM35 has an output voltage that's proportional to the Celsius temperature. the size factor is .01V/℃.

Fig 7 Temperature sensor

GSM

GSM stands for Global System for Mobile Communication. It's a digital cellular technology used for transmitting mobile voice and data services. Gsm is 2g network it's used to send messages, calls etc...

Fig 7 GSM

ZIGBEE

ZigBee is low-cost and low-powered mesh network widely deployed for controlling and monitoring applications where it covers 10-100

meters within the range. This communication system is a smaller amount expensive and simpler than the opposite proprietary short-range wireless sensor networks as Bluetooth and Wi-Fi. **ZigBee supports different network configurations for master to master or master to slave communications.**

Fig 6 ZigBee

VII. ACKNOWLEDGEMENTS

To the grace and generous blessing of Godhead, I attribute the successful completion of my project. it's our duty to respectfully offer my sincere gratitude to all or any the people that have kindly offered their valuable support and guidance. We would wish to extend our heartiest because of the Management of my college, who provided me with the necessities for the completion of the project .We deeply and wholeheartedly thank Prof Dr G.SRIRAM Dean(E&T),SCSVMV. for his valuable advice and encouragement. We also wish to increase my sincere gratitude to our HOD V.SWAMINATHAN for his valuable advice. We also wish to increase my sincere gratitude to our guide Dr.A.RAJASEKARAN, Asst.Professor, Dept. of ECE, SCSVMV. Before I culminate, i might wish to extend my heartfelt gratitude to all or any the teachers and Staff of department of Electronics and Communication Engineering, SCSVMV for his or her cooperation and support. Last but not the smallest amount , I thank all others and particularly my relations and my Classmates who in how or other helped me in successful completion of this project.

VIII. CONCLUSION

Here during this paper a system is developed to detect the leakages in gas pipeline through wireless technology though there are several methods to detect an equivalent system but there are some limitations. So we tried to form the system cost effective, reliable, real time monitoring.

REFERENCES

- 1. L. Wang, S. C. Narasimman, S. Reddy Ravels and A. Ukil, "Water Ingress Detection in Low-Pressure Gas Pipelines Using Distributed Temperature Sensing System," in IEEE Sensors Journal, vol. 17, no. 10, pp. 3165-3173,may2015 doi: 10.1109/JSEN.2017.2686982
- 2. S. Ali et al. "SimpliMote: A Wireless Sensor Network Monitoring Platform for Oil and Gas Pipelines," in IEEE Systems Journal, vol. PP, no. 99, pp 1- 12 doi: 10.1109/JSYST.2016.2597171
- 3. L. Shu, M. Mukherjee, X. Xu, K. Wang and X. Wu, "A Survey on Gas Leakage Source Detection and Boundary Tracking with Wireless Sensor Networks," in IEEE Access, vol. 4, pp. 1700-1715, 2016. doi: 10.1109/ACCESS.2016.2550033
- B.V.Prasanth, "Cloud connected smart gas leakage detection and safety precaution system,"International Journal of MC Square Scientific Research, vol. 6, 2014.
- S. H. Kumar Keshamoni, "Smart gas level monitoring booking gas leakage detector over IOT,"International Journal of MC Square Scientific Research, Vol. 1, 2017.
- C. R. LIU Zhen-Ya, WANG Zhen-dong, "Intelligent residential security alarm and remote control system based on the single chip computer,"IEEE, Vol. 1, 2008.