Performance of Gas Line Leakage And Address Navigation to Cloud Over Internet Of Things


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ABSTRACT

The Internet of things (IOT) is the network of electronic devices, which are related with embedded systems and also other domains through internet. The infrastructure of the kit is like a moving robot with two motors and it consists of gas sensor to detect the gas leakages in pipe. Gas pipes play very important roles for cities, industries and thus in growing economies. So, gas leakages lead to losses as well as are a threat because they can also lead to fire accidents. Placing sensors at each section of pipe is very costly. So here we propose an innovative robot that clings on to the outer surface of the gas pipe and moves with the pipe to check for leakages. The kit consists of MQ2 gas sensor to detect the gas leakages. The robot will be moving continuously along the metal pipe, if there any presence of leakage the GPS sensor module will transmits the location to the cloud.

Keywords: Internet of things (IOT), WIFI Module, GSM Module

INTRODUCTION

The platform for this work is based on embedded system. An embedded system is a special-purpose system in which the computer is completely encapsulated by the device it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few pre-defined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, so the cost savings may be multiplied by millions of items[1-5]. The Internet of things to uniquely identified objects and their virtual representations in an internet-like structure. In this work the main aim is to detect gas line leakage in under pipeline through internet connectivity and monitoring it daily. An embedded system is a special-purpose computer system designed to perform a dedicated function. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few pre-defined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded system comprises of both hardware and software. Embedded system is fast growing technology in various fields like industrial automation, home appliances, automobiles, aeronautics etc. Embedded technology is implemented to perform a specified task and the programming is done using assembly language programming or embedded C. Ours being a
developing country the power consumption is increasing on large scale to meet the growing need of the people[6-10].

**PROPOSED SYSTEM**

In the proposed system, the robot keeps moving along the metal pipe it keeps monitoring for any gas leakage, on detection it uses an interface GPS sensor to transmit location of the leakage detected over to the IOT login system, here we use IOT gecko to receive and display the gas leakage alert and location over IOT. Thus we have a fully automated insect like robot that moves with the gas pipe and detects gas leakages instantly at a low budget. The latitude and longitude positions will be send through the internet using GPS sensor to the cloud storage. This very useful when compared to the existing system. There is a benefits in proposed system when compared to existing system.

**POWER SOURCE UNIT**

![Power Source Unit Diagram]

**RECEIVER UNIT**

![Receiver Unit Diagram]

Fig 1 Block diagram of Under Pipe Travelling Robot to Detect Gas Line Leakage and Address Navigation to Cloud over IOT

In power source unit from the power supply the AC main input 220v-240v supply is been taken. The Arduino board is capable of 5v supply only. So the step transformer is used to step down the
voltage level to 12v. Then the rectifier & filter is used to convert the A.C to Direct current (D.C). The direct current 12v is been regulated to 5v with the help of voltage regulator. Then the output voltage source is been delivered. In receiver unit the arduino board is the main part. From the output voltage source the supply is been given into the board to operate the different parts which has been connected. By using of motor the robot can able to be run towards the pipe. Motor driver is controller of motor to run. And wherever the gas leakage is been detected by using of gas sensor. That particular location is been shared to cloud storage through the internet. The pipe monitoring team will view the location of latitude and longitude positons of axis. Then they will go to the leakage part and clear the problem.

**Arduino:**

![Arduino board model](image)

Arduino is open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project is based on microcontroller board designs, manufactured by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can be interfaced to various expansion boards (“shields”) and other circuits. The boards feature serial communications interfaces, including USB on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on the Processing project, which includes support for the C and C++ programming languages.

**POWER SUPPLY:**

![Power Supply Diagram](image)
LPC2148 works on 3.3V Power Supply. So LM117 a 1A low dropout regulator designed to provide 3.3V from a 5V supply. It is ideally suited for systems which contain both 5V and 3.3V logic, with prime power provided from

**Transformer:**
A transformer can be defined as a static device which helps in the transformation of electric power in one circuit to electric power of the same frequency in another circuit. The voltage can be raised or lowered in a circuit, but with a proportional increase or decrease in the current ratings. In this system it is used to step down 230V AC to 9V AC supply and provides isolation between power grids and circuit.

**Rectifier:**
A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification.

**Filter:**
The output from the rectifier is pulsating D.C. These pulsations are due to the presence of A.C. component in the rectifier output. The filter circuit removes the A.C. component so that steady D.C. voltage is obtained across the load.

**Regulator:**
A regulated power supply consists of an ordinary power supply and voltage regulating device. The output of ordinary power supply is fed to the voltage regulator which produces the final output. The output voltage remains constant whether the load current changes or there are fluctuations in the input A.C. voltage.

**GAS SENSOR**

The MQ5 is used in gas leakage detecting equipment in consumer and industry applications. This sensor is suitable for detecting LPG, natural gas, coal gas. Avoid the noise of alcohol, cooking fumes and cigarette smoke. The sensitivity can be adjusted by the potentiometer.
GPS MODULE:

The SKG13BL is a complete GPS engine module that features super sensitivity, ultralow power and small form factor. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

It is based on the high performance features of the Media Tek MT3337 single-chip architecture, its –165dBm tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment where the GPS was not possible before. The small form factor and low power consumption make the module easy to integrate into portable device like PNDs, mobile phones, cameras and vehicle navigation systems.

Motor Drive:

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motors with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). The L293D can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info. You can Buy L293D IC in any electronic shop very easily and it costs around 70 Rupees (INR) or around 1 $ Dollar (approx Cost) or even lesser cost. You can find the necessary pin diagram, working, a circuit diagram, Logic description and Project as you read through.

DC MOTOR:
A DC motor is any motor within a class of electrical machines whereby direct current electrical power is converted into mechanical power. Most often, this type of motor relies on forces that magnetic fields produce. Regardless of the type, DC motors have some kind of internal mechanism, which is electronic or electromechanical. In both cases, the direction of current flow in part of the motor changed periodically. The speed of a DC motor is controlled using a variable supply voltage or by changing the strength of the current within its field wind rings. While smaller DC motors are commonly used in the making of appliances, tools, toys, and automobile mechanisms, such as electric car seats, larger DC motors are used in hoists, elevators, and electric vehicles.

Fig 5.13 12v DC motor

WIFI MODULE
The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espress if Systems[1].

Fig 5.14 ESP8266 WIFI module

GSM MODULE
GSM stands for Global System for Mobile Communications. It is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones.

Fig 5.17. GSM module
RESULTS & DISCUSSION

This method shows that the gas leakage of pipe is been sensed and transfers the location to cloud storage through the internet. So the axis positions, temperature values and moisture values is been noticed and viewed through the software. This process results in gas leakage is sensed and positions are been transmitted to pipe monitoring team. So it reduces the work of human process and easily monitored.

CONCLUSION

The IOT technology makes the robot to move continuously and keep monitoring the pipe. If there is any leakage the kit senses it and sends the location to the pipe monitoring team. Hence the monitoring team will receive the latitude and longitude positions of axis to the cloud storage through the internet. We can improve this kit by fixing a small sized camera which can be useful for viewing the location of gas leakage.

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