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Sensor Network Monitoring Platform for Gas Pipeline System

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Abstract: The sensor Network monitoring platform for Gas pipeline is the system installed in Industrial areas for distribution of natural Gas .The objective of this system sensor network are used which detect, localize the leaks in pipelines by using a robotic car, which move inside the pipeline. Wireless ZigBee control car movement inside the pipeline the leaks in pipeline at considerable distances This system being used to make every existing digital system more smart internet of things.it provides real time information of sensor .this auto detection and altering system offers quick response time and accurate detection so that it helps in faster recovery of system.

Keywords— Gas sensor, ZigBee, robot car, Real time.

I. INTRODUCTION

Industries that operate on pipeline networks (water, gas, oil, or any other fluid) spend large sums of money. This early detection is usually derived from the large 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, such as chemicals, have been employed as major utilities in a number of countries 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. Even though lasting activities for maintenance are strongly demanded, they need enormous budgets that may not be easily handled by related industries. Currently, the applications of robots for the maintenance of the pipeline utilities are considered as one of the most attractive solutions available. In-pipe robots, which have a long history of development in robotics, can be classified into several elementary forms according to movement patterns. It has been employed for the inspection of pipelines with large diameters. The wheel type is similar to the plain mobile robot, and a number of commercialized robots have been reported up to now.

The robot with caterpillars instead of wheels. The wall-press type, which has a number of advantages in climbing vertical pipelines, corresponds to the robot with a flexible mechanism for pressing the wall with whatever means they apply. In fact, the goals of the in-pipe robot have close relations with the task space of specific applications, because the principal requirement of the pipeline. The robot used in this project is to detect the crack and damage in the pipelines. To detect leakages, it is vital to understand the characteristics of substance the pipelines transport. To overcome these issue a sensor network technology application is developed in my project which will monitor continuously on real time based. This chapter describes about the overview, objective and implementation of the hardware.

II. PROPOSED SYSTEM OF GAS DETECTION

As smoke production increases, the output voltage gets increase. These output is given to the microcontroller which will be displayed on the Processing 3 screen so that from these we can get to know some problem has occurred in pipeline system. As here seen by figure gas leak detection is done in pipelines by using Gas sensor which alerts to controllers which are assisting it, in monitoring center. The data are send to the By this Model we can get the real time data more secure as well as with less cost as pipeline industries has to pay huge amount for solving this problem.

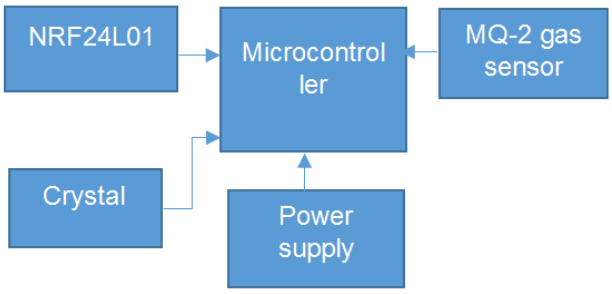

Figure: 1 Block diagram of transmitter section

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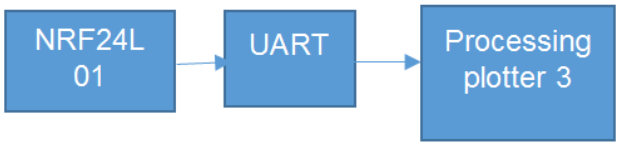

Figure: 2 Block diagram of receiver section

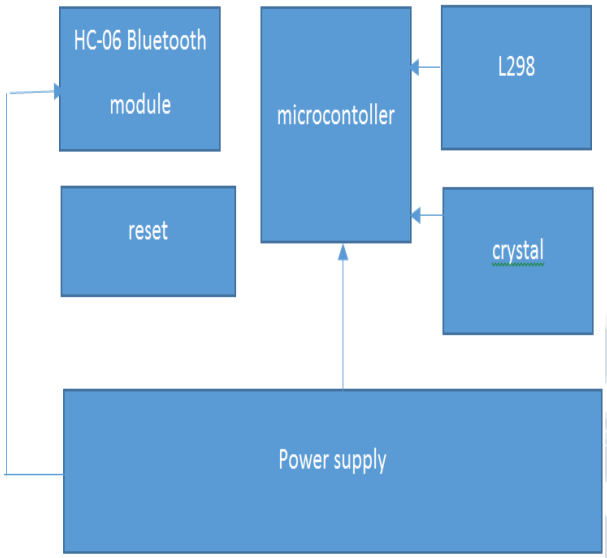

Figure:3 Block diagram of Robotic section

III. DESIGN METHODOLOGY

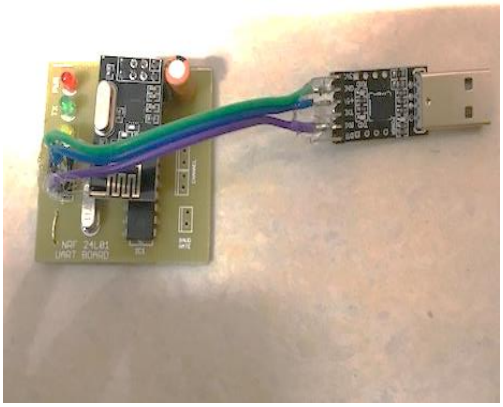

Figure: 4 Hardware Module

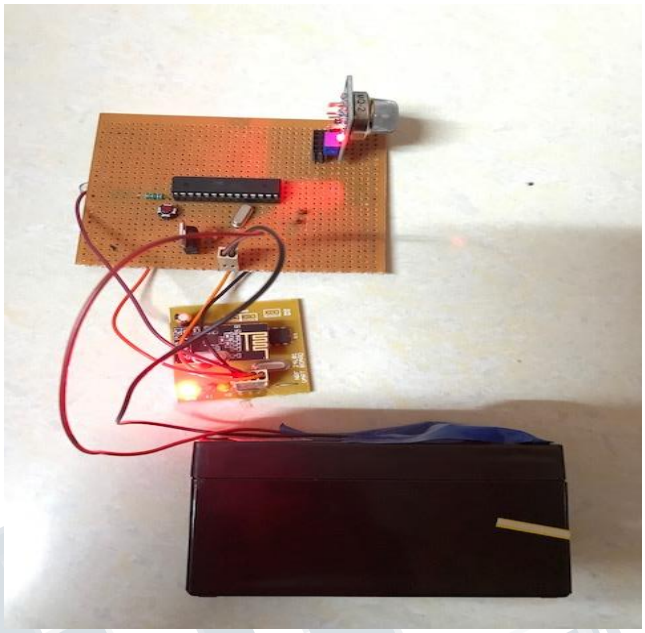

Figure: 5 Hardware Module

Figure: 6 Robotic detecting cracks

The system continuously monitor on real time based if any leakage occurs, an signal is shown to the controllers wirelessly, so that they can assist the problem as soon as possible. The transmitter section send the signal wirelessly and receiver section gets the signal as the gas concertation increases the output voltage comes out from gas sensor, as a result it shows in the form of waveform that gas leakage has been created. These signal continuously gives the signal serially. Here a Robot gas motor is been made which will be moving inside the pipeline continuously to assist the leakage problem.

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2.2 Gas Sensor

Sensitive material of MQ-2 gas sensor is SnO2, which with lowerConductivity in clean air. When the target flammable gas exist, the sensor's conductivity gets higher along with the gas Concentration rising.

Figure: 7 MQ-2 sensor

Flow Chart

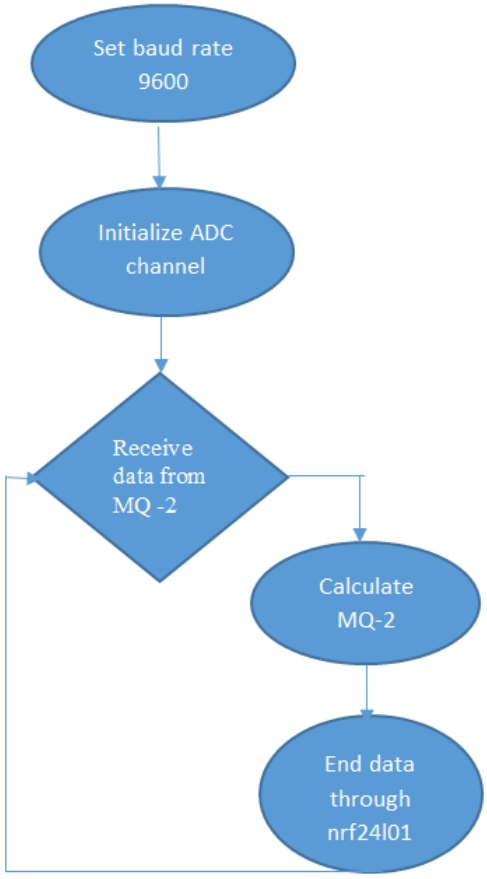

Figure: 7 flow chart of the system

ALGORITHM

Strep: 1 set the baud rate at 9600
Step: 2 initialise the ADC channel
Step: 3 receive the data from MO-2gas sensor.
Step: 4 calculate the MQ-2 Gas sensor.
Step: 5 End through NRF24L01 if it false stop the channel, if it is true it again goes to the loop and start beginning it works.

SOFTWARE

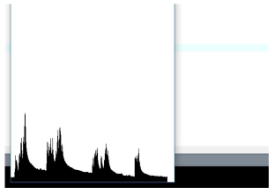

Figure: 8 Result of gas detection

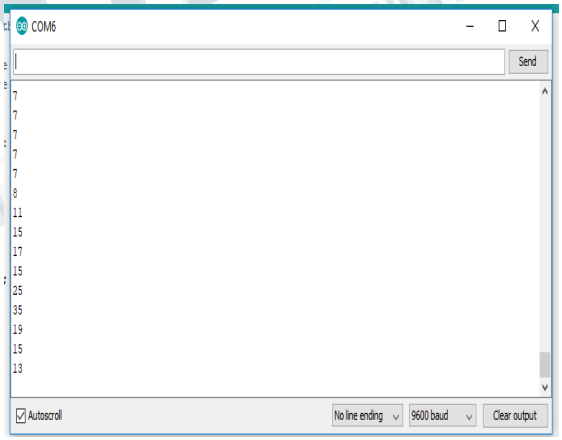

Figure: 9 serial data showing

This result displays that data shows in serial form but when the leakage is created in pipeline this serial data does not display.

CONCLUSION

Here in this paper a system is developed to detect the leakages in gas pipeline through wireless technology though there are several methods to detect the same system but there are some limitations. So we tried to

make the system cost effective, reliable, real time monitoring

FUTURE WORK

In this data is taken on real time based using ZigBee, Bluetooth module which wirelessly can control through distances to controllers. In future the prototype has the possibility to put cameras, motion sensors.

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