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INDUSTRIAL AIR POLLUTION MONITORING SYSTEM

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ABSTRACT

These days Air quality is affected by various industrial activities which change the composition of air particles and pollute the environment locally, regionally and globally. Both natural and anthropogenic activities introduce air pollutants which can be large solid, liquid or gas into the atmosphere that pose problem to human health. The main purpose of this paper is to characterize the gas exhaled from industries and for this we need to study the level of pollutants being discharged by these industries. The necessity of treatment of gas before its release from industries needs to be recognized. This is important part to reduce pollution particles, so we can restore natural productivity and to promote sustainable development of the surroundings as well as regulate the quality of the pollutants released into the environment.

KEYWORDS

Renesas Microcontroller, LCD display, GSM, CO Sensor, LM35 Sensor.

1. INTRODUCTION

The polluted gas generated from industrial processes need to be properly treated and disposed to avoid damage to environment particles like soil and ground water. Hence due to the hazardous wastes are required to be analyzed and characterized. Hence in this paper we have been proposed, how to analyze the exhaled gas from industries is done and uploading the measured values to the cloud. As we know Air pollution is a major urban environmental problem. Hence we need to do wide research to monitor the pollution level which will cause major impact on public health. World Health Organization has reported China is the highly polluted country in the world. Generally the causes of air pollution within a region are complex and depend on synoptic patterns and anthropogenic emission densities. And also meteorological factors such as relative humidity, pressure, wind, and temperature might contribute either directly or indirectly to the level of pollutants within a region. The purpose of this paper is to characterize the gas exhale from industries and volume of pollutants being discharged as

well as regulate the quality of the effluent released into the environments.

2. EXISTING SYSTEM

As we know that there is increase in industrialization massively in urban areas. Hence the air pollution monitoring is very challenging in smart cities. Therefore we need to do deployment of sensors is necessary to get good performances for ensuring a minimal financial cost. In this paper, they have considered citywide wireless sensor networks to tackle the minimum cost node issue for air pollution monitoring. This depends on spatial analysis of pollution data, which allow us to take into the account the nature of the pollution phenomenon.

3. PROPOSED SYSTEM

Here we are proposing how to use RENESAS MICROCONTROLLER for regulating Air pollution caused by industries. The main factor of Renesas Microcontroller is Uniqueness which is flexible and has new features of adapting more GPIO pins and cost

effective. The unique property of Renesas Microcontroller other than Arduino is more Hardware Oriented. In this Microcontroller we can store certain amount of data which are used in alerting user about Pollution caused by Industry. And using GPRS we will store data generated by sensors in the cloud. So in the proposed system we are monitoring Air Pollution in the Industry level.

The objectives of this proposed paper are:

- To study the level of Pollution caused by Industry.
- To minimize Air Pollution.
- The data collected by Sensors are sent to cloud using GPRS.

4. OVERVIEW

There are multiple Embedded Systems that have different designs according to their functions and uses. In this paper we have designed, structured using modular design concept and a system is mainly composed of a Renesas microcontroller, LCD, temperature sensor, Gas sensor, LDR sensor, solenoid, Relay and GPRS.

The microcontroller is located in the centre of the block diagram it forms the control unit of the entire unit. We will embed the program within the microcontroller that helps the microcontroller to take actions based on the threshold values which we have provided in the program by the output of the sensors.

Here we will analyze the gas by using sensors like carbon dioxide sensor, gas sensor, and temperature sensor. The measured sensor value is uploaded to cloud via GPRS. The analysis of gas is done by the threshold values. Based on the sensors value uploaded in the cloud the government takes required action against industries such has more charges, notice or license cancel.

5. BLOCK DIAGRAM

The air pollution is influenced by many factors such as pollutants, impurities, temperature, pressure of air, level of CO etc. Here we aim to reduce the pollution caused by each industry. For regulating air pollution

we are using different sensors to detect various parameters of the pollutant level of gas, CO, temperature, air clearance. When any of the above sensors output cross a threshold value fixed using program in Microcontroller, this will help to maintain and to reduce the pollution level caused by industries, the sensors sense the changes and the microcontroller takes the input data from the sensors. Then Microcontroller takes the required actions by using threshold values and employ relays until the data sent to the cloud using GPRS.

A node composed of:

- Co sensor
- Temperature sensor
- Gas sensor
- LDR sensor
- LCD

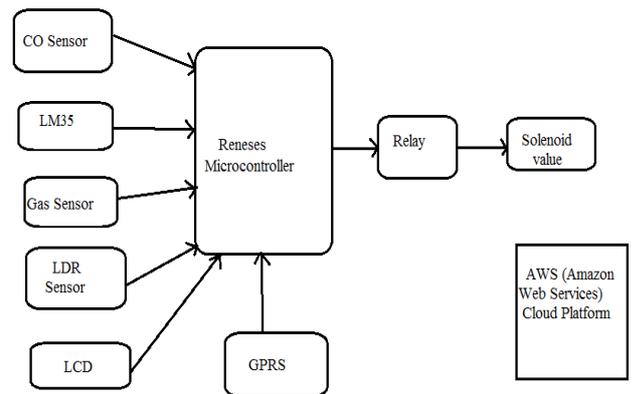


Fig 5.1 Block Diagram

6. HARDWARE DESCRIPTION

6.1 RENESAS MICROCONTROLLER

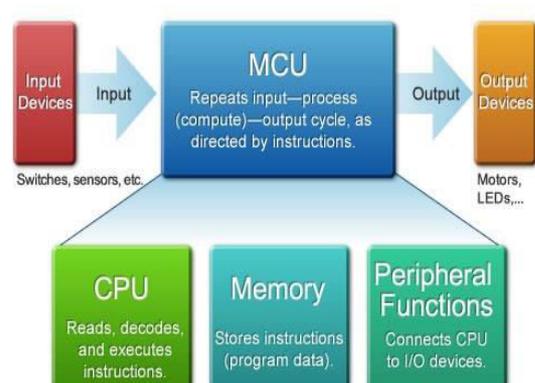


Fig 6.1 Renesas Microcontroller

The structure of typical MCU consists of

1. CPU
2. Memory
3. Some Circuitry

“In simple words we can say CPU does the Thinking, memory store relevant information, and Peripheral devices acts as nervous system”.

6.2 LCD



Fig 6.2 LCD

LCD is Liquid Crystal Display which is portable, reliable, lightweight, and cost effective than the LED. LCD screen is thin layer of liquid crystal, which exhibits crystalline properties. It is sandwiched between two electrical conducting plates. And it has transparent electrodes on top. The viewer can view the data on the screen. A data is viewed by passing light through selected segment of liquid crystal. LCD screen works on the principle of emitting light.

ADVANTAGES:

- LCD is cost effective.
- LCDs require less power supply.
- LCD's are light weight and small in size when compared to the LED.

DISADVANTAGES:

- Very sensitive in nature.
- Data capacity is less.
- Speed is very less.

6.3 GSM



Fig 6.3 GSM Modem

GSM is Global System for Mobile communications. It is used to transmit mobile data and voice services. This GSM modem be used, using any SIM card just like a mobile phone with its own unique phone number. These GSM modems offer services of mobile internet connectivity, and also allow sending and receiving data from two ends.

6.4 CO SENSOR



Fig 6.4 CO Sensor

- CO sensor is a Carbon monoxide sensor.
- It is in small size with long life.
- It will consume less power.
- It is cost effective.

6.5 LM35 SENSOR

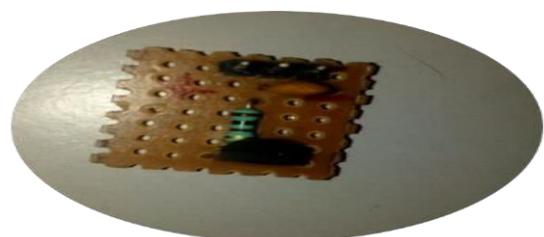


Fig 6.5 LM35 Sensor

LM35 sensor is a temperature sensor, used to sense the temperature of surrounding. This sensor operates in the range of -55°C to $+150^{\circ}\text{C}$. LM35 is an integrated circuit sensor. It does not require any external source and maintains accuracy.

7. FUTURE SCOPE

Here we have developed a prototype module. In future, we can implement this in each product level of industries. And to make it user friendly and durable, we need to make it cost effective and use rigid components so it does not collapse for external pressure. Going further, most of the units can be embedded along with the microcontroller on a single board this will reduce the size of the system.

8. CONCLUSION

In this paper, we build a prototype module. In future, we can apply it in production level also. To make this paper a user friendly, cost effective and durable, we need to make it compact. So we need to try to fix all components in single controller board unit with different technology, their by decrease the size of the system. Our paper help to analysis the gas exhaled from the industries is measured by sensors like carbon dioxide sensor, gas sensor, temperature sensor. The measured sensor values are uploaded to cloud via GPRS. The analysis of gas is done based on threshold value fixed by government sector to monitor air pollution caused by the industries. Based on the sensors measured value on the cloud the government will take the necessary action against the industries, actions are more charges, sending notice or cancelling the license.

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