IOT BASED AIR POLLUTION MONITORING SYSTEM USING RASPBERRY PI

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Abstract: This paper proposes an approach to build a cost effective standardized environmental monitoring device using the Raspberry-Pi (R-PI). The system was designed using Python programming language and can be controlled and accessed remotely through internet of things platform. It takes information about the surrounding environment through sensor and uploads, it directly upload to the internet, where it can be accessed any time and any where through internet. Experimental result demonstrated that the system is able to accurately measure, temperature, humidity, carbon monoxide, smoke, LPG, methane harmful air pollutant. This project based on Raspbian operating system.

Keywords- Sensor; Raspberry pi; ADC3008:GPIO; IOT; Python.

I. INTRODUCTION

In recent year many study showed that air pollution not only brings serious damage to human health but cause negative effect to nature environment so it has become more and more important to prevent air pollution in urban cities.

In this study we use the wireless sensor network (WSN) technology to set up an air quality monitoring system in Taipei city. This system is composed of numerous nodes and a gateway the node connect to four sensor, carbon monoxide(CO), methane, LPG, Smoke sensor which are use to evaluate air quality. It has many advantages when using IOT technology. For example sensor are generally in small size, easy to set up, less expensive with this advantages IOT suitable for that set up. we have used 5v supply to connect raspberry pi kit.

Tracking the environmental parameters, variation is essential in order to determine the quality of our environment. The collected data encompass important details for a variety of organization and agencies. With result of monitoring, government can make informed decision about how the environment how the society is affects the environment. Outside the government and other organization, the information is use by many people, because of the weather’s effect on a wide range of hen’s activities. Such as, agriculture, transportation and leisure time. The information can be used by municipal engineers to design flood control system to design effective policies.

Today internet is one of most important part in our daily life. It has changed how people live. Work play and learn. Internet serve for many purpose, educations, finance, Bussiness, Industrie, Entertainement, Social Networking, Shopping, E-Commerce etc. The next new mega trend of Internet is Internet 0f thing (IOT).
TRANSMITTER & RECEIVER SECTION:

1. TRANSMITTER

![Block diagram of air pollution in transmitter section.](image)

It include various types of blocks such as sensors i.e., CO, C02, LPG, Methane, Smoke etc. ADC 3008 IC, Raspberry pi, LCD display, Dongle etc.

1. CO Sensor

In CO sensors is a device that detects the presence of the carbon monoxide (CO) gas in order to prevent carbon monoxide poisoning. CO is a colorless tasteless and odorless compound produced by incomplete combustion of carbon-containing materials. It is often referred as a “silent killer” because it is virtually undetectable without using detection technology.

2. CO2 Sensor

A carbon dioxide sensor or CO2 sensor is an instrument for the measurement of carbon dioxide gas. The most common principles for CO2 sensors are infrared gas (NDIR) sensors and chemical gas sensors.

   NDIR sensors are spectroscopic sensors to detect CO2 in a gaseous environment by its characteristic absorption.

   Chemical CO2 gas sensor with sensitive layers based on polymer or heteropolysiloxane have the principal advantage of very low energy consumption, and can be reduced in size to fit into microelectronic based systems.

3. Humidity

Most of the currently available humidity sensor are constructed based on a porous sintered body structure ceramics and utilize the ionic type humidity sensing principle by water absorption on the ceramic surfaces, their electrical properties would change and this change in compasses the resistance, capacitance or electrolytic conduction depending upon this sensing type.

4. Smoke Sensor
The smoke sensor is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to fire alarm control panel as a part of fire alarm system, while household smoke detectors, also known as smoke alarms, generally issue a local audible or visual alarm from the detector itself.

5. Analog to Digital IC
The MCP3008 chip is an SPI based analogue to digital converter (ADC). It has 8 analog input channels that can be configured for single ended and different ADC conversions. The MCP3008 is a 10-bit ADC that can convert up to 200Kilo samples per second (200ksps)(@5V!!). The MCP3008 comes in 28 PDIP and SOIC package. A poi out is provided in Figure

6. Xively
(formerly known as cosm and pachube) offers an IOT platform as a service, business services, and partners that enable businesses to quickly connect products and operations to the Internet.

7. putty
Putty is a free and open-sources terminal emulator, serial console and network file transfer application. It surface several network protocol, including SCP, SSH, Telnet, Raspbian and raw socket connection.

RASPERRY PI

The raspberry pi is low cost. Credit card small size computer that plugs into a computer monitor or TV, and uses a standard keyboard and a mouse. It is a capable little device that enables people of all to explore computing, and learn to how to program in languages like scratch and python.

It’s capable of doing everything you’d expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

The raspberry pi has the ability to interact with the outside world, and has been used in a wide array of digital marker project, from music machines, and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry pi being used by kids all over the world to learn to program and understand computer work.

Fig:- Hardware of Raspberry Pi
Hardware is a physical device that can be touched or held, like a hard drive or a mobile phone. Software can be thought of as a program or a collection of a program that instruct a computer on what to do and how to do it. The operating system is the software that makes it work, like windows on a pc. The recommended operating system is called Raspbian.

2.RECEIVER:

![Fig: Block diagram Air pollution in Receiver section.](image)

At receiver section signal will be received by mobile, laptop via internet.

Result:-
This fig. shows that temperature, humidity, co and smoke level.

![Fig: Output of project](image)

The R-Pi’s special characteristics such as the digital-only input and power limitation narrowed the options of compactable components. The poly-fuses and the current draw in the RP-I limit the current to the 5V GPIO pin, which permit number of sensor that could be connected to that pin. Connecting too many
components to that pin can also result in permanent damage to the device. Running the R-Pi headless helped in reducing the current draw but it was still not enough. Difficulties in calibrating the carbon monoxide sensor due to the need of a controlled and contain chemical reaction that produces the gas.

CONCLUSION

The environmental monitoring system might offer server potential benefits; It provides monitoring services for remote areas and for ad hoc application that are normally not available from larger monitoring systems owned by government and big agencies. It can be used to predict the onset of bad weather using sign such as changing temperature and humidity raising the awareness of how society affected the region’s environmentally policies and have the knowledge basis to push for the change…

REFERENCES