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Remote Monitoring of Environmental Parameters Monitoring System with Internet of Things and Raspberry Pi

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Abstract: *In this paper presents the real-time monitoring of different environmental parameters using IoT at low cost. The project aims at building a system which can be used on universally at any scale to monitor the parameters in a given environment. For this purpose we have used ARM based Raspberry Pi board. Raspbian operating system is selected to use with Linux for Raspberry Pi. recent difficulties of checking and control of far off natural parameters precisely has developed as new field of research. The idea of Internet of Things (IOT) is additionally developing quickly where everything around us accompanies web availability for observing and control. Monitoring the environmental parameters and initiating a control action from internet is also part of this concept. In proposed work, design an environment monitoring system, capable of monitoring and control of environmental parameters like temperature, co2 and humidity. Also, focuses on design of a low cost system that is capable. Which is not just remotely observing the earth factors like temperature, Pressure and humidity additionally starts some control activity like exchanging devices ON/OFF from the gprs The Control node has been designed to initiate the control action? The Central Monitoring is based on ARM11 raspberry pi board. The concept of Internet of Things (IOT) is also emerging very fast where everything around us comes with an internet connectivity for monitoring and control. Monitoring the environmental parameters and initiating a control action from internet is also part of this concept.*

Keywords: environmental parameters, internet of things, raspberry pi

1.1 INTRODUCTION

Study of different environmental parameters using some instruments and equipment's has been done. So to meet the goal of weather monitoring we have designed IoT based real-time, low-cost, portable and high speed weather station using Raspberry Pi. At our weather station we are measuring some environmental parameters like temperature, humidity, temperature, co2. ARM based Raspberry Pi board can handle many operations and same one is used in this system. Output data can be seen on thingspeak.com using HTTP protocol. IoT means Internet of Things. It provides inter-networking of physical devices, buildings, vehicles and other components like sensors and actuators. By giving network connectivity to systems embedded with electronics, software, sensors and actuators; these objects are able to collect and exchange data. By using IoT objects to be sensed or controlled remotely through existing network. It gives opportunity to connect physical world with computer-based systems. IoT improves efficiency, accuracy, economic benefits along with reduced manpower. IoT frameworks help for the interaction between "things". Also supports for more complex structures like distributed computing and development of distributed applications. Now a days most of IoT frameworks seem to focus on real-time data logging solutions.. These parameters are imperative in numerous applications like in industry, brilliant homes Greenhouse and climate determining. Advanced Environment monitoring systems offer many features like remote access to the measurement data and furthermore can start some control activity from inaccessible area.

1.2 MOTIVATION

The Motivation of Project is in recent developments in wireless and micro sensor technologies have provided foundation

platforms for considering the development of effective modular systems. They offer the prospect of flexibility in use, and network scalability. The Raspberry Pi has proved to be ideal as the core of such a system. There are many other practical uses for the environment monitor including monitoring of temperature and humidity in a home, outbuilding, greenhouse, or even a museum Although this has been designed for passive monitoring it would be possible to have this used for actively notifying someone of a temperature change, turning on heating.

1.3 OBJECTIVE

Internet of Things (IoTs): The Internet of Things (IoTs) can be described as connecting everyday objects like smartphones, Internet TVs, sensors and actuators to the Internet where the devices are intelligently linked together enabling new forms of communication between things and people, and between things themselves. Building IoTs has advanced significantly in the last couple of years since it has added a new dimension to the world of information and communication technologies. This IoT based weather monitoring system is developed using powerful development platform Raspberry Pi board. Raspberry Pi board is helpful to minimize the system hardware. So here in this project use of any external microcontroller, ADC and communication module is avoided. This system uses Temperature ,Humidity Sensor,co2 sensors. All these sensors are interfaced with GPIO header of Raspberry Pi board. To get real time monitoring of data from sensors Ethernet network is used.

2. LITERATURE SURVEY

Ruchi Mittal and Bhatia propose a system in which they detect irregular patterns of sensory data with respect to time and space. They design a system which continuously queries and monitors sensor data to detect any deviations from the norm. This is essential in detecting a faulty sensor node and ensuring it can be quickly replaced. This system is especially helpful when detecting environmental activity like forest re. In or- der to achieve desired results, Data preprocessing and sensor data clustering is used. In data preprocessing, the sensor data is cleaned by putting in missing values and removing any unwanted data. Mittal and Bhatia analyzed this data cluster by plotting data, comparing them against expected/predicted patterns and detect anomalies.

1. GeorgeMois, TeodoraSanislav, andSilviu C. Folea, Member of IEEE Presented A Cyber-Physical System for Environmental Monitoring in 2016. This paper presents the development of a cyber physical system that monitors the environmental conditions or the ambient conditions in indoor spaces at remote locations. The resulted solution provides the possibility of logging measurements from locations all over the world and of visualizing and analyzing the gathered data from any device connected to the Internet. This work encompasses the complete solution, a cyber-physical system, starting from the physical level, consisting of sensors and the communication protocol, and reaching data management and storage at the cyber level. The experimental results show that the proposed system represents a viable and straightforward solution for environmental and ambient monitoring applications. 2. Kadri et al. [8] in 2013 presented real time air pollution monitoring based on Machine to machine communication. The system was implemented with various monitoring station which consist of different gaseous and meteorological sensors. Each monitoring station communicates with the backend server through M2M communication which uses GPRS network. 3. Anuj Kumar et 2013 conducted a review on environmental monitoring system. review discussed different techniques and various hardware used in the environment monitoring systems. It also considered the parameters like low cost, low power consumption, reliability, and signal to noise ratio.

3. RELATED WORK

Existing systems:

In existing system community-led air quality sensing network that allows anyone to collect

very high resolution readings of NO2 and CO concentrations outside of their home.Sensor networks are also being deployed in tunnels to monitor air flow, visibility, and a range of gases (CO, CO2, NO2, O2, SH2 and PM-10).1T 1TOther sensor networks measure temperature, humidity and similar parameters on highways to qualify them as 'smart roads'. Due to the vast technological developments in the field of wireless communication technology it has led to the emergence of many Pollution monitoring sensors and wireless networks for monitoring and reporting pollution. Some of the pollution monitoring sensors is given as follows.

Disadvantages of Existing System

- Low powered microcontroller which perform single task
- Less reliable hardware system
- High power consumption
- Poor accuracy

Proposed system

In the proposed system have to build a smart city is to improve quality of life by using technology to improve the efficiency of services and meet residents' needs. Information and Communication Technology allows city officials to interact directly with the public to tell what is happening in the city, how the city is evolving, and how to enable a better quality of life. A Smart City is one with at least one initiative addressing one or more of the following six characteristics: Smart Governance, Smart People, Smart Living, Smart Mobility, Smart Economy and Smart Environment. We are going to develop an app that is going to bear a hand in this campaign. Consider an area that is being surveyed for estimating how much the area is affected by pollution. The constituents of air along with its proportion are calculated and if it is higher than normal then the officials are intimated about it. Then the people are evacuated to a safe place.

4. IMPLEMENTATION

4.1 Block Diagram:

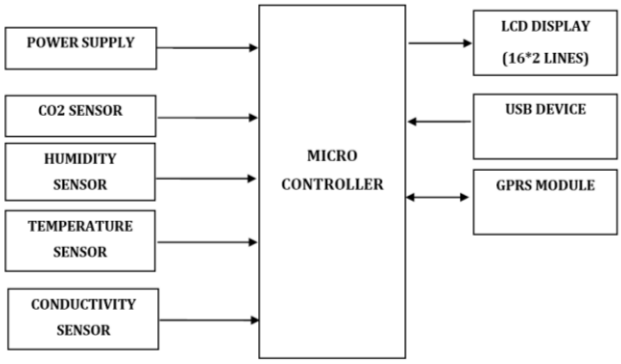

Figure-1: Block diagram

4.2 BLOCK DIAGRAM DESCRIPTION:

The block diagram of the project consists of the following.

RaspberryPi3:

Whilst maintaining the favored board format the Raspberry Pi Three Model B brings a high powerful processer, 10x quicker than the first generation Raspberry Pi. Additionally, it has high connectivity modules by including wireless LAN & Bluetooth connectivity modules making it the ideal solution for powerful connected designs.

Micro controller:

This is the essential core unit of the control of the proposed solution.

Liquid-crystal display (LCD):

There are many variants of use cases using LCD displays in embedded systems, In the current project LCD panels are being used to display the ongoing activities or events.

Co2 Sensor:

It is utilized as a part of gas spillage recognizing hardware's in family and industry, are reasonable for identifying of LPG, i-butane, propane, methane, liquor, Hydrogen, smoke. Affected voltage flag yield of the heap resistance RL which arrangement wound is significantly used to acquire the surface resistance of the sensor.

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Temperature sensor:

Thermistors area unit usually utilized as inpouring current circuit, temperature sensors, self-resetting overcurrent defenders, and automatic warming parts. Right now TMP103 is being utilized as a piece of the present proposition, which is an advanced yield temperature sensor in a four-ball wafer chip-scale bundle. The TMP103 is suitable perusal temperatures to a determination of 1°C.

Humidity Sensor:

Mugginess sensor is a gadget that measures the relative moistness of in a given zone. A stickiness sensor can be utilized as a part of both inside and outside. Moistness sensors are accessible in both simple and computerized shapes. A simple mugginess sensor which catches the stickiness of the air by utilizing a capacitor-based framework. The sensor is made out of a film generally made of either glass or pottery. The cover material which is planned to ingest the water is made out of a polymer material which takes in and discharges water in light of the relative stickiness of the given territory.

4.3 SCHEMATIC DIAGRAM

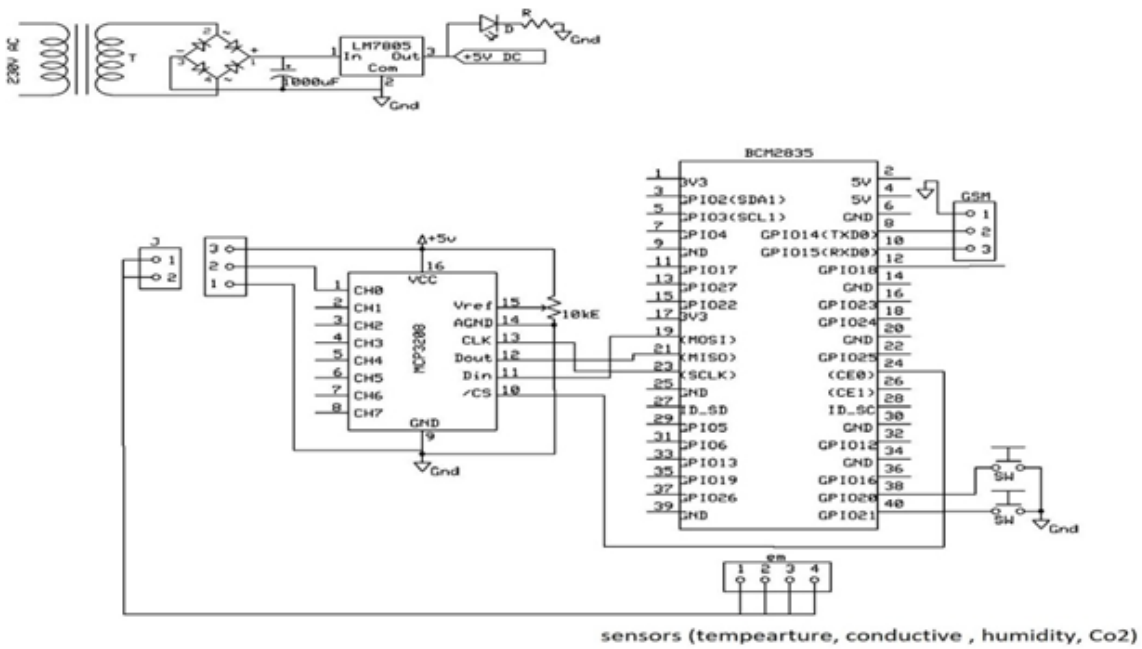

Figure-2: Schematic diagram

5. RESULTS

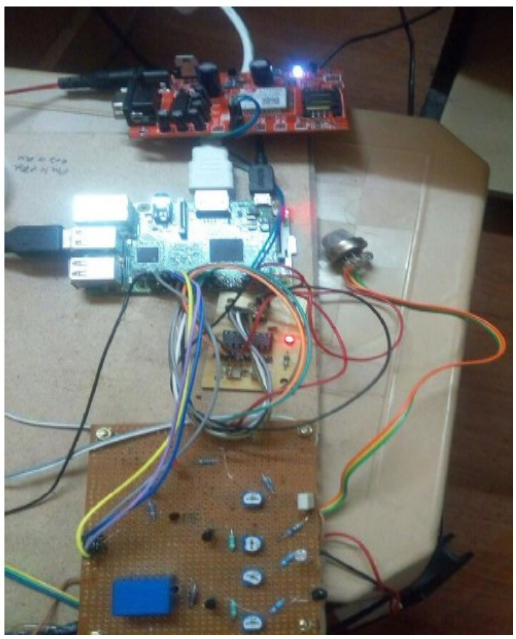

Fig.-3 Hardware KIT

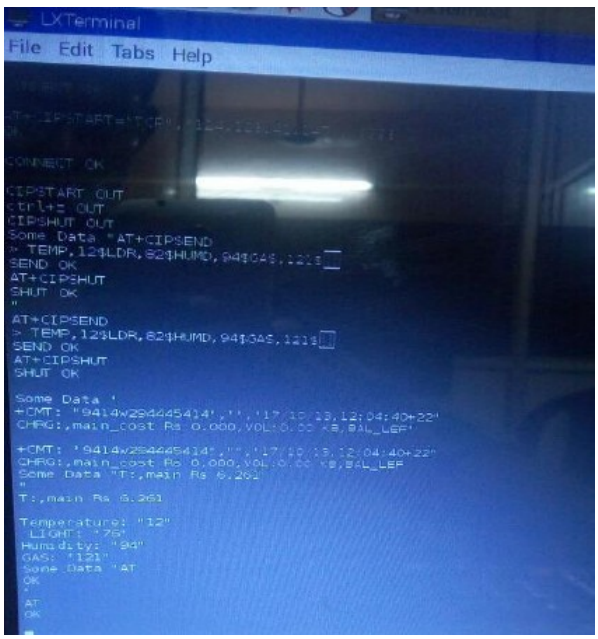

Fig.-4 Values on display

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Fig.-5 Gprs values when low

Fig.-5 Gprs values when high

6. CONCLUSION

This IoT based system gives real-time monitoring of environmental parameters. This system monitors humidity , temperature and co2. Data can be seen from anywhere in the world. By using this system the client can continuously monitor different environmental parameters without any interaction with additional server. Raspberry Pi itself acts as a server. This is efficiently carried out by Raspbian operating system. This weather monitoring system is designed using Raspberry pi is having low cost, small size, low power consumption, fast data transfer, good performance and remote monitoring.

7. FUTURE SCOPE

The system can be deployed at any small scale industry which cannot bear the cost of such kind of systems available in market. There can be

further advancements made in this system by attaching more senor nodes or by providing alternate mode of internet connection to the central monitoring unit like GSM interface. The designed system have scope in field of industrial automation, Green house Monitoring, Smart Home systems, Dairy Farms and Automated Agriculture Farms. Remote Monitoring of Environmental Parameters Monitoring System With Internet of Things and Raspberry Pi

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