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IOT BASED NOISE AND AIR POLLUTION MONITORING SYSTEM USING RASPBERRY PI

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ABSTRACT

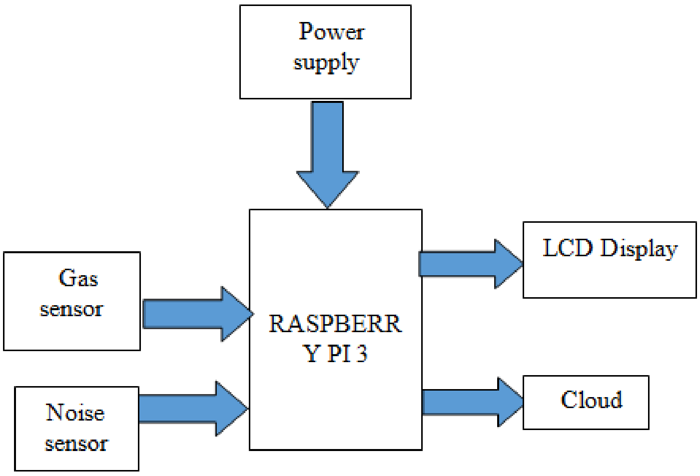
The rapid growth in infrastructure and industrial plants creating environmental issues like climate change, malfunctioning and pollution has greatly influenced for the need of an efficient, cheap, operationally adaptable and smart monitoring systems. In this context smart sensor networks are an emerging field of research which combines many challenges of computer science, wireless communication and electronics. In this paper a solution for monitoring the noise and air pollution levels in industrial environment or particular area of interest using wireless embedded computing system is proposed. The solution includes the technology Internet of Things (IoT) which is outcome of merged field of computer science and electronics. Here the sensing devices are connected to the embedded computing system to monitor the fluctuation of parameters like noise and air pollution levels from their normal levels. This model is adaptable and distributive for any infrastructural environment that needs continuous monitoring, controlling and behavior analysis. The working performance of the proposed model is evaluated using prototype implementation, consisting of raspberry pi, sensor devices and python software support package. The implementation is tested for two or three parameters like noise, CO and radiation levels with respect to the normal behavior levels or given specifications which provide a control over the pollution monitoring to make the environment smart.

***Keywords*: Raspberry PI 3, MQ135 Gas Sensor, lm393 Noise Sensor**

I. INTRODUCTION

An efficient environmental monitoring system is required to monitor and assess the conditions in case of exceeding the prescribed level of parameters (e.g., noise, CO and radiation levels). When the objects like environment equipped with sensor devices, microcontroller and various software applications becomes a self-protecting and self-monitoring environment.Human needs demands different types of monitoring systems these are depends on the type of data gathered by the sensor devices. Event Detection based and Spatial Process Estimation are the two categories to which applications are classified. Initially the sensor devices are deployed in environment to detect the parameters (e.g., noise, CO and radiation levels etc.) while the data acquisition, computation and controlling action (e.g., the variations in the noise and CO levels with respect to the specified levels). Sensor devices are placed at different locations to collect the data to predict the behavior of a particular area of interest. The main aim of the this paper is to design and implement an efficient monitoring system through which the required parameters are monitored remotely using internet and the data gathered from the sensors are stored in the cloud and to project the estimated trend on the web browser.

II.SYSTEM REQUIREMENTS



2.1 Raspberry PI3

The Raspberry Pi 3 is the third generation Raspberry Pi. It replaced the Raspberry Pi 2 Model B in February 2016.It has 1.2GHz 64-bit quad-core ARMv8 CPU, 802.11n Wireless LAN, Bluetooth 4.1.As pi 2 raspberry pi3 also has some similar features like 1GB RAM, 4 USB ports, 40 GPIO pins, Full HDMI port, Ethernet port, Combined 3.5mm audio jack and composite video, Camera interface, Display interface Micro SD card slot, Video Core IV 3D graphics core.

The Broadcom BCM2835 SoC used in the first generation Raspberry Pi is somewhat equivalent to the chip used in first generation smartphones (its CPU is an older ARMv6 architecture),[14] which includes a 700 MHz ARM1176JZF-S processor, VideoCore IV graphics processing unit (GPU),[15] and RAM. It has a level 1 (L1) cache of 16 KB and a level 2 (L2) cache of 128 KB. The level 2 cache is used primarily by the GPU. The SoC is stacked underneath the RAM chip, so only its edge is visible. The Raspberry Pi 2 uses a Broadcom BCM2836 SoC with a 900 MHz 32-bit quad-core ARM Cortex-A7 processor (as do many current smartphones), with 256 KB shared L2 cache. The Raspberry Pi 3 uses a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache

2 .2 MQ 135 Gas Sensor:

The MQ series of gas sensors utilizes a small heater inside with an electro chemical sensor these sensors are sensitive to a range of gasses are used at room temperature. MQ135 alcohol sensor is a Sno2 with a lower conductivity of clean air. When the target explosive gas exists, then the sensor's conductivity increases more increasing more along with the gas concentration rising levels. By using simple electronic circuits, it convert the charge of conductivity to correspond output signal of gas concentration.

2.3 LM 393 sound detection sensor:

The sound sensor module provides an easy way to detect sound and is generally used for detecting sound intensity. This module can be used for security, switch, and monitoring applications. Its accuracy can be easily adjusted for the convenience of usage. When the sensor detects a sound, it processes an output signal voltage which is sent to a raspberry pi then performs necessary processing.

III. METHODOLOGY

In this implementation model we used raspberry pi 3 as embedded device for sensing and storing the data in cloud. Raspberry pi connects the embedded device to internet and sensors are connected. The corresponding sensors read to its digital value and from digital value the corresponding environmental parameters will be evaluated. The raspberry pi 3 has inbuilt wifi module is to be established to transfer sensor data to the end user.

IV RESULTS

This results in fig gives the information of gas level in the day time and at night time and 5b gives the information sound levels

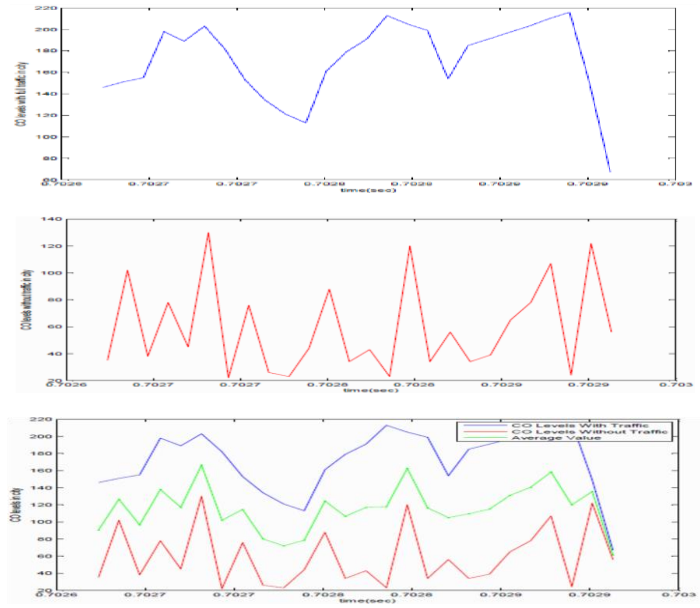


Fig: cloud storage data results of gas sensor

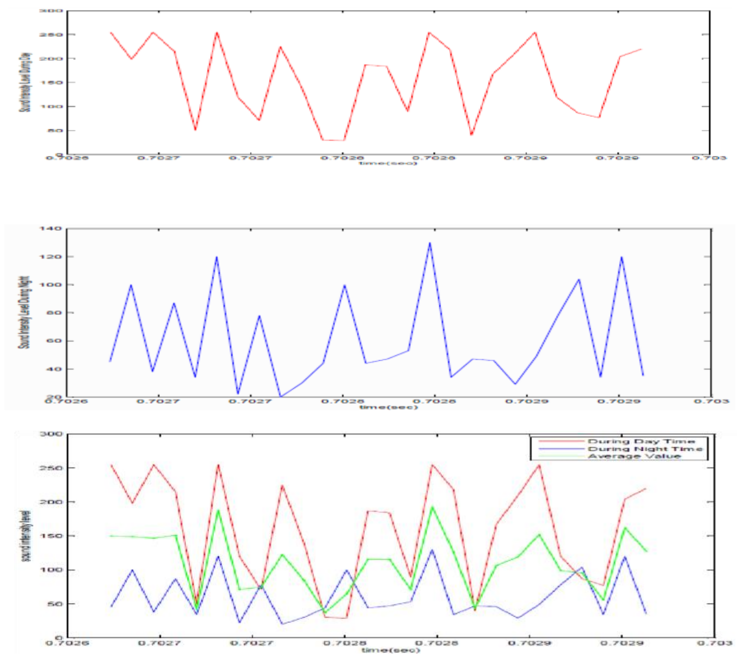


Fig: cloud storage data results of sound sensor

V. CONCLUSION

By keeping the embedded devices in the environment for monitoring enables self protection to the environment. To implement this need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, we can bring the environment into real life. Then the collected data and analysis results will be available to the end user.

The noise and air pollution monitoring system with Internet of Things (IoT) concept experimentally tested for monitoring two parameters. It also sent the sensor parameters to the cloud. This model can be further expanded to monitor the developing cities and industrial zones for pollution monitoring. To protect the public health from pollution, this model provides an efficient and low cost solution for continuous monitoring of environment

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