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# Design and Implementation of IoT Enabled Wireless Sensor Network Applications

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***Abstract:*** **- This paper is an advanced solution for monitoring various climatic parameters at a particular place and makes the information visible anywhere in the world. The technology behind this is Internet of Things. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in accuracy, economic benefit and improved efficiency in addition to reduced human intervention. The main goal is to monitor and report the temperature, humidity, light intensity and moisture content in any location i.e. agricultural fields, high temperature zones in industries, cold storages and other locations.**

***Keywords*** **:- IoT, network, NodeMCU 8266, Amazon Web Services.**

## I. INTRODUCTION

Monitoring system has been used in various applications including flow rate, temperature, pressure, humidity, capacity, acceleration and so on. This monitoring is commonly use in all area of the world and traditional method of farming, human labours were required to visit the greenhouse at specific time and need to check the temperature level manually. This conventional method is considered time consuming and needs a lot of work and effort. Therefore this paper focuses on developing a system that can remotely monitor and predict changes of temperature level in agricultural greenhouse. The objective of the paper is to develop the remote real time temperature monitoring system by using sensor network. The proposed system has measurement which capable of detecting the level of temperature, humidity, light intensity and moisture content. This system has a mechanism to alert farmers regarding the temperature, humidity and moisture content changes in the field and greenhouse so that early precaution steps can be taken. It also has a mechanism to alert and auto turn-off compressors at cold storages in case of fire emergencies. It can also detect high temperatures beyond the threshold values at factories with high temperature zones. In this work, several tests had been conducted in order to prove the viability of the system. Test results indicated that the reliability of the system in propagating information directly to the farmers, owners of factories, cold storages, etc. could be gained excellently in various conditions. It has a wide range of scalability and can easily be moved from one location to another as it is a handheld device.

## II. EXISTING SYSTEM

In today's world many pollution monitoring systems are designed by considering different environmental parameters. Existing system model is presented uses Zigbee based wireless sensor networks to monitor physical and environmental conditions with thousands of application in different fields.

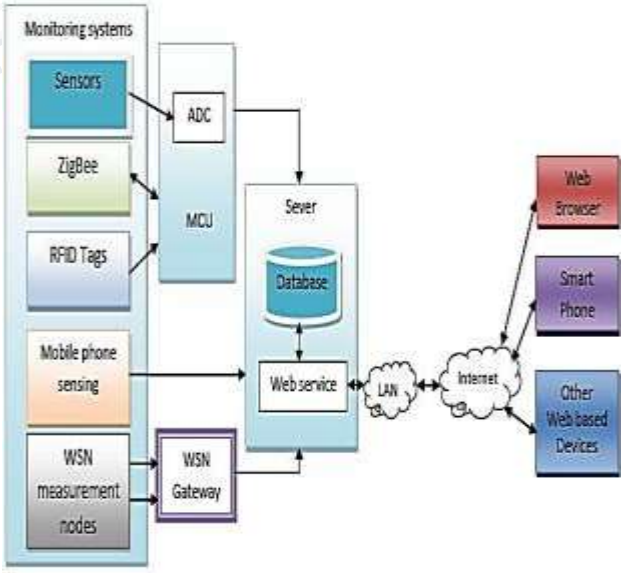


***Figure 1: Existing system***

The sensor nodes communicate with the moving nodes present on the object of interest which avoid the use of complex routing algorithm but local computations are

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very minimal. RFID is a means of storing and retrieving data through electromagnetic transmission to an RF compatible integrated circuit. It is usually used to track items in factories and supermarkets. RFID system consist of two main components: readers and tags.

Mobile phones or smart phones that are enabled with sensors are used for impact on social including how mobile technology has to be used for environmental protecting, sensing and to influence just-in-time information to make movements and actions environmental friendly.
The gateway acts as the network coordinator in charge of node authentication, message buffering where you can collect, process, analyze, and present your measurement data. Wireless sensor network management model consists of end device, router, gateway node and management monitoring centre. End device is responsible for collecting wireless sensor network data, and sending them to parent node, then data are sent to gateway node from parent node directly or by router. After receiving data from WSN, the gateway node will extract the data after analysing and packaging them into Ethernet format data and then sends them to the server. A server is an instance of a computer program that accepts and responds to requests made by another program known as a client. Casually, a device that runs server software could be considered a server. Servers are used to manage network resources.

## III. PROPOSED WORK

The proposed embedded device is for monitoring Temperature, Humidity, Light Intensity and, Moisture content in the atmosphere to make the environment intelligent or interactive with the objects through wireless communication. The proposed model is more adaptable and distributive in nature to monitor the environmental parameters. This proposed architecture is classified into a 4-tier model with the functions of each individual modules developed for noise and air pollution monitoring. The proposed model consists of 4-Tiers. They are as follows:
Tier-1 is the environment.
Tier-2 has sensor devices
Tier-3 has sensor data acquisition and decision making
Tier-4 has intelligent environment.

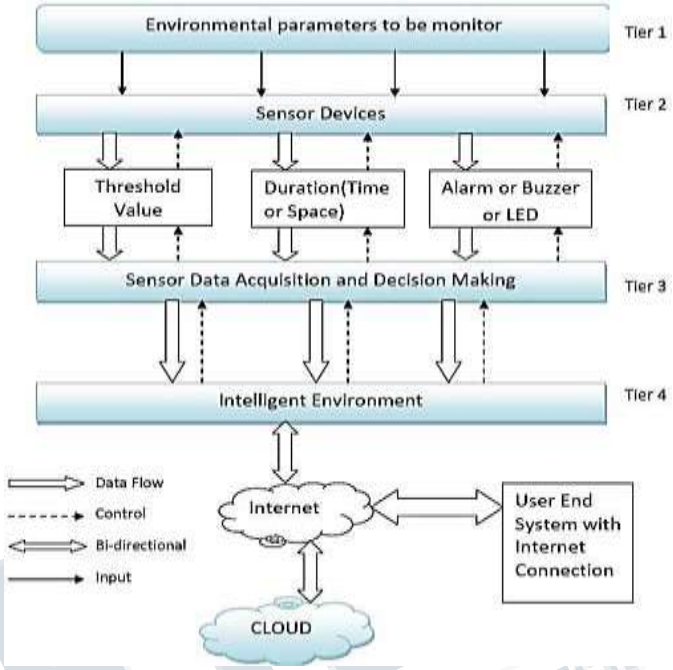


***Figure 2: Proposed System***

Tier-1 provides information about the parameters in the region which is monitored for temperature, humidity, light intensity, moisture, etc.
Tier-2 deals with the sensor devices with suitable characteristics, features and each of these sensor devices are operated and controlled based on their sensitivity as well as the range of sensing. In between Tier-2 and Tier-3 necessary sensing and controlling actions will be taken depending upon the conditions, like fixing the threshold value, periodicity of sensing, messages etc. Based on the data analysis performed in between Tier-2 and Tier-3 and also from previous experiences the parameter threshold values during critical situations or normal working conditions are determined.
Tier-3 describes about the data acquisition from sensor devices and also includes the decision making. Which specify the condition the data is representing which parameter.
In the proposed model Tier-4 deals with the intelligent environment. Which means it will identify the variations in the sensor data and fix the threshold value depending on the identified level of CO or noise levels. In this tier sensed data will be processed, stored in the cloud i.e.in to the Google spread sheets and also it will show a trend of the sensed parameters with respect to the specified values. The end users can browse the data using mobile phones, PCs etc.

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## IV. RESULT

This way, we have implemented the IoT enabled Wireless Sensor Networks based efficient notification system, where we provide the automation and manual control to the user via SMS services. User can monitor the remote location via this SMS system. If anything is found abnormal, then notification is sent immediately to the user and necessary actions are taken immediately.

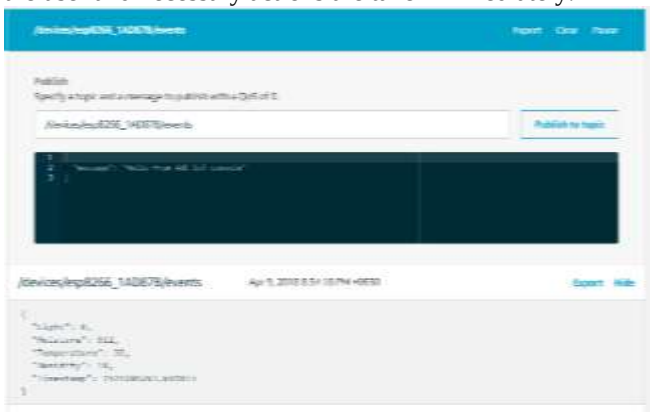

*Figure 3: AWS Buffer Storage*


*Figure 4: SMS Notifications*

## V. CONCLUSION AND FUTURE WORK

IoT is growing rapidly almost all the domains are impacting by Internet of Things. Every-things are changing from manual to automate. In this work, we have shown a design of a new body temperature, humidity, light intensity and soil moisture monitoring system. The final result of our approach is a remote measurement system with a flexible architecture that can be adopted in several different application fields. Remote wireless monitoring of these parameters is done with very minimal cost. This device also has a wide range of scalability and can be integrated into any bigger machines for automation process.

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