IOT BASED ENVIRONMENT MONITORING SYSTEM

Engineering

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ABSTRACT

This paper represents the environmental and ambient parameter monitoring using low-power wireless sensors connected to the Internet, which send their measurements to a central server. The data from all over the world, stored on the base station, can be remotely visualized from every device connected to the Internet. IoT enables to be connected to virtually unlimited devices over the internet. It thus has a great potential of communicating and interacting with them.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. It overcomes the problem of system integration and interoperability, providing a well-defined architecture that simplifies the transmission of data from sensors with different measurement capabilities and increases supervisory efficiency. The main objective of this system is to provide environmental parameters at remote location using internet.

KEYWORDS

IoT, remote location, sensors, visualizing.

INTRODUCTION

This paper focuses on environmental monitoring system using IOT. Environmental monitoring system provides a moderate and less expensive way of sensing and monitoring system in the field of domestic and as well industrial standards to implement the IOT. This system is designed to provide environmental parameters at remote location using internet. Environment monitoring is one of the major application of wireless sensor network. The importance of weather monitoring is existed in many aspects. The weather conditions are required to be monitored to maintain the healthy growth in crops and to ensure the safe working environment in industries, etc. Due to technological growth, the process of reading the environmental parameters became easier compared to the past days. The sensors are the miniaturized electronic devices used to measure the physical and environmental parameters. By using the sensors for monitoring the weather conditions, the results will be accurate and the entire system will be faster and less power consuming. The importance of environmental monitoring is undoubted in our age. This is the field where wireless sensor networks (WSNs) have been first used, their primary purpose consisting in the observation of the physical world and the recording of physical quantities characterizing it.

PROPOSED IOT SYSTEM

The system consists of a microcontroller (LPC1768) as a main processing unit forthe entire system and all the sensor and devices areconnected with themicrocontroller. The sensors can be operated by the microcontroller to retrieve the datafrom them and it processes the analysis with the sensor data and updates it to the internetthrough Wi-Fi module connected to it. The microcontroller LPC1768 is an effectivechoice for the system. As the proposed system is a low power consumable solution, themicrocontroller should be also low power consuming. LPC1768 is having 8 channelsAnalog to Digital converter which will be a major advantage with this microcontroller toget the data from the analog sensors connected to it. It is having so many features onchip. For the conversion of logic levels I2C module is used. Wi-Fi ESP8266 module has TCP/IP protocol stack integrated on chip. So that itcan provide any microcontroller to get connected with Wi-Fi network. ESP8266 is apreprogrammed SOC and any microcontroller has to communicate with it through UARTinterface. It works with a supply voltage of 3.3v. The module is configured with ATcommands and the microcontroller should be programmed to send the AT commands in arequired sequence to configure the module in client mode. The system consists oftemperature sensor and humidity sensor, LDR and pressure sensor. These 4 sensors willmeasure the primary environmental factors light intensity, temperature, pressure andrelative humidity respectively. All these sensors will gives the analog voltagerepresenting one particular weather factor. The microcontroller will converts these analogvoltages into digital data.
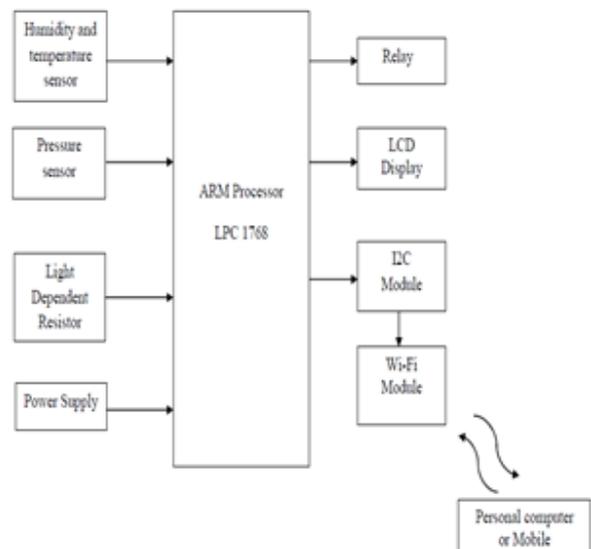

Figure 1: Block diagram of proposed system

THINGSPEAK

The software implementation plays a major role while retrieving the sensor data and updating it to the server. For plotting the sensor data in a graphical form "Thingspeak" website is used. It is one open source data logger website to make reduce the implementation cost.It provides a free userspace for creating the data channels. Each channel will be having 8 fields to write thevarious data and it automatically plots the given data in a graphical representation. The communication with Thingspeak server can be done by using its IP address.Once we created one channel for entering thedata into web site, the channel will be allocated with one API key. So we have to write the API key before writing the actual data, then the data will be stored and displayed in the required channel.

PERFORMANCE ANALYSIS
Table – 1 Performance analysis of different places

Place/ Node	Temperature	Humidity (%)	Pressure (mb)	Light (L)
1st Place	25.8	58.8	1012	8336
2nd Place	28	46.2	1011	8221
3rd Place	32	40.8	1012	9111
4th Place	41.2	30.5	1011	7865
5th Place	26.5	59.6	1012	8146

As the system is tested on different places, sometimes it shows error in readings. Parameters coming on website are delayed because of

Internet speed. Sometime one parameter gets posted early on website and others get delayed. Some set points are given, so that when the parameter goes above the set point then relay will ON.
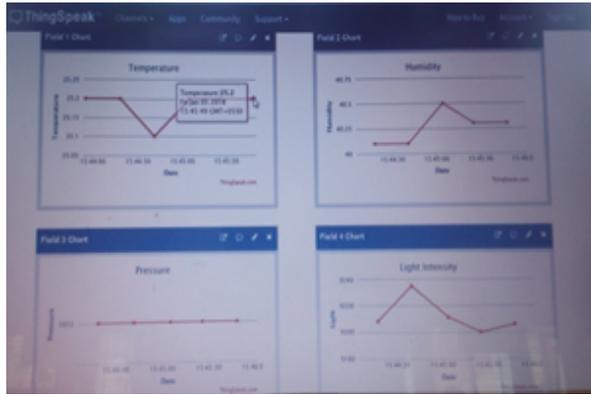

Figure 2 Parameters on Website

The parameters on LCD display and website are same. The overall database of the system is generated in the form of Comma Separated Value (CSV). The CSV file can be converted into Excel sheet. The excel sheet consists of database with date and time.
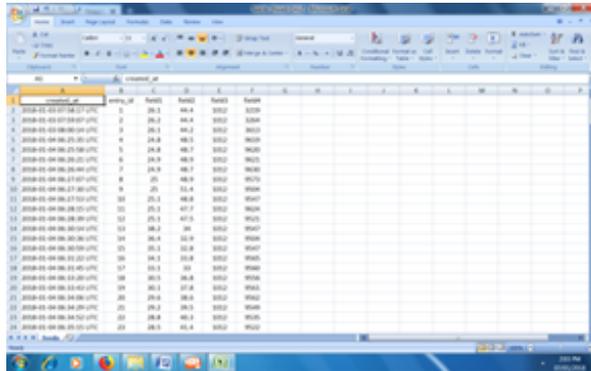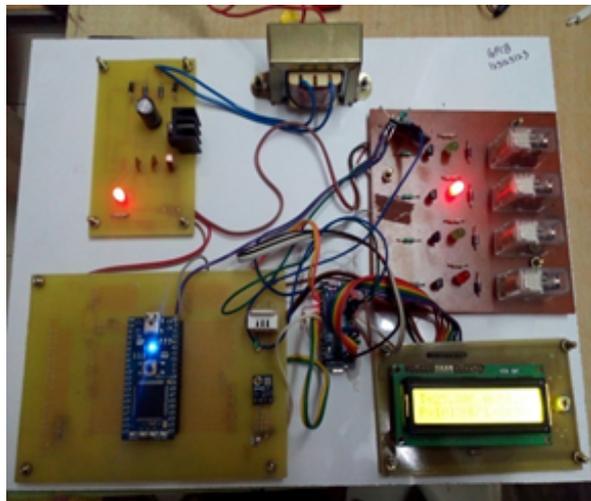

Figure 3 Excel sheet showing database

Figure 4 IOT system

CONCLUSIONS

The smart way to monitor environment and an efficient, lowcost embedded system is presented. The sensors to cloud system with Internet of Things (IoT) concept experimentally tested for monitoring four parameters. It alsosent the sensor parameters to the cloud (Thing speak). This data will be helpful forfuture analysis and it can be easily shared to other end users. It employs sensors measuring the ambient or theenvironment, which send messages to an IoT platform. The systemeliminates bulky solutions, provides the possibility of logging data where Wi-Finetwork coverage exists and can be used in a wide range of monitoring applications.

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