

IOT based Environment Condition Monitoring System

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Abstract:

Objectives: The Embedded Technology is currently in its primary and the affluence of Knowledge offered is amazing. Embedded System is a permutation of hardware and software. Embedded technology plays a most important role in integrating the variety of functions coupled with it. **Methods:** This desire to bind up the variety of sources of the Department in a closed loop structure. This proposal significantly reduces the manpower, saves time and operates efficiently without individual interfering. This project puts out the first action in achieving the desired target. With the advent in technology, the existing systems are developed to contain inbuilt intelligence. This system will automatically broadcast the real time surroundings data. **Findings:** In this project we are going to observe the environment circumstances using the smart sensors in embedded technology, using this project we can analyze the climate and pollution state of our surrounding, using this data we can recover our surroundings from pollution. **Applications:** The Arduino as the prime controller which uses ATMEGA328 microcontroller, temperature, humidity, gas, sound sensors are used to sense the environment condition and provide the data to the Microcontroller which is used to observe the level and send the data to the cloud server via IOT module.

Keywords: Arduino, Embedded Technology, Internet of Things, Sensors

1. Introduction

The Internet of Things (IOT) is an environment in which things, animals or individuals are provided with unique identifiers and the capability to transmit data over a network without requiring human-to-human or else human-to-computer interaction.^{1,4} IOT has evolved from the convergence of wireless technologies and the Internet. The concept may also be referred to as the Internet of Everything. In IOT the module that has wired sensor scan be used to alert the people in abnormal conditions.

2. Materials and Methods

2.1 Problem Statement

The satellite weather report system gives condition of present which does not give the exact condition of the particular place. The Drawbacks is in conventional method are the devices are expensive and don't have data visualization. In case of any abnormalities there is no such automatic device to give the alert signal hence it's hard to control that abnormality.

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2.2 Proposed System

The weather conditions in the outside surroundings of the home or any buildings are monitored and data are transmitted to the cloud server. The Advantages will be this system will automatically transmit the real time environment data. The data can be viewed in any parts of the world. This application is to observe and regularly update the environment condition. Environment conditions can be monitored and if the environmental condition goes abnormal, abnormalities can be updated in cloud and necessary action to reduce those abnormalities can be done.

2.3 Environment Monitoring System

Environment monitoring is an IOT application which helps to monitors the environment condition of any locality or surrounding and the condition can be viewed by everybody with the help of internet. This application is more effective, rapid in providing environment conditions.⁶ It helps the individuals or government to take remedial actions if the condition of the environment becomes abnormal.

Environment condition monitoring system provides a method to verify the condition and changes happens over the surrounding. We use Arduino, Sound sensor, Gas sensor, Temperature Sensor, Humidity sensor, IOT module in this system. The temperature and humidity sensor will monitor and provides the details about the climatic changes. It is useful to the agriculture.¹⁵ The gas and sound sensor is used for monitoring the pollution over environment. Nowadays, air and noise pollution makes the environment more vulnerable. Using this module we can detect the polluted area and build awareness to the people for living in the pollution expressly. Changes in the climatic system cannot be defined accurately and it may accidentally defined sometimes but using an IOT module we can characterize more approximate change of an environment and it can be updated in the cloud. There are many modules used in this system as follows:

2.3.1 Sensor Module

The sensor network is connected with a large number of small sensor nodes which can be used as an efficient tool for gathering data for various applications under various situations.^{2,9} Different sensors are incorporated in this

project which has its unique way of data collection from the environment.

- Temperature sensor is used to convert temperature value to an electrical value. Temperature Sensors are the key to read temperatures correctly and to control temperature in most of the applications. System uses the LM34 series of temperature sensors.¹
- System uses the DHT11 humidity sensors. It offers excellent quality, fast response, anti-interference ability and cost-effectiveness. This sensor is extremely accurate on humidity calibration.
- The gas enters into the sensor through the porous membrane into the working electrode where it is oxidized or reduced. This reaction grades in an electric current with the intention of passing through the external circuit. Hence, it is used to detect the pollutant material in the air.
- The sound sensor module provides the straight forward method to monitor sound and is usually used for detecting sound power. This module can be used for security and monitoring applications. Its accuracy can be easily adjusted for the usage convenience.

2.3.2 Power Module

The Power for the system can be given through the adapter or the USB. The Arduino board can be powered using the USB cable or with an external power supply. The power source can be selected automatically.

2.3.3 Controller Module

Arduino UNO is the controller of this application. The Arduino board converts the Analog data which is generated by the sensor to digital data. Arduino is created to monitor or understand the environment or surrounding by getting input from a various sensors and it can influence its atmosphere by managing lights, motors and other actuators. The micro-controller on the board is programmed using the Arduino programming language and Arduino development environment. Arduino projects can be detached or they can communicate with software on running on a computer.

2.3.4 IOT Module

IOT board is designed to meet a variety of online application requirements with distinct advantages that enable

the embedded system designer to easily, quickly and seamlessly add internet connectivity to their applications. The module's UART update feature and webpage control make them perfect for online wireless applications such as environmental sensors and data from portable battery operated wireless sensor network devices. Lumisense IOT board featured with SIM900 GPRS modem to activate internet connection so equipped with a controller to process all input UART data to GPRS based online data.

2.3.5 Indication Module

Our indication module consists of LED lights which indicate the normal and abnormal values.

2.4 Execution

Arduino is powered using USB cable and the four sensors are connected to the Arduino board and LED is connected for the alert signal. IOT module also connected to the Arduino board for getting input from the sensors and it is powered using the adapter. The USB cable not only gives power to the Arduino board but also transfers data from the Arduino board to computer. Those data can be analysed and result can be shown in the computer and indication is done using LED lights. Connections are shown in Figure 1 drawn using design tool.

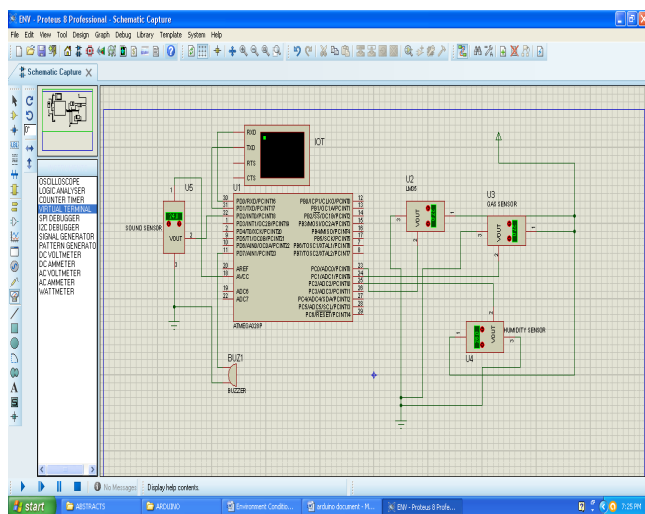


Figure 1. Pin configuration.

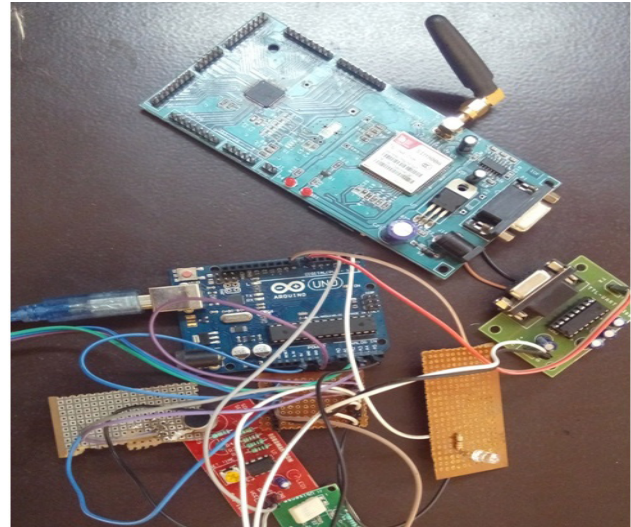


Figure 2. Overall connection.

3. Results

Connections of one sensor and another sensor can be done separately or combinable with the Arduino board and IOT module.

The Figure 1 connections are done manually in Figure 2.

3.1 Range of Sensor

The result of an environment condition monitoring system is based on different inputs for the different sensors. The temperature should be below 45. If value exists above 45, it gives the alert message. The Figure 3 and Figure 4 shows the above range.

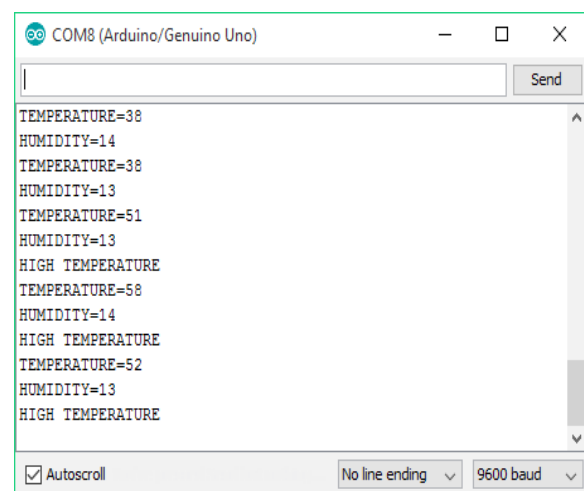


Figure 3. Measurement of Temperature Sensor.

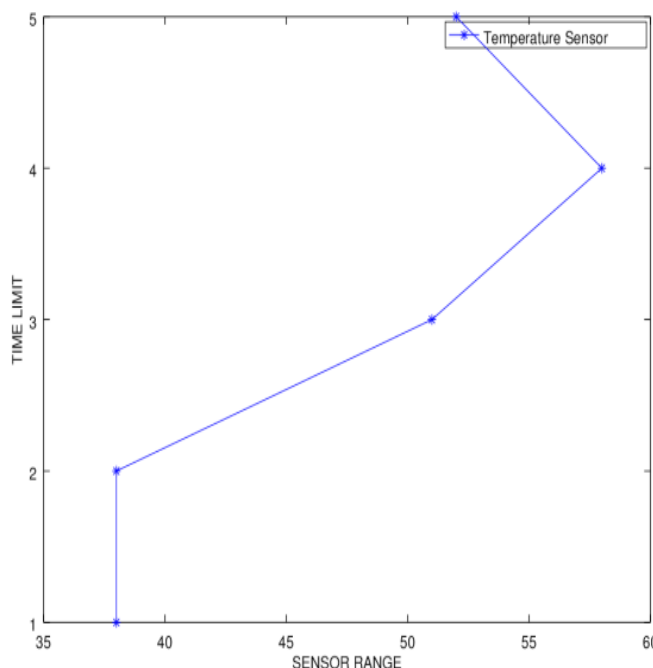


Figure 4. Graph of Temperature Sensor.

The humidity value should be below 50. If value exists above 50, it gives the alert message. The Figure 5 and Figure 6 shows the above range.

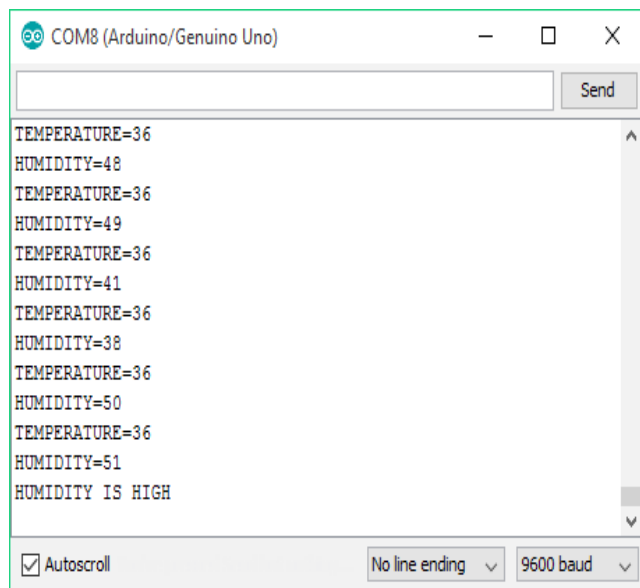


Figure 5. Measurement of Humidity Sensor.

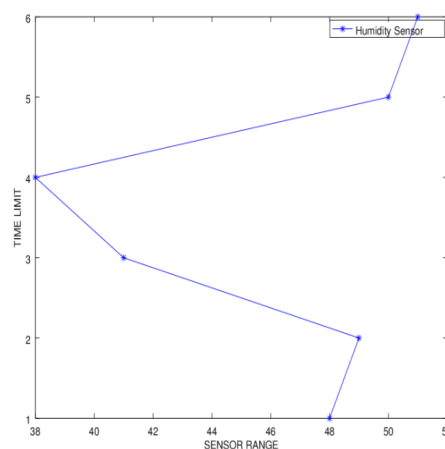


Figure 6. Graph of Humidity Sensor.

The gas sensor value should be below 250. If it exists above 250, it gives the alert message. The Figure 7 and Figure 8 shows the above range.

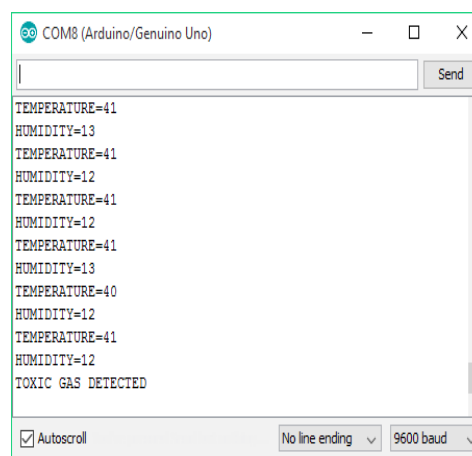


Figure 7. Gas Sensor (Toxic level).

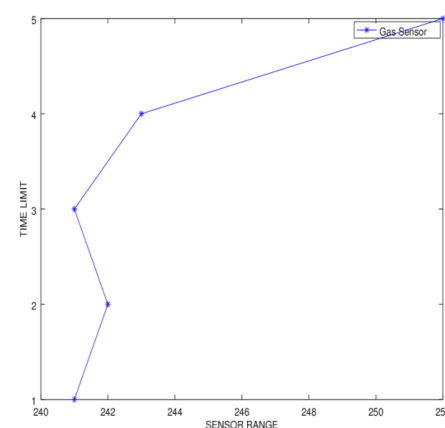


Figure 8. Graph of Gas Sensor.

The noise sensor value is the binary value and it should high. If it goes high, it gives the alert message. The Figure 9 and Figure 10 shows the above range.

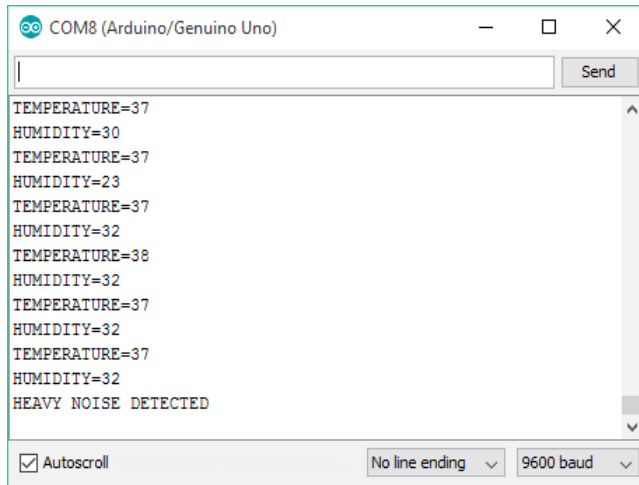


Figure 9. Sound Sensor (Frequency Measurement).

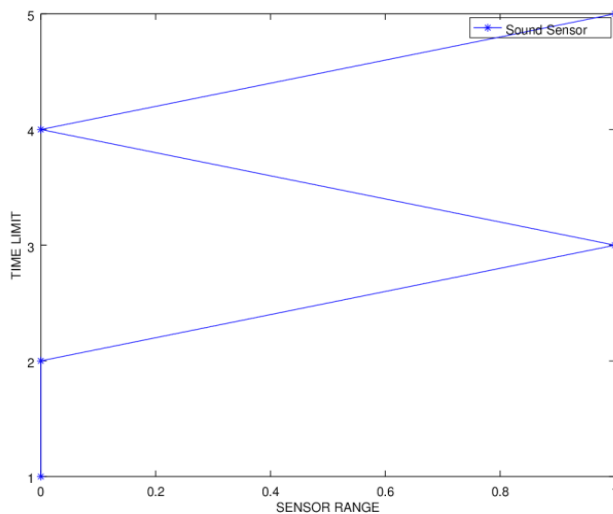


Figure 10. Graph of Sound Sensor.

Every abnormal value is updated in the cloud and people can view it using the internet. For the every abnormal message the LED glows by indicating the abnormal value.

4. Conclusion

This System monitors the changes happening over the environment and provides the sufficient ways for the users to access the information from anywhere through

cloud. The temperature and humidity sensor will monitor and gives the details about the changes happening over the climate. The gas and sound sensor is used for monitoring the pollution over environment. The Monitored condition will be updated in the cloud.

5. References

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