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IoT Based Environment Monitoring by Using Arduino

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ABSTRACT

Internet of Things (IoT) plays a vital role in Next Generation Networks. Ample number of research works in IoT is carried out in developing countries like India. Research and Development units of industries are working on connecting tiny devices and objects to infer and to measure environmental and ecological resources. Domestic applications are also in line with this research. This paper proposes an integrated smart environment based on IoT. Several sectors like agriculture, security and emergency, banking, Surveillances, meteorology, health care, education, government – e services, domestic appliances monitoring, traffic surveillance are integrated and the various objects and devices are connected using RFID technology. This paper also deals with how various sectors are connected by means of RFID technology and sensor networks. It also brings forth an idea of establishing IoT information

Keywords : IoT, ARDUINO, ESP8266.

I. INTRODUCTION

The current advances in the fields of technology and economy are having a significant impact over the Environment, and have led to serious concerns regarding pollution and climate change. Internet of Things (IoT) is a concept and a paradigm that considers pervasive presence in the environment of a variety of things/objects that through wireless and wired connections and unique addressing schemes are able to interact with each other and cooperate with other things/objects to create new applications, services and reach common goals. Environmental monitoring applications of the IoT normally exploit sensors to aid in environmental protection by monitoring parameters like temperature, humidity, light level, air quality and atmospheric conditions. This paper designs a prototype of wireless environmental monitoring system to upload information from array of sensors to the database. This application allows us to observe or measuring the environmental conditions from remote location from anywhere in real time. This system consist of main three modules namely sensor nodes, the wireless communication and the web server. The sensor nodes in remote location collect the information from surrounding environmental conditions and send data wirelessly using ESP8266 to the server. Adafruit (Input/Output) IO is a system that makes data useful. Our concentration is to allowing simple data connections with little programming required and moreover easy of use.

II. METHODS AND MATERIAL

This section contain list of Hardware components used.

A. Gas Sensor

They are available in wide specifications depending on the sensitivity levels, type of gas to be sensed, physical dimensions and numerous other factors. This Insight covers a methane gas sensor that can sense gases such as ammonia which might get produced from methane. When a gas interacts with this sensor, it is first ionized into its constituents and is then adsorbed by the sensing element. This adsorption creates a potential difference on the element which is conveyed to the processor unit through output pins in form of current. What is this sensing element? Is it kept in some chamber or is kept exposed? How does it get current and how it is taken out.

B. Humidity Sensor

Humidity sensors are gaining more significance in diverse areas of measurement and Control technology. Manufacturers are not only improving the accuracy and long-term drift of their sensors, they are improving their durability for use in different environments, and simultaneously reducing the component size and the price.

Specifications:

Items	SYH2 and SYH-2S
Rated voltage	AC 1Vrms (1 kHz)
Rated power	AC 0.22Mw
Operating temperature	0-60 degree centigrade
Operating humidity	20-95%RH
Standard characteristics	33KQ (At 25 degree centigrade, 60%RH)
Storage temperature	-30—85 degrees centigrade
Storage humidity	within 95%RH

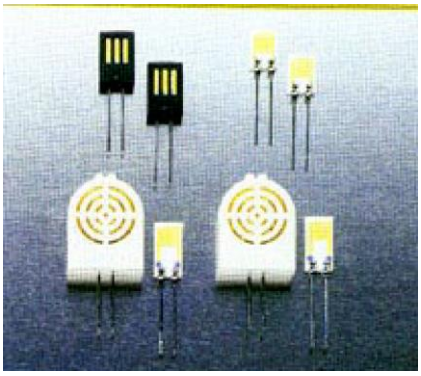


Figure 1. Humidity Sensor

C. LCD(Liquid Crystal Display)

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other.

Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

D. LDR(LIGHT DEPENDENT RESISTOR)

A photo resistor or Light Dependent Resistor or CdS (Cadmium Sulphide) Cell is a resistor whose resistance decreases with increasing incident light intensity. It can also be referred to as a photoconductor.

A photo resistor is made of a high resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance.

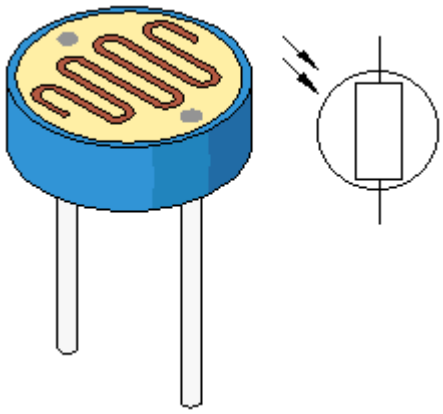


Figure 2. LDR sensor

E. Temperature Sensors (LM35)

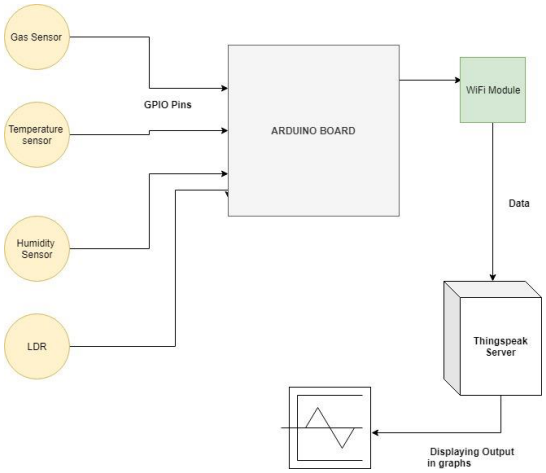
The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracy of ±1/4°C at room temperature and ±3/4°C over a full -55 to +150°C temperature range.

F. Arduino Micro Controller

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources.

Working Procedure

Following is the block diagram of IoT device



Values from the sensors are obtained to Arduino board and arduino sends instructions to wifi module to send data. Data is sent using the API key of the channel in things speak server. The data is recieved by server and shown in the form of graphs. Data is uploaded by device in 15 seconds and it takes atleast 1 min to complete the cycle.

III. RESULTS

Results are obtained in the form of Graphs. All the four Graphs are shown below.

Figure 3. Gas Graph

The above figure represents the graph with values uploaded by device and the values are readings of Gas Sensor.

Figure 4. Temperature Graph

The above figure represents the graph with values uploaded by device and the values are readings of Temperature Sensor. Temperature is shown in units of Centigrade.

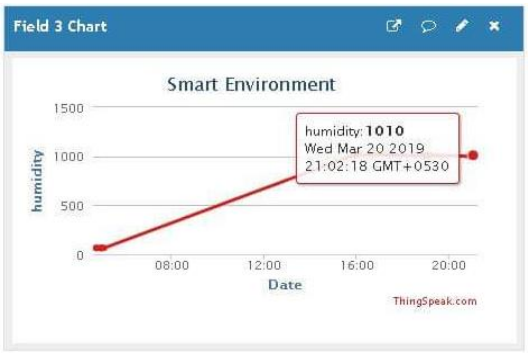


Figure 5. Humidity Graph

The above figure represents the graph with values uploaded by device and the values are readings of Temperature Sensor.Humidity is shown in units of PPM.

Figure 6. LDR graph

The above figure represents the graph with values uploaded by device and the values are readings of Temperature Sensor.Humidity is shown in units of lumen.

IV. CONCLUSION

Our device produces good results in showing the values of environmental attributes. It can be improved as per the requirement i.e. we can add more sensors to monitor extra attributes like pH value of soil. Therefore, we attained our motivation.

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V. REFERENCES

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