Environmental Analysis in IOT using Raspberry Pi

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ABSTRACT - The system in this project is a solution for checking the weather conditions at place and make the information visible anywhere in the world. The technology is used to do this project is Internet of Things (IOT). Now-a-days Internet of Things is in trend, which is an advanced and efficient solution for connecting the devices to the internet and to connect the entire world of devices in a network. Things like electronic gadgets, sensors and automotive electronic equipment are used. The system monitors and controls the environmental conditions like temperature, relative humidity, light intensity and CO level with sensors and sends the information to the web page. The data that is collected from the system can be accessed in the internet from many locations in the world.

KEYWORDS: IoT, Raspberry Pi, Sensors, Smart Environment, Weather Parameters.

I. INTRODUCTION

IOT means Internet of Things. It provides internetworking of physical devices, buildings, vehicles and other components like sensors and actuators. By giving network connectivity to systems embedded with electronics, software, sensors and actuators; these objects are able to collect and exchange data. By using IoT objects to be sensed or controlled remotely through existing network. It gives opportunity to connect physical world with computer-based systems. IoT improves efficiency, accuracy, economic benefits along with reduced manpower. IoT frameworks help for the interaction between "things". Also supports for more complex structures like distributed computing and development of distributed applications. Now in these days most of IoT frameworks seem to focus on real-time data logging solutions.

Many things affect the weather. And weather also have effect on most of living as well as non-living things. At Weather station, study of different environmental parameters using some instruments and equipment's has been done. So, to meet the goal of weather monitoring we have designed IoT based real-time, low-cost, portable and high-speed weather station using Raspberry-Pi. At our weather station we are measuring some environmental parameters like temperature, humidity, light intensity, gases and pressure. GSM module along with ADC and microcontroller are used by many weather monitoring systems for environmental parameters monitoring. ARM based Raspberry Pi board can handle many operations and same one is used in this system. In this system there is no need of any external module, microcontroller and ADC. The proposed system uses IDLE text editor where programs can be written in Python. Output data can be seen on thingspeak.com using respective protocol.

II. RELATED WORK

Existing system model mainly focuses on controlling and monitoring of different environmental activities. It uses sensor networks to monitor physical and environmental conditions with thousands of applications in different fields. The sensor nodes are placed at different locations to collect the data and to predict the behaviour of area. But it ranges only some extent of area where the ZigBee protocol is used. It is the main drawback.

1) DISADVANTAGES:

• Manually Monitoring the application.

• Less Transmission and low speed data rate.

• It is extended up to 10-100 meters only.

III. PROPOSED SOLUTION:

Our proposed system makes use of 2 sensors and an LDR to measure the environmental factors such as temperature, humidity and gases. The values read from the sensors are processssed by the raspberry Pi.   The readings are also displayed on an LCD

for quick viewing. The sensors can be operated by the microcontroller to retrieve the data from them and it processes the analysis to produce the graph sheets and updates it to the GSM and finally the message is sent to the concerned number.

ADVANTAGES:

- Improved safety and security

- High quality receiving data

- Less power consumption

- High speed data rate

IV. SYSTEM ARCHITETURE:

The implemented system consists of an operating system called Raspbian as a main processing unit for the entire system and all the sensor and devices can be connected with the Rasp-berry pi. The sensors used in this project are Temperature sensor, humidity sensor, gas sensor and light intensity sensor. The analog switch is connected to the gas sensor and LDR sensor. This ADC is used to convert analog signals to digital signals. A Relay switch is used to maintain a constant stability in light intensity levels. For quick access the outputs are displayed on the LCD display.
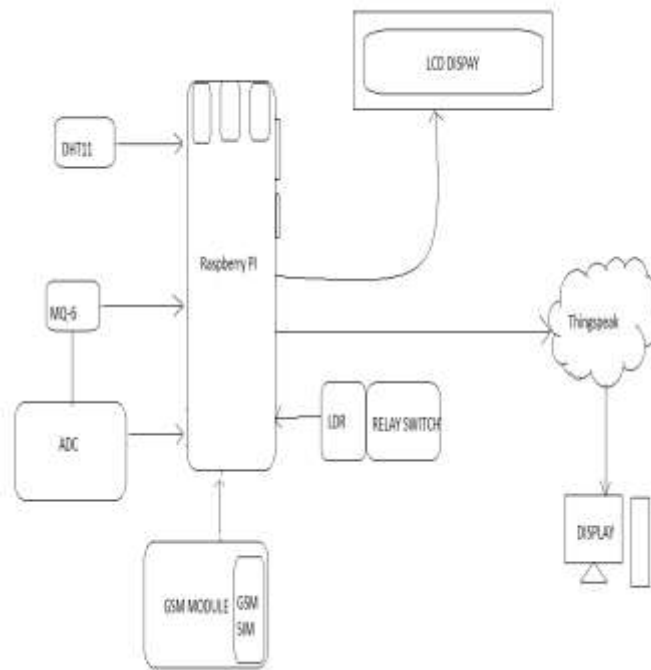

Fig: SYSTEM ARCHITECTURE

V. MODULES

DHT11 SENSOR:

This DHT11 Temperature and Humidity Sensor consists of a digital signal output with the temperature and humidity sensor. Every DHT11 sensor features extremely accurate sensing of humidity chamber. The sensor provides excellent quality, fast response, anti-interference ability and high performance.

MQ-6 SENSOR:

Different gases keep evolving in the environment. Using MQ series of sensors we can easily detect the gases like LPG, Nitrogen. This sensor takes the gases in the form of analog data and converts it into digital signals using ADC. Propane and Hydrogen are

combined to produce Methane and other combustible steam, It is available in low cost and can be used for different applications.

ADC:

ADC is a system that converts an analog signal to a digital signal. It also provides converting analog voltage to digital numbering representing the magnitude of the voltage or current. The main function of ADC is to collect the information from the outside world.

LDR:

The light dependent resistor works on the principle of photo conductivity. When light falls on the resistor then the resistance is decreased. When the same LDR is kept in dark then the resistance will be high. In this, the light sensitive material is arranged in zigzag pattern.

GSM MODULE:

Global system for mobile communication (GSM) is a standard for digital mobile communication. It supports only GSM and a few GPRS networks. GSM was established in 1982 to create a European telephone standard. It is mainly used for sending text messages using a GSM SIM.

VI. OUTPUT SCREENSHOTS:

The following figure shows the homepage of Thinkspeak cloud. The main intension of using this Thingspeak is to store the data that is delivered by the sensors and store that data in the form of tables.

Here it is necessary to register and login into an account with respective email and create a channel related to your project.

The outputs are shown in the form of graph sheets. This data can be stored in CSV format can be viewed whenever it is required.
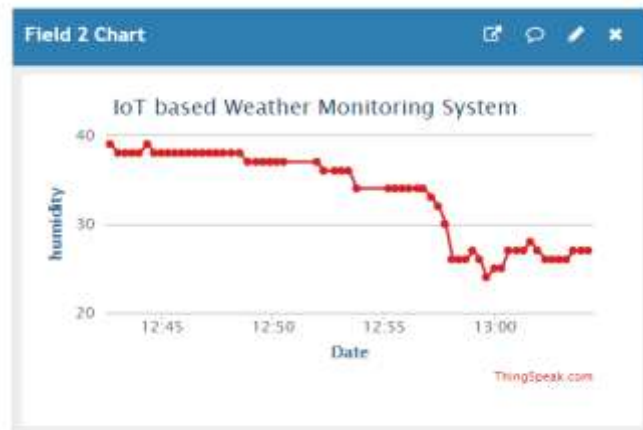

Fig: For Temperature
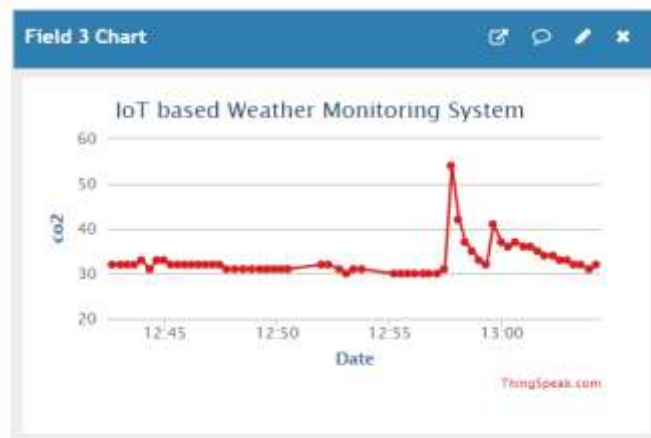
Fig: For Humidity
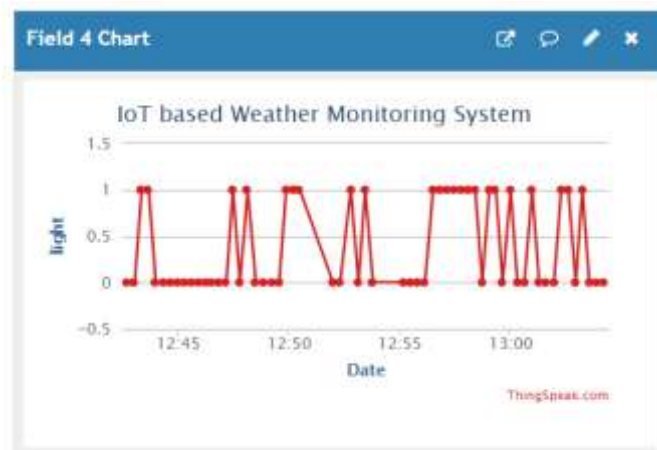

Fig: For Gas levels

Fig: For Light Intensity levels

If the values are exceeded the range of threshold values then an alert message is sent to the respective mobile number.

VII. CONCLUSION:

Implementing the embedded devices in the environment for monitoring activates self protection to the environment. For this, we need to deploy the sensor devices in the environment for collecting the data and analysis purpose. After deploying sensor devices in the environment, we can bring the environment into real life i.e. This device can interact with other objects through the network. Using GSM, the end user can store and analyze the data. This is the smart way to monitor environment and an efficient, low cost embedded system that is presented with different models in this project.

VIII. REFERENCES

[1] Book "Getting Started with Raspberry Pi", written by Shawn Wallace, First Edition.

[2] Michael Wijanarko, "Ambient Environmental Quality Monitoring Using IoT Sensor Network",

[3] Tamilarasi B, Saravanakumar P, "Smart Sensor Interface for Environmental Monitoring in IoT", February 2016.

[4] Nikhil Ugale, "Implementation of IoT for Environmental Condition Monitoring in Homes".

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