Drought Detection using Internet of Things

Shoeb Ahmed Shabbeer, Srijan, Tejaswini Rajesh Patil, Rohan Yewale, Prof. Sridevi C. Karande
Department of Computer Engineering, Maharashtra Institute of Technology, Pune-411038

Abstract - *The real-time acquisition and transmission system of agricultural drought data is researched. With the real time acquisition and analysis of agricultural drought data, it can effectively and accurately predict and analyze the agricultural drought data. It has great significance in increasing agricultural production and for promoting agricultural production. Based on Internet of things technology, the sensing layer is distributed in the agricultural infrastructures, real-time data acquisition is realized, the Network transmission layer is used to transmit the agricultural drought data and the Application layer is used to display the data from the sensors in the field.*

Key Words: Computer Society, agricultural drought data, data acquisition, data transmission, system design.

1. INTRODUCTION

The year 2015 is slated to be the hottest year of the past decade as well as the current one. As you might have noticed, rainfall in the Maharashtra state has been very low this year and dams are their record lowest. This has resulted in water cuts right after the monsoon season. Another much serious implication is for the agricultural sector. The lack of water results in a drought situation with farmers committing suicide due to lack of relief funds from the government.

1.1 Present System

Presently the system depends upon the government officials going to the fields manually and takings the readings from the field. This takes a lot of time and effort and is prone to errors. Our system is being developed to help with the drought detection by deploying sensors in the field and connecting them to the internet using IoT technology and making the sensor data available at an instant.

1.2 Area of Project

Wireless Networks and Communication
Client-Server architecture
HTML & php Programming

2. Software Technologies used

1) Apache Tomcat
2) MySQL
3) PhpMyAdmin
4) Arduino IDE
5) Php
6) HTML

3. Architecture

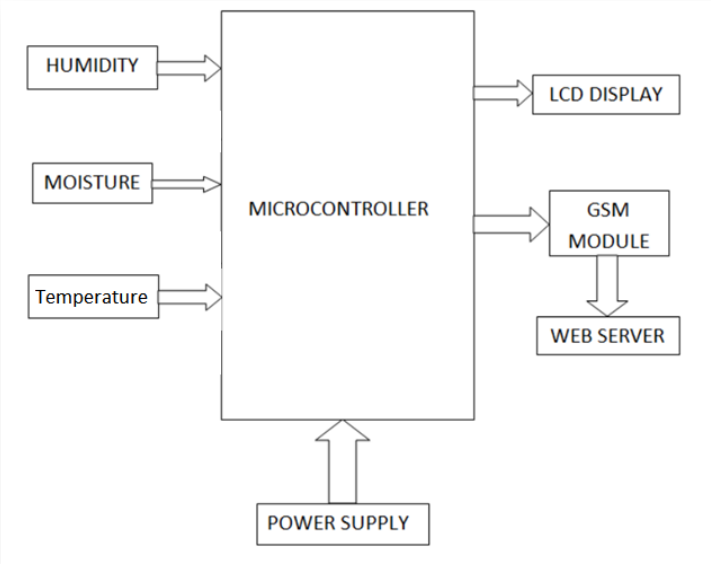

Fig. 1 Architecture

1) Humidity Sensor

Humidity sensor takes the current humidity level of the environment and gives the output as an appropriate voltage to the microcontroller. The microcontroller contains an inbuilt Analog to Digital Converter (ADC) which converts the voltage given by the sensor to its appropriate digital

value. The humidity sensor makes use of the resistive property to calculate the humidity.

2) Moisture Sensor

Moisture sensor consists of long copper probes which go into the ground. For our system, at a practical level, we are using a short probe. The probes measure the value of moisture content in the soil and give the appropriate voltage to the microcontroller.

3) LCD Display

In this system we use a 16x2 display. The LCD displays the values of the sensor currently as well as the status of the micro-controller.

4) Power Supply

Since each component requires some power to function, the power supply must be designed accordingly. The expected total power requirement is around 700-800mAh.

5) GSM Module

The GSM module is responsible for sending the data from the sensors to the web server. The GSM module makes use of network connectivity in the form of GPRS data and sends the data to a specified IP address of the server.

6) Web Server

The web server receives the data from the microcontroller in the field and stores it in a database. When the data is requested by the user, the web server displays the appropriate data from the specified time and displays each sensor data.

4) Functioning of the system

The microcontroller aggregates the data from the sensors and converts the values into human readable values. Analog to Digital conversion is performed wherever necessary.

The next step is to send the data to the web server. The microcontroller uses the sim900A module for this purpose. The values from the sensor are concatenated into a HTTP URL and then is sent to the web server address using GET method.

The Web server receives this data and stores it in a MySQL database. The web server is also responsible for showing the data to the user in a graphical or tabular form when the user requests for the data.

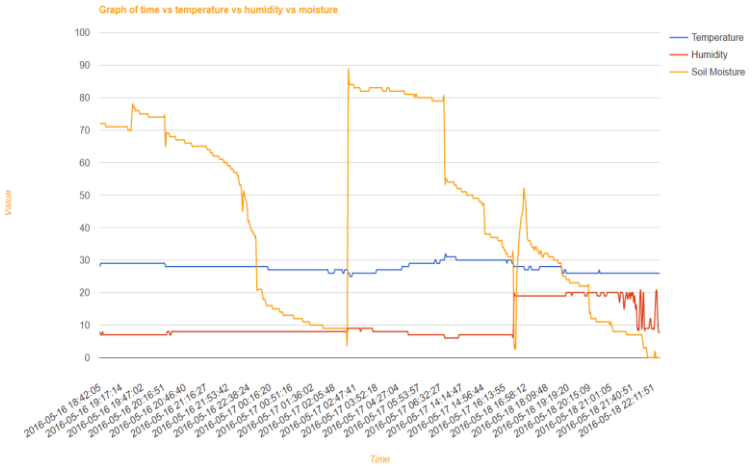

Fig 2. Graphical output

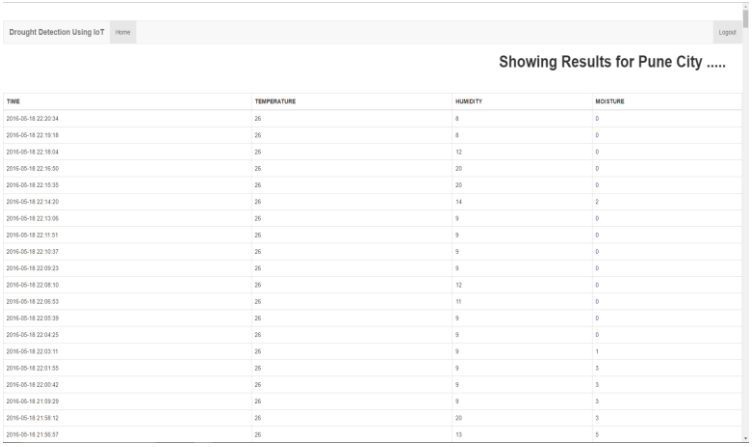

Fig 3. Tabular output

5) Deployment Diagram

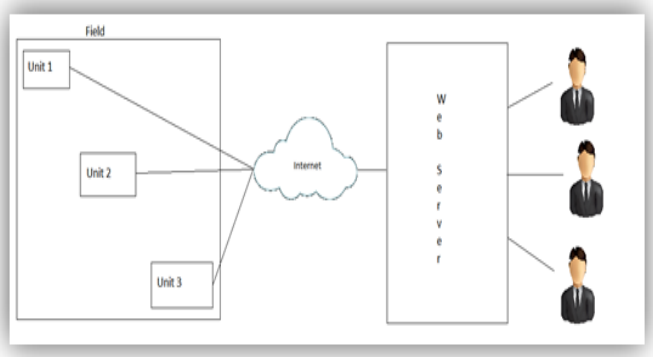

Fig 4. Deployment diagram

The sensors along with the microcontrollers are distributed along the field and using GPRS send the data to the web server.

6) Communication Diagram

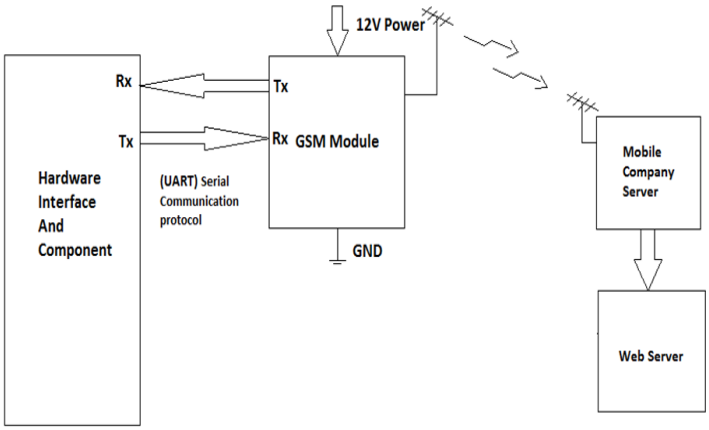

Fig 5. Communication diagram

The GSM module communicates with the Arduino board with the UART protocol. The Tx pin of the Arduino is connected to the Rx pin of the GSM module and vice-versa.

The GSM module sends this data via GPRS. The data is in the form of a HTTP GET request and the request has to be completed with the help of the SIM card's data provider company.

7) Future Scope

1) Providing detailed updates to the user.
2) Increasing the range of sensors.
3) Decreasing system size.
4) Making the system mobile and autonomous.

ACKNOWLEDGEMENT

It gives us great pleasure in presenting the preliminary paper on Agricultural Drought Data Acquisition and Transmission System Based on Internet of Things.
We would like to take this opportunity to thank our internal guide Prof. S.C. Karande for giving us all the help and guidance we needed. We are really grateful to her for her kind support. Her valuable suggestions were very helpful.
We are also grateful to Prof. Dr. V. Y. Kulkarni, Head of Computer Engineering Department, MIT Pune for her indispensable support, suggestions.

REFERENCES

[1] Liu Ping, Agricultural Drought Data Acquisition and Trans- mission System Based on Internet of Things., China, 2014.

[2] Octavian Fratu, Simona Halunga, Rzvan Crciunescu, and Alexandru Vulpe, Instrumental IoT - from Environmental Monitoring to Cosmic Ray Detection Belgrade, Serbia, 2014.

[3] Mahdi Jalili, Joobin Gharibshah, Seyed Morsal Ghavami, Mohammadreza Beheshtifar, and Reza Farshi, Nationwide Prediction of Drought Conditions in Iran Based on Remote Sensing Data, Iran, 2014.

[4] Zhiqiang Gao, Ning Xu, Chuancheng Fu, and Jicai Ning, Evaluating Drought Monitoring Methods Using Remote Sens- ing: A Dynamic Correlation Analysis Between Heat Fluxes and Land Cover Patterns, China, 2015.