Smart Irrigation and Remote Farm Monitoring System

Priyanka Choudhari
NDMVP KBTCOE, Nashik

Ankita Borse
NDMVP KBTCOE, Nashik

Harsh Chauhan
NDMVP KBTCOE, Nashik

ABSTRACT
Primary occupation of our country is agriculture. Automation of farming activities is smart farming, Traditional way reduces the productivity as well as there is wastage of water. To overcome this problem smart irrigation system using IOT is developed. This project includes various sensors like Soil Moisture, PT100, BH1750, Float sensor to sense the physical parameter. Arduino is used to control all the sensors. The data is handled remotely using Android app and website. Evapotarnspiration algorithm is used to calculate accurate requirement of water. KNN algorithm is used to predict the crops for particular geographical zone. This product would increase the productivity of farm as proper amount of water only would be supplied to the plants.

General Terms
IoT, GUI , KNN, GPRS, GSM

Keywords
IOT, Sensors(soil moisture, float, PT100, BH1750), Ardiuno, Android, Website, KNN, Evapotranspiration

1. INTRODUCTION
Agriculture has a major role in the economy of the country. Most of population in India depends on agriculture for their living. As the agriculture's contribution to GDP i.e Gross Domestic Product is declining nowadays, we are in urge to increase crop productivity with efficient and effective water usage.

To improve traditional methods, there has been many systems developed using advanced technologies that help to reduce crop wastes, prevent excessive and scarce watering to crops and thereby increase the crop yield. In Drip Irrigation water droplets are dripped to the root of the plants directly after some specific time. The design for water required for the crop varies with the crop type. When compared to traditional method it uses 30-50% less water. There are some parameters to determine irrigation of crop , like soil moisture and temperature etc. [1] In this proposed work the system will be developed using sensors which will monitor crop-field and automate irrigation system. The transmission of sensor data from field to the server and the android application and controlling the agriculture field from mobile application, the automated irrigation control will be done.

The aim is to monitor and control the farm atmosphere remotely using android application. This system increases the level of production than the current situation. and efficiently help the farmers to solve their issues. [1]The production and growth of any plant cannot be affected by the environment conditions and we can increase the farming production. In this proposed work the system will be developed using sensors that will monitor the crop field condition and automate the irrigation.

Various sensors would be deployed in field will collect the data from the field. The sensors would be interfaced with Arduino microcontroller. [2]Once it is interfaced and programmed it would be placed in the field. The soil moisture sensor is used to get the moisture of soil .The float sensor gives the water level in the reservoir. So, when the water level is low the motor is turned on. The BH1750 sensor is used to get the weather condition of the field, while PT100 Sensor is used for sensing the temperature of the field .These sensor data is the input data to the system.

2. PROPOSED FRAMEWORK
The architecture above shows how the sensors and various components of system are connected to the Arduino board which is the microcontroller. In this, we have used various sensors like soil moisture sensors, float sensors, PT100 sensor and BH1750 sensor which continuously monitor the field. The data received from the sensors is send to the web server through the microcontroller using the GSM module. The web server is designed to analyze the data received and to check with the threshold values of moisture and temperature. The above diagram also shows how the data will be send to the android application from the web server.

The motor would be turn off/on as per the water level in the reservoir using float sensor.

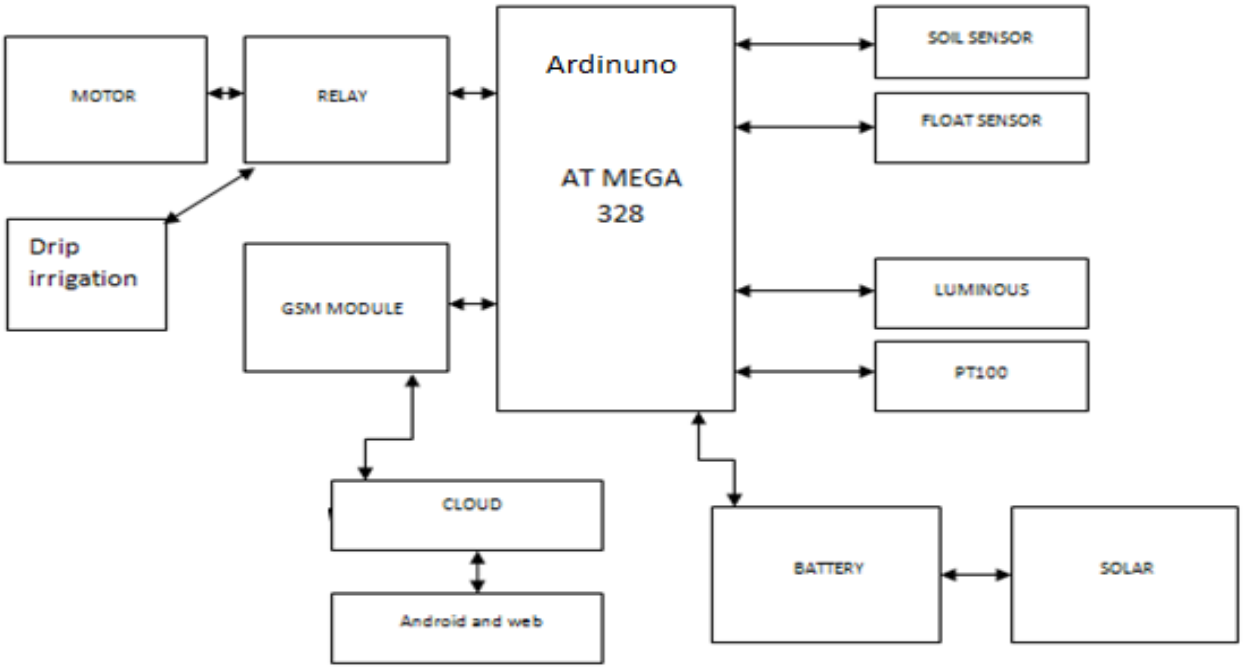

Fig: Architecture design

3. ALGOMITHM

Evapotranspiration Algorithm

The formula for the calculation of the crop water requirement is :

ETcrop = kc x Eto

where:

ETcrop = the water requirement of a given crop in mm per unit of time .

kc = the "crop factor"

ETo = the "reference crop evapotranspiration" in mm per unit of time.

Example:

Crop in the farm: cotton

- Growth period: 190 days

- ETo: average 6

-kc:0.82

Crop water Requirement:

ET crop =kc x Eto

ET crop = 0.82 x 6 = 4.92 mm per day

ET crop = 4.92 x 190 =934.8 mm per day

KNN Algorithm:
In project KNN is used for estimation of the crop in a particular region. Crops are assigned with ETo. On the basis of ETo the plants are classified in three groups i.e low drought sensitive, high drought sensitive , medium drought sensitive. As per the condition of soil and temperature in the region the farmer is given prediction about the plant he should plant in the region.

Algorithm:

1. get ETo from Arduino.
2. Calculate manthan distance of ETo and database values.
3. Sort the array in ascending order.
4. Select the number of crops.
5. Categorize the crop as per drought sensitivity.
6. Display the selected number of crops.
7. Display the prediction

4. EXPERIMENTAL SETUP

The experimental setup for proposed system will consist a database, adafruit.io will be the server and client android application will be installed with proposed system. A different platform and technology which will be used to build proposed system are:

Os: windows or linux for development and android for client.

Server: Rest sever

Language: Android, HTML , Embedded c.

Mobile: Android application

5. EXPECTED RESULT

The system would supply appropriate amount of water to different plant based on Etcrop factor. Farmer would be provided with correct prediction about the plant to be cultivated in the particular region. The motor would be turn off/on as per the water level in the reservoir using float sensor.

6. CONCLUSION

The automated irrigation system is designed and implemented in our proposed work. The developed system will be beneficial and works in cost effective manner. It reduces the water consumption to a greater extent. It need minimal maintenance and power consumption reduced. The System is very useful in areas where water scarcity is a major problem. The crop productivity increases and the wastage of crops will

be reduced using this irrigation system. The proposed system will be more helpful and gives more feasible results. The work would calculate appropriate amount of water for particular plant using evapotranspiration algorithm. The KNN algorithm would be used to predict the plant in particular region based on the climatic condition of the region

7. ACKNOWLEDGEMENT

We express our sincere thanks to our Project Guide M.B. Thombare for guiding us throughout the project. It might be difficult for us to complete project without her guidance. We are thankful to her encouragement, guidance, and motivation throughout the project. We also thank Dr. V. S. Pawar Head of the Department for making available all the requirements.

8. REFERENCES

[1] AnkitYadhav ,PranavPandhare ,SaleelKulkarni,Shubham, Kale,SoniyaZope, "Design and implementation of Smart Agriculture using Embedded System", Volume 5 Issue 12 Dec.2016, International Journal Of Engineering And Computer Science ISSN: 2319-7242.

[2] Dr.N.Suma,Sandra Rhea Samson ,S.Saranya, G.Shanmugapriya, R.Subhashri, "IOT Based Smart Agriculture Monitoring System" Volume 5 Issue 2,International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169.

[3] Rajalakshmi.P,Mrs.S.DeviMahalakshmi, "IOT Based Crop-Field Monitoring And Irrigation Automation",10th international conference on intelligent system and control(ISCO),Year:2016.

[4] Bishnu Deo Kumar, Prachi Srivastava, Reetika Agrawal, Vanya Tiwari," Microcontroller Based Automatic Plant Irrigation System", Volume 4 Issue 5, May 2017, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 .

[5] Sonu Kumar ,C. Sethuraman ,Kota Srinivas, "Solar Powered Automatic Drip Irrigation System (SPADIS) using Wireless Sensor Network Technology", Volume 4 Issue July 2017,International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056.

[6] Dale Boyd "Soil moisture monitoring for crop management", IOP Publishing,IOPConf.Series:Earth and Environmental Science 25,Year:2015.

[7] Dr. P. Banumathi, D. Saravanan, M. Sathiyapriya, V. Saranya "An Android Based Automatic Irrigation System Using Bayesian Network with SMS and Voice Alert", Volume 2 Issue 2,International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307.