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Automated Irrigation System using IOT

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***Abstract*— Agriculture has been the most important practice from very beginning of the human civilization. Traditional methods that are used for irrigation, such as overhead sprinkler is not much efficient as it results in wastage of water and can also promote disease such as fungus formation due to over moisture in the soil. Automated irrigation system is essential for conservation of the water and indirectly viability of the farm since it is an important commodity.**

Keywords—Moisture; Cloud; Machine learning;

I. INTRODUCTION

Automation in irrigation is gaining large scope in the field of science. It not only simplifies and reduces labour, but also lightens up the technology among the people. In automation system water availability to crop is monitored through sensors and as per need watering is done through the controlled irrigation. The almost infinite capabilities of storage and processing, the rapid elasticity makes cloud computing an attractive solution to the large amount of data generated.

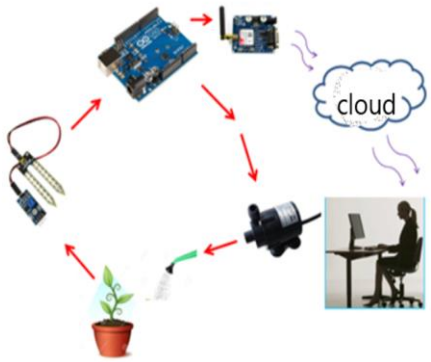

Fig 1: Basic module

The whole project is being developed based on the requirements of the client. Therefore, the basic idea here is to focus on parameters such as temperature and soil moisture and others depending on client's further requirements. This is a Mobile Integrated and smart irrigation system using IOT based on application controlled monitoring system. The main objective of this project is to control the water supply on sprinklers and monitor the crop and soil condition through a remote device say a smartphone. The application that is been developed as a part of this project is completely hosted on the cloud using the platform, Amazon Web Service (AWS), that provides on-demand cloud computing platforms to individuals, companies and governments, on a paid subscription basis. The technology allows subscribers to have at their disposal a virtual cluster of computers, available all the time, through the Internet. The use of cloud also allows unlimited storage of data from the sensors and the admin can reach to it anytime from anywhere.

II. METHODOLOGY AND RESULTS

The system consists of many sensors including temperature, moisture sensors etc. At first all modules are initialized and the moisture value is read.

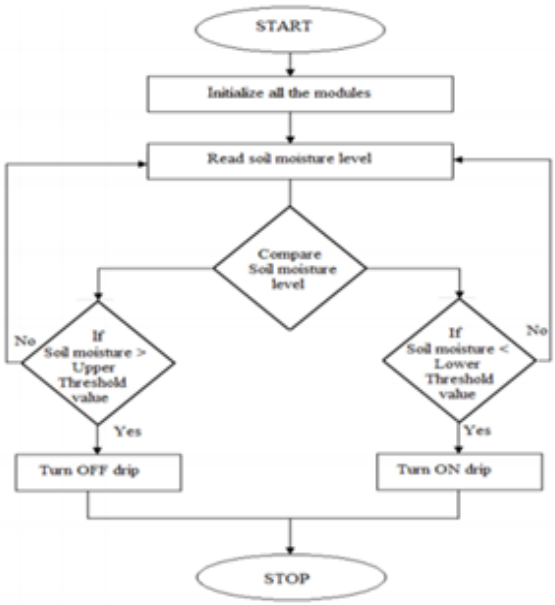

Fig 2: Flowchart

If the soil moisture is lesser than the threshold value, the pump with sprinklers and drips is automatically started. If moisture value is greater than the threshold value, the drip with pump will be automatically turned off. As the data is completed hosted in cloud, we use a web app to access the data and notifications. The flask web framework is used.

The commands used to install flask are as follows:

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★ Pip installation prior to flask required.
Command used : python get-pip.py

★ Environments (setting up a virtual environment)
pip install virtualenv

★ Versions:
pip --version

★ Flask installation :
pip install Flask

Fig 3: Flask installation

Corresponding database is also created to store the datasets of moisture and temperature.Databaase connection is made used SQLachamy. The MQTT protocol is used to publish the sensor data. Publish and subscribe concept is involved in it too. There are many datasets collected for different types of soil. The dataset is generated for different type of soil, consisting of date and time, type of light, temperature and moisture.

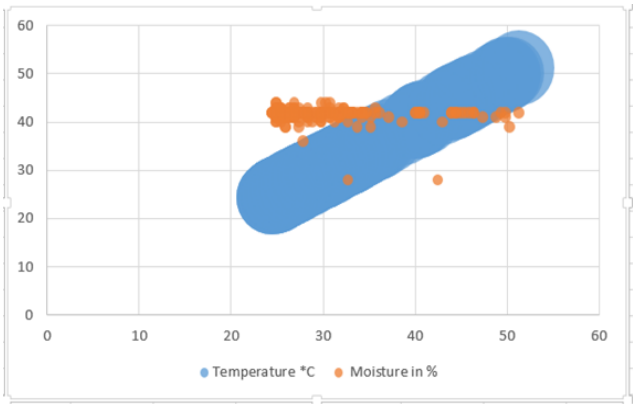

Fig 4 : soil type 1 with certain moisture level

Accuracy testing carried for different type of soil using machine learning algorithms. The results are listed below.

Table 1 : Accuracy of ML algorithms

Soil type1	
Naive_bayes	43.75
Decision tree	46.53
Random forest	46.53
SVM	43.75
KNeighbors Classifier	34.72
Logistic Regression	43.75

Various supervised learning methods are applied on collected data set for different soil type. Based on the best accuracy, one of the model will developed. The model will be designed in such a way that it automatically predicts different threshold values for different types of soil moistures.

III. CONCLUSION

We are into a development of a market based system that can help in an automated irrigation system by analyzing the moisture level of the ground. The smart irrigation system proves to be a useful system as it automates and regulates the watering without any manual intervention. The primary applications for this project are for farmers and gardeners who do not have enough time to water crops or plants. Several types of sensors are deployed here to sense the parameters considered. These sensors send alerts to the controller which in turn reaches the admin through an application installed in his device with Wi-Fi connectivity. The power efficiency and the cloud security management are also given much importance.

Our further work on this system as per the client requirements and support shall result into developing the system into a matured state.

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