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Automatic Soil Moisture Monitoring System

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***Abstract* - Irrigation part in farming has always been an important part for farmers. Manual attempts for the irrigation, such as water supply and keeping the records are quite tedious .In order to make it simple and connected to technology, Soil moisture can be detected by soil moisture sensor. This sensor can detect the moisture level of the soil. This can be done automatic with microcontroller, so that whenever moisture level of soil gets low or soil gets dry, Water can be supplied automatically. The android app will store the records and can control the sensor and water pump. This can cut the manual attempts regarding the irrigation and simplify the efforts for farming with technology. Connecting the irrigation with technology makes it to the "smart irrigation".**

***Keywords*— Soil moisture sensor, microcontroller, irrigation, smart irrigation.**

I. INTRODUCTION

Problems Faced By The Farmer-

In many countries where agriculture plays an important part in shaping up the economy and the climatic conditions are isotropic, but still we are not able to make full use of agricultural resources. One of the main reasons is the lack of rains and scarcity of land reservoir water. Extraction of water at regular intervals from earth is reducing the water level as a result of which the zones of un-irrigated land are gradually increasing. Also, the unplanned use of water inadvertently results in wastage of water.

II. MOTIVATION

The motivation for this project came from the countries where economy is based on agriculture and the climatic conditions lead to lack of rains and scarcity of water.

Recent Irrigation Techniques-

1) In recent times, the farmers have been using irrigation technique through the manual control in which the farmers irrigate the land at regular intervals by turning the water-pump on/off when required.
2) This process sometimes consumes more water and sometimes the water supply to the land is delayed due to which the crops dry out.
3) Water deficiency deteriorates plants growth before visible wilting occurs.
4) In addition to this slowed growth rate, lighter weight fruit follows water deficiency

Water Conservation and New Irrigation Technology

Using Moisture Sensors as a tool to monitor and control the watering of soil by taking the moisture level from the soil moisture sensors provides farmers an efficient way of providing the soil the exact amount of water that is required by the soil, this not only saves the water but also maintains the moisture value of the soil. Maintaining the log and automating the process makes it much more easier to research and water the soil.

III. AN OVERVIEW OF AUTOMATIC SOIL MOISTURE MONITORING SYSTEM

The Automatic Soil Moisture Monitoring System is essential for saving water and maintaining the moisture value of the soil. With this system we can automate the watering process to crops, trees, plants without doing any effort. This system is also can be used for the research purpose as online database is maintained for the log of the system which will help us to know the what type of soil requires what amount of water for what kind of crop/tree/plant. We can also control and operate the system through cell phones using android application.

IV. IMPLEMENTATION

A. Main Window

This is the main window of the project i.e. the windows application where we have to connect the usb port and open the connection i.e. connect the embedded system to the pc and online database connection is established.

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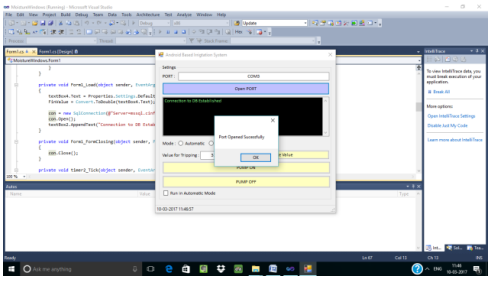

Fig. 1: Main Window of my project.

B. Automatic and Manual Modes

The system works on automatic and manual modes after opening the port and establishing the database connection.

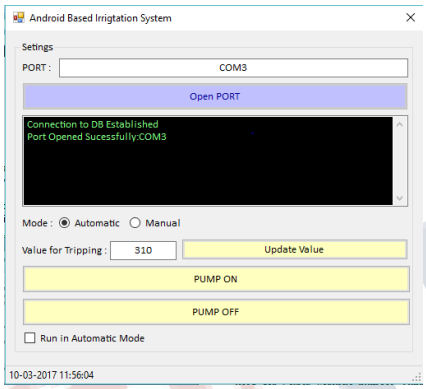

Fig. 2: Automatic and Manual mode of windows application.

C. Automatic Mode

The Automatic mode of web application is one in which the application updates and checks the value of of sensors in every 3sec of interval and if the the value is below the expected value then the pump starts and above the value it stops.

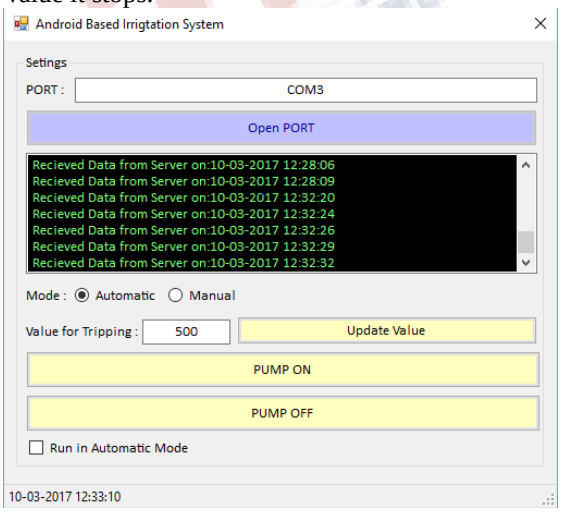

Fig. 3: Automatic mode.

D. Manual Mode

The Manual mode of the system is developed in case of some emergencies in this mode we can manually operate the pump just by clicking ON OFF buttons.

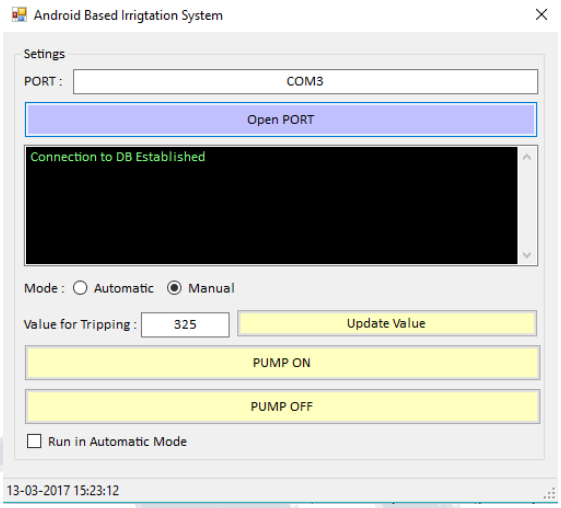

Fig. 4: Manual mode of windows application.

E. The Android App

The System can also be controlled and operated by android application by which we can view the log anywhere using this application and can control the pump manually with the app and the current reading of the soil is also obtained using this app through online database.

Fig. 5: Screenshot of Android application.

F. Sensor and the circuit along with the USB port for integrating the circuit with Online database.

The circuit contains a Moisture Sensor, a USB port, Relay, Pump, LED, URN-2003 and a Micro Controller. The Soil Moisture Sensor is put inside the soil which continuously checks the moisture content in the soil .The Moisture Sensor then send this value to the micro

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controller which then converts the analogue value to digital using URN-2003and send the value to the Pc which checks the value and compares with the threshold value of the soil set by the user and if the value is below the threshold value then it sends the ON command else sends the OFF command and repeats the process after regular intervals and also updates the Log in the Online database. The command is then by micro controller is sent to the relay which is further connected to the Pump.

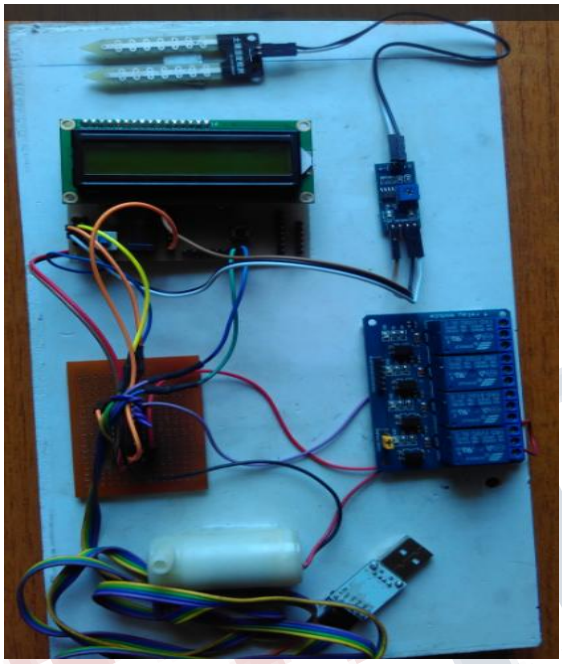

Fig. 6: Hardware of the system.

G. Online Database

The Log of the Moisture sensor values are maintained in the database with date-time , values of the sensor and status of the pump so that it can be further studied for the purpose of research and development.

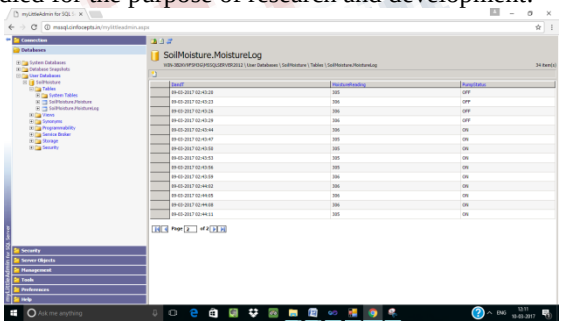

Fig. 7: Online Moisture log to research and analyze the water requirement of the soil.

IV. CONCLUSION

This is an ongoing project. The main objective of project is that farmers were facing problem because of scarcity of water but now by using this system we can prevent wastage of water and farmers can maintain the quality of soil by supplying the adequate amount of water and even we can do research on the basis of log of pump that what kind of water require what quantity of water. We have discussed a small prototype in this paper but in future it can be expanded to many other areas.

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