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# Real Time Atomization Of Indian Agricultural System

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**Abstract---The recent trends in developing low cost techniques to support cost effective agriculture in developing countries with huge population has motivated the development of low cost sensing systems to provide for low cost irrigation facilities and also to provide for saving of water at the same time. A smart irrigation system is developed to optimize water use for agricultural crops. The system has a distributed in-situ wireless network of soil-moisture and temperature sensors placed in the root zone of the plants. In addition, humidity sensor, ultrasonic sensor and PH sensor is used for automation. India being an agricultural country where many people's livelihood depends on agricultural production it can provide to be highly beneficial.**

**Keywords–Moisture sensor, Temp & Humidity sensor, Ultrasonic sensor, Microcontroller, LABVIEW, ZigBee.**

## I. INTRODUCTION

Irrigation is one of the essential problems of agriculture in developing countries. Typically in these developing countries uneducated farmers tend to use more water than required by manual techniques hence wasting them. Soil moisture sensors are typically needed in such situations to indicate to the former when it is needed to irrigate the field and when not needed. An important parameter in today's world is food security as environmental degradation is a big threat. The need of the hour is proper utilization of resources.In developing countries where farming of land and crop production is a major source of income it becomes mandatory to manage the land in a beneficial manner. Moisture content in soil is optimal for plant growth .All the water held in the soil is not available to plants. Much of the water is available in the soil as a thin film which serves as a medium for supply of nutrients to growing plants. The paper describes design of a capacitance based soil moisture sensor which helps in finding moisture content of soil also depicting the variations in analog voltage with the change in moisture content.

Atomizing the agricultural system is very useful for old people and normal persons who live far away from the agricultural field. If installed and programmed properly, automatic agricultural systems can even save us money and help in water conservation. Here LCD and ZigBee the information about temperature, humidity, water level and conditions of the soil and motor. This paper using withATMEGA16 and Zig Bee is focused on atomizing the irrigation system for social welfare of Indian agricultural system and also to provide perfect irrigation in particular area. Soil moisture sensor sense the condition of the soil whether it is dry or wet and ph level of soil detail sends the information to controller. Moisture sensor senses the water level in the soil and sends the information to the controller. Controller sends the information to the relay then on/off of the motor is done. Temperature and humidity sensor also sense the condition of the weather and sends the information to Controller. There is a serial communication between controller and ZigBee. So the information from the controller is sent through ZigBee. Server displays and receives the information about temperature, humidity and conditions of the soil.Our project aims to implement the basic application of Modernization the irrigation field by programming the components and building the necessary hardware.

It is a very interesting application. An integrated wired/wireless solution allows one to exploit the positive aspects of both technologies by improving performances and productivity. Various network topologies that have to be implemented depend on the requirement of the application. The entire farm can be controlled by LAN, implemented based on the requirement of the farm application. Each node will be connected with the sensors, solenoid valves, and microcontroller. They are connected with each other by wireless systems. The sensors are used to monitor and collect the information about the climatic condition of the farm like temperature, humidity and also to check the water level with dry/wet condition of farm.

## II. METHODOLOGY

The prototype model real-time atomization of agricultural environment for social modernization of Indian agricultural system will be made in the following steps:

- Complete layout of the whole setup will be drawn inform of a block diagram for each node.
- PH sensor sensed the ph level of the soil and gives its output to the microcontroller & is displayed on the LCD.
- The temperature sensed by sensor is displayed on LCD
- The soil condition is checked by moisture sensor, depending upon the soil condition & water level, water pump motor is turned on or off.
- Prevention from the animals and birds Ultrasonic sensor is used and buzzed the alarm.
- The status of the whole farm can be checked & updated wirelessly with help of ZigBee technology.

## III. LITERATURE SURVEY

Over 50 years since its independence, India has made immense progress in its agriculture system to increase food grains. Two years of severe drought in 1965 and 1966 convinced India to reform its agricultural policies. Even though Agricultural policies were success; irrigation infrastructure was very poor hence Indian farmer innovated with tube-wells,to harvest ground water. New technology was adopted to irrigate the agriculture land in large. The lasting benefits ofimproved farming technologies depends on whether India develops infrastructure such as irrigation network, floodcontrol systems, reliable electricity usage and production capacity.As irrigation becomes the major part to have growth at economic status of our country. In time watering and properapplication of bio fertilizer, along with proper monitoring of fields results in the social modernization of Indianagriculture system. This becomes quite interesting concept which is going to be major tool to reduce the power cost required for atomization of agriculture.

This system uses the integration of the both wired and wireless techniques and ATMEGA16 controller to have regular monitoring on the environmental conditions of farm and also provides the necessary precautions to be taken for yield to increase for modern agriculture.

## IV. WORKING PRINCIPLE

### A. Block Diagram

The high performance ATMEGA16 microcontroller is used for monitoring and controlling purpose with the LABVIEW software. This project is mainly designed for irrigation. So it explains soil moisture sensor and its functions.8bit analog to digital converter collects the temperature and humidity value.Fig.1 explains the entire parts of the project and it tells the total controlling system.

In case of monitoring the soil moisture, we know that each crop requires different moisture level. We are using a soil moisture sensor which is based on the principle of parallel capacitor. As we know that the voltage across is inversely proportional to the dielectric medium. Principle is used to determine the soil moisture by measuring the dielectric constant of soil. This is then informed the centralized unit. The centralized unit will send the message to the device of that particular subscriber. The device waits for a certain amount of default time for which it is programmed.

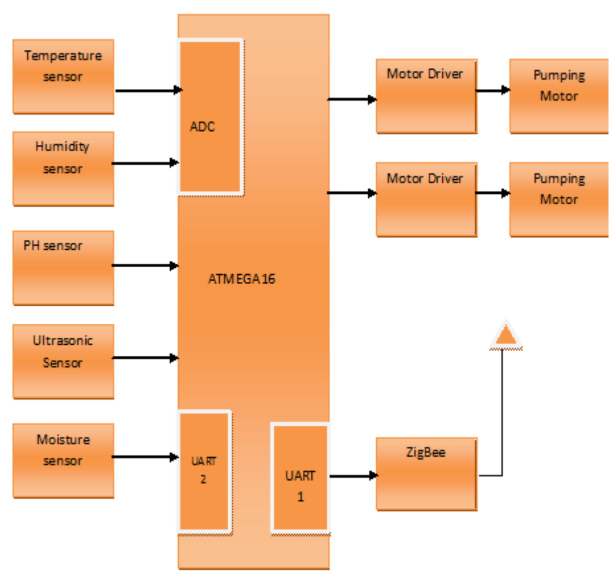


Fig.1 Block Diagram of Irrigation System

Temperature sensor works in 10bit ADC. Every 5sec the values is noted. The reference voltage is 5V.we used the formulae for converting the count into voltage.

Voltage= (5000/1024)*count

Humidity sensor measured the relative humidity in percentage. The amount of moisture in the air is expressed in relative humidity. We should maintain the relative humidity RH between 60-70%. It affects the ability of plants. Humidity also influences plant diseases especially fungi and molds that grow and spread rapidly when humidity is high. RH value decreases, it increases the evaporation. If RH value increases, it affects the leaf growth, photosynthesis, pests, reduced $CO_2$ uptake.

B. Moisture Sensor

The sensor measures the soil's dielectric constant in order to find its volumetric water content (VWC). It obtains the volumetric water content by measuring the dielectric constant of the media through the utilization of frequency domain technology. Since the dielectric constant of water is much higher than that of air or soil minerals, the dielectric constant of the soil is a sensitive measure of volumetric water content.The sensor has a less power requirement and much more resolution. This gives the ability to make many measurements (i.e. hourly) over a long period of time with minimal battery usage. In addition, the sensors incorporate a high frequency oscillation, which allows the sensor to accurately evaluate soil moisture in any soil with minimum salinity and textural effects. Following are example output readings from sensor. Each reading consists of 4 bytes at 9600 baud rate. The reading packet's last byte is always enter key character (0x0D in hex and 13 in decimal) so we can view each reading on new line. Also this character knows how to be used to sync in microcontrollers after reach readings.The output reading is 8bit value in ASCII format from 000 to 255.

In air the output would be 000-005 and holding by hand the reading would go instantly to 040-050 sensing even the moisture of hand. If dipped in full water the reading would come to around 170-180 instantly. If we slowly move it out of water, the reading will start dropping.If sensor is locate in full wet soil, the reading will come to around 200 to 255. In dry soil reading would be around 020-050.

C. Control Unit

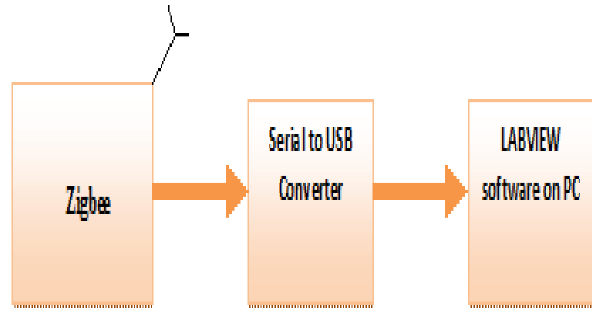


Fig.2 Receiver Section

D. Flow Chart

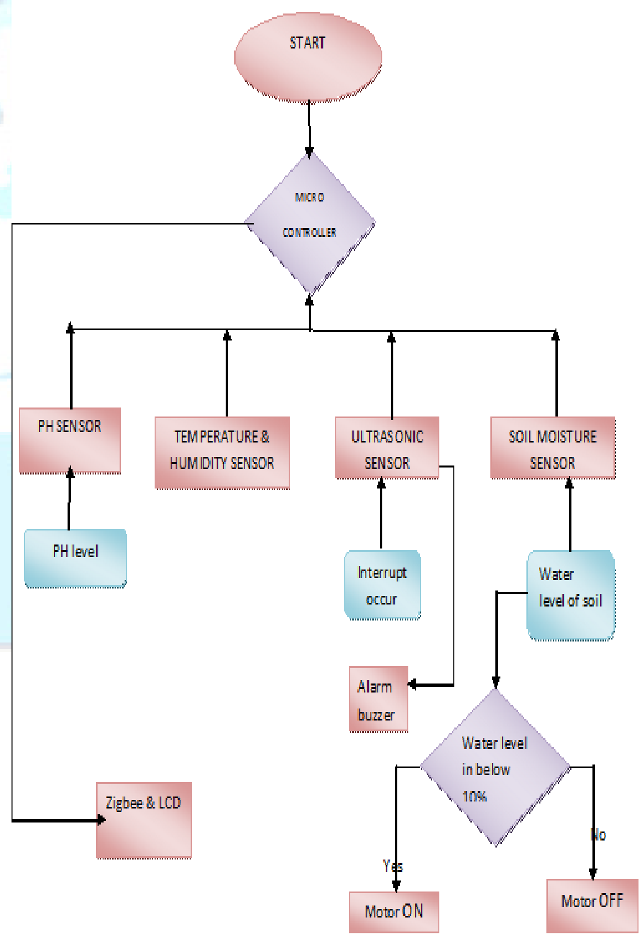


Fig.3 Flow Chart

## V. MONITORING SYSTEM-SOFTWARE

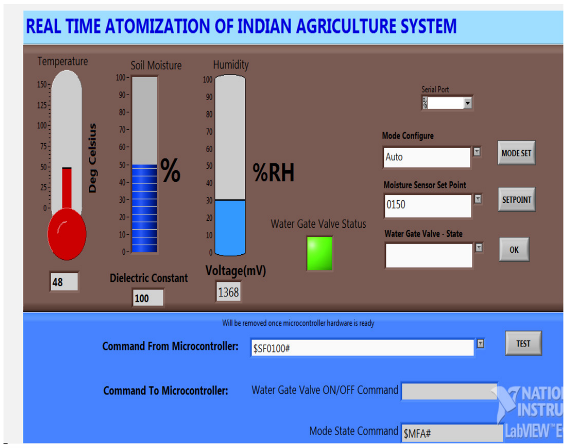


Fig.4 Front Panel-Auto Mode

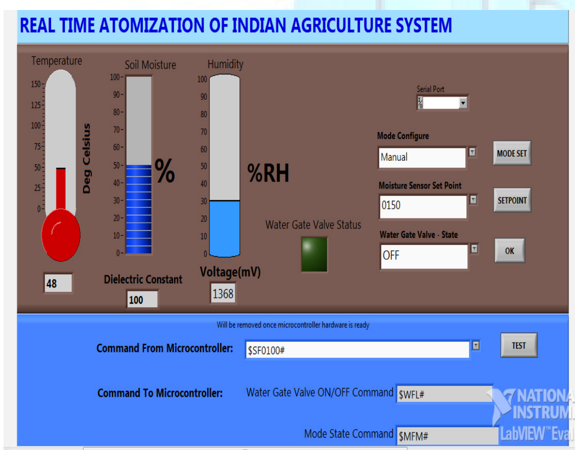


Fig.5 Front Panel-Manual Mode

The above diagrams show the front panel of the LABVIEW. Fig.4 shows the smart irrigation- auto mode. We set the sensor range in microcontroller. If we set the value, it reaches and below the set value of moisture sensor, the water gate level is automatically ON. It's all done is the while loop. So the process is continuously done without the man power.

Fig.5 shows the smart irrigation manual mode. Here we can know the ranges of moisture, temperature and humidity. We open and off the water gate level manually whenever we want. Table 1 shows the range of moisture sensor whichever used in this project.

Table 1 Range of Moisture Sensor

| TYPE | DIELECTRIC CONSTANT (IN COUNT) | VWC (IN %) |
|---|---|---|
| **In air** | 00 to 05 | 0 |
| **Dry soil** | 20-50 | 10 |
| **Half wet soil** | 70-120 | 40 |
| **3/4$^{th}$ wet soil** | 130-180 | 60 |
| **Full wet soil** | 200-255 | 100 |

## VI. CONCLUSION

Traditional or old-type farming method is involving much more manual labor and for longer hours than the more modern methods of today. Farmers are highly dependent on climate and weather. In traditional agricultural system the farmer is used to stay at nights in order to ON the motor when power comes. Instantly the farmer comes to the field to monitor its condition.

The Frequency domain based sensor is used along with the temperature and humidity sensor for efficient irrigation using wireless sensor network. The present work includes framing of the software protocol, which is used to transfer the data between the control center and field sensor nodes. The control center is running in LABVIEW software. The soil moisture, Temperature and humidity sensor data are collected in LABVIEW and the corresponding values are displayed in the LABVIEW using framed software protocol. The data are collected and processed and displayed to the corresponding sensor's indicator. The smart irrigation scheduling is designed such that both experts and non-experts can irrigate a particular field. The software consists of AUTO and MANUAL Mode. AUTO mode is made for non-experts and Manual Mode made for experts to schedule their irrigation. This irrigation scheduling algorithm is tested with different set point using LABVIEW software. Based on the sensor's threshold value, the water gate valve control action is performed and displayed in LABVIEW software. Hence both incoming and outgoing data packets are processed and corresponding display actions are performed.

The system not only saves the energy consumption significantly, but also reduces a large number of inputting on the human and material resources in the management. Applying embedded technology and ZigBee wireless transceiver technology to the rapid deployment system of the incident detection of emergency food storage environment without complicated connections, it enhances the system's flexibility, small size, low cost and good effective, so it is easy to install and migrate.

Future scope is, the sensor node can be monitored and controlled from remote place through a web server using GPRS module at the control center. The superior person can also monitor, which canal is irrigating the field presently from a remote place. This avoids the misuse of the water gate valve operation by a particular field person. This makes the solution more effective.

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