Automated Irrigation System

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***Abstract*— Population of many countries around the world is growing at a rapid speed. The growth in population is leading to numerous problems but the most featured problem is the shortening of food supplies which is a threat for the Third World. So to meet up the future food needs, there is a significant need of advancement in cultivation. It is important to know moisture levels in soil to maximize the output. This paper proposes and demonstrate an economical and easy to use arduino based controlled irrigation system where there is no need of human labour. The designed system deals with various environmental factors such as moisture, temperature and amount of water required by the crops using sensors like soil moisture sensor and water level sensor. Measuring soil moisture is an effective way to determine condition of soil and get information about the quantity of water that need to be supplied for cultivation. The system is completely automatic and reliable which can improve cost efficiency and water resource management.**

I. INTRODUCTION

This Continuous increasing demand of food requires the controlin highly specialized greenhouse vegetable rapid improvement in food production technology. In a production and it is a simple, precise method for country like India, where the economy is mainly based on irrigation The main reason is the lack of rains scarcity of land Irrigation. India is called country of agriculture. Here 70 depends on agriculture. According to human population, agriculture is only one source to grow the seeds of food. of water without planning the ground water level is decreasing day by day, the lack of rains and land of water is decreasing also. It means the volume of water on earth and its level is down day by day. Today drip irrigation is necessary to control the level of water on earth. Drip irrigation system is provided the root to zone of plant drop by drop which results in saving of huge amount of water. The target of this system is following: a) Save energy and water resources. b) Manually and automatic control the system. c) Detect the water level. c) To increase the productivity of crop. e) To increase the efficiency of water. f) Selection of irrigation based on the different parameter.

II. PROBLEM STATEMENT

At present there is emerging global water crisis where managing scarcity of water has become a tedious job and there are conflicts between users of water. This is an era where human use and pollution of water resource have crossed the levels which lead to limit food production and low down the ecosystem. The major reason for these limitations is the growth of population which is increasing at a faster rate than the production of food and after a few years this population will sum up to 3-4 billion. The management of these farms which are in greenhouses will require a data acquisition to be located in each greenhouse and the control room where a control unit is located. These are separated from the production area. At present, the data is transferred using wired communication called field bus. This data is transferred between greenhouses and control room.

A. WATER MANAGEMENT

The main requirement of paddy is wet soil for its growth and sufficient water management according to need. Flooding is unnecessary if the weeds can be removed manually but if not then the fields are flooded to suppress weed growth and maintain nutrients such as phosphorus, potassium, and calcium iron. Water is needed only at three critical stages, at the initial seedling period (10 days), flowering and panicle initiation stage. After the transplantation till the seedlings grow it needs standing water at a depth of 2-5 cm. Then till the dough stage of the crop, 5cm of water should be maintained. Then at last, water should be drained out from the field 7 days before the harvest. The amount of water given crop depends on state of development of soil, quantity and type of fertilizer given, quality of water needs a lot of water.

B. IMPORTANCE OF IRRIGATION

The rainfall of in our country depends on monsoons. Rainfall controls agriculture, but the agriculture is said to be “the gambling of the monsoon” as the monsoon rainfall are uncertain, irregular and uneven or unequal. So irrigation is essential for agriculture. In INDIA there are 80four months, i.e. from mid June to mid October. So it is very necessary to irrigation for farm field during the rest of the eight months [1].

C. What is irrigation

Irrigation is the artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate

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rainfall. Additionally, irrigation also has a few other uses in crop production, which include protecting plants against frost, suppressing weed growing in grain fields and helping in preventing soil consolidation. In contrast, agriculture that relies only on direct rainfal land farming.

III. PROPOSED WORK

In the proposed algorithm, according to the power supply given to the arduino board, the sensors will start working. The DHT11 sensor senses the temperature and humidity of particular root zone of the plants and on the other end the Soil moisture sensor is also interfaced to the microcontroller unit sends the corresponding values to the microcontroller unit for every 5minutes. The main aim of the microcontroller unit is to check the data values which was send by the sensors and was compared with the predefined threshold which was programmed in the microcontroller unit. When the sensor data value does not greater than the threshold value then the microcontroller displays these values.

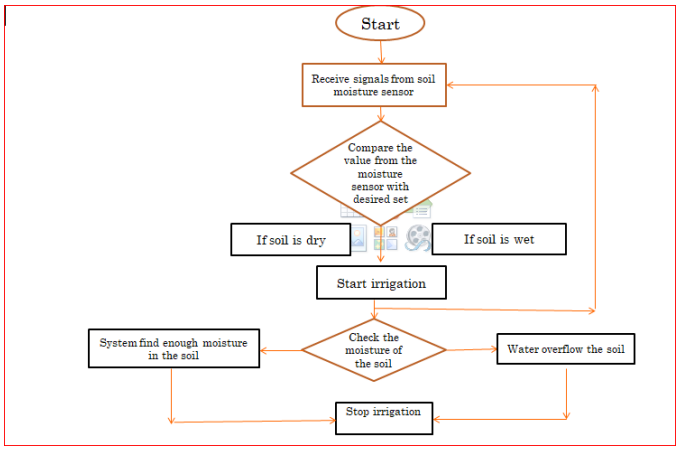

Fig. 1: Flowchart

IV. BLOCK DIAGRAM

The Block diagram implementation of an automated irrigation system using Arduino is shown in Fig.

The automated irrigation system consists of two units are control unit and sensing unit. The control unit consists of microcontroller which controls the execution of operation and the sensing unit consists of different sensors such as DHT11 sensor and soil moisture sensor. The microcontroller used in this project was the ATMEGA328 microcontroller. The arduino board consists of inbuilt ATMEGA 328 microcontroller unit. The DHT11 sensor and soil moisture sensors are interfaced to the ARDUINO board. The sensing units send the corresponding data values continuously for every 5minutes to the ARDUINO board. The board displays the current temperature and humidity of a particular root zone by using which is also interfaced to the board. The ARDUINO board gets the data values from the sensing units and these values are compared with the predefined threshold that was programmed in the microcontroller unit. When the data values of the particular sensors are greater than the threshold, then the ARDUINO board sends an SMS to the mobile phone of an owner who is in the remote location. The sending of an SMS is done is through SIM900A module which is interfaced to the ARDUINO board. This module communicates with microcontroller by AT commands.

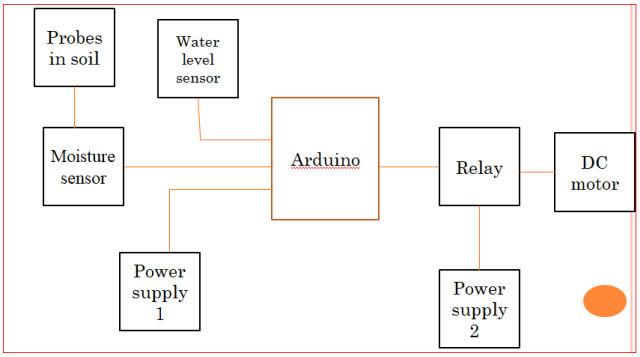

Fig. 2: Block diagram

V. SYSTEM COMPONENTS

A. Soil moisture Sensor

Soil moisture sensor includes comparator (LM393) which converts analog data to discrete. Two soil probes consist of two thin copper wires each of 5 cm length which can be immersed into the soil under test. The circuit gives a voltage output corresponding to the conductivity of soil. The soil between the probes acts as a variable resistance whose value depends upon moisture content in soil. The resistance across soil probes can vary from infinity (for completely dry soil) to a very little resistance (for 100in resistance across the probes (RS) leads to variation in forward-bias voltage which leads to corresponding variation

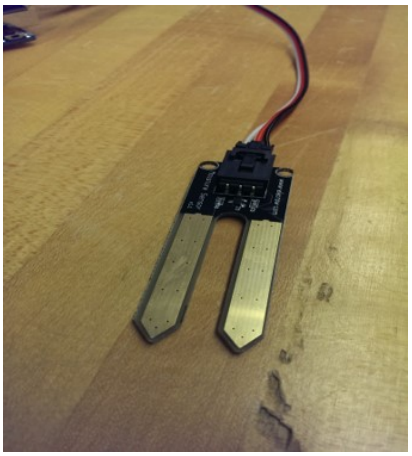

Fig. 3: Moisture sensor

B. ARDUINO board

ARDUINO is an open source physical computing platform based on a simple microcontroller board and a development

environment for writing software for the board. It has 14 digital pins, 6 analog pins, 16 MHZ crystal oscillator, a USB connection, a power source jack and a reset button.

Fig. 4: Arduino

C. Water Sensor

A water detector is an electronic device that is designed to detect the presence of water and provide an alert in time to allow the prevention of water leakage. A common design is a small cable or device that lies flat on a floor and relies on the electrical conductivity of water to decrease the resistance across two contacts. The device then sounds an audible alarm together with providing onward signalling in the presence of enough water to bridge the contacts. These are useful in a normally occupied area near any infrastructure that has the potential to leak water, such as HVAC, water pipes, drain pipes, vending machines, dehumidifiers, or water tan

Fig. 5: Water sensor

D. Water pump

A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps.[1]

Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps

Fig. 6: Pump

VI. ADVANTAGE

(a) It saves water due to possibility of using saline water.
(b) Efficient and welfare use of fertilizers.
(c) Installation is easy flexibility in operation.
(d) Suits to all types of land terrain also suitable to waste water.
(e) Enhances plant growth and yield better quality of produce.
(f) Weed growth is less.
(g) Saves labour works.
(h) No soil erosion which saves land.

VII. CHALLENGES AND FUTURE SCOPE

The future work is trying to improve the topology structure to make all nodes communicate with each other, also to improve the stability of wireless sensors in communication by better software and hardware design. Especially, a design of smart irrigation control system based on wireless sensor networks and implement irrigation decision by real-time humidity data and expert data. Moreover, design and implementation of software architecture for the smart monitor system need continuous improvement to meet various real demands change the font style.

VIII. CONCLUSIONS

By implementing this idea, we can improve the traditional way of agriculture irrigation system in different region of our country.

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