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SMART IRRIGATION SYSTEM

Prof. Shaikh Z. A. R. [1],
Mr. Alankar Suryawanshi [2],
Mr. Ram Suryawanshi [3],
Mr. Bhanudas Suryawanshi [4],
Mr. Dinesh Rampure [5]
Head of Department of Electrical Engineering [1]
(V V P Polytechnic Solapur – 413008)
Students of Department of Electrical Engineering [2,3,4,5]
(V V P Polytechnic Solapur – 413008)

Abstract
In daily operations related to farming or gardening watering is the most important practice and the most labor-intensive task. No matter what whichever weather is, either too hot and dry or too cloudy and wet, you want to be able to control the amount of water that reaches your plants. Modern watering systems could be effectively used to water plants when they need them. But this manual process of watering requires two important aspects to be considered: when and how much to water. In order to replace manual activities and make gardener's work easier, we have created an automatic plant watering system also known as a smart irrigation system. By adding this smart irrigation system to the garden or agricultural field, you will help all of the plants reach their fullest potential as well as conserve water. Using sprinklers drip emitters, or a combination of both, we have designed a system that is ideal for every plant in the yard. For the implementation of a smart irrigation system, we have used a combination of sprinkler systems, pipes, and nozzles. In this paper, we have used the ATmega328 microcontroller. It is programmed to sense the moisture level of plants at a particular instance in time if the moisture content is less than the specified threshold which is predefined according to the particular plant's water need then the desired amount of water is supplied till it reaches a threshold. Also, we have added a servo motor that gives direction to the water pipe. Generally, plants need to be watered twice a day, morning and evening. Thus, the microcontroller is programmed to water plants two times per day. Thesystem is designed in such a way that it reports its current state as well as reminds the user to add water to the tank. We hope that through this prototype we allzcan enjoy having plants, without being worried about absence or forgetfulness.

I. INTRODUCTION

We all know that plants are very beneficial to all human beings in many aspects. Plants help in keepingthe environment healthy by cleaning the air naturally and producing oxygen. Many people love to have plants in theirbackyard. But due to civilization and insufficiency of place,many people used to grow plants in mold or dirt, pots, and placed on the windowsill. This plant is dependent on conventional breeding - watering and providing the right amount of sun to sustain life and growth. In the busy schedule of day-to-day life, many time people forget to water their plants, and due to these plants suffers many disorders and ultimately died. In addition, the world's biggest problem in modem society is the shortage of water resources, agriculture is a demanding job to consume large amounts of water. It is very essential to utilize water resources in a proper way. Thus, a system is required, to handle this task automatically. Automated plant watering system estimate and measure the existing plant and then supplies desired amount of water needed by that plant. It minimizes the excess water use as well as keeps plants healthy.

II. LITERATURE SURVEY

Irrigation is most important for high yield of the farm. Today, by using WSN technology it is possible to monitor and control the environmental conditions as soil moisture, temperature, wind speed, wind pressure, salinity, turbidity, humidity etc. for irrigation. Automated irrigation performed by using solenoid valve and pump. Solenoid valve is an electromechanical valve used with liquid controller to control an electronic current through solenoid which is a coil of wire that uses to control the state of the valve according to need of irrigation. Mesa Sudha et al., 2011 [4] proposed a TDMA based MAC protocol used for collect data such as soil moisture and temperature for optimum irrigation to save energy. MAC protocol plays an important role to reduce energy consumption. Two methods used for energy efficiency as Direct Communication method and aggregation method. Direct Communication method provides collision free transmission of data, because all the sensor nodes senddata directly to the base station without the need of header node.

This method is better where the base station is near but itis not optimum where the base station is far because sensor nodes consume more energy during transmission of data and if there is much data to the sensor node, sensor nodesquickly damaged.

The data aggregation method is better to use rather than direct communication method. The sensor node senses the data and send to the head node. The head node collects data from the entire sensor node, performs aggregation using various aggregation techniques, and then sends data to the base station. Thus, by using aggregation method overall energy consumption reduce of the network. The simulation result show that aggregation method provides better performance rather than direct communication method. It provides 10% increase in residual energy and 13% increase in throughput. Sensor nodes consume more energy while transmitting data.

III. BLOCK DIAGRAM

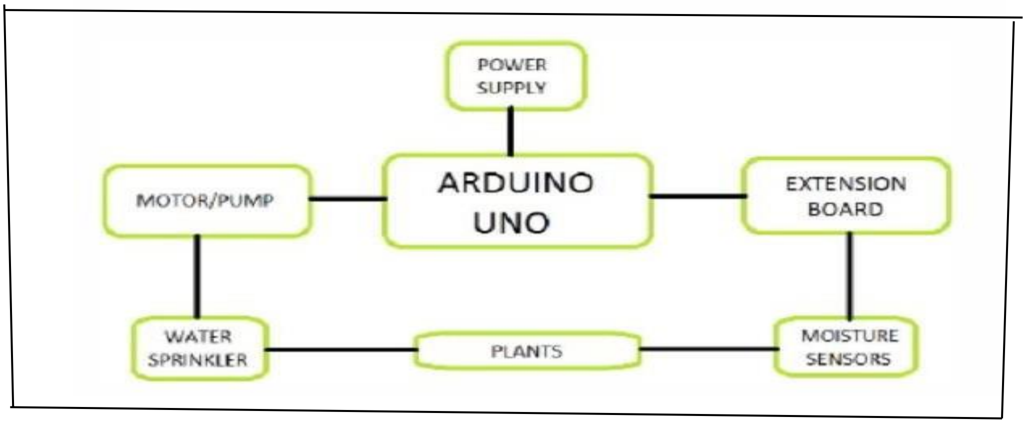


Fig. 1Block Diagram

IV. PROBLEM IDENTIFICATION

Now the problem is wasting water during the irrigation. To improve irrigation efficiency, an intelligent irrigation system has been introduced. In recent days, smart irrigation

V. CIRCUIT DIAGRAM

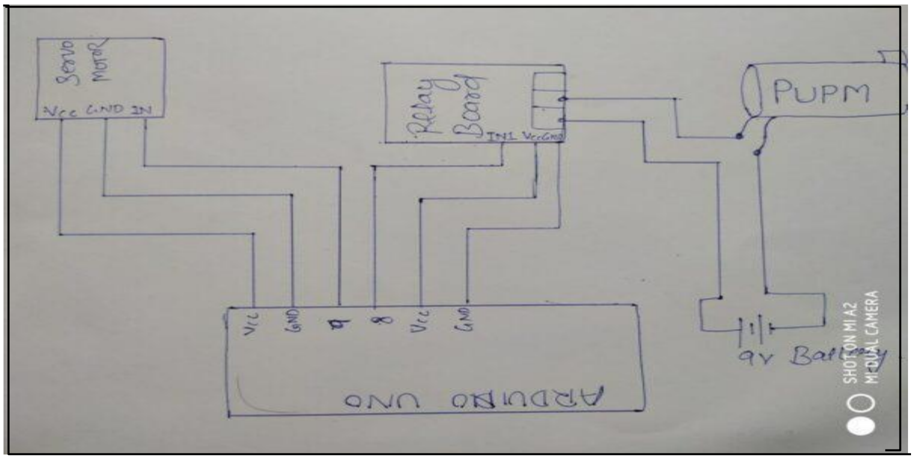


Fig. 2 Circuit Diagram

A. Detecting Moisture Content:

This will be achieved by a soil moisture sensor. They are connected to an Arduino microcontroller board. The Arduino board is programmed using the IDE software. Humidity sensor senses to indicate that the plant needs watering humidity levels in the soil, and sends the signal to the Arduino.

B. Select the plant to water:

Automatic Watering To The Plant And knowing which fieldrequired the water so, this way we can water the two different plants with the help of a direction control motor In this work, we have used an Arduino microcontroller in combination with a relay control switch to control the motorand overall functioning. The motor may be driven by an is the subject of popular discussion for researchers. The irrigation system is the smart climate monitoring system, soil conditions, evaporation, using plant water and automatic irrigation program. Intelligent irrigation systems beautify watering schedules an automatically running times to meet the specific needs of the landscape. The controllers significantly improve the efficiency of outdoor water use. There are several options for smart irrigation controllers, such as climate-based soil moisture sensors and on the site.

external 9V battery with interfacing to a microcontroller.

VI. METHODOLOGY

There are two functional components in this project;moisture sensors and a motor/pump. The Arduino board is programmed using the Arduino IDE software. A moisture sensor is used to detect the soil moisture content. The motor/pump is used to supply water to plants. Soil moisture range is set particularly for specific plants requirement, and according to that system is being operated. Microcontroller (ATmega328), is the brain of the system. Pump and servo motor coupled to the output pin. In case of soil moisture value is less than the threshold system automatically triggers the water pumpon till the sensor meets the threshold and then sets off automatically. The overall activity is reported to the user using mobile. There we are using two fields for irrigation and using there the servo motor to select the land to irrigate.

VII. COMPONENTS DESCRIPTION

A. Arduino Uno:

Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input / output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 16 MHz ceramic resonator, USB connection, power jack, ICSP plug, and a reset button. It contains everything needed to support the microcontroller; simply use the USB cable or power it with a AC-to- DC adapter or battery is connected to a computer begins.

B. Moisture Sensor Soil:

moisture sensor measures the soil water content. Soil moisture probe consists of a plurality of soil moisture sensors. Soil moisture sensor technology, commonly used are: •Frequency domain sensor, such as a capacitive sensor. • Neutron moisture meter, characteristic of the use of water in the neutron moderator. • Soil resistivity. In this particular project, we will use the soil moisture sensors which can be inserted into soil to measure the soil moisture content.

C. Water Pump:

Water is used to perform a specific task of artificially pumping. It can be controlled by an electronic microcontroller. It can be on 1 triggered by sending the signal and turned off as needed. Artificial process is called Water Pumping Station. There are many varieties of pumps. This project uses a small pump connected to the H-bridge.

D. The Relay Module:

The relay is an electrically operated switch. Many relays for switching solenoid mechanisms are mechanically operated, but can also be used for other principles of operation. Relays are widely used in early computers to telephones and perform logical operations.

E. Arduino IDE Tool:

Arduino open-source environment, you can easily write code and upload it to the 110 board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java, and according to the processing, AVC.

F. Servo Motor:

SG90 is a popular micro servo motor commonly used in hobbyist and DIY projects. It is a small, low-cost servo motor that can rotate 180 degrees with a maximum torque of 1.8 kg-cm. It operates at 4.8-6V and has a weight of approximately 9 grams, making it ideal for small-scale robotics and model control applications.

VIII. RESULTDesign And Implementation:

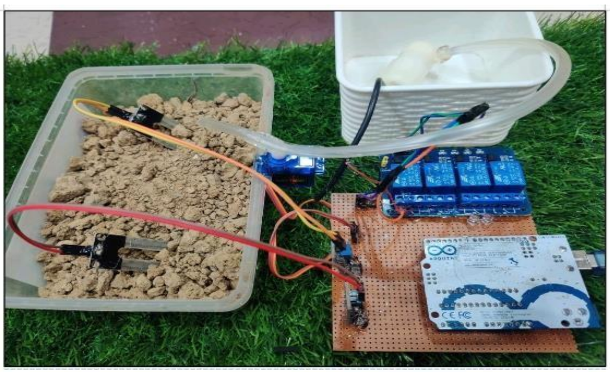
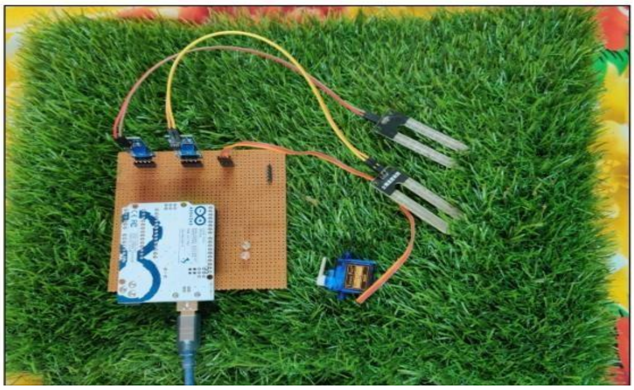
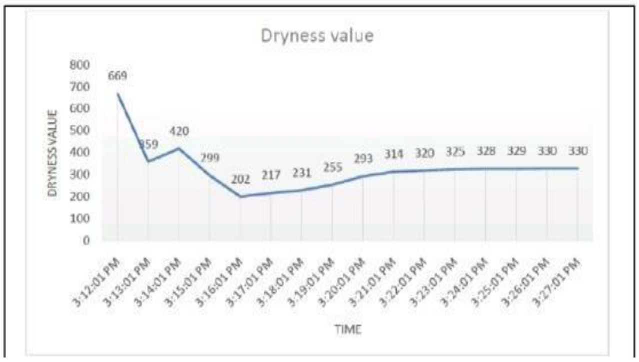


Figure shows the results of our experiment in the form of a general representation of our automatic irrigation system tested on the basis of the microcontroller and the Arduino sensor technology. When the program was loaded onto the Arduino, the soil moisture sensor began to Show the value of soil dryness.



Here we can see that when we placed sensor in the soil the dryness value is 669 and watering started as drynessvalue excess the maximum dryness level we defined in the program.

After watering 1min when it fulfills the demand, the motor was stopped automatically then few seconds later surrounding of the plant was dry and the dryness value was 420 the motor again started and watering few seconds then stopped automatically and given a constant value (Figure2). If we want to a water level in the plant then we need to change the defined value 400 to 250 in the program. The first dryness value was 680 then watering 2min it fulfills the demand of saturating water level then we need to change the defined value 400 to 250. Then the motor will be started again and watering the plant 1min and meet the demand of flooding water level then the motor will be stopped automatically (Figure 3). Few seconds later when the dryness value exceed the defined value then the motor started again and watering few value. Irrigation in the plant. The moisture value before and afterobtain excel file.



IX. ADVANTAGES

1. Protection of asserts like motor / control.
2. Save water, time and money.
3. It should be increasing hydraulic efficiency.
4. It also optimization of energy consumption.

X. CONCLUTION

Automatic system using a microcontroller, moisture sensor and other electronic tools were been developed. It was observed that the proposed methodology controls the moisture content of the soil of cultivated land.

The motor automatically starts pumping water if the soil is dry in the desired area. With this, we can give water to 2 different water requirement plants that need water and stops when the moisture content of the soil is maintained as required.

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