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Automated Irrigation System in Agriculture using Android App

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Abstract: Agriculture is the leading source in India. Most of the Indian families depend on agriculture, so it is the important occupation. It plays an important role in the development of an agricultural country. In India, 16% of total GDP and 10% of total exports in India is contributed by agriculture. Anyhow, as there is more water wastage in India one of the method used for water supply is irrigation. In this aspect for saving water and time by using IOT it led to the proposition of the project title named automatic irrigation system. The various sensors in this proposed system used are temperature, humidity, soil, moisture these sensors are used for sensing various parameters of the soil based on the soil moisture. Irrigation of the land is automatically done by ON/OFF of the motor using soil moisture value parameters. On users android application motor status and sensed parameters will be displayed.

Keywords: Internet of things (IoT), Arduino, Temperature sensor, Soil moisture sensor, Humidity sensor And Aspect.

I. INTRODUCTION

Mainly India is an agricultural country. Most of the Indian families depend on agriculture, so it is the most important occupation. In India, 16% of total GDP and 10% of total exports in India is contributed by agriculture. India is the second largest country in terms of total arable land and about 60% of India's land area is arable making. Water is the most essential thing for maintaining the absorption of nutrients from the soil and helps in transpiration. The regulation of the temperature and cooling down the plant is done by water. If availability seems limited through soil and not sufficient to meet the requirement due to drought or excess losses so water is applied externally.

To supplement the requirement as 'Irrigation' we call the external application of water to the soil. Irrigation systems in India are mostly operated manually. Semi-automated and automated techniques are replaced by these techniques. The techniques which are available are like ditch irrigation, terraced irrigation, drip irrigation and sprinkler system.

The global irrigation scenario is categorized by increased demand for higher agricultural productivity, poor performance and decreased availability of water for agriculture. Based on increased demand for higher agricultural productivity, poor performance and decreased availability of water for agriculture global irrigation scenario is categorized. If we use automated irrigation the problems are rectified appropriately.

II. EXISTING SYSTEM

In present systems we manual operation of water pump like farmer goes to pump station to switch on the pump, it takes lot time and lot of efforts to do this, we farmer is not at the location then it's very difficult to switch on the system.

III. PROPOSED SYSTEM

In this project we are automating the system such that soil moisture sensor will sensor soil dryness and switches the motor ON if the soil is dry, and switches off the motor if the soil is wet. in the same project we are adding an extra motor which will be controlled from android app to spray the pesticides to field.

IV. WORKING

In this project we have soil sensor which is kept in soil and when the soil gets dry this soil sensor resistance will change and that signal is given to comparator circuit to make It digital and then that digital signal is given to Arduino board to switch on the relay. Relay will switch on the motor once if it gets activated. The entire circuit gets off once the soil gets wet. We have a Bluetooth installed in this project which can the status of soil moisture and user can switch ON/OFF the motor from remote locations.

V. HARDWARE COMPONENTS

Hardware is just a box with electronic parts in it. It cannot do any work by itself. Certain programs need some work to do. It has the physical aspects of AC and DC voltages. The hardware components involved in this paper are adaptor, Arduino uno, relay module, blue tooth module, soil sensor and water pump. All these hardware components constitute to the construction of automated irrigation system in agriculture using android app. The description and definition of all these hardware components used in the system are stated below.

- 1) *Adaptor*: The device which converts AC voltage to DC is the (electrical) adapter or attribute of one electrical device or system to those of an otherwise incompatible device or system. That would have been incompatible if it does not allow a specific type of hardware to work with another device. The suitable voltages for radio or another small electronic devices i.e 120 V to 12V can be controlled by an electronic adapter. Adapter allow connecting a peripheral device with one plug to a different jack on the computer.

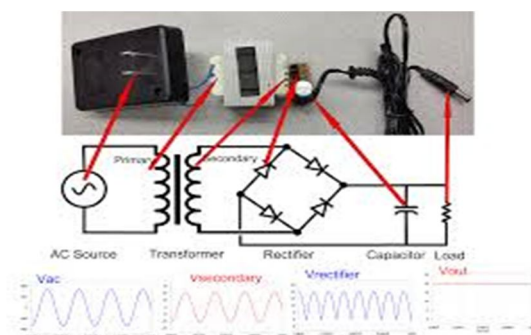


Fig. 1. Adaptor

- 2) *Arduino Uno*: Arduino will have a physical programmable circuit board which can also be called as microcontroller and it has the piece of software, or IDE (Integrated Development Environment) which can run on computer, used to write and upload the computer code to physical board.

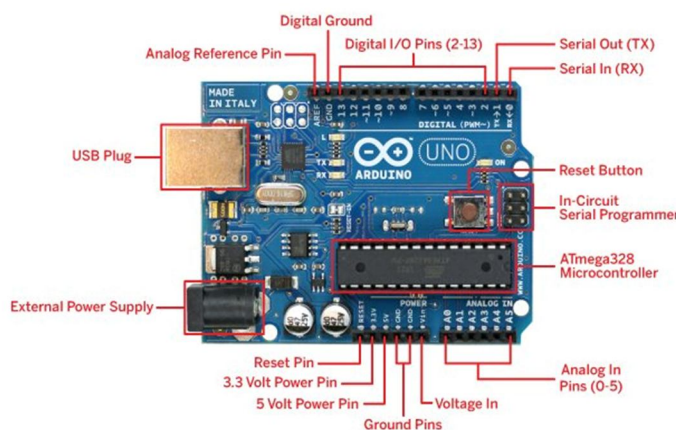


Fig. 2. Arduino uno

- 3) *Relay Module*: In this project we are using SPDT (single pole double throw) relay to switch on the water pump.



Fig. 3. Relay Module

- 4) *Bluetooth Module*: It works on serial communication. Using this module via Bluetooth technology in the smart phone the data collected by the moisture sensor is transferred to the android application.



Fig. 4. Bluetooth Module

- 5) *Soil Sensor*: Volumetric water content in soil is measured by soil moisture sensors. If the soil is wet then it gives a digital signal LOW; if the soil is dry then it gives a digital signal HIGH. This kind of sensor is mainly used for measuring soil moisture status.

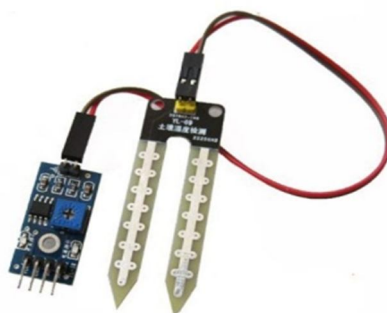


Fig. 5. Soil Sensor

- 6) *Water Pump*: This is a DC 12V motor which is used to pull the water from a tank or well to ground level. This is controlled logically based on soil moisture sensor inputs.



Fig. 6. Water Pump

VI. SOFTWARE REQUIREMENTS

The required software components used in this system are:

- A. Arduino IDE
- B. Embedded C
- C. MIT app Inventor

VII. ARCHITECTURE AND FLOWCHART

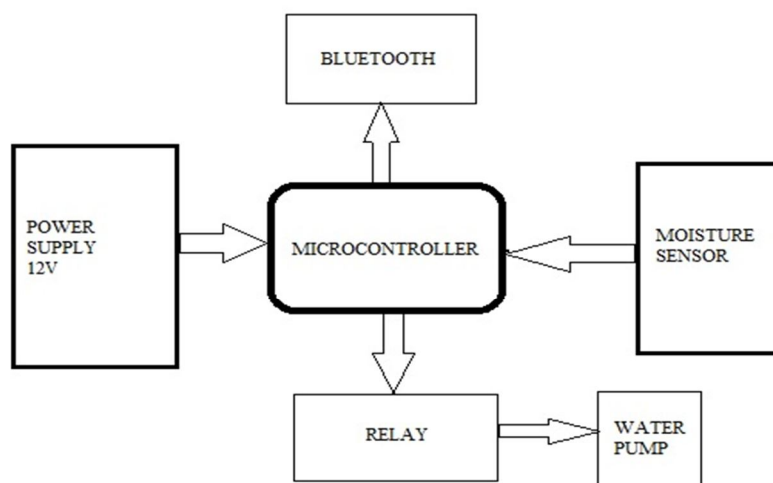


Fig. 7. Block Diagram of System Architecture

A. System Design

To develop an automatic irrigation system a project is designed which switches the pump motor ON/OFF on sensing the moisture content of the soil. Using a proper method of irrigation is important in the field of agriculture. To reduce human intervention and still ensure proper irrigation is one of the most advantage in using this method. Arduino microcontroller is used in this project which is programmed to receive the input signal of varying moisture condition of the soil through the sensing arrangement. The sensor data are stored in database. The web application is designed in such a way to analyse the data received and to check with the threshold values of moisture, humidity and temperature. The decision making is done at server to automate irrigation. If soil moisture is less than the threshold value the motor is switched ON and if the soil moisture exceeds the threshold value the motor is switched off. Let discuss about data acquisition from sensors one by one. The sensor is interfaced with Arduino microcontroller and programmed. The amount of moisture present in the soil surrounding it can be read by the moisture sensors. The soil moisture sensor has two probes which is inserted into the soil. To pass the current through soil this sensor uses two probes. The moisture soil has less resistance and hence passes more current through the soil whereas the dry soils has high resistance and pass less current through the soil. The resistance value help detecting the soil moisture.

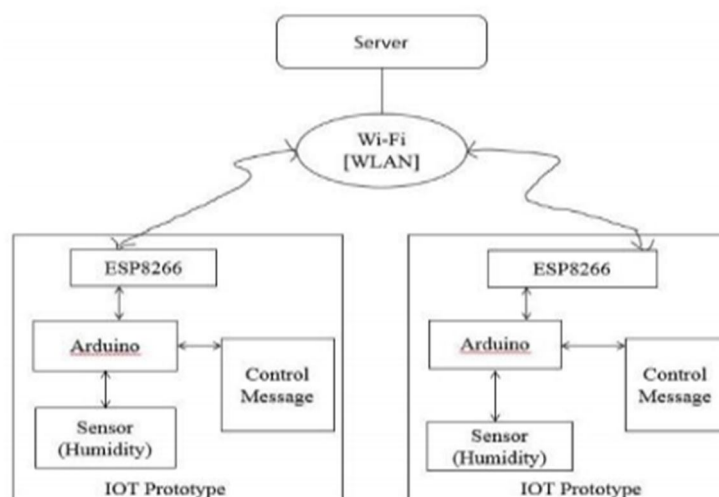


Fig. 8. System Design

VIII. APPLICATIONS AND ADVANTAGES

The applications involved in this project are:

- A. Used in agriculture.
- B. Used in irrigation purpose.
- C. Used in gardens.
- D. Wide usage in fruit crops.

The advantages of the proposed system are:

- 1) Easy to monitor the crop.
- 2) safe and easy to operate for any farmers.

IX. CONCLUSION

This project is very useful for farmers to spray the chemical to crops over android control with help of climate condition like temperature and humidity, in this process there is no need of any human intervention involved. It is truly a viable and financial approach to decrease human exertion and water wastage in farming area. This irrigation control framework utilizing Android can help agriculturist as a part of numerous courses.

X. FUTURE SCOPE

This project can be further enhanced with Raspberry pi IOT technology to achieve high performance to current technology, we can also develop android application for the user to make it more easy operation side part. In the coming years, this app becomes more vulnerable for agricultural methods and is very helpful for the farmers to maintain and monitor crops in a better and efficient way.

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