

Irrigation Management System

Sneha Shiju¹, Sunita Jana², Ashutosh Jain³, Tejas Kumar⁴

¹ Student, Computer Science and Engineering, SRM Institute of Science and Technology, Tamil Nadu, India

² Student, Computer Science and Engineering, SRM Institute of Science and Technology, Tamil Nadu, India

³ Student, Computer Science and Engineering, SRM Institute of Science and Technology, Tamil Nadu, India

⁴ Student, Computer Science and Engineering, SRM Institute of Science and Technology, Tamil Nadu, India

ABSTRACT

Water scarcity is a big concern for farming. This project helps the farmers to irrigate the farmland in an efficient manner with automated irrigation system based on soil humidity. Humidity sensor is used to find the soil humidity and based on this microcontroller drives the solenoid valve. Irrigation status is updated to the server or localhost. Java platform is used here for getting information via serial communication from microcontroller and to update the user. In addition for better cropping system, further in the extension of this project, fertilizers required for the crops, best crops to cultivate for the particular climatic and soil conditions are updated to server at regular basis by monitoring soil PH level, Temperature level of the field area etc., By using PC host, crop is continuously monitored. Also LCD is used to display the PH, temperature and moisture level. This will improve the cultivation method and leads to better productivity.

Keyword : - Humidity Sensor , Java, and LCD

1. Literature Survey

By using the concept of modern irrigation system a farmer can save water up to 50%. This concept depends on two irrigation methods those are: conventional irrigation methods like overhead sprinklers, flood type feeding systems i.e. wet the lower leaves and stem of the plants. The area between the crop rows become dry as the large amount of water is consumed by the flood type methods, in which case the farmer depends only on the incidental rainfalls. The crops are been infected by the leaf mold fungi as the soil surface often stays wet and is saturated after irrigation is completed. Overcoming these drawbacks new techniques are been adopted in the irrigation techniques, through which small amounts of water applies to the parts of root zone of a plant. The plant soil moisture stress is prevented by providing required amount of water resources frequently or often daily by which the moisture condition of the soil will retain well.

The traditional techniques like sprinkler or surface irrigation requires / uses nearly half of water sources. Even more precise amounts of water can be supplied for plants. As far as the foliage is dry the plant damage due to disease and insects will be reduced, which further reduces the operating cost. The dry rows between plants will leads to continuous federations during the irrigation process. Fertilizers can be applied through this type of system, and the cost required for will also reduces. The erosion of soil and wind is much reduced by the recent techniques when compared with overhead sprinkler systems. The soil characteristics will define the form of the dripping nature in the root zone of a plant which receives moisture.

As the method of dripping will reduce huge water losses it became a popular method by reducing the labor cost and increasing the yields. When the components are activated, all the components will read and gives the output signal to the controller, and the information will be displayed to the user (farmer). The sensor readings are analog in nature so the ADC pin in the controller will convert the analog signals into digital format. Then the controller will access information and when the motors are turned On/Off it will be displayed on the LCD Panel

1.1 Existing System

It is a simple project more useful in watering plants automatically without any human interferential. People do not pour the water on to the plants in their gardens when they go to vacation or often forget to water plants. As a result, there is a chance to get the plants damaged. This project is an solution for such kind of problems. Many irrigation systems exists such as,

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7. Automated Irrigation System Using a Wireless Sensor Network and GPRS Module.
8. Automated Irrigation System Using Solar Power.
9. Review for ARM based agriculture field monitoring system.
10. Automatic Irrigation Control by using wireless sensor networks.
11. Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network.

1.2 Issues in Existing System

Humidity sensor is used to find the soil humidity and based on this microcontroller drives the solenoid valve. Irrigation status is updated to the server or localhost. Java platform is used here for getting information via serial communication from microcontroller and to update the user . In addition for better cropping system , further in the extension of this project , fertilizers required for the crops, best crops to cultivate for the particular climatic and soil conditions are updated to server at regular basis by monitoring soil PH level, Temperature level of the field area etc., By using PC host, crop is continuously monitored. Also LCD is used to display the PH, temperature and moisture level. This will improve the cultivation method and leads to better productivity.

2. SPECIFICATIONS

Irrigation of plants is usually a very time- consuming activity, to be done in a reasonable amount of time, it requires a large amount of human resources. Traditionally all the steps were executed by humans. Nowadays some systems use technology to reduce the number or workers or the time required to water the plants. With such systems, the control is very limited, and many resources are still wasted. Water is one of these resources that are used excessively. Many irrigation is one method used to water the plant. This method represents massive losses since the amount of water given is in excess of the plants needs. The excess water is evacuated by the holes of the pots in greenhouses, or it percolates through the soil in the fields. The contemporary preception of water is that of a free renewable resource that can be used in abundance. It is therefore reasonable to assume that it will soon become a very expensive resource everywhere. In addition to the excess cost of water labour is becoming more and more expensive. As a result, if no effort is invested in optimizing these resources, there will be more money involved in the same process. Technology is probably a solution to reduce costs and prevent loss of resource, this project can be a strong way to tackle such a situation.



Fig -1 Soil Moisture Sensor

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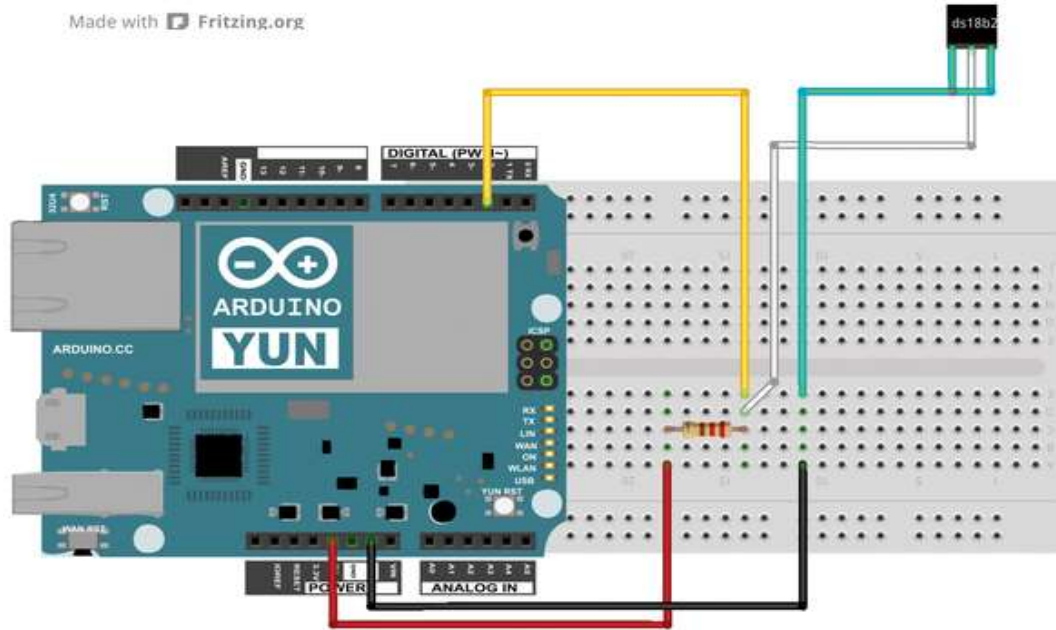


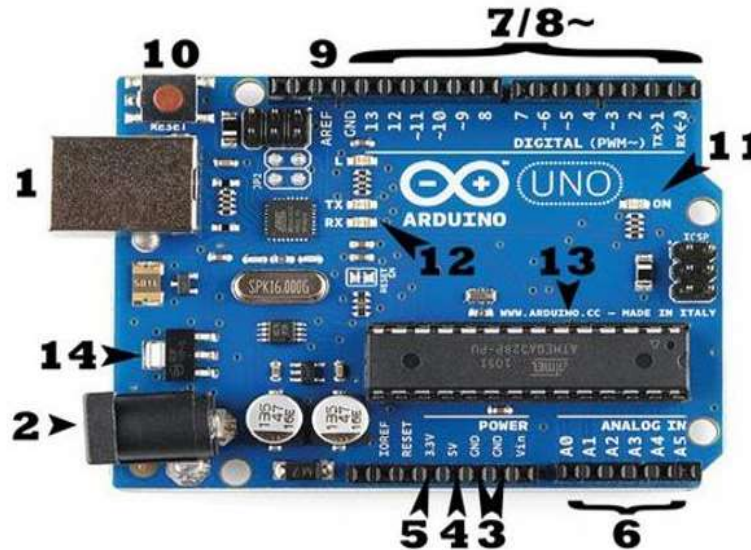
Fig -2: Connection Of Audrino and Sensor

2.1 Project Scope

Day by day, the field of electronics is blooming and have caused great impact on human beings. The project which we are implementing is an automated irrigation method and has a huge scope for future development. The project can be extended to greenhouses where manual supervision is far and few in between. The principle can be extended to create fully automated gardens and farmlands. Combined with the principle of rain water harvesting, it could lead to huge water savings if applied in the right manner. In agricultural lands with severe shortage of rainfall, this model can be successfully applied to achieve great results with most types of soil. By developing a Smart Wireless Sensor and by using upcoming techniques a farmer can increase his profit by solving different problems that are faced by

the farmer in his routine life. And also to involve Arduino – Controller with a video capturing by using an MMS facility about the crop position and at the same time sending video to the farmer.

Fig-3: AUDRINO UNO



2.2 Overall Description

Water is one of these resources that are used excessively. Many irrigation is one method used to water the plant. This method represents massive losses since the amount of water given is in excess of the plants needs. The excess water is evacuated by the holes of the pots in greenhouses, or it percolates through the soil in the fields. The contemporary preception of water is that of a free renewable resource that can be used in abundance. It is therefore reasonable to assume that it will soon become a very expensive resource everywhere. In addition to the excess cost of waterm labour is becoming more and more expensive. As a result, if no effort is invested in optimising these resources, there will be more money involved in the same process. Technology is probably a solution to reduce costs and prevent loss of resource, this project can be a strong way to tackle such a situation.

3. Hardware Interface

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package. The Arduino is a microcontroller board based on the ATmega8. It has 14 digital - input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Soil moisture probes can be permanently installed at representative points in an agricultural field to provide repeated moisture readings over time that can be used for irrigation management. Soil moisture content may be determined via its effect on dielectric constant by measuring the capacitance between the two electrodes implanted in the soil.

Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential; these sensors are usually referred to as soil water potential sensors and include tensiometers and gypsum blocks. Soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content

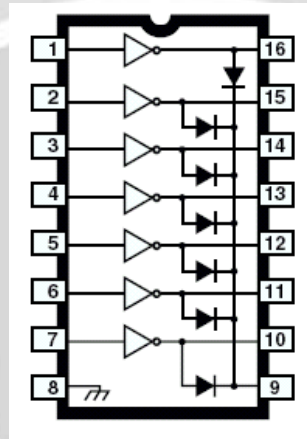


Fig 4: UPL Pin Diagram

3.1 DC Motor

Direct current motor works on the principle, when a current carrying conductor is placed in a magnetic field, it experiences a torque and has a tendency to move.

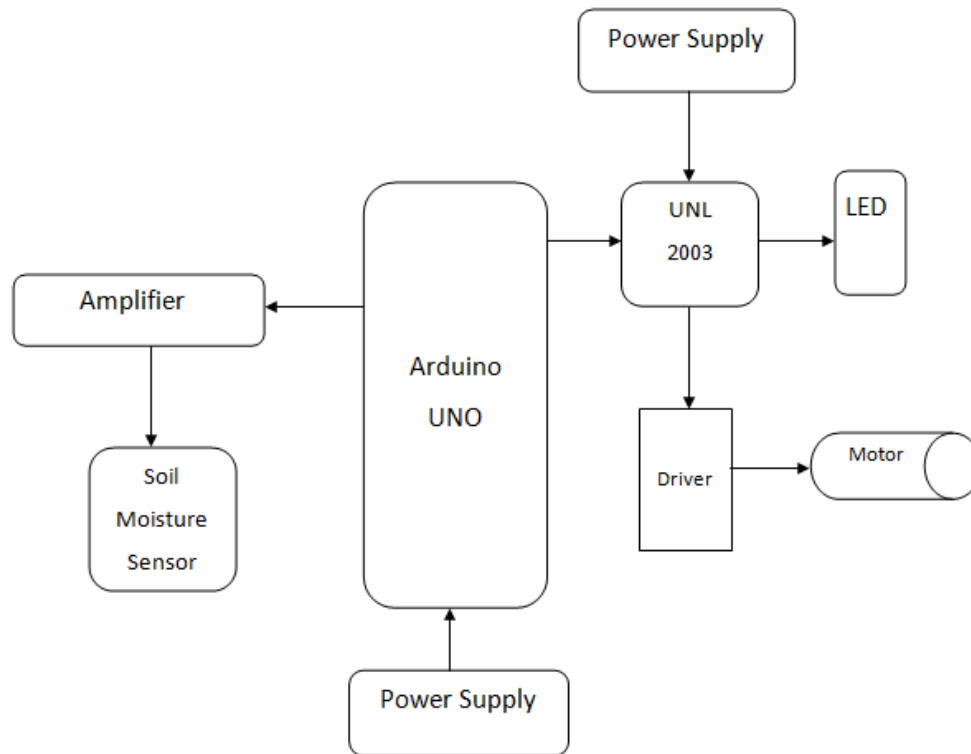


Fig -5: Work Flow Diagram

Ideally suited for interfacing between low-level logic circuitry and multiple peripheral power loads, the Series ULN20xxA/L high-voltage, high-current Darlington arrays feature continuous load current ratings to 500 mA for each of the seven drivers. At an appropriate duty cycle depending on ambient temperature and number of drivers turned ON simultaneously, typical power loads totaling over 230 W (350 mA x 7, 95 V) can be controlled. Typical loads include relays, solenoids, stepping motors, magnetic print hammers, multiplexed LED and incandescent displays, and heaters. All devices feature open-collector outputs with integral clamp diodes.

4. CONCLUSIONS

In the project, The primary applications for this project are for farmers and gardeners who do not have enough time to water their crops/plants. It also covers those farmers who are wasteful of water during irrigation. As water supplies become scarce and polluted, there is a need to irrigate more efficiently in order to minimize water use and chemical leaching. Recent advances in soil water sensing make the commercial use of this technology possible to automate irrigation management for vegetable production. However, research indicates that different sensors types perform under all conditions with no negative impact on crop yields with reductions in water use range as high as 70% compared to traditional practices

6. REFERENCES

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