Hemant Mewada, 2024, 12:3
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

International Journal of Science, Engineering and Technology

An Open Access Journal

Automatic Irrigation System

Hemant Mewada, Ishita Deep, Mayank Malviya, Khushi Gupta, Associate Professor Dr Vijay Yadav
Dept. of Electronics and Communication Engineering),
Lakshmi Narain College of Technology, Bhopal, India

Abstract- Watering the Farm land is the most important cultural practice and one of the labor intensive tasks in daily greenhouse operation. irrigation systems ease the burden of getting water to plants when they need it. Knowing when and how much to water is two important aspects of watering process. To make the gardener works easily, the automatic irrigation system is created. There have a various type using automatic irrigation system that are by using sprinkler system, tube, nozzles and other. This system uses watering sprinkler system because it can water the crops located in the field. This project uses Arduino board, which consists of ATmega328 Microcontroller. It is programmed in such a way that it will sense the moisture level of the crops and supply the water when required. This type of system is often used for general crops care, as part of caring for small and large gardens. Normally, the crops need to be watered twice daily, morning and evening. So, the microcontroller has to be coded to water the plants in the garden or farms about two times per day. People enjoy plants, their benefits and the feeling related to nurturing them. However for most people it becomes challenging to keep them healthy and alive. To accommodate this challenge we have developed a prototype, which makes a plant more self-sufficient, watering itself from a large water tank and providing itself with artificial sunlight. The pro-To type reports status of its current conditions and also reminds the user to refill the water tank. The system automation is designed to be assistive to the user. We hope that through this prototype people will enjoy having plants without the challenges related to absent or forgetfulness.

Keywords- Arduino, 16x2 LCD display, Moisture Sensor, water-pump, relay-module

I. INTRODUCTION

The main aim of this project was to provide water to the crops or gardening automatically using microcontroller (Arduino Uno). We can automatically watering the crops when we are going on vacation or don't we have to bother my neighbours, Sometimes the neighbours do too much of watering and the crops end up dying anyway. 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 re vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. When a zone comes on, the water flows through the lateral lines and ultimately finally ends up at the irrigation electrode (drip) or mechanical device heads. Several sprinklers have pipe thread inlets on the lowest of them that permits a fitting and also the pipe to be connected to them. The sprinklers are usually used in the top of the head flush with the ground surface . 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, and serial monitor windows.

There are many systems are available to water savings in various crops, from basic ones to more technologically advanced ones. For instance, in one system plant watering status was monitored and irrigation scheduled based on temperature presents in soil content of the plant.

1. Motivation

The motivation for integrating IoT into Automatic Irrigation systems arises from the need for smarter, more responsive, and efficient methods to enhance irrigation method. Traditional irrigation systems, while effective to a degree, often face limitations in accurately detecting breaches over extensive areas, leading to potential vulnerabilities and delayed response times.

By incorporating IoT technology, these limitations can be addressed comprehensively. IoT enables real-time monitoring and management of irrigation systems, allowing users to receive immediate alerts and access data remotely via internet-connected devices. This capability significantly improves the responsiveness of security measures, ensuring timely detection and response to unauthorized entry or breaches.

Furthermore, irrigation systems offer advanced features such as enabling users to identify patterns and optimize security protocols over time. The initial investment in solutions may be higher, but the long-term benefits are substantial.

Moreover, IoT integration aligns with the growing trend towards smart and connected technologies, ensuring that security systems remain adaptable and scalable to evolving needs and challenges. Ultimately, the motivation for adopting Automatic irrigation systems lies in creating safer, more efficient, and technologically advanced solutions that effectively protect lives, property, and water.

Objective

The main objective of this project was to provide water to the crops or gardening automatically using microcontroller (Arduino Uno). We can automatically watering the crops when we are going on some work or don't we have to bother my neighbours, Sometimes the neighbours do too much of watering and the plants end up dying anyway.

II. EXISTING SYSTEM

An automatic irrigation system using microcontroller ATMEGA328P is programmed such that it gives the interrupt signals to the motor via the relay. Soil sensor is connected to the Arduino board which senses the moisture content present in the soil. Whenever there is a change in the moisture content of the soil, the sensor senses the change, giving signal to the microcontroller so that the pump(motor) can be activated. Automatic irrigation systems are convenient, especially for those who travel. If installed and programmed properly, automatic irrigation systems can even save you money and help in water conservation. Dead lawn grass and crops need to be replaced, and that can be expensive[4]. But the savings from automatic irrigation systems can go beyond that. Watering with a hose or oscillator wastes water. Neither method targets crops roots with any significant degree of Results. Thus the "Automated Irrigation system based on soil moisture using Arduino" has been designed and tested successfully.

III. PROPOSED SYSTEM

An automatic plant watering system using microcontroller ATMEGA328P-PU is programmed such that it gives the interrupt signals to the motor via the relay. Soil sensor is connected to the Arduino board which senses the moisture content present in the soil. Whenever there is a change in the moisture content of the soil, the sensor senses

the change, giving signal to the microcontroller so that the pump(motor) can be activated. This concept can be used for automatic irrigation system.

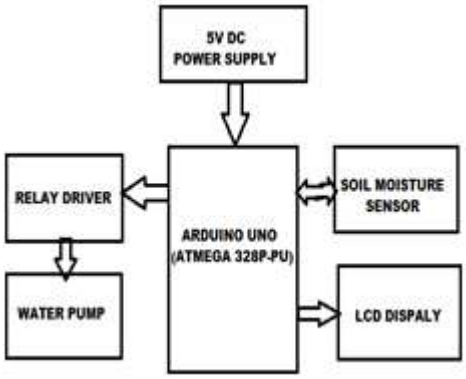

Fig1: Proposed system block diagram

IV. MODULE / COMPONENT DESCRIPTION

1. Arduino

In figure it is showing an Arduino board is an open source platform used for building electronics projects.Arduino is a programmable circuit's board which we can write a program based on your projects. Arduino program will be uploading with IDE (Integrated Development Environment) software that runs on your computer, it is used to write and upload computer code to the Arduino physical board. Arduino language is merely a set of C/C++ functions.

2. Moisture Sensor.

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, 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. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners. 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[5]. These sensors are usually referred to as soil water potential sensors and include tension-meters and gypsum blocks.

Fig 2: Moisture Sensor.

3. Water Pump

A small pump plus a driver. A driver is to provide enough current for the pump, my application needs a spray distance about one meter, so this pump is enough. But if you need to make a system that needs a large spray range, you may need larger pumps, or even a pressurized device to make the projectile even farther, such as the watering system in a tea garden.

Fig 3: Water Pump

4. Relay

In figure, shows are a relay is an electrically operated switch. Several relays use a magnet to automatically operate a switch, however alternative in operation principles are used, like solid state relays. Relays are used wherever it's necessary to regulate a circuit by a separate low-power signal, or wherever many circuits should be controlled by one signal. The essential relays were handling in long distance communicate circuits as amplifiers, they unbroken the signal coming back in from one circuit and re-transmitted it on another circuit.

Fig 4: Relay

5. LCD Display

Liquid Crystal Display (LCD) screen is an electronic display module. An LCD has a wide range of applications in electronics. The most basic and commonly used LCD in circuits is the 16x2 display. LCDs are commonly preferred in display because they are cheap, easy to programme and can display a wide range of characters and animations. A 16x2 LCD have two display lines each capable of displaying 16 characters. This LCD has Command and Data registers. The command register stores command instructions given to the LCD while the Data register stores the data to be displayed by the LCD[1][2].

Fig 5: LCD Display

V. RESULT

All the module & components finally assemble together & microcontroller code for this was developed finally and then we have reach to our goal of this project. Real hardware of our proposed system is shown in fig.4

Fig 6: final hardware of our proposed system

V. CONCLUSION AND FUTURE SCOPE

Thus the "AUTOMATIC IRRIGATION SYSTEM" has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Thus, the Arduino Based Automatic Irrigation System has been designed and tested successfully. The system has been tested to function automatically. The moisture sensors measure the moisture level (water content) of the different crops . If the moisture level is found to be below the desired level, the moisture sensor sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to respective crops . When the desired moisture level is reached, the system halts on its own and the Water Pump is turned OFF. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully. The development and implementation of an automatic irrigation system represent a significant advancement in agricultural technology. Such systems offer a range of benefits, including increased efficiency, conservation of water resources, and enhanced crop yields. Here are some key conclusions drawn from the study and deployment of automatic irrigation systems .

REFERENCES

1. Allen, R.G., Pereira, L.S., Raes, D., & Smith, M. (1998). Crop Evapotranspiration - Guidelines for Computing Crop Water Requirements. FAO

Irrigation and Drainage Paper 56. Food and Agriculture Organization of the United Nation .
2. Jones, H.G. (2004). Irrigation Scheduling: Advantages and Pitfalls of Plant-based Methods. Journal of Experimental Botany, 55(407), 2427-2436.
3. FAO (2017). Irrigation in Agriculture: Practices and Principles. Food and Agriculture Organization of the United Nations.
4. Jain Irrigation Systems Ltd. (2020). Case Studies on Automated Drip Irrigation Systems. Retrieved from Jain Irrigation website.
5. Sharma, N. (2018). How Smart Irrigation Systems are Revolutionizing Farming. Agriculture & Food Security Blog. Retrieved from Agriculture Blog.
6. Smith, J. (2021). The Benefits of Automated Irrigation Systems for Modern Agriculture. Farming Today Magazine. Retrieved from Farming Today website.