International Journal On Engineering Technology and Sciences – IJETS™
ISSN(P): 2349-3968, ISSN (O): 2349-3976
Volume X, Issue III, March - 2023

Automatic Water Control in Agriculture Field

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ABSTRACT:

The automatic water control system for agricultural fields that we offer in this journal article can assist farmers in effectively managing the irrigation process. The suggested system automatically adjusts the water flow based on the crop'swater needs, ambient temperatures, and soil moisture levels using a variety of sensors. The system also has an easy-to-useinterface that enables farmers to arrange irrigation times, get notifications, and keep an eye on the system from a distance. We put the system to the test in actual situations and saw encouraging results, highlighting the possibility for such systemsto boost crop yields and cut water use.

KEYWORDS: Water control, water level sensor, soil moisture sensor, power, motor.

INTRODUCTION:

In agricultural fields, irrigation is a necessary procedure, and effective water management is critical for crop growth and productivity. Edwin Raja S and Ravi R (2020) proposed to use the DMLCA approach to increase the detection accuracy utilizing a variety of factors, includingdetection accuracy based on true positive ratio, precision, and recall [1].

Automatic water control systems are becoming moreand Different sensors are used in automatic water control systems for agricultural fields to keep track of soil moisture levels, weather, and crop waterrequirements.

M. Ruban Kingston, N. Muthukumaran, and R. Ravi (2015) claimed that this strategy resulted in the decrease of Area by minimizing transistors in an operating frequency of 3.42 GHz with the power supply of 1.2 Volts. The findings of the circuit simulation are included in this report [2].

K. Praghash and R. Ravi (2017) claimed that focusing on sensor nodes' energy usage while supporting LEACH protocols within its own cluster [4] information, the system may automatically change the water flow to supply each crop with the right amount of water. S. Surya and R. Ravi (2018) proposed that achieving the fault tolerance mechanism would increase energy consumption and the lifespan of the sensor nodes [3].

The goal of automatic water control systems in agriculture fields is to provide a more efficient and precise way of managing irrigation. According to U. Muthuraman, J. Monica Esther, R. Ravi, R. Kabilan, G. Prince Devaraj, and J. Zahariya Gabriel (2022) future data analysis will be based on statistics gathered with the aid of sensors and will be implemented as a webapp [5].
According to S. Kalyani, L. K. Sudha Sankari, and R. Ravi (2014) the shadow queue approach to queue the packets in accordance with priority S. Surya and R. Ravi (2019) proposed that the aggregated data be gathered from the sink node in paragraph 34. These data are used to identify any 3D construction flaws that may be present. The work's principal benefit is a system that uses fewer sensors, is more reliable, and is more stable [6].

PROBLEM STATEMENT:

During heavy rain, farmer struggle to reach the field manually open the field. He / She may slip off or may get attacked by a lightning strike. The farmer may not be available at the right time to open the field. He may be gone somewhere. Water logging resulting from the heavy rainfall adversely affects crop production.

These issues can be resolved with the aid of automatic water control systems, which offer a more accurate and effective method of managing irrigation. The system can automatically change the water flow to give the required amount of water for each crop by employing sensors to monitor soil moisture levels, weather conditions, and crop water requirements. This can help to decrease water waste, boost crop yields, and enhance the irrigation system's general effectiveness.

PROPOSED SYSTEM:

The proposed system for automatic water control in agriculture fields consists of several components, including sensors, control units, communication devices, and irrigation equipment. The system is designed to monitor soil moisture levels, weather conditions, and crop water requirements, and adjust the water flow accordingly.

The sensors are buried in the soil and use it to measure the soil's moisture content, temperature, and other variables.

The proposed system can be customized to suit different crop types and soil conditions. For example, crops that require more water, such as rice, can be given a higher water flow rate, while crops that require less water, such as wheat, can be given a lower water flow rate. According to S. Kalyani, L. K. Sudha Sankari, and R. Ravi (2014) the shadow queue approach to queue the packets in accordance with priority. By using this approach, the packet's routing latency is decreased. Finally, the throughput is raised and energy efficiency is attained [7]. Moreover, the proposed system can be connected to the internet or a mobile network, allowing farmers to monitor and control the irrigation process remotely. This can help to save time and reduce the need for manual intervention.

BLOCK DIAGRAM:

The sensors in this diagram collect information from the environment, including soil moisture levels, and relay it to the microcontroller or computer. This information is processed by the microcontroller or computer, which then manages the irrigation system actuators. Here is a diagram showing possible connections and interactions between the parts of an autonomous water control system for agricultural fields (shows fig 1).

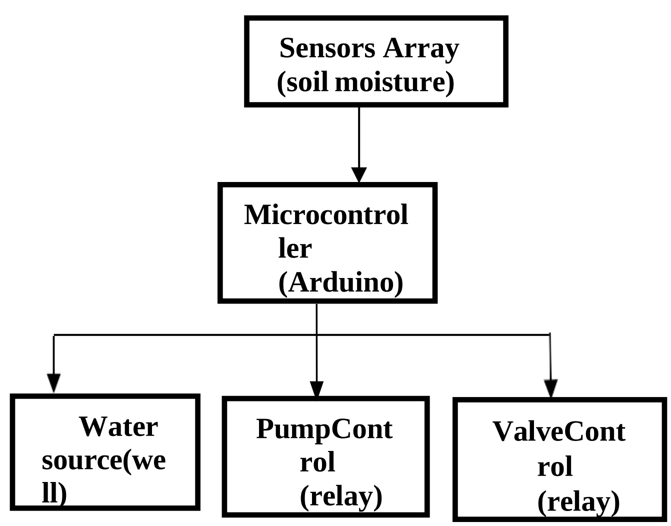

FIG.NO 1 WORKSFLOW OF THIS DIAGRAM

International Journal On Engineering Technology and Sciences – IJETS™
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The Smart Irrigation System was developed using the Arduino UNO Microcontroller, and Ruban Kingston et al. (2015) proposed that the decrease of Area be achieved by minimizing. A crucial part of this automated system, Frequency is an operating frequency of transistors. Numerous sensors, including those for temperature, water level, and soil moisture, are connected to the microcontroller.

Due to its adaptability, simplicity of use, and affordability, Arduino Uno is a microcontroller board that is frequently utilized in a variety of electronic applications. Due to the fact that it offers a simple platform for creating embedded systems, it is a preferred option among experts, students, and hobby is its alike.

the pump.To send the message to the user, this GSM module uses TDMA technology. This irrigation system depends on the relay because it gives the pump

information it needs to decide whether or not to turn on. These relays act as switches that open and close as necessary. A pump is a part that is made up of motor that converts electrical energy into mechanical energy. By replacing the moisture content with another characteristic of the soil, such as electrical resistance, the dielectric constant, or interaction with neutrons, it is possible to calculate the volumetric water content of the soil. Calibration of the connection is necessary because the relationship between the measured property and soil moisture canchange based on the environment, such as the type of soil, water, temperature, or electric conductivity.

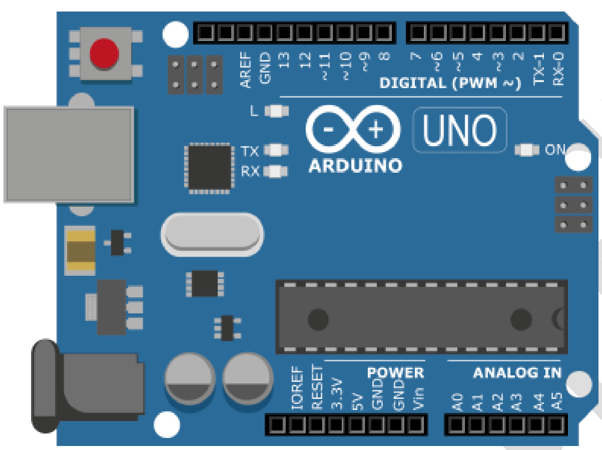

FIG.NO:2 ARDUINO UNO

FIG.NO:3 RAIN DROP SENSORS

The ATmega328P microcontroller, which has 32KB of flash memory, 2KB of SRAM, and 1KB of EEPROM, is the foundation of the Arduino Uno board. In addition, it has a 16 MHz quartz crystal oscillator, 6 analogue inputs, and 14 digital input/output connectors. (Fig no:2). The board features an internal voltage regulator that enables it to operate at 5V, and it may be charged through a USB connection or a DC power jack

The Global System for Mobile Communication is the name of the main mobile communication system. GSM can be used to provide the user with information on the ON and OFF states of

A rain drop sensor is a piece of electronic equipment used to find moisture or rain. It is frequently employed in automated irrigation systems, weather monitoring systems, and otherapplications that call for the precise and prompt detection of rainfall. (Fig no:3)
The electrical resistance is high when there is no wateron the surface and falls to a low value when water droplets touch the surface.

Different applications can make use of rain drop sensors. Theycan give precise and timely rainfall data for weather monitoring systems, which can be used to forecast floods or droughts. Based on the amount of rainfall, they can be utilized in automated irrigation systems to regulate how much water isapplied to plants.

A tank, well, or other water storage container'sdepth or water level can be measured using anelectronic instrument called a water level sensor. It is frequently utilized in a variety of industrial, commercial, and residential applications, including home automation, water treatment, and agricultural.

A water level sensor works on the fundamental premise of measuring the change in capacitance or resistance when the water level varies. Water level sensors come in a variety of forms, such as float sensors, pressure sensors, ultrasonic sensors, and optical sensors.

FIG.NO:4 WATER LEVELSENSOR

If the water level is above or below the specified value, the sensor will send a mobile device an alarm. The photoelectric water level sensor works by applying optical principles. It is used in modern applications because of its advantages, including as higher sensitivity and the absence of mechanical components. The corrosion resistance probe can withstand exceptionally high pressures and temperatures and is easy to attach. (Fig no:4)

An electromechanical device called a solenoid valve is used to regulate the flow of fluids like water, air, gas, and other liquids. It is made up of a coil of wire and a piston or moving plunger that is connected to a valve stem (Fig no:5).

When an electrical current is passed through the coil, a magnetic field is produced that attracts the plunger or piston to the coil, opening the valve and letting fluid pass through.

FIG.NO:5 SOLENOID VALVE

RESULT AND DISCUSSION:

Systems for intelligent irrigation are used in agricultural fields. In addition to the analogue signals from the buried moisture sensor, the Arduino also receives analogue signals from the temperature, humidity, and water level sensors. When the analogue impulses are converted to digital signals, the motor starts. The user is informed of the status of the motor and receives communication signals in the form of messages.

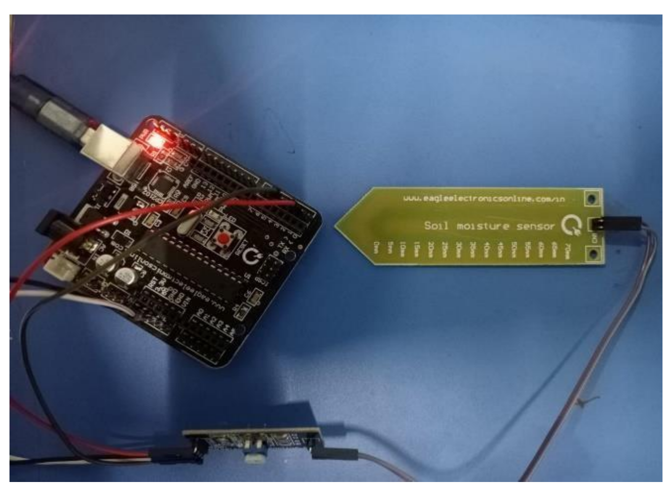

FIG.NO: 6 OUTLINE OF THE ARDUINO

The fig 6 shows the circuit diagram for automatic water control in agriculture fields will depend on the specific sensors, actuators, and micro control or computer being used. The specific circuit diagram for automatic water control. In agriculture fields, will depend on the specific components used. A professional electrician or agriculture engineer may be required to design and install the system.

CONCLUSION:

In conclusion, the implementation of an automatic water control system in agriculture fields is a promising approach to improve the efficiency and sustainability of agricultural production. Byutilizing sensors, microcontrollers, and solenoid valves, the system can automatically regulate water flow, optimize water usage, and reduce water consumption. This has led to increased crop yields, cost savings for the farmer, and better environmental stewardship.
The adaptable system, which may run in manual or automatic mode, enables farmers to modify water flow in response to real-time observations and shifting environmental factors.

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