



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## AI – MANAGED IRRIGATION SYSTEM

Ms.S.Lavanya Devi<sup>1</sup>  
Assistant Professor  
Department of Electronics  
And Communication  
Engineering  
Jerusalem College of  
Engineering, Chennai, India

Usha Nandhinee B<sup>2</sup>  
Student  
Department of Electronics  
And Communication  
Engineering  
Jerusalem college of  
Engineering, Chennai, India

Soumya R<sup>3</sup>  
Student  
Department of Electronics  
And Communication  
Engineering  
Jerusalem college of  
Engineering, Chennai, India

Akash M<sup>4</sup>  
Student  
Department of Electronics  
And Communication  
Engineering  
Jerusalem college of  
Engineering, Chennai, India

### ABSTRACT

In our paper, we redesign the AI - managed irrigation system for controlled application of water to get maximum yield with automatic regulation of valves. Here, we use soil moisture sensor, acoustic rain sensor as sensing device. It collects the input data like soil moisture value, soil temperature. The input data will be then processed using ARM Cortex. ARM, microprocessor sends the processed data to the AI system. On the other hand, the processed data is stored in cloud database and displayed in webpage. MySQL database is used as a source of database. The processor is connected to cloud using Wi-Fi module. Here, AI system is used for better decision making and initiation of motors and valves. It has preset timers and prehistoric database. It commands the control mechanism of valves and motors after the comparison of real time data with prehistoric database. This will in turns helps in controlling the application of water and prevents the environmental degradation. And, thus the proposed paper of redesigning the AI - managed irrigation system is expected to provide maximum yield with precise amount of water in a well effective way.

**Keywords:** Irrigation system, automatic valves, artificial intelligence, cloud database.

## 1. INTRODUCTION

Agriculture plays a great role in our day-to-day life. Farmers follow traditional agriculture method, where the water supply is imprecise in nature. This automatically leads to the crop degradation, water wastage and sub optimal plant growth. There is a need of consideration on the precise use of water in farms for better yield. Irrigation is the perfect methodology for distributing water to soil. It strengthens the crops in the field in an effective manner.

Irrigation is employed to complement the water on the market from downfall, field soil wetness. The most advantage of employing irrigation system includes an increase in crop production by higher yield to achieve food self-sufficiency, cultivation of crops, land value appreciation that makes land holders more wealthier and domestic water distribution system to towns and villages.

Sprinkler irrigation is a significant advancement over traditional surface irrigation. For precise use of water in agriculture, there is a need of an automated irrigation system. An efficient automated irrigation system should include all the components that automatically monitor and control the amount of water to be distributed without manual intervention. Our system uses an AI device for automation and more precise supply of water. And, this also helps in providing better yield with limited water resource.

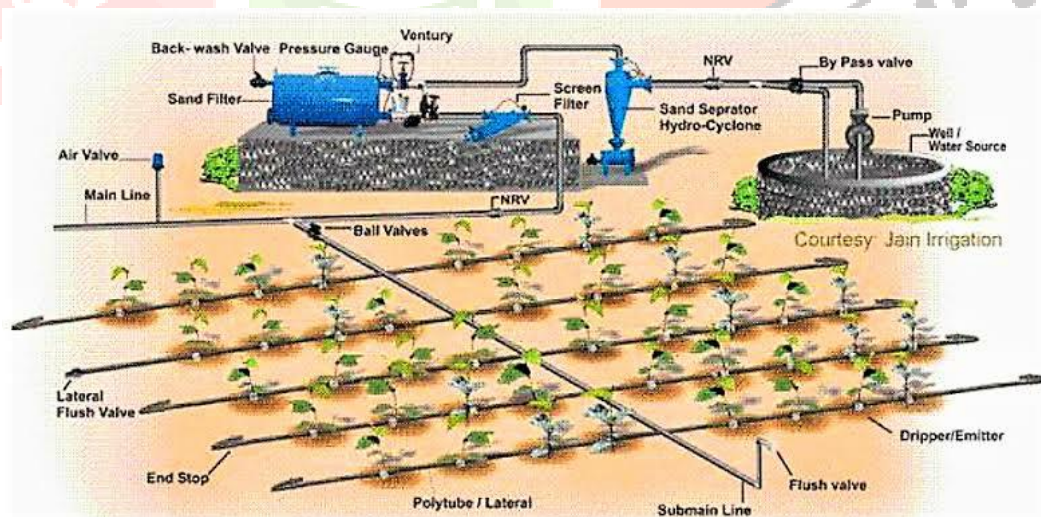


Fig:1 Existing irrigation system

## 2. PROPOSED WORK

- Cloud technology is used for data storage and analysis. Here, MySQL database is used.
- Artificial intelligence is used for automatic opening and closing of valves.
- This involves algorithms for precise actions.

## 3. REVIEW OF RELATED LITERATURE

S.NO	TITLE	AUTHORS	YEAR	TECHNOLOGY USED
1.	Automated Irrigation System Using IoT Cloud Computing	Ipseeta Nanda, Monika Singh	2023	Smart irrigation using IOT and cloud computing
2.	Automatic Fertigation System	Dr.Geetha Ramani J, Pavithiravalavan K, Vyshnav M.R	2022	Intelligent irrigation system using Arduino IDE with fertilizer and moisture sensor.
3.	Development of an IoT-based automatic fertigation system	Abdul Rasak Adegoke Zubair	2020	Fertigation Management system using IOT and Blynk IOT platform
4.	Fuzzy Logic based Smart Irrigation System using Internet of Things	R.Santhana Krishna Golden Julie, Harold Robinson	2020	Smart irrigation using fuzzy logic and IOT.

## 4. COMPONENTS USED

### A. SOIL 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.

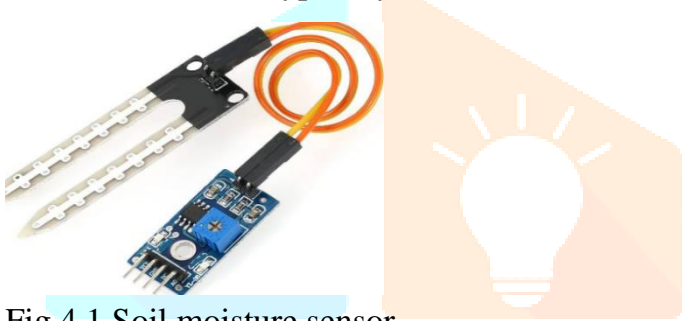


Fig 4.1 Soil moisture sensor

### B. ARM CONTROLLER:

ARM is an advanced risk machine. It is 16/32-bit microprocessor. ARM processors are designed to be used in cases of multiprocessing systems where more than one processor is used to process information. The first ARM processor introduced by the name of ARMv6K could support 4 CPUs along with its hardware. It uses Reduced Instruction Set Computing Architecture (RISC). It works by executing single instruction per cycle. Performance can be optimized by a Software-based approach. It deals with a single processor at a time, which makes it faster and it also consumes lesser power.

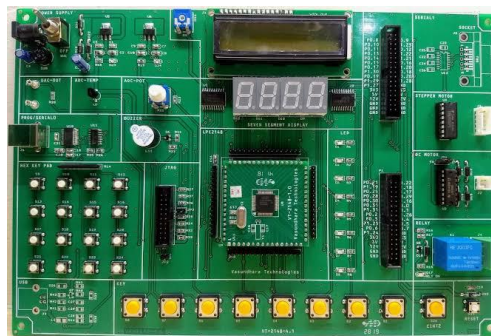


Fig 4.2 Arm Controller

### C. ACOUSTIC RAIN SENSORS:

Acoustic rain sensors are devices designed to detect and measure sound waves or acoustic signals in the surrounding environment. These sensors convert sound waves into electrical signals, which can then be analyzed, processed, and used for various applications. Acoustic sensors are used in a wide range of industries and applications



Fig 4.3. Acoustic rain sensors

### D. TEMPERATURE SENSOR:

A temperature sensor is a device used to measure temperature. This can be air temperature, liquid temperature or the temperature of solid matter. There are different types of temperature sensors available and they each use different technologies and principles to take the temperature measurement

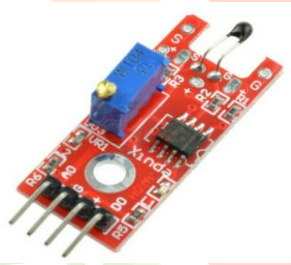


Fig 4.4 Temperature sensor

### E. AI SYSTEM:

Artificial intelligence (AI) system has the ability of a computer or it is a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment.



Fig 4.5 AI System

## F. CLOUD DATABASE:

A cloud database is a database that is deployed, delivered, and accessed in the cloud. Cloud databases organize and store structured, unstructured, and semi-structured data just like traditional on-premises databases and MySQL is used as a cloud database. MySQL manage databases and servers, so while it's not a database, it's widely used in relation to managing and organizing data in databases.



Fig 4.6 Cloud Database

## G. SPRINKLER SYSTEM:

A sprinkler system consists of pipes along a ceiling that contain water under pressure, with an additional source of water for a constant flow. Attached to the pipes, automatic sprinklers are placed at select locations. Sprinkler irrigation systems can cover a large area of land in a relatively short time, making it ideal for farming. The water sprinkler works on Newton's third law of motion principle. It states that to every action there is an equal and opposite reaction. As soon as the water supplied to the sprinkler reaches its nozzle end and it comes out of the nozzle precisely



Fig 4.7 Sprinkler System

## 5. METHODOLOGY AND IMPLEMENTATION

### ➤ SENSOR DATA COLLECTION:

The sensors used in the system undergoes sensing operation and collects the real time data on timely basis. The acoustic rain sensor senses the rain whereas the soil temperature and moisture sensor sense the soil quality and temperature conditions.



Fig 5.1 Sensor data collection

### ➤ DATA ANALYSIS:

The collected input data is then sent to ARM cortex. ARM is a 16/32-bit microprocessor used for processing the input data. The processed data is stored in cloud database. The MySQL cloud database is used for data storage. Web server acts as a medium of user interface, where the users can view the processed data from the displayed web page.



Fig 5.2 Data analysis

### ➤ INITIATION OF VALVES:

The processed data is sent to AI - system. AI - System is trained with pre historic data of input values. It compares the real time data with pre historic data and commands the control mechanism of valves and/or to work. The valves open and close according to the AI commands. The valves ends are connected to the sprinkler system.



Fig 5.3 Initiation of valves

## 6. CONCLUSION

This paper has provided a detailed vision on automated irrigation system. It gives an insight on advancement of automation system with application of artificial intelligence. It also provides information to the farmers constantly with the better web interface. Farmers are notified through messages or Gmail. The AI system automates the motor, where the water supply is initiated and the valves, where the position of valves are changed. And, thus sprinkler orifice opens for precise water supply.

## 7. REFERENCES

- Dr.Geetha Ramani J, Pavithiravalavan K, Vyshnav M.R, “Automatic Fertigation System”, December 2022.
- Madhurima Banik, Arindam Sarkar, “Chemigation Reduces Extra Chemical Load in Agriculture”, July 2018.
- Ipseeta Nanda, Monika Singh, “Automated Irrigation System Using IoT Cloud Computing”, January 2023.
- R.SanthanaKrishnan, E. Golden Julie, Y. Harold Robinson “FuzzyLogic based Smart Irrigation System using Internet of Things” , April 2020.
- Abdul Rasak Adegoke Zubair, “Development of an IoT-based automatic fertigation system”, June 2022.