SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution
MANGALURU

Department of Computer Science & Engineering

Mini-Project Synopsis - Academic Year 2023-24

1	**Title of the Project**	**Smart Irrigation System**
2	**Team No**	**CS38**
3	**Department**	**Computer Science and Engineering**
4	**Project Area/Domain**	**Agriculture**
5	**Project Type**	**IOT [Internet of Things]**
6	**Name of the Students with USN**	**1.Shalini L 4SF21CS144** **2.Shravani H.N 4SF21CS151** **3.Tejashree N.P 4SF21CS176** **4.Thanvi M.C 4SF21CS177**
7	**Name of Guide**	**Mrs. Reshma M**

8.Abstract:

Smart irrigation systems represent a pivotal advancement in agricultural and landscaping practices, integrating modern technology with traditional irrigation methods to optimize water usage and promote healthier plant growth. These systems rely on a network of sensors, controllers, actuators, and connectivity tools to collect real-time data on soil moisture levels, weather conditions, and plant health indicators.

Key words for smart irrigation system are water conservation, water scarcity, water use efficiency irrigation, irrigation management, IoT and prediction.

9.Introduction:

Traditionally, irrigation has often been conducted based on fixed schedules or manual assessments, leading to inefficiencies, overwatering, and underutilization of resources. However, the emergence of smart irrigation systems marks a paradigm shift, offering precision and intelligence in the delivery of water to plants. At the core of smart irrigation systems lie a network of sensors that continuously monitor environmental parameters such as soil moisture levels, weather conditions, and plant health indicators. These sensors provide real-time data, enabling the system to make informed decisions about when, where, and how much water to dispense.

Due to alarming changes in the climate, farmers cannot rely on natural rainwater. Irrigation is important to yield good quality crops in the seasonable or non-seasonable period. For modern agriculture, a smart irrigation system is one of the best techniques that give more production in minimum duration. To many extend, this smart irrigation system is designed and fully automated to minimize manual handling in agriculture and one of the good things is that it is very comfortable for users (or farmers) to understand the concept of IoT and sensors for smart irrigation.

The motivation for developing a Smart Irrigation System stems from the urgent need to address the inefficiencies and challenges prevalent in traditional irrigation practices. Conventional methods often lead to overuse or underutilization of water resources, contributing to water scarcity and environmental degradation. Climate change further exacerbates these issues, making it crucial to adopt advanced technologies for sustainable agriculture. The Smart Irrigation System aims to mitigate these challenges by leveraging modern sensor technologies and automation. By monitoring soil moisture levels in real-time and considering dynamic weather patterns, the system optimizes irrigation schedules, ensuring crops receive precisely the amount of water they need. This not only enhances agricultural productivity but also conserves water resources, promoting responsible and efficient use. The motivation behind this system is rooted in the pursuit of resource conservation, increased crop yields, and the broader goal of creating. resilient. and sustainable agricultural practices that can adapt to a changing climate. Through innovation in irrigation, we strive to secure food production, minimize environmental impact, and contribute to the long-term viability of agriculture.

10.Literature Survey:

1. International Journal of Creative Research Thoughts

Methodology: Through the utilization of IoT (Internet of Things) technology, a smart irrigation system presents an exceptionally efficient and productive approach to watering plants and crops. By employing sensors, controllers, and connectivity devices, this advanced system is capable of gathering and analyzing real-time data pertaining to soil moisture, weather conditions, and other factors that significantly impact plant growth.

Conclusion: The implementation of an IoT enabled smart irrigation system brings numerous benefits to farmers, gardeners, and the environment alike. By leveraging real-time data and automation, these systems optimize water usage, mitigate the risks of over- and underwatering, and enhance crop yields and overall plant health.

2. 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE)

Methodology: The primary aim of the study is to develop a framework to stay track of remote soil wetness from an abroad area and to deal with the moisture of soil so it doesn't influence the products. The IOT basically based arranged framework given amid this examination are valuable to achieve such an undertaking. The prototype framework examination of this study enables monitoring any agricultural arrive and keeps up moisture of the dirt. This thought will unquestionably encourage any country move to sensible Agriculture. The framework is foreseen to figure and create records in period. The real execution of the framework would require changes in detecting component, innovations and supply code in spite of the fact that the approach and control remain steady. The proposed system was demonstrated with the help of Thing speak cloud. Thing Speak is an IOT analytics place to accommodate to sanctions to aggregate, depict and analyze real-time data streams in the cloud. Thing Speak gives instant envision of data posted by the contrivances with the competency to execute MATLAB code. Additionally, it is often utilized for prototyping and proof of concept IOT systems that require analytics.

Conclusion: The sand and the water level are the critical parameter for the development of smart irrigation system. Generally, the soil moisture is affected by a sundry parameter such as air temperature, soil temperature, air humidity, ultra violet rays, and much more. This paper proposed an IoT based smart irrigation system utilizing sensors to record the data and store it

in the cloud storage. The future work can be prediction of soil moisture using the recorded data and it may provide cost effective. The auto mode makes it a smart system and it
can be further customized for application categorical scenarios. The future plan is to conduct a water saving analysis based on proposed algorithm with multiple nodes along with minimizing the system cost.

3.International Research Journal of Modernization in Engineering Technology and Science
Methodology: Depending on the type of crop, three possibilities are sprinkling irrigation, channel irrigation, and drip irrigation. With the help of a channel system, large regions are watered. Smart irrigation systems outperformed the other methods. A smart irrigation system denotes an automated system as opposed to drip and sprinkle irrigation systems, which are frequently operated by a person. Whether the farmer is in the field or not, irrigation is done. The soil moisture sensor has a comparator in it. The value of the soil's varying resistance in the middle two probing areas depends on the moisture content of the soil. To gauge the amount of soil moisture, moisture sensors are placed in the ground, and irrigation is then carried out as necessary. Before being delivered to a microcontroller, the output sensor value of the comparator LM 393 is compared to a predetermined value. A model of agriculture industry irrigation system automation was included in the paper. The soil's moisture content has a big impact on plant development. The farmers have benefited greatly from the use of this technology, which was put into practice in a distant area. By reducing water waste and labour -intensive manual labour, the use of an automated irrigation system maximizes the usage of water. The longevity of the system is increased while electronic devices use less energy. According to the requirements of the crops, the water was
used.
Conclusion: In order to monitor and control the environment in nurseries, this study describes research using a ZigBee based wireless sensor network (WSN). Instead of the usual two stations seen in earlier frameworks, the proposed framework features three stations: a Sensor Station, Coordinator Station, and Central Station (a detecting station and a control station). The sensor station reacts to six different environmental limits: temperature, relative wetness, soil temperature, dampness, light intensity, and carbon dioxide (CO2). The facilitator station has features akin to switches. From the nursery station, it is in charge of communicating

information and directives to the focus station. Using nearby hardware, such as sprinklers, radiators, exhaust fans, and other devices, it is also in charge of controlling the nursery's atmosphere. The primary station serves as the framework's primary regulator. It completes various tasks, including information gathering, capacity building, handling, and changing the nursery environment. With three stations, the workload is evenly distributed across each station, finally focusing on the execution, imperturbable quality, and flexibility of the framework.

4.International Journal of Engineering and Technology

Methodology: Irrigation can be automated by using sensors, microcontroller, Bluetooth, android application. The low-cost soil moisture sensor and temperature and humidity sensor are used. They continuously monitor the field. The sensors are connected to Arduino board. The sensor data obtained are transmitted through wireless transmission and are reached to the user so that he can control irrigation.

Conclusion: The automated irrigation system implemented was found to be feasible and cost effective for optimizing water resources for Agri-culture production. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability. The irrigation system helps the farmer by making his work smarter. As the demand for water increases, along with the need to protect aquatic habitats, water conservation practices for irrigation need to be effective and affordable. As multiple sensors are used water can be provided only to the required area of land. This system reduces the water consumption to greater extent. It needs minimal maintenance. The power consumption has been reduced very much. The crop productivity increases and the waste-age of crops are very much reduced. The extension work is to make user interface much simpler by just using SMS messages for notifications and to operate the switches.

5. Social Science Research Network.

Methodology: Irrigation can be automated by using sensors, microcontroller, WIFI module, android application. The low-cost soil moisture sensor continuously monitors the field. The sensors are connected to Arduino board. The sensor data obtained are transmitted through wireless transmission and are reached to the user so that he can control irrigation. The mobile application can be designed in such a way to analyze the data received and to check with the threshold values of moisture, humidity and temperature. The decision can be made either by

the application automatically without user interruption or manually through application with user interruption. 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. The sensors are connected to the Arduino.

This hardware communicates through WIFI module so that user can access the data through his mobile that has an android application which can get the sensor data from the Arduino via WIFI module.

Conclusion: The machine learning requires a mass data so our recorded metero-logical data helps a lot in improving the performance. The region or area wise prediction can be done for giving more accurate farming suggestions of which crop can be grown by analyzing the data based on the soil and weather conditions. This paper can further be industrialized with camera feeds for checking the discoloration of leaves or plants and accordingly send the results to control the disease from anywhere. The field area can be protected from the trespassers by the deployment of AI and surveillance.

11.Problem Statement and Description:

Problem Statement:

Enhancing Water Management Through Smart Irrigation Systems. In the case of traditional irrigation system water saving is not considered. Since, the water is irrigated directly in the land, plants under go high stress from variation in soil moisture, therefore plant appearance is reduced. The absence of automatic controlling of the system result in improper water control system .At present there is emerging global water crisis where managing scarcity of water has become a serious job.

Description:

The efficient use of water in agriculture and landscaping is critical for sustainable resource management and environmental conservation. However, conventional irrigation methods often result in water wastage, suboptimal plant growth, and increased operational costs. To address these challenges, there is a pressing need for the implementation of smart irrigation systems

that leverage technology to optimize water usage and enhance overall efficiency. The proposed solution integrates soil moisture sensors and plant-specific requirements into a centralized Smart Irrigation System. Using real-time data analytics, the system determines the optimal irrigation schedule, minimizing water wastage and maximizing crop health. Additionally, it offers remote monitoring and control through a user-friendly interface, allowing farmers to manage irrigation efficiently, conserve resources, and enhance overall agricultural productivity." This growth can be seen in countries which have shortage of water resources and are economically poor.

12.Objectives:

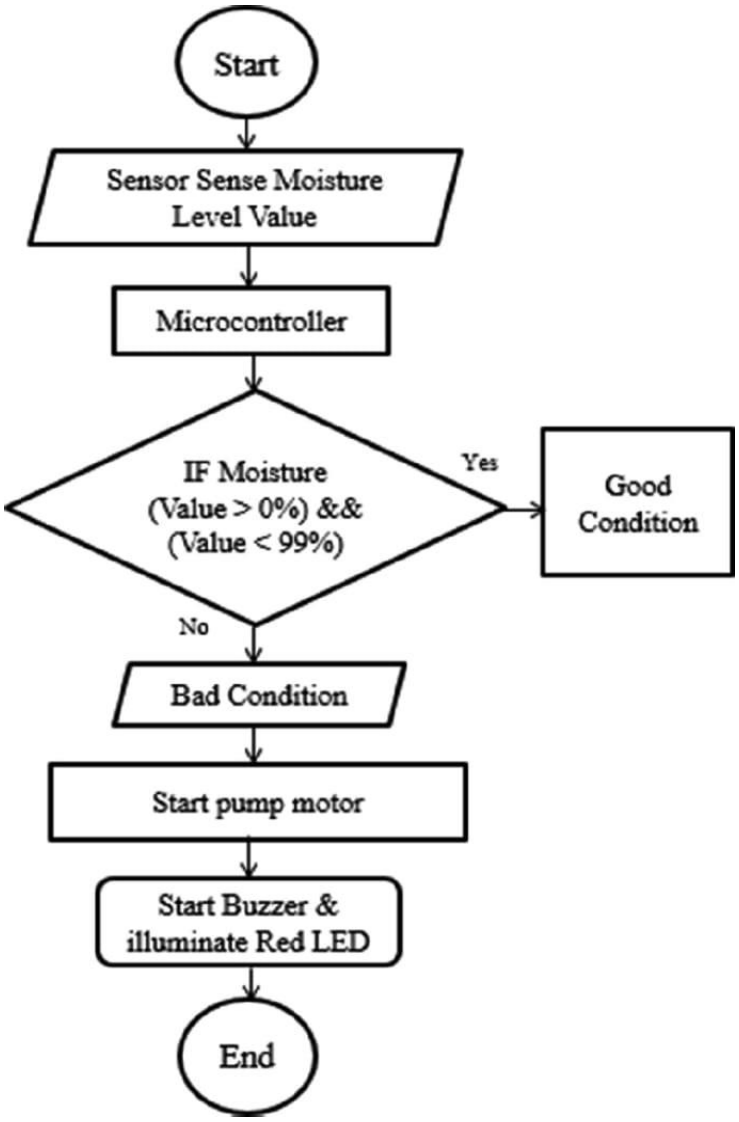
Water Conservation: One of the primary objectives of a smart irrigation system is to conserve water by minimizing wastage and optimizing the use of available resources. By precisely delivering water to plants based on real-time environmental conditions and plant needs, smart irrigation systems help reduce water consumption and mitigate the risk of water scarcity.

Optimized Plant Growth: Smart irrigation systems aim to promote healthier plant growth and improve crop yields by ensuring that plants receive the right amount of water at the right time. By monitoring soil moisture levels, weather patterns, and plant health indicators, these systems can adjust watering schedules and volumes to provide optimal growing conditions for different types of plants.

Scalability and Adaptability: Smart irrigation systems are designed to be scalable and adaptable to various agricultural and landscaping settings, including farms, vineyards, orchards, gardens, and urban green spaces. This objective ensures that smart irrigation solutions can meet the diverse needs and requirements of different users and environments.

Remote Monitoring and Control: Smart irrigation systems enable remote monitoring and control capabilities, allowing users to access and manage their irrigation systems from anywhere using mobile apps or web interfaces. This objective enhances convenience , flexibility, and responsiveness in managing irrigation operations, empowering users to make timely adjustments based on changing conditions.

13.Proposed Methodology:



1.Planning and requirements analysis:

Identify regulatory requirements and user needs.

2.Sensor Selection and Deployment:

Choose appropriate sensors for soil moisture, weather, and plant health.

Deploy sensors strategically in the irrigation area.

3.Data Acquisition and Processing:

Develop a system to collect and process sensor data in real-time.

4.Decision-Making and Control:

Design logic for determining irrigation schedules based on sensor data.

5.User Interface Design:

Enable remote access and data visualization features.

6.Integration and Testing:

Conduct rigorous testing to validate system functionality and performance.

7.Deployment and Training:

Install the system at the target site and configure settings and provide training to users.

8.Monitoring and Optimization:

Monitor system performance and user feedback.

14.Outcome of Work:

1.Water Conservation: Smart irrigation systems optimize water usage by delivering water precisely when and where it is needed, minimizing waste and runoff

2.Improved Plant Health and Yield: By providing plants with the right amount of water at the right time, smart irrigation systems promote healthier root systems, improved nutrient uptake, and better overall plant growth.

3.Resource Efficiency: Smart irrigation systems optimize improves the overall sustainability and economic viability of agricultural and landscaping operations.

4.Environmental Sustainability: By minimizing water usage, runoff, and soil erosion, smart irrigation systems contribute to environmental sustainability.

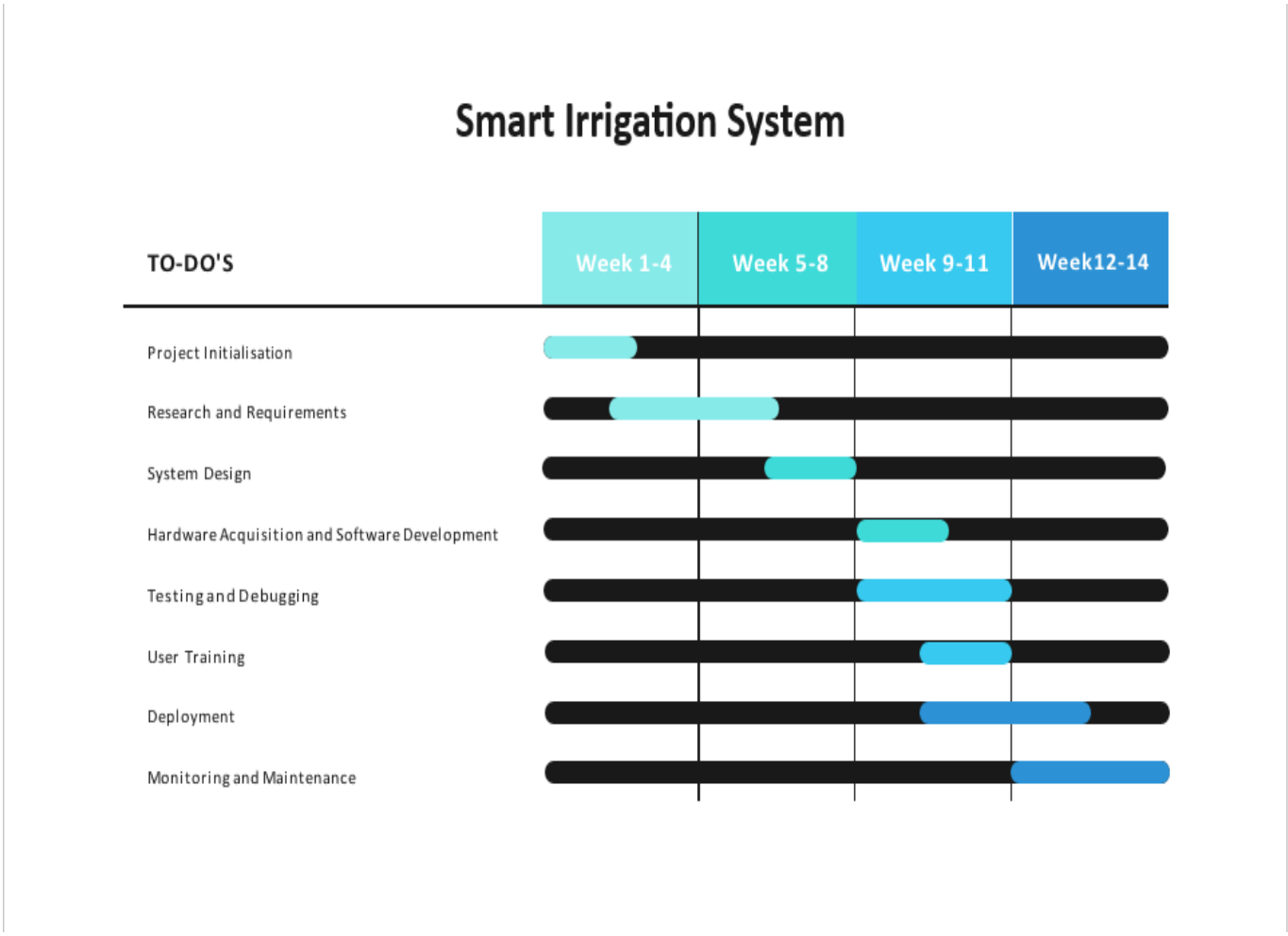
5.Cost Savings The long-term financial benefits often outweigh the initial investment in implementing the system.

6.Data-Driven Insights: Smart irrigation systems generate valuable data on soil moisture levels, weather patterns, and plant health indicators.

7.Scalability and Adaptability: Smart irrigation systems are scalable and adaptable to various agricultural and landscaping settings

10.User Convenience and Control: With remote monitoring and control capabilities, users can access and manage the smart irrigation system from anywhere using mobile apps or web interfaces. This provides convenience, flexibility, and real-time control over irrigation operations.

15.Work Plan (Gantt Chart):



Conclusion:

The Project 'Smart Irrigation System' is used for the optimization use of water in agricultural field without the intervention of farmer by using soil moisture Sensor that senses the moisture content of the Soil using Microcontroller that turn ON/OFF the pump automatically according to the need of water for irrigation and hence helpful in saving water. This system is quite affordable and feasible. This system of irrigation is also helpful in the region where there is scarcity of water and improves their sustainability. And can also be adjusted according to the need of varieties of crop to be irrigated.

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16.	**Signature of Students**	1.Shalini L 2. Shravani H N 3.Tejashree N P 4.Thanvi M C
17.	**Signature of Guide**	Mrs. Reshma M
18.	**Signature of the Project Coordinator**	