

PRODUCTIVE DESIGN FOR SMART IRRIGATION SYSTEM USING RASPBERRY PI

A Project Report Phase – II

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering degree in Electronics and Communication Engineering

by

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INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade “A” by NAAC

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work **VENKATA GANESH (39130241) and NARENDRA KULKARNI (39130248)** who carried out the project entitled " **PRODUCTIVE DESIGN FOR SMART IRRIGATION SYSTEM USING RASPBERRY PI** " under our supervision from November 2022 to April 2023.

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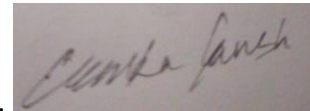
We, **VENKATA GANESH (39130241)** and **NARENDRA KULKARNI (39130248)** here by declare that the Project Report entitled " **PRODUCTIVE DESIGN FOR SMART IRRIGATION SYSTEM USING RASPBERRY PI** " done by us under the guidance of **Dr. S . Dr. S.LALITHAKUMARI, M.E., Ph.D.**, Associate Professor, Dept. of Electronics and Communication Engineering, Sathyabama institute of science and technology , Chennai, submitted partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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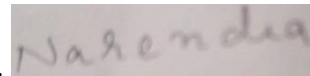
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SIGNATURE OF CANDIDATES

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ABSTRACT

Water is the most essential requirement in the cultivation of agricultural products and therefore in order to regulate the supply of agricultural irrigation. An automatic irrigation technique distributes water efficiency and productivity of the system through the integration of various components and features. This design includes multiple sensors to monitor the soil moisture, temperature, and humidity levels, which are processed by the Raspberry Pi to determine the optimal watering schedule for the plants. Additionally, the system incorporates a weather station to receive real-time weather updates and adjust the watering schedule accordingly. A mobile application is also included, which allows the user to remotely monitor and control the system from their smartphone. Furthermore, the system is designed to be expandable, with the ability to add additional sensors and features as required. This productive design for a smart irrigation system using Raspberry Pi can significantly improve the efficiency and productivity of agriculture and gardening, while reducing water waste and promoting sustainable practices.

Over the years, attention of water and electricity issues has brought about elevated use of sprinkler structures. At present, automation plays one of the most vital roles in human lifestyles. This not only offers comfort, however additionally reduces power consumption, performance and saves time. Currently, the enterprise uses automation and control gadgets, which can be price and no longer appropriate for agricultural and horticultural use. So, in this work, we can develop IoT based irrigation smart technologies the use of Raspberry pi. The proposed sprinkler system might be reasonably-priced and might be used by Indian farmers.

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CHAPTER 1

INTRODUCTION

From massive agribusiness players like Cargill to small organic farmers, growers all over the world are using the Internet of Things to reduce their consumption of water and fertilizers, cut waste and improve the quality or yield of their products. Examples range from tracking microclimates across cropland, to closely monitoring temperature changes and humidity levels as perishable goods move from field to warehouse to store in order to extend their shelf life and eliminate waste. Tech providers are helping them with tools such as drone imagery and soil sensors, which measure real-time conditions. According to The Nature Conservancy, such precision agriculture can enable farmers to cut water and fertilizer use by up to 40 percent, without reducing yields. By improving the irrigation efficiency in agricultural sector, this industry become more competitive and sustainable. Also, in dry areas, where there is no sufficient rainfall, proper irrigation is not possible. Hence by using this irrigation system by monitoring the moisture content of soil are can meet the water requirements necessary for the field. To save effort of farmers, the important considerations are water and time. In present condition, they need to wait until field is fully watered. This restricts them to do other activities. This idea is not only meant for farmers but also for watering the plants. In our present era, the farmers are irrigating their crops at regular interval of time. The techniques they use will consume more water by creating water logging and results in water wastage. This system that we designed will completely eliminate the stress of manual Labour. Two types of soils have been tested and it will only work when the soil condition is dry. The raspberry pi is the heart of the system and the webcam is interfaced with Raspberry pi via Wi-Fi Module. Python programming language is used for automation purpose. The system is a network of wireless sensors and a wireless base station which can be used to provide the sensors data to automate the irrigation system.

1.1 OBJECTIVE

The objective of smart irrigation is to optimize water usage in agriculture by using data and technology to apply water in a way that is precise, efficient, and

sustainable. Smart irrigation systems use sensors, weather data, soil moisture data, and other information to determine when and how much water to apply to crops. This allows farmers to reduce water waste, save money on water bills, and improve crop yields. Smart irrigation also helps to conserve water resources, which is becoming increasingly important in regions where water is scarce or expensive.

1.2 PROBLEM STATEMENT

The problem of water scarcity is a major challenge in agriculture, with irrigation being one of the largest users of freshwater resources worldwide. Traditional irrigation systems are often inefficient, leading to water waste and increased costs for farmers. In addition, climate change and unpredictable weather patterns have made it difficult to manage irrigation effectively.

To address these challenges, there is a need for a more sustainable and efficient irrigation system that can optimize water usage and reduce waste. Smart irrigation systems that use advanced technologies such as sensors, IoT, and data analytics have shown great promise in addressing these challenges. However, there is still a need for further research and development to optimize the performance and scalability of these systems

1.3 TARGET SPECIFICATIONS

After the study of the problem statement and the market needs for the system, the target specifications for the systems are being framed. In this case adaptation of the system, compact to a vehicle, and the process of the system is being defined.

The main parameters based on which the system is to be designed are as follow

- Reliable
- Low cost
- Low power consumption
- Quick response
- Durability
- Easy Adaption
- Compact process

1.4 RESEARCH AND DEVELOPMENT

Smart irrigation systems have been the focus of research and development in recent years due to the growing concern over water scarcity and the need for sustainable

agriculture. These systems use advanced technologies to optimize irrigation efficiency, reduce water waste, and improve crop yields.

One of the key technologies used in smart irrigation systems is sensor technology. Soil moisture sensors, for example, are used to monitor soil moisture levels and determine when irrigation is necessary. Other sensors, such as temperature and humidity sensors, are used to gather additional information about the soil and environment.

The use of IoT (Internet of Things) technology has also played a significant role in the development of smart irrigation systems. IoT technology allows for the integration of sensors, controllers, and communication devices into a single system, enabling real-time monitoring and control of the irrigation process.

In addition, advanced data analytics techniques have been developed to process the large amounts of data generated by these systems. Machine learning algorithms, for example, can be used to analyze the data collected by sensors and make accurate predictions about the water needs of crops.

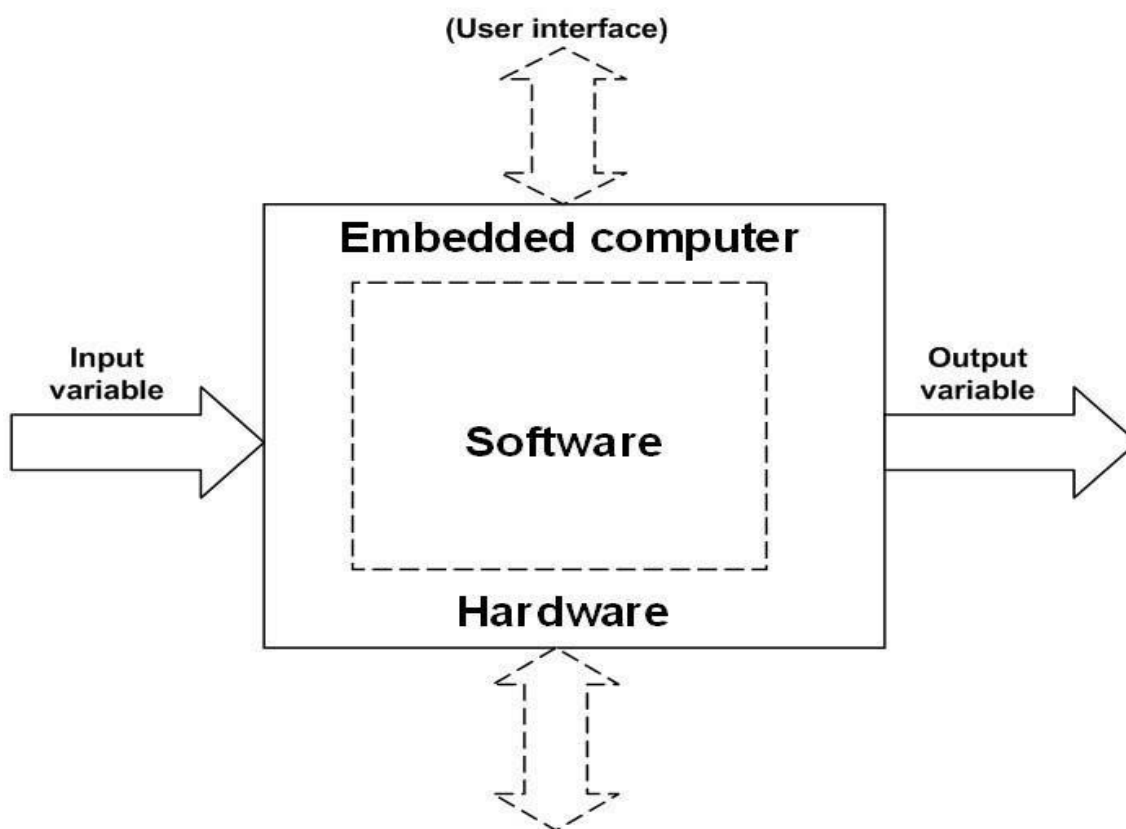
Smart irrigation systems have been tested and implemented in various agricultural settings, including fields, greenhouses, and urban gardens. These systems have shown promising results in reducing water consumption, increasing crop yields, and improving the overall efficiency of irrigation.

In conclusion, the research and development of smart irrigation systems have led to the creation of advanced technologies and techniques that can help address the challenges of water scarcity and sustainable agriculture. With continued innovation and refinement, smart irrigation systems have the potential to revolutionize the way we approach irrigation and agriculture.

1.5 EMBEDDED SYSTEM IMPLEMENTATION

Introduction:

An embedded system is one kind of a computer system mainly designed to perform several tasks like to access, process, and store and also control the data in various electronics-based systems. Embedded systems are a combination of hardware and software where software is usually known as firmware that is embedded into the hardware. One of its most important characteristics of these systems is, it gives the o/p within the time limits. Embedded systems support to make the work more perfect and convenient. So, we frequently use embedded systems in simple and complex devices too. The applications of embedded systems mainly involve in our real life for several devices like microwave, calculators, TV remote control, home security and neighbourhood traffic control systems, etc.



Link to other embedded system

Fig 1.1 Embedded Block Diagram

1.5.1 EMBEDDED SYSTEM AND HARDWARE:

As with any electronic system, an embedded system requires a hardware platform on which it performs the operation. Embedded system hardware is built with a microprocessor or microcontroller. The embedded system hardware has elements like input output (I/O) interfaces, user interface, memory and the display. Usually, an embedded system consists of:

- Power supply
- Processor
- Memory
- Reliable

CHAPTER-2

LITERATURE REVIEW

2.1 LITERATURE INTRODUCTION

Smart irrigation systems using Raspberry Pi have gained significant attention due to their ability to efficiently use water resources, save energy and reduce labor costs. Here's a brief literature survey on productive design for smart irrigation systems using Raspberry Pi. Smart Irrigation System using Raspberry Pi" by Manikandan.

This paper proposed a smart irrigation system using Raspberry Pi that uses soil moisture sensors, temperature sensors, and humidity sensors to collect data and make intelligent decisions about when to water the plants. The system was designed to be energy-efficient, user-friendly, and low-cost. Raspberry Pi Based Smart Irrigation System for Agriculture" by Deepak .That uses a web-based interface for monitoring and controlling the irrigation system. The system was designed to be modular and scalable, allowing farmers to add or remove sensors as needed. Design and Implementation of a Smart Irrigation System using Raspberry Pi by Naik. That uses a combination of soil moisture sensors, temperature sensors, and humidity sensors to optimize the watering of plants. The system was designed to be user-friendly and low-cost.

Maheshwari uses a mobile application to monitor and control the irrigation system remotely. The system was designed to be low-cost, scalable, and energy-efficient. Design and Implementation of a Low-Cost Smart Irrigation System using Raspberry Pi" by Reddy. That uses soil moisture sensors and a microcontroller to automatically irrigate plants when the soil moisture level drops below a certain threshold. The system was designed to be low-cost and easy to install.

Overall, these studies suggest that smart irrigation systems using Raspberry Pi are becoming more popular due to their ability to conserve water and energy while reducing labor costs. The designs are generally user-friendly, low-cost, and scalable, making them accessible to a wide range of farmers and gardeners.

2.2 REVIEWS OF EXISTING SYSTEM

Khirade Identification of the plant diseases is the key to preventing the losses in the yield and quantity of the agricultural product. It requires tremendous amount of work, expertize in the plant diseases, and also require the excessive processing time. Hence, image processing is used for the detection of plant diseases. Disease detection involves the steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification. This paper discussed the methods used for the detection of plant diseases using their leaves images. This paper discussed various techniques to segment the disease part of the plant. This paper also discussed some Feature extraction and classification techniques to extract the features of infected leaf and the classification of plant diseases. The accurately detection and classification of the plant disease is very important for the successful cultivation of crop and this can be done using image processing. This paper discussed various techniques to segment the disease part of the plant. This paper also discussed some Feature extraction and classification techniques to extract the features of infected leaf and the classification of plant diseases. The use of ANN methods for classification of disease in plants such as self-organizing feature map, back propagation algorithm, SVMs etc... From these methods, we can accurately identify and classify various plant diseases using image processing technique.

Prof. Sanjay, B.Dhaygude the application of texture statistics for detecting the plant leaf disease has been explained Firstly by color transformation structure RGB is converted into HSV space because HSV is a good color descriptor. Masking and removing of green pixels with pre-computed threshold level. Then in the next step segmentation is performed using 32X32 patch size and obtained useful segments. These segments are used for texture analysis by color cooccurrence matrix. Finally if texture parameters are compared to texture parameters of normal leaf.

Amandeep Singh, Maninder Lal Singh the most significant challenge faced during the work was capturing the quality images with maximum detail of the leaf colour. It is very typical task to get the image with all the details within a processable memory. Such images are formed a through high resolution and thus are of 610MB of size.

This was handled by using a Nikon made D5200 camera which served the task very well. Second challenge faced was to get rid of illumination conditions as from the start to the end of paddy crop season, illumination varies a lot even when the image acquiring time is fixed. However the solution to this is variable user defined thresholding and making necessary adjustments to the shades of LCC.

M.Malathi, K.Aruli they provides survey on plant leaf disease detection using image processing techniques. Disease in crops causes significant reduction quantity and quality of the agricultural product. Identification of symptoms of disease by naked eye is difficult for farmer. Crop protection especially in large farms is done by using computerized image processing technique that can detect diseased leaf using color information of leaves. Depending on the applications, many image processing technique has been introduced to solve the problems by pattern recognition and some automatic classification tools. In the next section this papers present a survey of those proposed systems in meaningful way. There are many methods in automated or computer vision for disease detection and classification but still there is lack in this research topic. All the disease cannot be identified using single method. Malvika Ranjan, Manasi,Rajiv Weginwar describes a diagnosis process that is mostly visual and requires precise judgment and also scientific methods. Image of diseased leaf is captured

2.3 LITERATURE CONCLUSION

In conclusion, the literature survey of productive design for smart irrigation systems using Raspberry Pi has shown that these systems have gained significant attention due to their ability to conserve water resources, save energy, and reduce labor costs. The proposed designs are generally user-friendly, low-cost, and scalable, making them accessible to a wide range of farmers and gardeners. The use of sensors such as soil moisture, temperature, and humidity sensors, combined with Raspberry Pi, enables intelligent decision-making for watering plants. The ability to remotely monitor and control the irrigation system using a web-based interface or mobile application has also been proposed in some studies. The implementation of these productive designs could have a significant impact on agriculture, especially

in areas where water resources are scarce, and traditional irrigation methods are no longer efficient or sustainable.

The implementation of these productive designs could have a significant impact on agriculture, particularly in areas where water resources are scarce, and traditional irrigation methods are no longer efficient or sustainable. Overall, these studies suggest that smart irrigation systems using Raspberry Pi are an effective solution to address the challenges faced by traditional irrigation systems, and their adoption could lead to sustainable agriculture practices that could benefit the environment, farmers, and society at large

CHAPTER-3

SYSTEM ANALYSIS

3.1 EXISTING METHOD

In the Existing System, people used to check and verify the moisture content in the fields manually. This is very difficult and risk process to check the condition in the mid-night. Even though the climate is good the humidity is unknown, so in the previous system we have some disadvantages.

DISADVANTAGES: The driver might not be aware about the sign or intentionally doesn't follow. It results in violation of the rule and occasionally in accident.

3.1.1 EXISTING METHOD

Smart irrigation systems use various sensors and technologies to optimize water usage in a landscape or agricultural setting. Here are some existing methods of smart irrigation systems:

Soil Moisture Sensors: Soil moisture sensors measure the amount of moisture in the soil and help determine when irrigation is needed. These sensors can be placed at different depths in the soil to provide a comprehensive view of soil moisture levels.

Weather-based Irrigation Controllers: These controllers use real-time weather data to adjust watering schedules based on local weather conditions. They take into account factors such as temperature, humidity, wind, and precipitation to determine the optimal watering schedule.

Evapotranspiration (ET) Controllers: ET controllers use weather data and other factors such as soil type and plant type to calculate the amount of water lost to evaporation and plant transpiration. They then adjust watering schedules accordingly.

Flow Sensors: Flow sensors measure the amount of water flowing through an irrigation system. They can detect leaks and other issues that can be issued.

3.2 PROPOSED SYSTEM

In this smart irrigation system can help optimize water usage, reduce waste and ultimately lead to more efficient and sustainable agriculture practices. Here are some components of a proposed smart irrigation system:

Sensors: The first component of a smart irrigation system is sensors that can measure soil moisture, temperature, and humidity. These sensors can be placed at various points in the field, and can provide real-time data that can be used to determine when and how much water should be applied.

Weather station: A weather station can be added to the smart irrigation system to collect real-time data on temperature, humidity, wind speed, and precipitation. This data can be used to adjust the irrigation system and ensure that crops are watered only when necessary.

Control system: A control system can be installed to monitor and manage the smart irrigation system. The control system can use the data collected by the sensors and weather station to make real-time adjustments to the irrigation system. It can also be programmed to turn on and off at specific times, based on pre-set watering schedules.

Water delivery system: The water delivery system can be automated, using sensors and control systems to deliver water only to the areas that need it. Drip irrigation systems can be installed to minimize water usage, and water pressure can be monitored to ensure that the correct amount of water is being delivered to each plant.

Mobile app: A mobile app can be developed to allow farmers to remotely monitor and manage the smart irrigation system. The app can provide real-time data on soil moisture, temperature, and humidity, and can be used to adjust watering schedules and monitor the system's performance.

By implementing a smart irrigation system, farmers can optimize water usage and reduce waste, leading to more sustainable and efficient agriculture practices.

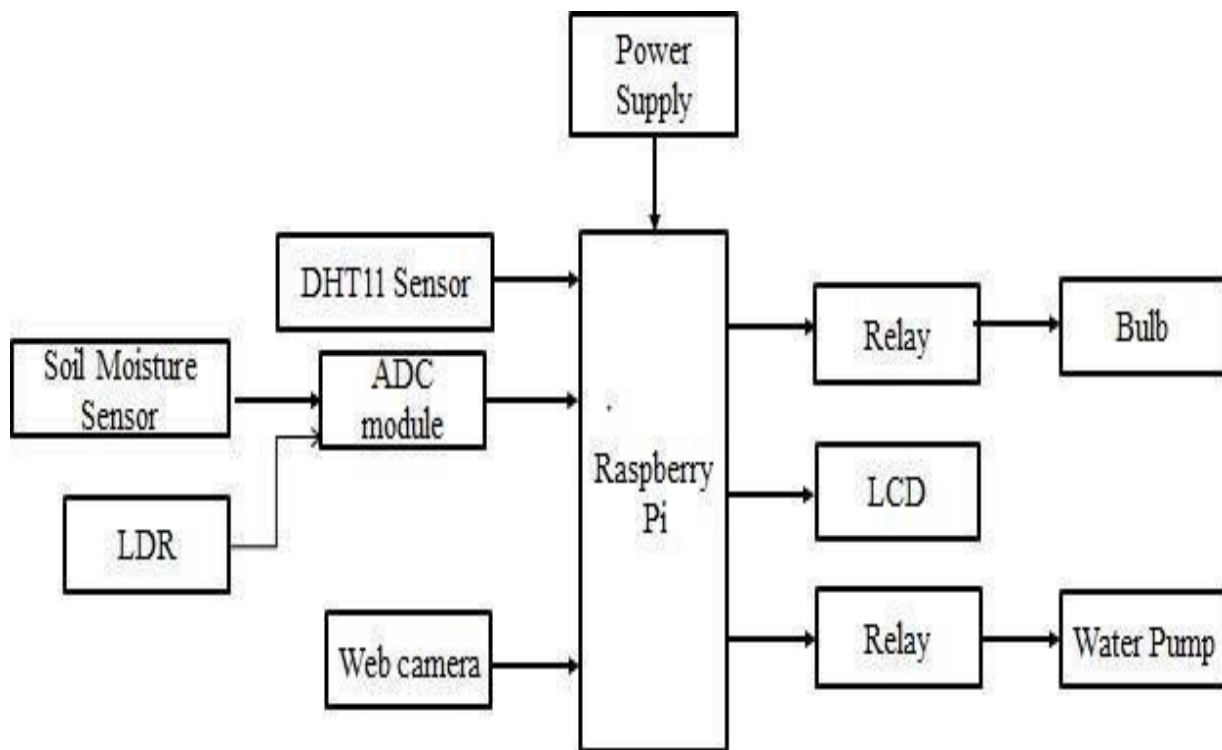


Fig 3.2 Proposed System Block Diagram

3.3 ADVANTAGES

Advantages of smart irrigation system using Raspberry Pi

There are several advantages of using a smart irrigation system based on Raspberry Pi, a small single-board computer, as compared to traditional irrigation systems:

Cost-effective: Raspberry Pi is an affordable and versatile platform for building a smart irrigation system. It can be used to control sensors, manage irrigation schedules, and monitor data, all at a fraction of the cost of traditional irrigation systems.

Customizable: Raspberry Pi provides a flexible and customizable platform for building a smart irrigation system. The system can be tailored to meet the specific needs of each farm, with the ability to integrate different sensors and control systems.

Efficient water usage: With sensors that can detect soil moisture levels, temperature, and humidity, the smart irrigation system can water crops only when needed. This can significantly reduce water waste and improve crop yields.

Automated: Raspberry Pi-based smart irrigation systems can be fully automated, with the ability to turn on and off irrigation systems based on pre-set schedules or realtime data from sensors. This reduces the need for manual intervention and improves the efficiency of irrigation operations.

Remote access: With the ability to connect to the internet, a Raspberry Pi-based smart irrigation system can be remotely accessed and managed. This allows farmers to monitor the system from anywhere and make realtime adjustments as needed.

Scalable: Smart irrigation systems based on Raspberry Pi can be easily scaled up or down, depending on the size of the farm and the number of crops being grown. Additional sensors and control systems can be added as needed, without the need for major infrastructure changes.

Overall, a smart irrigation system based on Raspberry Pi can provide farmers with a cost-effective, customizable, and efficient solution for managing their irrigation operations, leading to improved crop yields and sustainable agriculture practices.

CHAPTER-4

4.1 SELECTED METHODOLOGY

In here are several methodologies that can be used in the development and implementation of a smart irrigation system. The most common ones are:

Rule-based: A rule-based methodology involves setting up a set of rules or conditions for the irrigation system to follow. For example, if the soil moisture level drops below a certain threshold, the system will automatically turn on the irrigation system to water the crops. This methodology is relatively simple and easy to implement, but it may not be as accurate as other methodologies.

Fuzzy logic: Fuzzy logic is a mathematical methodology that allows for uncertainty and imprecision in decision-making. In a smart irrigation system, fuzzy logic can be used to set up rules that take into account various factors such as soil moisture, temperature, and humidity to determine the optimal irrigation schedule for the crops. This methodology is more complex than rule-based systems but can provide more accurate results.

Machine learning: Machine learning involves training a computer algorithm to learn from data and make predictions or decisions based on that data. In a smart irrigation system, machine learning can be used to analyze data from sensors and other sources to predict the optimal irrigation schedule for the crops. This methodology requires a significant amount of data and expertise in machine learning, but it can provide highly accurate results.

Neural networks: Neural networks are a type of machine learning that is based on the structure and function of the human brain. In a smart irrigation system, neural networks can be used to analyze data from sensors and other sources to predict the optimal irrigation schedule for the crops. This methodology is highly complex and requires

expertise in both machine learning and neural networks, but it can provide highly accurate results.

The selected methodology for a smart irrigation system will depend on various factors such as the complexity of the system, available data, and expertise of the development team. Rule-based and fuzzy logic methodologies are often used for simple systems, while machine learning and neural networks are more commonly used for more complex systems.

Let's take the example of a smart irrigation system that uses fuzzy logic as the selected methodology.

Fuzzy logic is a mathematical methodology that allows for uncertainty and imprecision in decision-making. In a smart irrigation system that uses fuzzy logic, the system would take into account various factors such as soil moisture, temperature, and humidity to determine the optimal irrigation schedule for the crops.

The system would use a set of rules that take into account the different factors and their respective levels to determine the irrigation schedule. For example, the rule could be: "If the soil moisture level is low and the temperature is high, increase the irrigation schedule". This rule would be written in a linguistic format using fuzzy sets to define the input variables and output variables.

The fuzzy sets define the membership of each variable to a certain degree, allowing for uncertainty and imprecision. For example, the soil moisture level could be defined as "low", "medium", or "high", with each level having a certain degree of membership.

The temperature could be defined as "low", "medium", or "high" as well.

The system would use fuzzy logic inference to determine the output variable, which in this case would be the irrigation schedule. The system would use a set of fuzzy rules, each with a specific weight, to determine the degree of membership of the output variable. The weights would be based on the importance of each rule in determining the output variable.

The final output would be a crisp value that defines the irrigation schedule. The system would then use this value to control the irrigation system and deliver the required amount of water to the crops.

Overall, using fuzzy logic as the selected methodology for a smart irrigation system allows for a more accurate and precise irrigation schedule, taking into account multiple factors that affect crop growth. However, it requires a significant amount of expertise and knowledge in fuzzy logic and the development of such systems

4.2 DESIGN OF PROPOSED MODULE

Here is a general design of a proposed module of a smart irrigation system using Raspberry Pi:

Sensors: The system would include sensors to measure different parameters such as soil moisture, temperature, humidity, and light intensity. These sensors would be connected to the Raspberry Pi through analog-to-digital converters (ADCs).

Raspberry Pi: The Raspberry Pi would serve as the brain of the system, where the data from the sensors would be processed and analyzed. The Raspberry Pi would also control the irrigation system based on the analysis of the data.

Communication module: The system would include a communication module to enable communication between the Raspberry Pi and the user's smartphone or computer. This would allow the user to monitor the system remotely and make adjustments as needed.

Power supply: The system would require a power supply to operate, which could be a battery or a power adapter.

Irrigation system: The system would include an irrigation system to deliver water to the crops. The irrigation system could be a simple drip irrigation system or a more complex system with sprinklers.

Control algorithm: The system would include a control algorithm that would use the data from the sensors to determine the optimal irrigation schedule for the crops. The control algorithm could use a fuzzy logic system or another methodology, depending on the requirements of the system.

User interface: The system would include a user interface that would allow the user to monitor the system and make adjustments as needed. The user interface could be a web-based application or a mobile application.

Overall, the proposed module of a smart irrigation system using Raspberry Pi would include sensors to measure different parameters, a Raspberry Pi to process and analyze the data, a communication module for remote monitoring, a power supply, an irrigation system, a control algorithm, and a user interface. This module could be integrated into a larger system to create a complete smart irrigation system

4.3 DESCRIPTION OF SOFTWARE FOR IMPLEMENTATION AND TESTING OF THE PROPOSED MODEL

To implement and test the proposed model of a smart irrigation system using Raspberry Pi, we would need to develop software that would run on the Raspberry Pi. Here's a description of the software components that would be required the Raspberry Pi would require an operating system such as Raspbian or Ubuntu to run the software. Sensor data acquisition the software would need to read the data from the sensors connected to the Raspberry Pi. This would require developing drivers to interface with the ADCs connected to the sensors. Data processing and analysis The software would need to process and analyze the data from the sensors to determine the optimal irrigation schedule. This would require developing algorithms that take into account different factors such as soil moisture, temperature, and humidity.

Control algorithm: The software would need to implement the control algorithm that determines the irrigation schedule based on the analysis of the sensor data. This could be a fuzzy logic system or another methodology, depending on the requirements of the system. Irrigation system control The software would need to control the irrigation system based on the determined irrigation schedule. This could be done using a relay module connected to the Raspberry Pi that controls the flow of water to the crops User interface The software would need to provide a user interface for monitoring the system and making adjustments as needed. This could be a web-based or mobile application that communicates with the Raspberry Pi over a network.

4.4 PROJECT MANGEMENT PLAN

Here is a general project management plan for a smart irrigation system:

Define the scope and objectives of the project: The first step is to define the scope and objectives of the smart irrigation system project. This should include identifying the crops to be irrigated, the environmental factors that need to be considered, and the expected outcomes of the project.

Develop a project schedule: The project schedule should identify the tasks to be completed, the timeline for each task, and the dependencies between tasks. This will help ensure that the project stays on track and is completed on time.

Allocate resources: The project will require resources such as personnel, materials, and equipment. These resources should be allocated based on the project schedule and the needs of the project.

Identify risks: The project should be assessed for potential risks, including technical, environmental, and financial risks. Risk mitigation plans should be developed to address these risks.

Integration and Testing: Once the hardware and software components have been developed, the integration and testing phase begins. This involves integrating the different components and conducting various tests to ensure that the system meets the project requirements. Testing should include both functional and non-functional testing, including stress testing, performance testing, and usability testing.

Deployment and Maintenance: Once the automatic vehicle speed control system has been tested and validated, it can be deployed. The deployment phase includes installing the system in the vehicle and providing training to the endusers. The maintenance phase includes ongoing support and maintenance to ensure that the system continues to operate at optimal performance levels. **Project Closure:** The project closure phase includes conducting a final project review to assess the success of the project and identify areas for improvement in future projects. It also includes

documenting the project, archiving project materials, and releasing resources. In conclusion, the development of an automatic vehicle speed control system using an RTC module and ZigBee requires careful planning, development, testing, and deployment. A well-executed project management plan can help ensure that the project is completed on time, within budget, and meets the desired performance requirements.

4.5 FINANCIAL REPORT ON ESTIMATED COSTING

The estimated cost of a smart irrigation system using Raspberry Pi will depend on several factors such as the size of the farm, the type of crops, the number of sensors required, and the complexity of the control system. Here is a breakdown of the estimated costs for a small to medium-sized farm: Raspberry Pi board: \$35-\$50

Sensors (e.g. soil moisture, temperature, humidity): \$5-\$10 per sensor

ADC module for connecting sensors to Raspberry Pi: \$3-\$5

Relay module for controlling water valves: \$5-\$8 per valve

Power supply for Raspberry Pi: \$5-\$10

Miscellaneous components (eg. wiring, connectors, housing): \$10-\$15

The total estimated cost for a small to medium-sized farm with 10 sensors and 2 water valves would be approximately \$80-\$100.

In terms of financial reports, a cost-benefit analysis could be conducted to determine the financial benefits of implementing a smart irrigation system. This analysis would compare the costs of implementing the system to the potential savings in water usage and labor costs. It could also consider the potential increase in crop yield due to more efficient irrigation.

Other financial reports could include cash flow projections, which would provide an estimate of the cash inflows and outflows associated with the project over time. This could be used to determine the financial feasibility of the project and to plan for financing needs.

Overall, while the initial investment for a smart irrigation system using Raspberry Pi may seem high, the potential savings in water usage and labor costs, as well as the

potential increase in crop yield, can provide significant long-term financial benefits for farmers.

Software Costs:

The software costs associated with a smart irrigation system using Raspberry Pi will depend on the specific software components and tools used in the system. Here are some potential software costs to consider.

4.6 SOFTWARE TO OPERATIONS PLANS

Steps involved in software installation here are the general steps involved in installing the software for a smart irrigation system using a Raspberry Pi:

1. Install the operating system: Download the latest version of Raspbian or another operating system for your Raspberry Pi and install it on the SD card.
2. Update the software: Open the terminal and run the command "sudo apt-get update" to update the software.
3. Install the required software packages: Install the necessary software packages for your smart irrigation system such as Python, Flask, and GPIO libraries using the command "sudo apt-get install [package name]".
4. Connect the hardware: Connect the Raspberry Pi to the sensors, actuators, and other hardware components required for the smart irrigation system.
5. Write the code: Write the code for the smart irrigation system using a suitable programming language such as Python. You can use libraries such as RPi.GPIO to interface with the hardware.
6. Test the code: Test the code to ensure that it is working correctly. You can use debugging tools and techniques to identify and fix any issues.
7. Run the code: Run the code on the Raspberry Pi to activate the smart irrigation system.

8. Configure the system: Configure the system according to your requirements by modifying the code or settings as needed.
9. Monitor the system: Monitor the smart irrigation system regularly to ensure that it is working correctly and making the required adjustments if necessary.

Overall, the process of installing software for a smart irrigation system using a Raspberry Pi involves a combination of hardware and software tasks that require a certain level of technical knowledge and experience

STEPS INVOLVED

Software design: The software design phase involves defining the system requirements, developing use cases, and designing the system architecture. During this phase, the software team will determine the software requirements, data flow, and data processing for the speed control system.

Software development: The software development phase involves writing and testing the software code for the speed control system. The software team will develop the code that communicates with the RTC module and ZigBee module,. Integration testing: Integration testing involves testing the individual software components and

CHAPTER-5

IMPLEMENTATION DETAILS

5.1 DEVELOPMENT AND DEPLOYMENT SETUP

To make software to work with embedded systems we need to bring software and hardware together. for this purpose, we need to burn our source code into microprocessor or microcontroller which is a hardware component and which takes care of all operations to be done by embedded system according to our code.

Generally we write source codes for embedded systems in assembly language, but the processors run only executable files. The process of converting the source code representation of your embedded software into an executable binary image involves three distinct steps:

- Each of the source files must be compiled or assembled into an object file.
- All of the object files that result from the first step must be linked together to produce a single object file, called the relocatable program.
- Physical memory addresses must be assigned to the relative offsets within the relocatable program in a process called relocation.

The result of the final step is a file containing an executable binary image that is ready to run on the embedded system.

Hardware Setup:

Here are the general steps involved in setting up the hardware for a smart irrigation system using a Raspberry Pi:

Gather the required components: Gather all the components needed for the smart irrigation system, such as a Raspberry Pi, sensors, actuators, relays, water pumps, and other hardware components.

Connect the Raspberry Pi: Connect the Raspberry Pi to a power source, monitor, keyboard, and mouse.

Connect the sensors: Connect the sensors such as temperature, humidity, and moisture sensors to the Raspberry Pi using appropriate cables.

Connect the actuators: Connect the actuators such as water pumps and solenoid valves to the Raspberry Pi using appropriate cables.

Connect the relays: Connect the relays to the Raspberry Pi using appropriate cables. The relays are used to switch on and off the water pumps and solenoid valves.

Mount the sensors and actuators: Mount the sensors and actuators in suitable locations such as soil, plant leaves, or water tanks.

Check the connections: Check all the connections and cables to ensure that they are securely attached and functioning correctly.

Power up the system: Power up the system and test the sensors, actuators, and relays to ensure that they are working correctly.

Configure the system: Configure the Raspberry Pi and sensors to work together and collect data from the environment. Write code to control the actuators based on the collected data.

Monitor the system: Monitor the system regularly to ensure that it is working correctly, and make any required adjustments to the hardware or software as needed.

Overall, the process of setting up the hardware for a smart irrigation system using a Raspberry Pi requires a certain level of technical knowledge and experience. It involves connecting various components, mounting sensors and actuators, and testing and configuring the system to work effectively

DEPLOYMENT OF RASPBERRY PI

Raspberry Pi can be used in a smart irrigation system to automate and optimize the watering of crops or plants. Here are the steps you can follow to deploy Raspberry Pi in a smart irrigation system.

Set up the hardware: First, you need to set up the Raspberry Pi board with necessary components such as sensors, relays, and actuators. The sensors can be used to measure various environmental parameters such as temperature, humidity, soil moisture, and light intensity. The relays can be used to control the water pumps or valves, while the actuators can be used to adjust the direction of the irrigation system.

Install the software: Once the hardware is set up, you need to install the necessary software on the Raspberry Pi. This can include the operating system, programming language (such as Python), and any required libraries or frameworks. You can also install a database to store sensor data for analysis and optimization. Develop the irrigation control algorithm: You need to develop an algorithm that will control the irrigation system based on the sensor data. This algorithm can be designed to adjust the amount and frequency of watering based on the soil moisture levels, weather forecasts, and other environmental factors.

Deploy the system: Once the software and algorithm are developed, you can deploy the system in the field. This can include installing the sensors, actuators, and relays in the appropriate locations and connecting them to the Raspberry Pi.

You can also connect the Raspberry Pi to the internet to remotely monitor and control the irrigation system.

Monitor and optimize the system: Finally, you need to monitor the system and analyze the data collected by the sensors to optimize the irrigation algorithm. This can involve adjusting the watering schedule or amount based on the data collected and using machine learning techniques to improve the accuracy of the algorithm. By following

these steps, you can successfully deploy Raspberry Pi in a smart irrigation system and improve the efficiency and productivity of your crops or plants.

5.2 ALGORITHM USED

The algorithm used in a smart irrigation system using Raspberry Pi can vary based on the specific requirements and environmental conditions of the crops or plants being watered. However, here is a basic algorithm that can be used as a starting point. This algorithm uses a set of rules and membership functions to determine when to trigger irrigation. The system considers inputs such as soil moisture level, weather conditions, and crop type, and uses fuzzy logic to make decisions about when to irrigate. This algorithm is more complex than the threshold-based algorithm, but it can be more accurate and can take into account more variables.

Measure soil moisture: The system measures the soil moisture using a soil moisture sensor connected to the Raspberry Pi. The sensor provides a moisture level value between 0 and 100.

Determine watering needs: The system compares the moisture level value to a predefined threshold value to determine if watering is needed. If the moisture level is below the threshold value, the system proceeds to the next step.

Calculate watering duration: The system calculates the watering duration based on the moisture deficit, which is the difference between the current moisture level and the desired moisture level. The desired moisture level can be pre-defined based on the crop requirements.

Turn on water pump: The system turns on the water pump or valve for the calculated duration to water the plants.
Wait for moisture level to rise: After watering, the system waits for a certain period of time for the moisture level to rise to the desired level.

Irrigation Algorithm

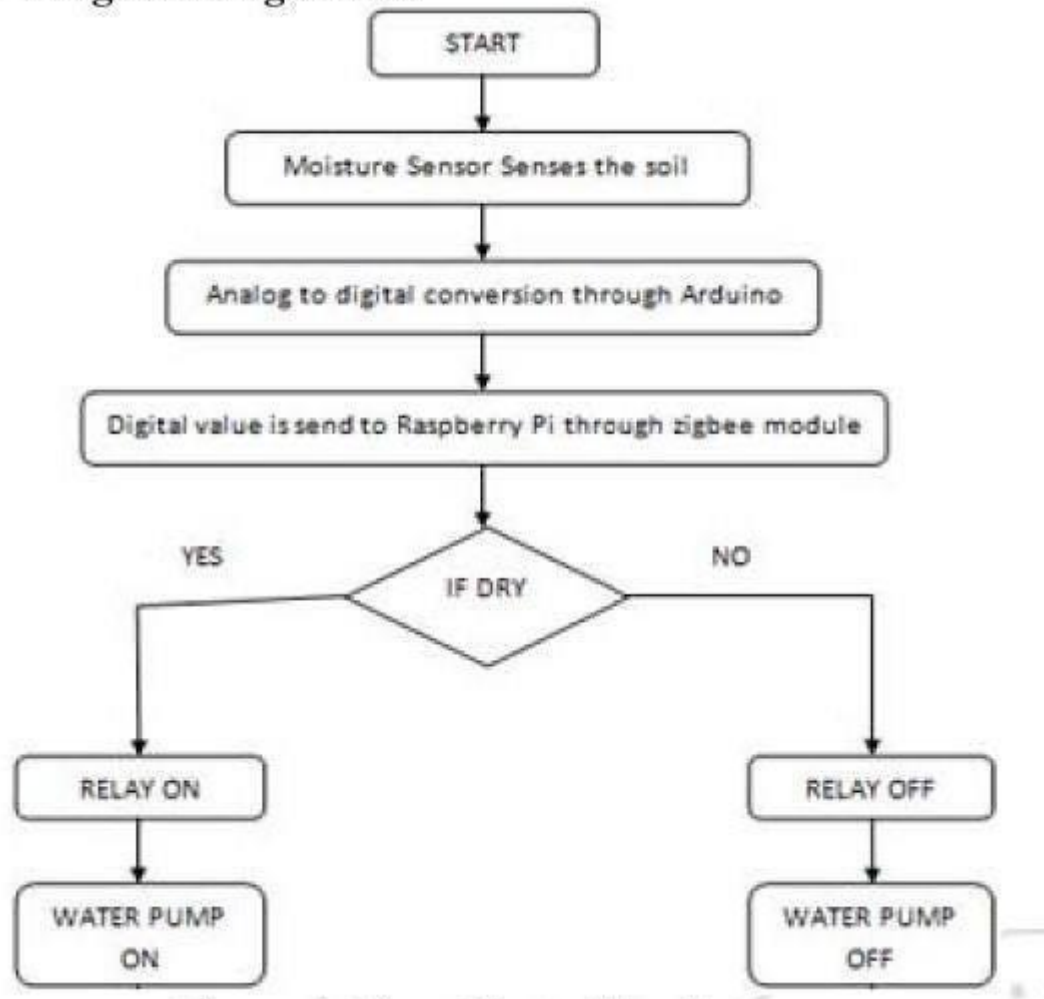


Fig 5.1 Algorithm Block Diagram

Steps involved

Sensor data collection: The first step is to collect data from various sensors such as temperature, humidity, soil moisture, rainfall, and other environmental factors that affect plant growth.

Data processing and analysis: The data collected from the sensors needs to be processed and analyzed to determine the optimal irrigation needs for the plants.

Decision making: Based on the analysis of sensor data, the system needs to make a decision on when and how much water to supply to the plants.

Control system: A control system is required to implement the irrigation decision made by the system. This system can be implemented using various technologies, such as microcontrollers, programmable logic controllers (PLCs), or other computing devices. Communication system: The system needs to communicate with the sensors, control system, and other devices in the irrigation system to ensure that the irrigation process is efficient and effective. User interface: A user interface is required to provide feedback to the user about the irrigation process and allow them to input their own preferences for the system. Monitoring and feedback: The system needs to constantly monitor the plants, sensors, and other devices in the irrigation system to provide feedback on the effectiveness of the irrigation process.

5.3 TESTING

Setting up the Raspberry Pi: The first step is to set up the Raspberry Pi with the necessary software, including the operating system, programming environment, and any necessary libraries or dependencies.

Connecting sensors: The next step is to connect sensors to the Raspberry Pi, including sensors for measuring soil moisture, temperature, humidity, and other environmental factors.

Programming the system: The smart irrigation system needs to be programmed using a suitable programming language, such as Python. The code should include algorithms for processing sensor data, making irrigation decisions, and controlling the irrigation system.

Testing the system: Once the system is programmed, it should be tested to ensure that it is functioning as expected. This can involve running the system in a controlled environment, simulating sensor data, and verifying that the system is making appropriate irrigation decisions and controlling the irrigation system correctly.

Field testing: Once the system has been tested in a controlled environment, it should be tested in the field to ensure that it is functioning correctly under real-world conditions.

This can involve installing the system in a garden or other outdoor environment and monitoring its performance over time.

Performance optimization: As the system is tested and deployed, it may be necessary to optimize its performance by adjusting algorithms, adding new sensors, or modifying the irrigation system. This process may involve collecting additional data, analyzing system logs, and making changes to the code as necessary.

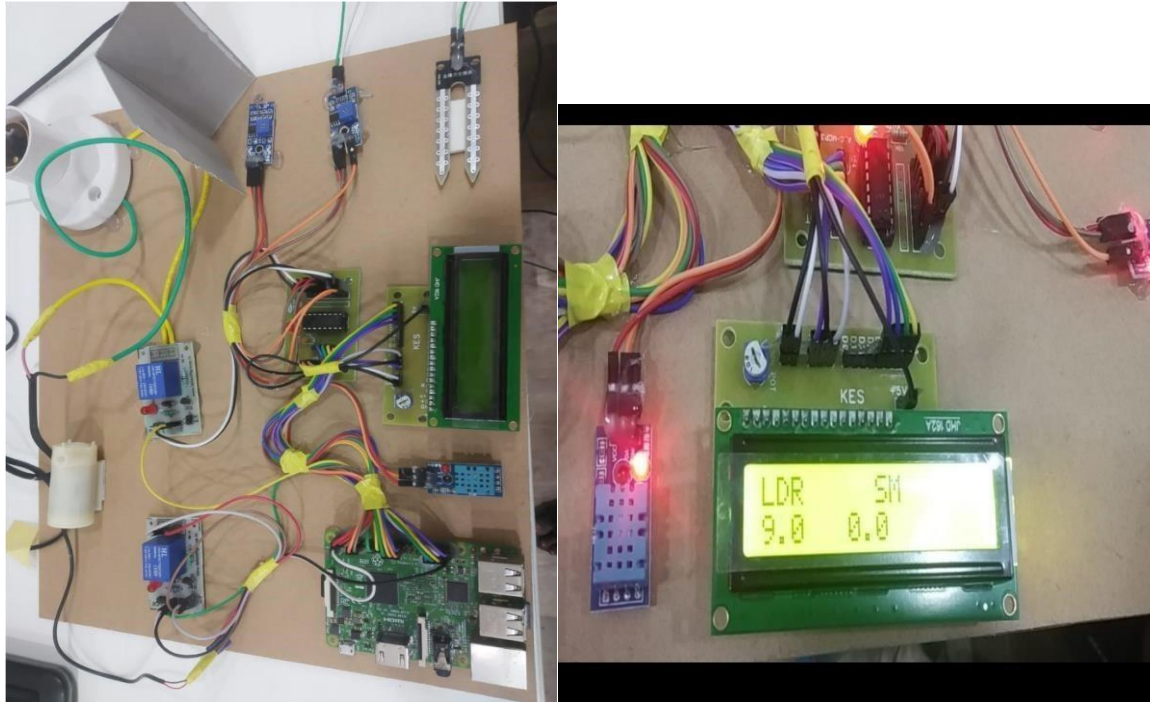


Fig 5.2 Result Diagram

Maintenance: Maintenance involves updating the software as needed to address any bugs or issues that arise. During this phase, the software team will monitor the system to ensure that it operates optimally and address any issues that arise.

Overall, the software implementation process for speed control using ZigBee and RTC module involves defining the system requirements, designing the software architecture, developing the software code, testing the system components.

CHAPTER- 6

RESULTS

LIMITATIONS

Cost: Smart Irrigation systems can be expensive to install and maintain, particularly if they require specialized hardware or sensors. The cost of the system may not be feasible for small-scale farmers or gardeners.

Maintenance: Smart Irrigation systems require regular maintenance to ensure that they are functioning correctly. This includes replacing sensors, monitoring and adjusting the irrigation schedule, and repairing any damaged components. If the system is not maintained properly, it may not function effectively.

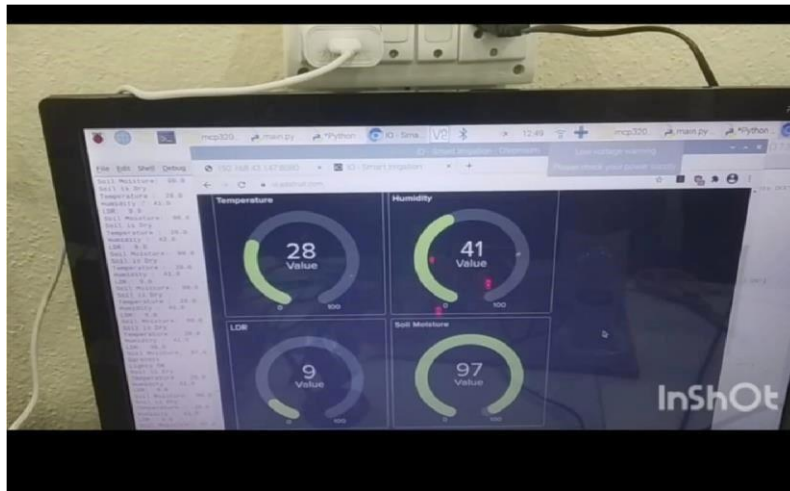
Technical expertise: Setting up and maintaining a Smart Irrigation system requires technical expertise, particularly in the areas of programming, electronics, and data analysis. This may be a barrier for some farmers or gardeners who do not have these skills.

Environmental factors: Smart Irrigation systems rely on accurate data from sensors to make irrigation decisions. However, environmental factors such as wind, rainfall, and temperature can affect the accuracy of the data, which can lead to incorrect irrigation decisions.

Power supply: Smart Irrigation systems require a reliable power supply to operate effectively. This can be a challenge in remote or off-grid locations where access to electricity is limited.

Compatibility: Smart Irrigation systems may not be compatible with existing irrigation systems or infrastructure, which can make installation and integration more challenging.

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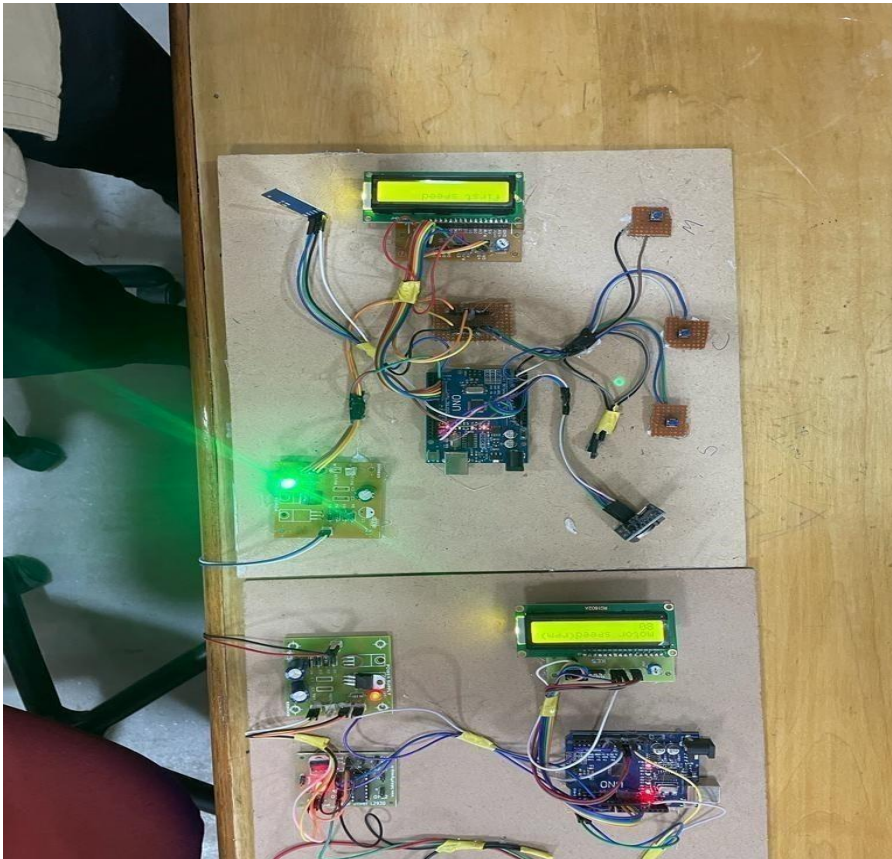


6.1 RESULTS

The result of a Smart Irrigation system using Raspberry Pi can be a significant improvement in plant growth, water conservation, and efficiency. By using sensors to monitor soil moisture levels and weather conditions, the system can make informed decisions about when to irrigate and how much water to use. This can help ensure that each plant receives the right amount of water at the right time, leading to healthier plants, higher crop yields, and better overall productivity. Additionally, the system can be customized to meet the specific needs of different plants and environmental conditions, providing a flexible and efficient solution for irrigation. Realtime monitoring

and alerts can also help farmers and gardeners stay on top of any issues or problems that arise, ensuring that the system operates smoothly and effectively. Overall, the result of a Smart Irrigation system using Raspberry Pi can be a significant improvement in water management, plant growth, and overall efficiency.

6.2 PERFORMANCE



The performance of a Smart Irrigation system using Raspberry Pi can be measured by several factors. One of the most critical factors is water savings. Smart Irrigation systems are designed to conserve water by delivering the right amount of water to plants based on their specific needs. By comparing the amount of water used by a traditional irrigation system with a Smart Irrigation system, it is possible to measure water savings and evaluate the system's efficiency.

Another key factor in evaluating the performance of a Smart Irrigation system is crop yield. By providing plants with the right amount of water at the right time, a Smart

Irrigation system can help improve crop yield and quality. The performance of the system can be evaluated by comparing crop yield with and without the system in place. Energy consumption is another factor that can be used to evaluate the performance of a Smart Irrigation system. The system may require electricity to operate, and energyefficient components can help reduce energy consumption and operating costs.

The accuracy of sensors used in a Smart Irrigation system is critical to the system's performance. The sensors must provide accurate data on soil moisture levels, weather conditions, and other factors that affect irrigation. The performance of the system can be evaluated by testing the accuracy of sensors and adjusting the system's algorithms accordingly.

Finally, user satisfaction is an essential factor in evaluating the performance of a Smart Irrigation system. Farmers or gardeners may provide feedback on the system's ease of use, effectiveness, and overall performance. This feedback can help identify areas for improvement and optimize the system's performance to meet the needs of its users. In conclusion, the performance of a Smart Irrigation system using Raspberry Pi can be evaluated based on water savings, crop yield, energy consumption, accuracy of sensors, and user satisfaction. By monitoring these key performance indicators, it is possible to optimize the system's performance and ensure that it meets the needs .

CHAPTER-7

CONCLUSION

7.1 CONCLUSION

In conclusion, Smart Irrigation systems using Raspberry Pi can be an effective and efficient solution for water management and plant growth. By using sensors to monitor soil moisture levels and weather conditions, the system can make informed decisions about when to irrigate and how much water to use. This can lead to water conservation, improved crop yield, and better overall efficiency. Additionally, the system can be customized to meet the specific needs of different plants and environmental conditions, providing a flexible and efficient solution for irrigation. Real-time monitoring and alerts can also help farmers and gardeners stay on top of any issues or problems that arise, ensuring that the system operates smoothly and effectively. While there may be some limitations to the system, the benefits of Smart Irrigation systems using Raspberry Pi can help overcome these limitations and provide a sustainable and effective solution for water management and plant growth. Overall, the use of Smart Irrigation systems using Raspberry Pi can provide a significant improvement in water management, plant growth, and overall productivity.

7.2 FUTURE WORK

While Smart Irrigation systems using Raspberry Pi are already proving to be an effective solution for water management and plant growth, there is still plenty of room for future work and improvement. Some potential areas for future work include: Integration with other systems: Smart Irrigation systems using Raspberry Pi can be integrated with other systems, such as weather forecasting, soil analysis, and crop management systems. This integration can help further optimize irrigation scheduling and improve crop yield.

Use of machine learning: Machine learning algorithms can be used to analyze data from sensors and make predictions about irrigation needs. This can help the system learn and adapt over time, improving its efficiency and accuracy. Wireless connectivity: Smart Irrigation systems using Raspberry Pi can be connected to wireless networks, enabling real-time data transmission and remote monitoring. This can help farmers and

gardeners stay on top of irrigation needs and respond to any issues or problems in a timely manner.

Automated maintenance: Smart Irrigation systems using Raspberry Pi can be equipped with automated maintenance features, such as cleaning sensors, replacing batteries, and adjusting water pressure. This can help reduce maintenance costs and improve the overall efficiency of the system.

Optimization of water resources: Smart Irrigation systems using Raspberry Pi can be designed to optimize the use of water resources, such as rainwater harvesting and greywater recycling. This can help reduce reliance on freshwater sources and promote sustainable water management practices.

7.3 RESEARCH ISSUES

There are several research issues that need to be addressed when implementing.

Sensor accuracy: Sensor accuracy is a critical factor in the performance of a Smart Irrigation system. Research is needed to develop and test sensors that provide accurate data on soil moisture, weather conditions, and other factors that affect irrigation.

Energy efficiency: Smart Irrigation systems using Raspberry Pi may require electricity to operate, which can increase energy consumption and operating costs. Research is needed to develop energy-efficient components that can help reduce energy consumption and improve the system's overall efficiency.

System optimization: Smart Irrigation systems using Raspberry Pi rely on algorithms to determine when and how much to irrigate. Research is needed to optimize these algorithms to ensure that the system operates efficiently and effectively.

Integration with other systems: Smart Irrigation systems using Raspberry Pi can be integrated with other systems, such as weather forecasting and crop management systems. Research is needed to identify and develop effective integration strategies and protocols.

User acceptance: The success of a Smart Irrigation system depends on user acceptance and adoption. Research is needed to identify the factors that influence user acceptance and develop strategies to promote adoption and use of the system.

Sustainability: Smart Irrigation systems using Raspberry Pi can help promote

sustainable water management practices, but research is needed to identify and evaluate the system's environmental impacts and overall sustainability.

7.4 IMPLEMENTATION ISSUES

Smart Irrigation systems using Raspberry Pi can be expensive to implement, especially for small-scale farmers or gardeners. Research is needed to identify cost-effective components and strategies to reduce the overall cost of the system. Smart Irrigation systems using Raspberry Pi require technical expertise to install, configure, and maintain. Research is needed to develop user-friendly interfaces and documentation to facilitate installation and maintenance of the system. Smart Irrigation systems using Raspberry Pi can be scaled to meet the needs of different crops, farm sizes, and water resources. However, research is needed to identify the limitations and challenges of scaling the system and develop strategies to overcome these challenges. Smart Irrigation systems using Raspberry Pi may be subject to local, state, or national regulations related to water use, electricity, and data privacy. Research is needed to identify and comply with relevant regulations and standards. Smart Irrigation systems using Raspberry Pi generate a large amount of data, which must be managed and analyzed to optimize system performance. Research is needed to develop effective data management strategies and protocols. Smart Irrigation systems using Raspberry Pi rely on wireless communication, which can be subject to interference from other wireless systems. Research is needed to identify and mitigate potential interference issues.

REFERENCE

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- [2] Prof. Sanjay B. Dhaygude, Mr.Nitin P.Kumbhar, "Agricultural plant Leaf Disease Detection Using Image Processing", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 2, Issue 1, January 2013.
- [3] Amandeep Singh ,Maninder Lal Singh, "Automated Color Prediction of Paddy Crop Leaf using Image Processing", International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015), 2015.
- [4] M.Malathi, K.Aruli , S.Mohamed Nizar, A.Sagaya Selvaraj, "A Survey on Plant Leaf Disease Detection Using Image Processing Techniques", International Research Journal of Engineering and Technology (IRJET),Volume: 02 Issue: 09, Dec 2015.

APPENDIX

A. SOURCE CODE

SOURCE CODE FOR TRANSMITTER

```
from flask import Flask from flask import render_template, request import RPi.GPIO
as GPIO import time from time import sleep import serial import smtplib from
mcp3208 import MCP3208 import Adafruit_DHT from Adafruit_IO import Client aio =
Client("Ganesh_22","aio_lyvt60HW6urT1P9Xd7VKs3fbtDnC") dht_mod
= Adafruit_DHT.DHT11 dht_pin = 4
# Define GPIO to LCD mapping
LCD_RS = 16 LCD_E
= 20

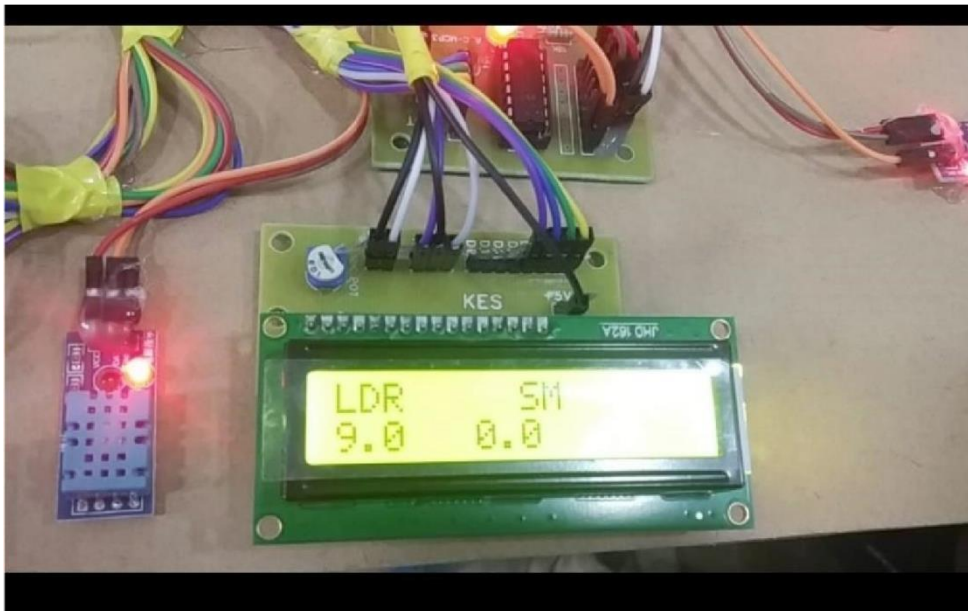
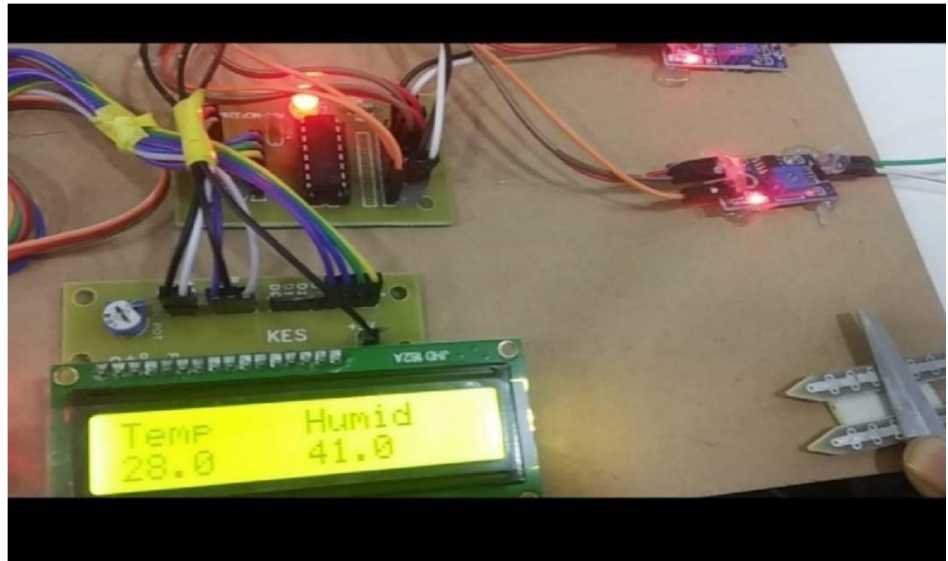
LCD_D4 = 21
LCD_D5 = 13
LCD_D6 = 19
LCD_D7 = 26 pump
= 23 bulb = 24
# Define some device constants
LCD_WIDTH = 16 # Maximum characters per line
LCD_CHR = True
LCD_CMD = False
LCD_LINE_1 = 0x80 # LCD RAM address for the 1st line
LCD_LINE_2 = 0xC0 # LCD RAM address for the 2nd line
E_PULSE = 0.0005
E_DELAY = 0.0005
GPIO.setwarnings(False)
GPIO.setmode(GPIO.BCM)
GPIO.setup(LCD_E, GPIO.OUT)
GPIO.setup(LCD_RS, GPIO.OUT)
GPIO.setup(LCD_D4, GPIO.OUT)
GPIO.setup(LCD_D5, GPIO.OUT)
```

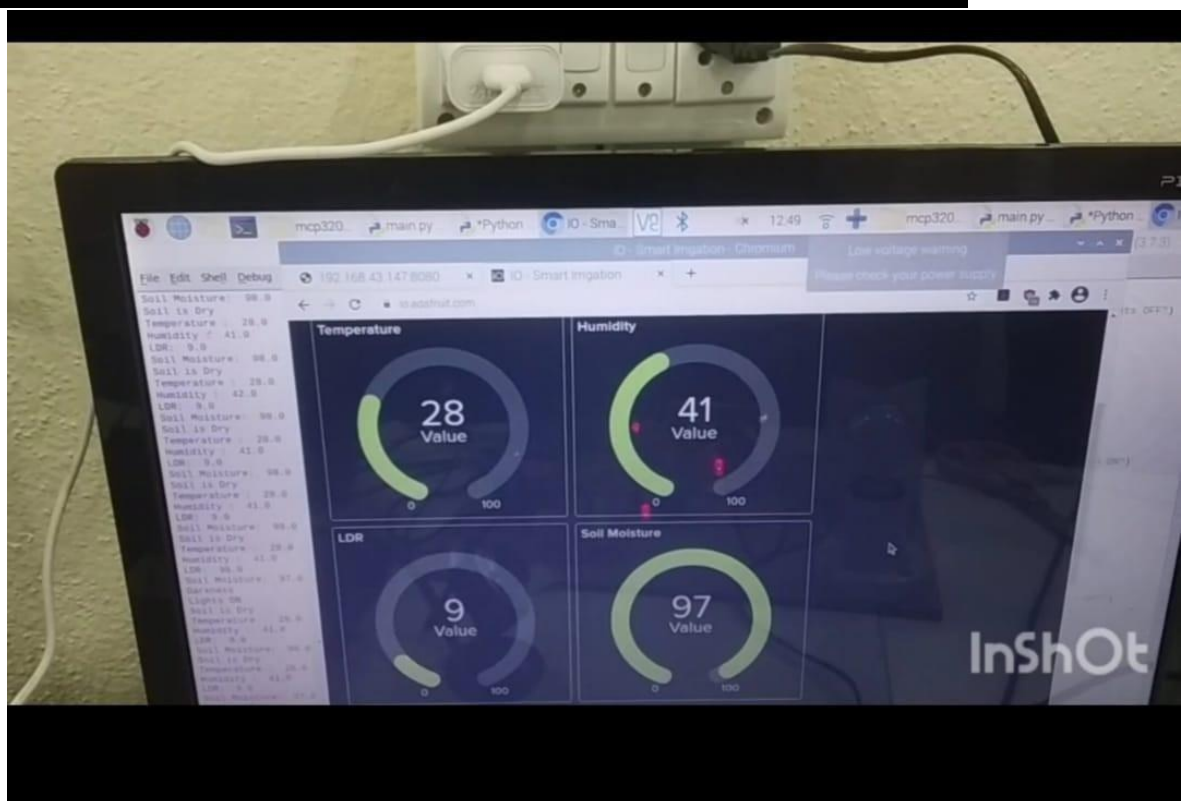
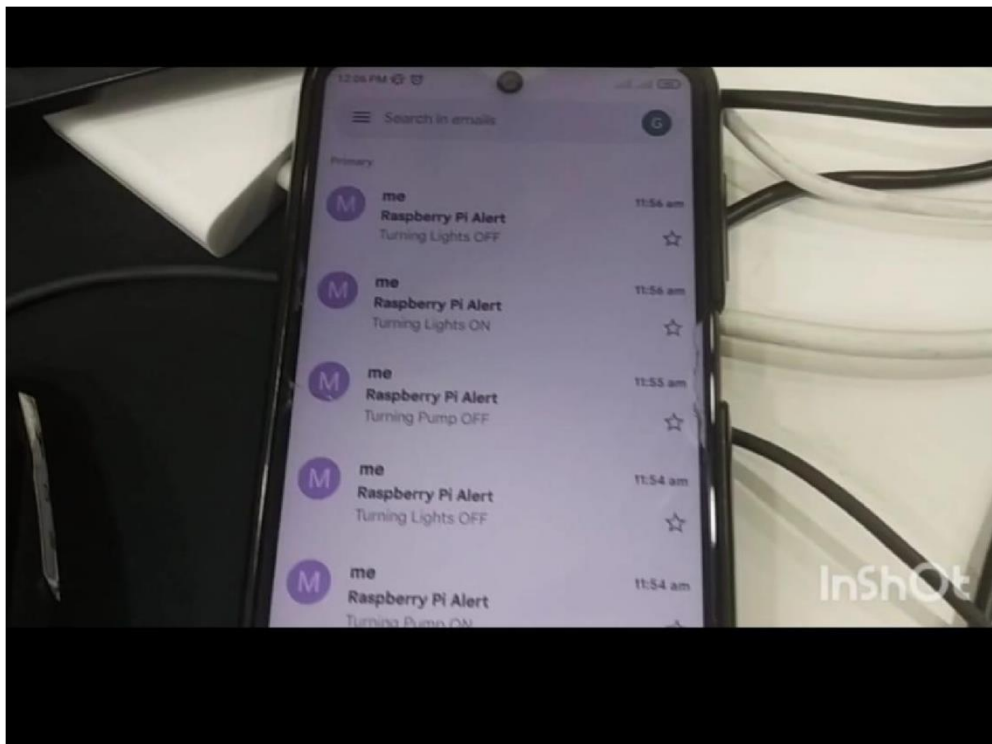
```

GPIO.setup(LCD_D6, GPIO.OUT)
GPIO.setup(LCD_D7, GPIO.OUT)
GPIO.setup(pump, GPIO.OUT)
GPIO.setup(bulb, GPIO.OUT)
GPIO.output(pump, 0)
GPIO.output(bulb, 0) adc =
MCP3208() app =
Flask(_name_)
GPIO.setmode(GPIO.BCM
)
a = 0 b = 0
SMTP_SERVER = 'smtp.gmail.com'
#Email Server(don't change)
SMTP_PORT = 587 #Server Port (don't change)
GMAIL_US ='venkataganeshkosinepalli@gmail.com GMAIL_P ='frzfmogmdeqqfxy'
rec = 'venkataganeshkosinepalli@gmail.com' def lcd_init(): # Initialise display
lcd_byte(0x33,LCD_CMD) # 110011 Initialise lcd_byte(0x32,LCD_CMD) # 110010
Initialise lcd_byte(0x06,LCD_CMD) # 000110 Cursor move direction
lcd_byte(0x0C,LCD_CMD) # 001100 Display On,Cursor Off, Blink Off
lcd_byte(0x28,LCD_CMD) # 101000 Data length, number of lines, font
size lcd_byte(0x01,LCD_CMD)
# 000001clear display time.sleep(E_DELAY) def lcd_byte(bits, mode):
# Send byte to data pins
# bits = data
# mode = True for character # False for command
GPIO.output(LCD_RS, mode) # RS

```

B. SCREENSHOTS





Different types outputs

PRODUCTIVE DESIGN FOR SMART IRRIGATION SYSTEM USING RASPBERRYPI

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Abstract:

Water is the most critical input inside the cultivation of agricultural merchandise, and therefore the system of expansion of water supply has grow to be a key shape of progressed agriculture in the area. An automatic irrigation technique distributes water among vegetation/plant life by way of blowing it over the vegetation/vegetation, much like natural irrigation. In this venture, we can expand an automatic machine so that it will assist the farmer/guy to understand about his area and the condition of the plant at domestic or everywhere inside the world. This work will help the farmer to irrigate the field maximum efficaciously with an automated irrigation system primarily based on soil, moisture and weather. Streaming, as well as measuring temperature, humidity, and seeking out forecasts from other climate services. Whenever there's a exchange in temperature, humidity and the contemporary country of rain inside the surroundings, these sensors stumble on the change in temperature and humidity and ship an interrupt sign to the BUSH IDAEUS pi. Over-irrigation not simplest reduces plant productivity, but also reasons soil fertility losses and environmental hazards inclusive of water pollution and salinization. Over the years, attention of water and electricity issues has brought about elevated use of sprinkler structures. At present, automation plays one

of the most vital roles in human lifestyles. This not only offers comfort, however additionally reduces power consumption, performance and saves time. Currently, the enterprise uses automation and control gadgets, which can be pricey and no longer appropriate for agricultural and horticultural use. So, in this work, we can develop IoT based irrigation smart technologies the use of Raspberry pi. The proposed sprinkler system might be reasonably-priced and might be used by Indian farmers.

Keywords: Irrigation system, Raspberrypi, DHT11, Soil Moisture

INTRODUCTION

India is one in every of the most important customers of clean water within the international and our usa uses extra fresh water than other countries. A huge amount of water is used in agriculture, not inside the home and business quarter. Sixty five% of the full water supply falls into groundwater. Today, water has grow to be one of the most crucial sources on this planet and is mainly utilized in agriculture. Since best the moisture sensor and the temperature sensor are located inside the root region of the plant life, the machine can distribute this information wirelessly. The Raspberry Pi is the coronary heart of the machine, and the

webcam is hooked up to the Raspberry Pi through a Wi-Fi module. Python programming language is used for automation purposes. The gadget is a community of wireless sensors and a Wi-Fi base station that may provide sensor records for irrigation automation.

LITERATURE SURVEY

Khirade & et al... [1] The detection of plant sicknesses is prime to stopping the lack of vegetation and agricultural production. This requires a big quantity of labor, understanding of plant diseases and also calls for too much processing time. Hence, picture processing is used to locate plant sicknesses. Disease detection includes steps together with photograph acquisition, picture preprocessing, photo segmentation, function extraction, and segmentation. This article mentioned techniques for identifying plant sicknesses from leaf photos. This article discusses the numerous strategies of segmenting the affected part of the plant. This paper additionally discussed some strategies of character extraction and classification for extracting characters from infected and diseased plant leaves. Accurate detection and category of plant sicknesses is essential for a hit crop cultivation, which can be achieved through the use of photograph processing. This article discusses the diverse techniques of segmenting the affected part of the plant. This paper also discussed some strategies of man or woman extraction and type for extracting characters from infected and diseased plant leaves. The use of ANN techniques to diagnose plant diseases, including self-business enterprise function map, algorithm, SVM, etc., may be correctly used. With these techniques we can as it should be pick out and suggest various plant

illnesses through the usage of photo processing techniques.

Prof. Sanjay, B. Daigude et al.[2] The software of texture information to the detection of plant leaf sicknesses is defined. First, the RGB colour shape is transformed into HSV area, considering that HSV is a superb coloration descriptor. Masking and elimination of green photos with a precalculated threshold. Then, inside the subsequent step, segmentation is achieved through the use of 32X32 uncooked patches and beneficial segments are acquired. These segments are used to analyze the matching texture of the color matrix. Finally, if the feature parameters are in comparison with the feature parameters of the normal sheet.

Amandeep Singh, Maninder Lal Singh et al.[3] The best undertaking encountered inside the paintings became to reap exceptional pics with awesome shade element. A very usual undertaking is to get a photo with all of the details inside the method memory. Such images are created with excessive decision and consequently have a length of 6-10 MB. The Nikon D5200 turned into geared up for this assignment, and it did its activity very well. The second problem faced changed into setting the situations to dispose of, due to the fact from the start to the give up of the rice planting season there is lots of alternate in the lights, even if the time is constant for the acquisition of the picture. But the answer to this trouble is to exchange the consumer-described threshold and make the vital changes to the LCC colors.

M. Malathi, K. Aruli & et al... [4] They are doing research at the detection of plant leaf disorder using picture processing era. The ailment reasons a widespread reduction in the quantity and quality of agricultural products. It is difficult for farmers to understand the signs of the disease with the naked eye. For

crop protection, particularly in large farms, laptop imaging generation has been evolved which can hit upon leaf illnesses the use of leaf colour information. In phrases of hassle-fixing packages, many methods of picture processing have been introduced via pattern recognition and some automatic classification gear. The following a part of this article offers a meaningful overview of these proposed structures. There are many methods of computerized or laptop vision to stumble on and diagnose illnesses, however there is still a loss of studies on this problem. All diseases can't be diagnosed by using one method.

MalvikaRanjan, Manasi Rajeev Veginwar et al [5] describes a diagnostic method that requires mainly visual and accurate judgment as well as scientific strategies. An photo of a dead leaf is captured. For this cause of segmentation, HSV color signals are highlighted. An synthetic neural network (ANN) is then trained to differentiate between wholesome and diseased samples. ANN class overall performance is eighty% higher in accuracy.

EXISTING SYSTEM

In the Existence System, human beings checked and showed the content material of the fields manually. It is a very complex and threatening manner to test the kingdom in the midnight. Even if the weather is right, the humidity is unknown, so we have a few hazards in the previous machine.

Drawbacks:

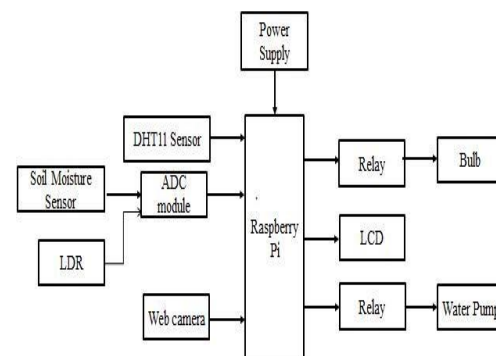
- This is a very complicated and dangerous technique to test the fame inside the middle of the night.

PROPOSED SYSTEM

In the proposed device, the consumer has made sufficient use of technologies in the agricultural quarter; Here in this system we

use a humidity sensor to hit upon the moisture content material of the soil, a DHT11 sensor to hit upon the temperature and a humidity sensor to degree the presence of water within the air. The information from these sensors is displayed at once on the LCD display. If the soil moisture is better than the moisture level and the humidity is high to this price, and additionally if the temperature is excessive, then the water of the motor may be converted into, while if the humidity degree, the humidity temperature is low; the motor will be turned off never. LDR is used to automatically manipulate the seating, the night light activates robotically so that we can watch our village at night time even thru cell telephones. A webcam is used to monitor the farm.

Block diagram:



HARDWARE REQUIREMENTS

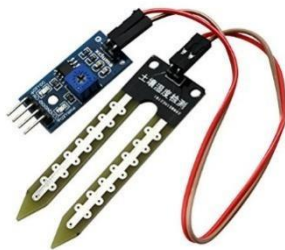
RASPBERRYPI:



Raspberry Pi is a relied on laptop scale made and evolved within the United Kingdom by means of the Raspberry Pi Foundation to teach the basics of computer technology to school kids and anybody interested in laptop hardware, software and DIY tasks..

The Raspberry Pi is manufactured in three board configurations below certified manufacturing contracts with New Element 14 (Premier Farnell), RS Components and Egoman. These agencies sell Raspberry Pi on line. Egoman produces a version for distribution best in China and Taiwan, which may be prominent from different Pis through its colour and shortage of FCC/CE markings. All producers have the equal tool.

SOIL MOISTURE:



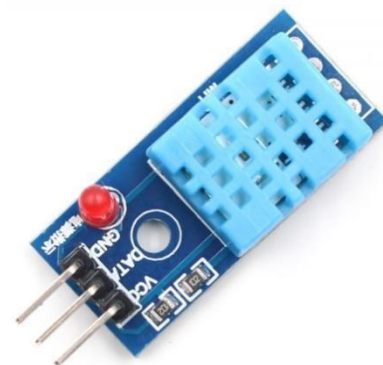
A soil moisture sensor is one kind of sensor for measuring the water content of soil volutes. Since the direct gravimetric cost of soil moisture need to be included, dried and additionally weighed. These sensors measure soil water content indirectly the usage of different soil parameters inclusive of permittivity, electrical resistance, different neutron interactions and moisture content displacement.

The courting between the calculated property and soil moisture have to be adjusted and can vary according to environmental elements which include temperature, soil type or electrical conductivity. Reflected radiation

may be stricken by soil moisture and is mainly used in agriculture and far off sensing in hydrology.

DHT11 SENSOR (TEMPERATURE/HUMIDITY):

The DHT11 is a simple low fee virtual temperature and humidity sensor. It makes use of a capacitive humidity sensor and a thermistor to measure the ambient air and output a digital signal on a data pin (no longer requiring analog enter pins). It is pretty smooth to apply, but calls for care for data collection. The simplest real drawback to this sensor is that you may most effective get new records from it once each 2



seconds.

- The type of touch used, whether or not generally open, normally open, or closed.
- Choose to crush before or create before Jungo crush accurately.
- Insulation among coil circuit and contacts

DC Water Pump:

DC powered pumps use DC electricity from a motor, battery, or sun power to transport fluid in a selection of ways. Motorized switches normally perform on 6, 12, 24, or 32 volts DC. Solar-powered DC pumps use photovoltaic (PV) panels of sun cells that produce DC

present day uncovered to the solar.



DC Pump Classification:

1. Brush DC water pump
2. Brushless insulated dc magnetic water pump drive.
3. DC water pump with brushless motor.

LCD Display



Liquid crystal presentations (LCDs) are crafted from materials that integrate the residences of both drinks and crystals. Instead, they've a melting point temperature wherein the molecules are almost as cellular as in a liquid, however are packed collectively in an ordered crystal shape.

The LCD display consists of two glass panels, among which is liquid crystal sand. The inner surface of the glass plates is covered with transparent electrodes, which layout

characters or symbols or styles to be displayed. Polymer layers are gift among the electrodes and the liquid crystal, which causes the liquid crystal molecules to preserve a positive perspective of orientation.

One polarizer is glued to the outdoor of glass panels. These polarizers deflect mild rays passing thru a positive angle.

In the absence of an LCD, the light rays are circled through two polarizers and a liquid crystal so that the mild rays exit the LCD without any orientation and therefore the LCD seems transparent.

Conclusion

The acute irrigation gadget is appropriate and fee effective for using water assets in agricultural production. The machine will offer a remarks control gadget that effectively monitors and controls all of the sports of the crop and irrigation machine.

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