SMART IRRIGATION

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Abstract: - The main objective of the project "Smart Irrigation" is to develop a purpose of this study is with the water requirements in irrigation being large, there is a need for a smart irrigation system that can save about 80% of the water. This prototype aims at saving time and avoiding problems like constant vigilance. It also helps in water conservation by automatically providing water to the plants/gardens depending on their water requirements[1]. It can also prove to be efficient in Agricultural fields, Lawns & Parks. As technology is advancing, there is always a chance of reducing risks and making work simpler. Embedded and micro controller systems provide solutions for many problems. This application precisely controls water system for gardens by using a sensor micro controller system. It is achieved by installing sensors in the field to monitor the soil temperature and soil moisture which transmits the data to the microcontroller for estimation of water demands of plants.

1. INTRODUCTION

The continuous increasing demand of food requires the rapid improvement in food production technology. In a country like India, where the economy is mainly based on agriculture and the climatic conditions are isotropic, still we are not able to make full use of agricultural resources. The main reason is the lack of rains & scarcity of land reservoir water. The continuous extraction of water from earth is reducing the water level due to which lot of land is coming slowly in the zones of un-irrigated land. Another very important reason of this is due to unplanned use of water due to which a significant amount of water goes to waste [2].

In modern drip irrigation systems, the most significant advantage is that water is supplied near the root zone of the plants drip by drip due to which a large quantity of water is saved. At the present era, the farmers have been using irrigation techniques in India through manual control in which farmers irrigate the land at the regular intervals.

This process sometimes consumes more water or sometimes the water reaches late due to which crops get dried. Water deficiency can be detrimental to plants before visible wilting occurs. Slowed growth rate, lighter weight fruit follows slight water deficiency. This problem can be perfectly rectified if we create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth and detecting rain content through rain sensor[3]. In the domain of farming, utilization of appropriate means of irrigation is significant. The benefit of employing these techniques is to decrease human interference and still make certain appropriate irrigation. This automated irrigation project brings into play an Aurdino board ATmega328 micro-controller is programmed to collect the input signal of changeable dampness circumstances of the earth via dampness detecting system.

2. LITERATURE SURVEY

1. Farm Field Monitoring and Irrigation Automation Using IoT

In this paper it mainly focuses on the irrigation purpose. By working under the mentioned sensors, the irrigation management can be performed perfectly .The collected value from the sensor and the irrigation controller are coordinate with Wi-Fi network. With the help of that specified application, the person can able to know the present situation of the land .Based on the current valuation, the water can be irrigated. As reported by weather forecasting, the water supply can be done to the farm field either periodically or continuously .Here naive Bayes algorithm is used to get the accurate result, the user can get the proper value like how much level of water needs to irrigate. With the guidance of that application, the farmer can built the decision at which condition they want to supply water [2].

2. Wireless Sensor Network and Internet of Things (IoT) Solution in Agriculture

This paper illustrates the automatic irrigation to improve the water conservation. Here RFID and WSN are used along with the ZigBee protocol. In this paper it replaces the function of human to human and human to machine to the Machine to Machine process. If the soil is dry then the RFID based on ZigBee Platform is used to send ID to the reader, then it recognize the node. After that, it sends the exact value of data for irrigation processes without human intervention. The farmer can get the information through system or mobile. Here the water can be supplied throughout the land by sprinkle method. In the automatic irrigation method 50% of the water can be reduced when compared to the manual irrigation. By applying this procedure, the yield of the crop is heightened [2].

3. Smart Drip Irrigation System using Raspberry pi and Arduino

This paper holds the concept about drip irrigation by applying both the raspberry pi kit, Arduino. Python language is written

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on both the kit. If less amount of water is identified by the sensor then a signal will be forward to pi, through the microcontroller. As soon as the report can be send to the e-mail, to turn ON the motor for X minutes. Then the water is supplied only for X minutes, after that the motor become idle state .This setup having the water tank, in which it contain the ultra sound distance sensor to measure the water level in the water tank. By using this it contain the threshold value where the water tank does not leads to empty and also does not leads to overflow of the water. The cost for building this automatic irrigation method is cheap and easy to use [3].

4. A Decision Support System For Managing Irrigation In Agriculture

Here it examined the SIDSS. Depends upon the moisture level in soil and environmental condition, the water is supplied on weekly bases. This paper is focused only on the citrus cultivation. Traditionally the decision can be taken by the experienced farmers for better irrigation, but now decision support system, is used for better irrigation. two machine learning techniques PLSR and ANFIS are used under DSS. By using this method a person who does not have any idea about the agriculture can also able to irrigate the correct amount of water to the farm field [4].

5. IoT Based Auto Irrigation System Using Soil Moisture Sensor

In this paper the automatic irrigation is constructed with the support of pump motor. The motor will turn ON or OFF automatically. The signal received from the microcontroller and the soil moisture is used to turn ON the water pump. While begin the process, the power is supplied to the microcontroller. The level of the moisture and the humidity is noted. According to the moisture content, the water is supplied. If the sensed value is less than fixed value, the irrigation motor will turn ON. This can be controlled over the app or system using the internet connectivity. It is used to overcome the unnecessary water flow [5].

2.1 ANALYSIS

The Advantages of Our System are: -

1. Cost Effective-As the amount of components and motors keep increasing our project is made from basic cardboard and components ,we used cost effective hardware

2. Made using basic parts without anything prebuilt- we have used basic project to reduce the complexity of project.

2.2 OBJECTIVE

- Ensure enough moisture essential for plant growth.
- Provide crop insurance against short duration drought.
- Cool the soil and atmosphere to provide a suitable surrounding.
- Wash out or dilute harmful salt, chemicals of the soil.
- Reduce hazards of soil piping.

3. RESEARCH METHODOLOGY

A smart irrigation is a smart machine type. It is connected by sensor to regulate water sensor. With technology advancing and the rapid increase in the flow of information, people are now guided to search different markets that cater with the rapidly increasing human needs and people have then entered the competition to manufacture quality products cheaply. Our aim is also to make it cost effective so that many numbers of people can get the benefit from this. And it should be usable to anyone and helpful for them

Here mainly, we have these tasks. They are as follows:

To complete our project, we require some software as well as some hardware.

1. Required Software:
1.1 AVR STUDIO
1.2 PROETUS
2. Required Hardware:
1. AVR MICROCONTROLLER
2. 5v Power Supply
3. Microcontrollers
4. Rechargeable Battery
5. Solar Panel
6. Moisture Sensor
7. Rain Sensor
8. Water Pump
9. Relay Module
10. Temperature and Humidity sensor

The output from this micro controller is taken and given to a water pump circuit which will regulate water to the required level.

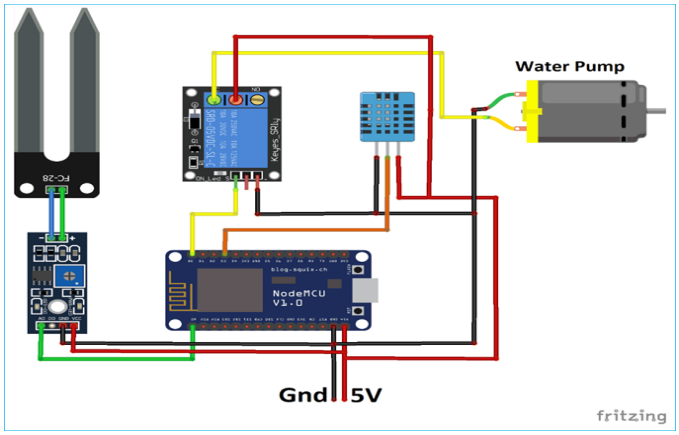

Fig3.1 Circuit Diagram

Circuit Implementation:

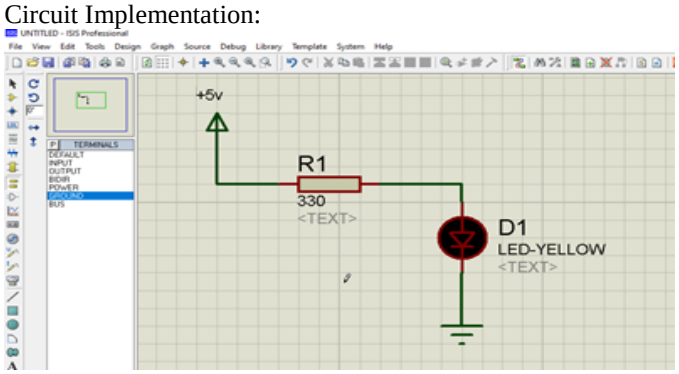

Fig 3.2: proetus project implementation

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- Create a circuit layout using proetus
- Write the code used in the microcontroller into AVR Studio.
- The frame is made out using cardboard.
- A Blank PCB board is used to implement all the circuit parts into the circuit

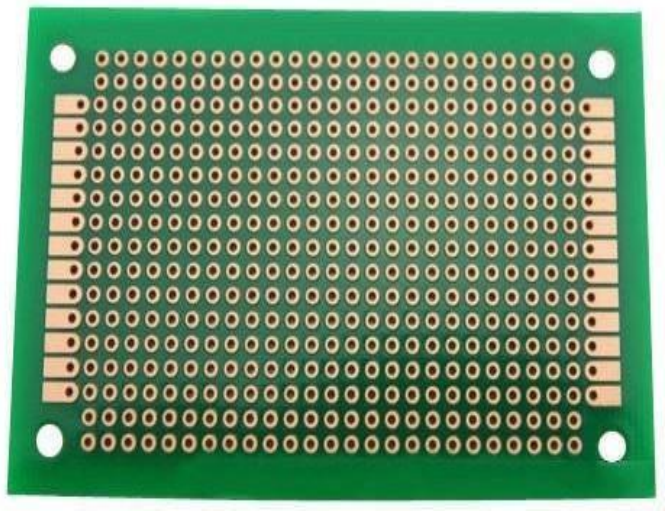

Fig3.3-pcb

4. CODING

The coding for the project has been done on the following platforms. These platforms/coding environments have been used for designing the front end and back end of this project:

4.1 AVR STUDIO OR MPLAB IDE

Especially created to provide a means of putting together applications based on Atmel ARM Cortex-M and Atmel AVR microcontroller- technologies, this program comes fully equipped for a wide range of tasks. Projects can be built from the ground up, tested and verified within the same environment. Part of the package, the editor facilitates code writing by adding suggestions as soon as some letters of a certain symbol are put down on the canvas. More so, you can begin your work by selecting one of the numerous pre-existing samples.

4.2 Dedicated C/C++ compiler inside AVR studio

There is also a dedicated C++ compiler at your disposal to help build your apps faster, as well as a simulator and assembler that work together to make sure the final products are thoroughly tested. To make this complete, the powerful debugger brings a solid set of functions for inspecting the code up close to identify any possible errors.

4.3 Proteus

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

5. RESULT AND CONCLUSION

5.1 RESULT

After the completion of all the codes and designing of the project, the project would appear as follows in the end. Below are pics depicting how the project will look. After following all the necessary steps and implementing the coding, this illustrates the completed project. It will vary user to user too if they decide to use prebuilt frame or cardboard of their own as per requirement.

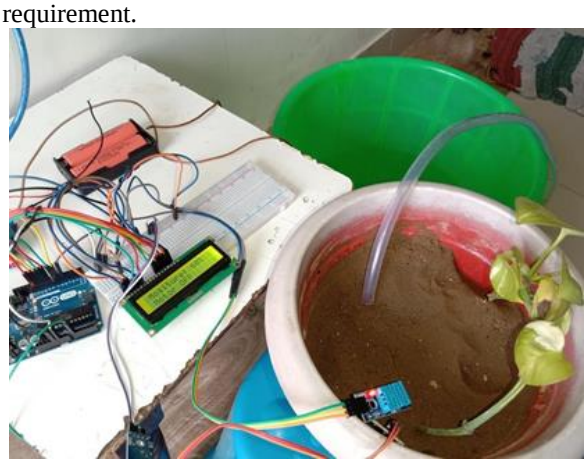

Fig 5.1: Total project preview

5.2 CONCLUSION

In this paper many of the techniques are followed to maintain the automatic irrigation. To promote sustainable agriculture to all, this paper helps in promoting agriculture by effectively predicting the crop, monitoring the crop production and also the water supply to the crop. The information about the crop is given to the user for better monitoring during the cultivation. This helps in cultivation of crops by anyone and they need not be a farmer or an agriculturist. This development will be useful to anyone who wants to cultivate and will help them though they do not have basic knowledge about this field. In future, the classification [6] and object segmentation [7] is combined with IoT to achieve better efficiency.

6. FUTURE SCOPE

We can interface LCD screen in order to display the current status of the soil moisture content levels, percentage of water utilized to water the plant, duration of time for which the water pump is ON, etc. We can also show the graphical representation of the moisture content levels in the soil. To improve the efficiency and effectiveness of the system, the following recommendations can be put into consideration. Option of controlling the water pump can be given to the farmer. The farmer may choose to stop the growth of crops or the crops may get damaged due to adverse weather conditions. In such cases farmer may need to stop the system remotely. The idea of using IOT for irrigation can be extended further to other activities in farming such as cattle management, fire detection and climate control. This would minimize human intervention in farming activities.

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7. APPLICATIONS

1. Hybrid Architecture - A hybrid creates a platform for infrastructure and applications, and it expands a feature on various services provided by hybrid cloud services.
2. Testing and Development - Earlier, testing and development would take a lot of time for setting up physical assets and workforce. Cloud Computing can eliminate this problem as it is cost-effective and creates a development environment.
3. Storage - With advanced technology, storing data requires more space. Cloud Computing provides a convenient way to store data with high security, benefits of scalability, and high speed.
4. Big Data Analysis – This uses advanced analytical techniques on big datasets.
5. Recovery and Backup
6. It can be used for water management.

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