Smart Irrigation System with Mobile controller

Amol Kawade

[1]*Student, Dept. of Mechanical Engineering, Vishwakarma Institute of Technology, Pune*

Abstract - *Conventional water system strategies had extreme issues like an increase in responsibility of farmers and regularly led to issues, for example, overirrigation or under-irrigation, and draining of soil. The Agricultural sector is very important from the point of view of a Farmer. This project targets creating a mechanized water system framework that will give adequate water needed by the crops by observing the moisture of soil and environmental condition to prevent the wastage of water resources. It will likewise have numerous benefits for farmers. The project is intended to build up a programmed water system framework that switches the motor on-off-on detecting soil moisture levels or as the farmer's inputs. Agriculture requires use of appropriate method for irrigation. This technology will be useful by providing technical assistance and improving efficiency at the farms. The task utilizes a NodeMcu Esp8266 which is customized to get the info sign of shifting soil moisture levels through the sensors. When the controller receives a command to operate, it irrigates the crops. Thus improving efficiency of the irrigation.*

Key Words: Automation, Soil Moisture Sensor, Smart Irrigation, Micro-controller.

1.INTRODUCTION

In the current state, one of the world's serious issues is the absence of water, and water is burned abundantly in farming. Thusly a proper water utilization framework is required. In this task Internet, technology and innovation facilitate giving solace to individuals to do their jobs easily. The farmer loses a ton of time to make a trip to the field for investigation of moisture levels of soil or to simply turn on the motor. This time could be utilized by the farmer to learn new rural procedures. The water system is a vital component of cultivating practice everywhere in the world and there is no uncertainty that the farmer is very much acclimated with the measure of water that will be needed for inundating a specific yield in a specific soil type. Smart Agriculture developing model is a real-time monitoring system It monitors the soil properties like temperature, humidity soil moisture, etc. It is feasible to control numerous tasks of the field distantly from any place, whenever by IoT. It offers an advanced lifestyle where an individual will control his electronic gadgets utilizing a smartphone, it additionally offers a productive utilization of energy. It applied in every aspect of the industry, including shrewd agribusiness, brilliant stopping, keen structure natural checking, medical care transportation and a lot more are being incorporated with the Node MCU which a most recent variant is and acts both as a microcontroller just as a worker. A primary component of this philosophy is its modest expense for the establishment and various benefits. Here one can access just as control the agriculture system using Windows, Android, or Apple OS utilizing the planned regulator application. [16] [17]

1.1 COMPONENTS

NodeMCU-ESP8266 (Microcontroller):

NodeMCU is an open-source Lua (HL programming language) based firmware and development board that is best suited and made for IoT-based Applications. It's anything but's a high taking care of force with in-manufactured Wi-Fi and Bluetooth limits and Deep Sleep Operating features make it ideal for IoT projects.It is effectively programmable with the Arduino IDE and is not difficult to use with not very many equipment necessities.

Applications of NodeMCU are:

- Low powered systems
- IoT devices
- Systems requiring multiple I/O, Wi-Fi, and Bluetooth.

Features relevant to the project:

- A small module that fits easily inside IoT projects.
- Built-in Wi-Fi and Bluetooth. DHT11(Temperature sensor):

DHT11 is a basic, cheap digital humidity and temperature sensor and sends a digital signal to the data pin without any input pin requirements. It has a power requirement between 3.5-5.5V and is connected to the ground of the circuit. It has an NTC compatible with any 8 bit microcontroller so as to process accurate readings of the Temperature levels. This will help in accurately determining Temperature levels.

Features relevant to the project:

- Can measure temperatures between 0°C and 50°C with an accuracy of ±1°C and ±1%.
- Low powered
- Easy to use.

YL-69(Soil Moisture sensor):

The dirt dampness sensor (Hygrometer) is generally used to recognize the stickiness of the dirt which makes it ideal for our programmed watering framework and to screen the dirt dampness of plants. The sensor is set up in the soil so that the copper prongs in the sensor would be able to sense the moisture of it. At the point when the dirt is wet the yield, voltage diminishes and the framework diminishes the water stream to the plants, and when the yield voltage expands, the water stream is expanded.

Features relevant to the project:

- Outputs both humidity and temperature.
- Built-in Potentiometer Water Pump(9V):

This water pump is a cheap micro-DC operating within just 3 to 6 Volts submersible pump with a flow rate of 80-120 L/H with a very low current consumption of 220 mA.

Motor Driver-L298N:

This L298N Motor Driver Module is a powerful engine driver for DC that has a voltage between 5-35 V and Stepper Motors. This module comprises of a L298 engine driver IC and a 78M05 5V controller. It can handle multiple engines with direction and speed control

It has 2 pins A and B to connect to two different motors and 4 pins for directional control.

Applications:

- Robotics
- Driving DC and Stepper motors

Features relevant to the project:

- Max Supply Voltage: 46V
- Max Output Current: 4A
- Over-Temperature protection
- Maximum Power (W): 25W
- Heatsink to passively exchange heat to the air.

Battery(9V):

9- volt batteries are easily replaceable, disposable high-energy-density batteries that are convenient for the user to change when they run out.

Features relevant to the project:

- High energy density.
- Easily replaceable. LED(5V):

LEDs are used in this circuit to test the circuit on the developer end. When current is passed through the semi-conductor, it moves from one side of the boundary to the other and hence releasing energy in the form of light instead of heat as is in most diodes.

Features relevant to the project:

- Less amount of power consumption
- Energy efficient

BREADBOARD:

The entire circuit is assembled on it. It is a component on which the whole circuit is assembled, and components are connected and are grounded through it.

2. LITERATURE REVIEW

The main aim of this project is to ease the stress of farmers by upgrading their traditional model of irrigation and making it automated, based on the smartphone that they use in their daily life.

The project is made by interfacing the following components:[20]

2.1 NodeMCU (ESP8266): It is a microcontroller with a basic interface and savvy activity. The main justification picking it is its Wi-Fi capacity.It commands the motor driver to drive the motor.

2.2 Soil Moisture Sensor YL69: This Soil Moisture Sensor can be known as a Hygrometer that is utilized to recognize the Humidity level of the dirt making it an ideal fit for use in an Automated water system.

2.3 DHT11: The DHT11 is a generally utilized Temperature and humidity sensor. The sensor goes with a submitted NTC to measure temperature and a 8-digit microcontroller to yield the potential gains of temperature and dampness as consecutive data.

2.4 L298N Motor Driver: This L298N Motor Driver will be used for driving motors. This module comprises an L298 engine driver IC and a 78M05 5V controller. L298N Module can handle up to 4 DC engines.

IJESRT Study paper on smart irrigation [2] has proposed an irrigation system based on Arduino and GSM control. This system was meant to irrigate the crops on the call of the farmer.

LPU Automatic Soil moisture sensing and Water Level Indicator [3] have proposed an irrigation system based on NodeMCU Microcontroller that will be powered through

Solar energy using Solar panels and will also indicate the water levels of the crops.

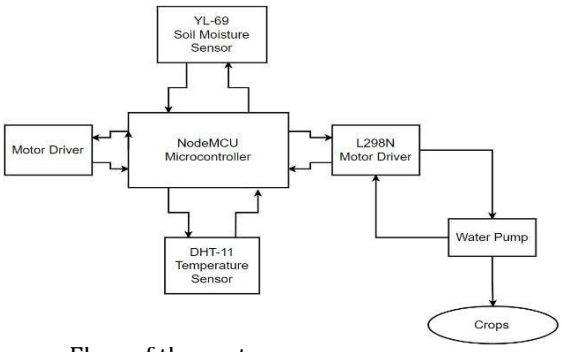
IJIRSET GSM-based Remote Sensing and Control of an Irrigation System [4] have developed a system based on a Microcontroller and which controls a solar- powered motor with the help of GSM.

IJES Microcontroller-based Automated Irrigation System [5] has made a project a system in which a Soil moisture sensor detects the moisture level of the soil and displays it on the LCD, and further Microcontroller gives command of irrigation of crops whenever the specific reading of dryness is given by the sensor.

GSM based irrigation system [6] have included an Arduino Uno in the system that is interfaced with GSM module which is used to receive a call from the farmer and pass on the command of irrigation to the controlling Arduino of the system thus irrigating the field on the remote command of the farmer.

Based on the survey of these kinds of literature we have proposed a system based on NodeMCU that operates over Wi-Fi and provides the information on Soil and Humidity in the field to the Farmers Smartphone and also enables him to operate the system remotely from any location with the help of interfaced operation application.

3. METHODOLOGY



1. Flow of the system

There are two changes associated with the microcontroller to kill on and turn the engine physically farmer can turn on and the engine physically on the off chance that they need with the assistance of these switches.

A dampness sensor is used to choose the water level in the earth. we have used a YL-69 dampness sensor in the task. On the off chance that the water level in the dirt is less, the soil moisture sensor will send a contribution to the microcontroller to turn on the engine and if the water level in the dirt is typical, it will kill the engine the dirt moisture sensor has the two copper prongs which are covered in the dirt. it chips away at the rule that the conductivity of wet soil is more than the conductivity of dry soil.

A microcontroller is the brain of the project. The microcontroller is the mind of the project. Every one of the parts is associated with the microcontroller directly or with the assistance of other segments. We have utilized NodeMCU (ESP8266) 1.0 microcontroller in the project. The microcontroller is the focal piece of the framework. A DC supply is given to the microcontroller with the assistance of a bridge rectifier.

The Node MCU microcontroller (ESP8266) has high preparing power with in-fabricated Wi-Fi/Bluetooth Operating highlights make it ideal for IoT, considering it we can handle the engine from any place on the planet. NodeMCU can be controlled utilizing a Micro USB jack. it is modified with the assistance of audio ide.

Every one of the segments is associated with one another with the assistance of Breadboard. A breadboard is an advancement base for prototyping contraptions parts. Since the solderless breadboard needn't bother with securing, it is reusable. This simplifies it to use for making ephemeral models and investigating various roads with respect to circuit plans.

The engine driver IC is a coordinated circuit chip utilized as an engine controlling gadget in self- sufficient robots and inserted circuits. A Motor Driver is utilized too on and off the. Engine driver is a switch that kills on and the engine naturally. The AC engine is associated with the engine driver and the engine driver is associated with the microcontroller. As per the contributions from the microcontroller, the engine driver will kill on and the engine .it has given 9V DC supply.

DHT-11 Temperature Sensor is utilized to quantify the temperature of the encompassing. it estimates temperature just as the stickiness of the encompassing. It is associated with the microcontroller. It will send the contributions to the microcontroller and as indicated by the information's microcontroller will choose to one or the other turn on or off the engine.

There are two modes, auto, and manual. in the auto mode the dirt moisture sensor will detect the moisture in the dirt and will send a contribution to the microcontroller likewise the Temperature sensor will send the contribution to the microcontroller and as indicated by the temperature and stickiness it will choose to kill on and the engine. In the manual mode as per the contributions of the farmer to the microcontroller, the microcontroller will on and off the engine. with the assistance of the switch button farmer can on and the engine physically.

4. RESULTS AND DISCUSSIONS

After finishing the arrangement and the assortment of the parts of the mechanized Irrigation framework. The primary goal of this project is to build up a savvy framework that tackles most issues identified with the water system and agribusiness like controlling and saving both the water and power, increasing agricultural production using small quantities of water, minimize in watering with speeding up, preserving plants from fungi, lastly, simple to utilize[18]

All these features make these methods a sustainable option to be considered to improve agriculture and irrigation efficiency. The project centers around facilitating crafted by farmers by lessening actual strain to control the engine by offering NodeMCU to the framework. The vulnerability of force supply would no more be an issue as the client will be informed about the force supply status of the engine. Engine consequently turns ON/OFF with the distinctive degree of moisture level contained in the soil.

Regular Flood-type strategies consume a lot of water, however, the area between crop lines stays dry and gets moisture just from the coincidental precipitation, hand motors while this water system procedure gradually applies a modest quantity of water to the plant through channels.

Enactment or deactivations of machines rely upon contact orders handled by the processor. Better execution is seen under electromagnetic obstruction too. As a versatile handset can be worked till certain higher temperatures, it would work persistently. This mechanization framework will be utilized for incapacitated and individuals at significant distances and homesteads.

Today, IoT applications are on the ascent, and associating objects are getting increasingly significant.

NodeMCU is an open-source stage dependent on ESP8266 which can interface articles and let information move utilizing the Wi-Fi convention.

Component of the framework begins with turning on of the force supply followed by resetting the gesture MCU the copper wires (which go about as detecting course of action) which will be associated with a comparator will detect the suddenness of the dirt.

In this manner, the project will be useful to the farmers by facilitating their work and expanding yield by giving appropriate water supply to the harvests. After the execution of this task, it is required to accomplish a few objectives like:

- Reduce the water utilization
- It can forestall water system occurring on the day at some unacceptable time, to turn motor ON or OFF by using the water system framework, the regulator will attempt to switch the motor, so no requirement for bosses.

•To diminish slip-ups of activity because of representatives however much as could be expected and to protect water from squander.

- Facilitate and work on the water system framework by introducing and planning the entire programmed water system framework.
- Increase agrarian creation through an ideal water system as indicated by the need of the plant.

•There is a productive use of water.

•The time consumed is less thereby giving more outputs.

•Controls the development of weeds, saving the manure.

•Erosion of soil could be halted absolutely by utilizing this sort of framework.

•Leads to the advancement of an advanced water system control framework. Recoveries electrical energy.

•The framework expands the harvest profitability and lessens farmers' responsibility.

•By this task we are controlling and saving both the water and power

This model will be intended to work for taking care of the issues of the water system, for example, mistakes brought about by farmers and the utilization of gigantic amounts of water. These mistakes influence trees as their growths cause additionally influence the general supply of water. Moreover, it will work to raise the monetary return of the state or nation because of lessening the number of representatives in the field of horticulture.

4.1 LIMITATIONS

1. The NodeMCU has to be always kept in the range of Wi-Fi that has been interfaced with it else it would not be able to receive the signal.

2. Also the farmer needs to have an active internet connection to access the information from the field and to operate the motor.

3. Though the system does not have high maintenance, the soil moisture sensor needs to be clean at specific intervals else the wets soil stuck to it will lead to false readings.

4.2 FUTURE SCOPE

1. The project can be interfaced with a GSM module so that the user will be able to control it over the mobile network and the continuous need for internet connection would vanish.

2. Several more notification alerts can be added to the system, so the user gets notified when the sensor senses a low moisture level.

5. CONCLUSION

1. As the motor would be remotely operable the farmer can monitor the power supply status of the field and irrigate the field based on the available power supply.

2. The soil moisture level would also help the farmer monitor the health of soils and fertilizers in the field and thus helping him to increase the yield.

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