NEW HORIZON
COLLEGE OF ENGINEERING
New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA

MINI PROJECT REPORT ON

"SMART IRRIGATION SYSTEM BASED ON IOT"

Submitted by

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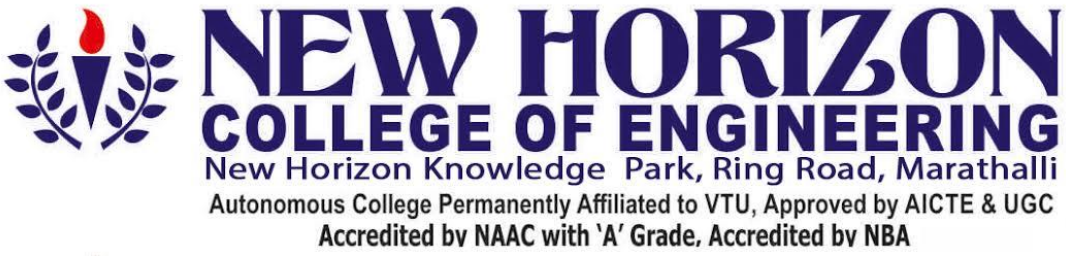
In partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

IN

ELECTRICAL AND ELECTRONICS



Bonafide Certificate

This is to Bonafide that the mini project report entitled "**Smart Irrigation System Based On IOT**" submitted by **Manoj Kumar M B(1NH18EE028)**, **Niranjan Kumar(1NH18EE038), Shekar(1NH18EE054)** Department of Electrical and Electronics Engineering, New Horizon College of Engineering, Bangalore in partial fulfillment for the award of the degree of Bachelor of Engineering , is a record of bonafide work carried out by him/her under my supervision, as per the NHCE code of academic and research ethics.

The contents of this report have not been submitted and will not be submitted either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university. The project report fulfils the requirements and regulations of the institution and in my opinion meets the necessary standards for submission.

Guide : **HOD**

LITHESH J **Dr. MAHESH. M**

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ACKNOLEDGEMENT

With immense pleasure and deep sense of gratitude, I wish to express my sincere thanks to my supervisor **LITHESH J**, Professor, Department of Electrical and Electronics Engineering, New Horizon College of Engineering, without her/his motivation and continuous encouragement, this mini project would not have been successfully completed.

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I wish to extend my profound sense of gratitude to my parents for all the sacrifices they made during my project and providing me with moral support and encouragement whenever required.

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ABSTRACT

The automation of farm activities can turn an agricultural sector into a manual and standalone to a clever and powerful one that leads to high productivity with minimal human supervision. This project proposes an automatic irrigation system that monitors and maintains the required soil moisture through automatic irrigation. The setting uses soil moisture sensors that measure soil moisture relative to the soil. This number allows the system to use the right amount of water that you avoid above / below irrigation. IoT is used to keep farmers updated on the status of farmers. Modem by which the farmer can check that the water springs are ON / off at any time.

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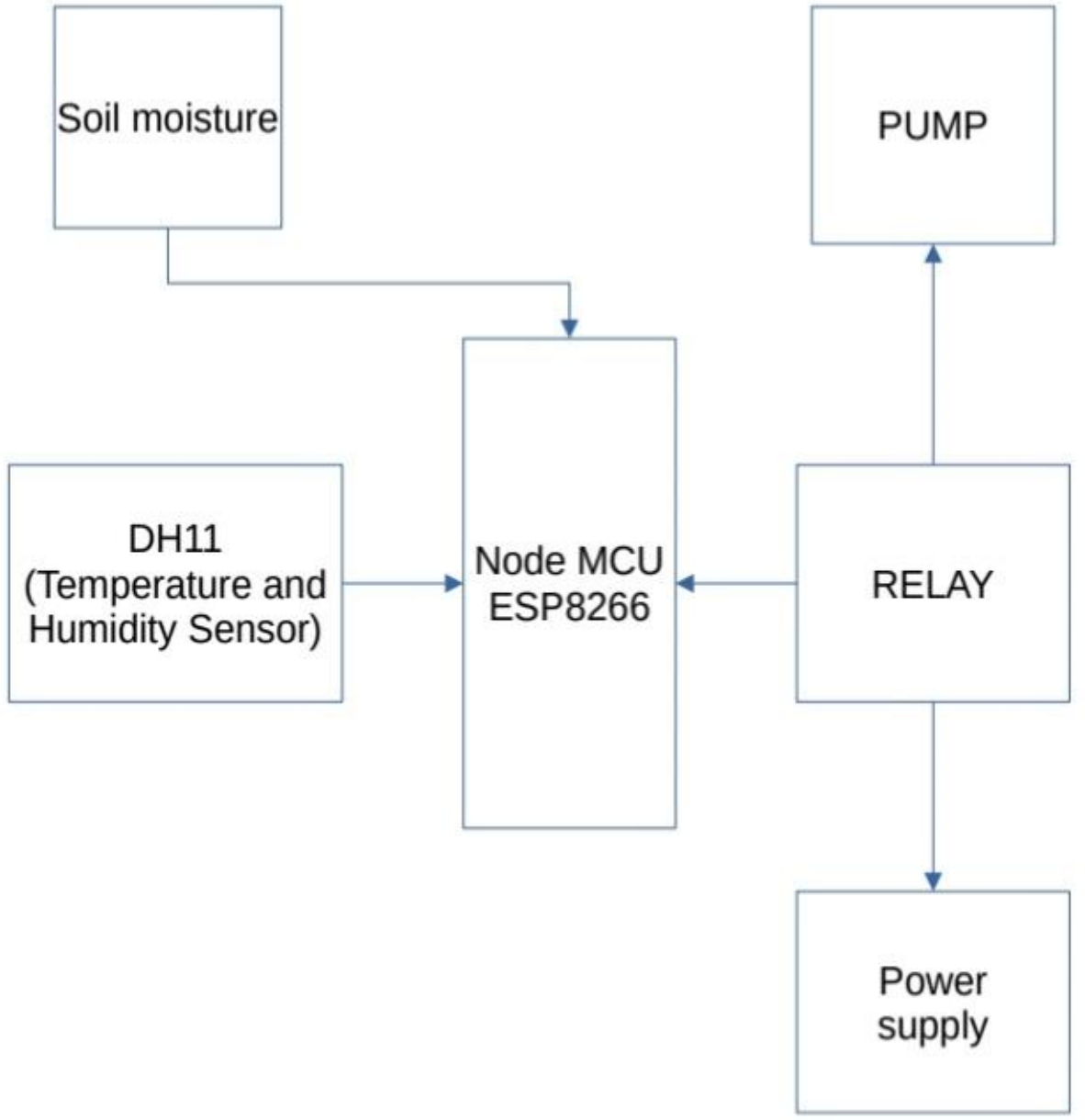
INTRODUCTION

Agriculture is undoubtedly the most important living supplier in India. With population growth, there is a need for increased agricultural production. To support mass production on farms, the demand for clean water for irrigation is also increasing. Currently, agriculture accounts for 83% of all water use in India. Random use of water can lead to unintentional wasting water. This means that there is an urgent need to make plans to prevent water wastage without putting pressure on farmers. Fifteen years ago, farmers began using computers and software programs to organize their financial data and keep track of their transactions with third parties and to monitor their crops more efficiently. In the age of the Internet, where knowledge plays a major role in people's lives, agriculture quickly becomes an industry that really needs data when farmers need to collect and evaluate large amounts of information from a variety of devices (e.g., sensors, farming equipment, etc.). With the advent of open source NodeMCUESP8266 and cheap moisture sensors, it is possible to enable devices to monitor soil moisture content and properly irrigate fields or landscape as needed.The proposed system uses an IoT tool called NodeMCUESP8266 sensory prices on that, which makes farmers much easier as they will look at other farm activities.

PROPOSED SYSTEM AND BLOCK DIAGRAM

General block diagram of automatic irrigation system consisting of three sensors connected to the controller and hearing values from these sensors are sent to the mobile app.



With the IOT Irrigation system block chain, farmers have started using a variety of monitoring and control methods to increase yields with the automatic help of agricultural parameters such as temperature, humidity and soil moisture to monitor and control a system that can help farmers improve their yields.

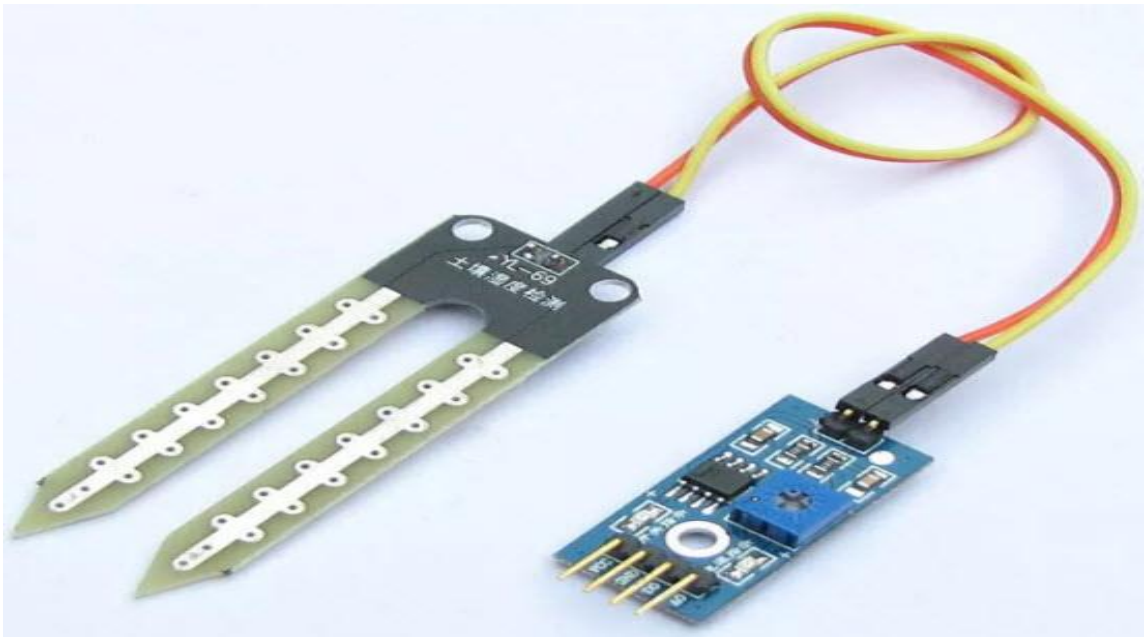
The proposed project includes an embedded system for automatic irrigation control. The project has a real-time wireless irrigation system, the system provides the same agricultural and required agricultural and avoid wasting water. When the moisture level in the soil reaches below the limit value and the system automatically switches to the car. When the water level reaches a normal level the car automatically shuts off. Sensitive parameters and the current state of the car will be displayed in the android user app.

COMPONENTS

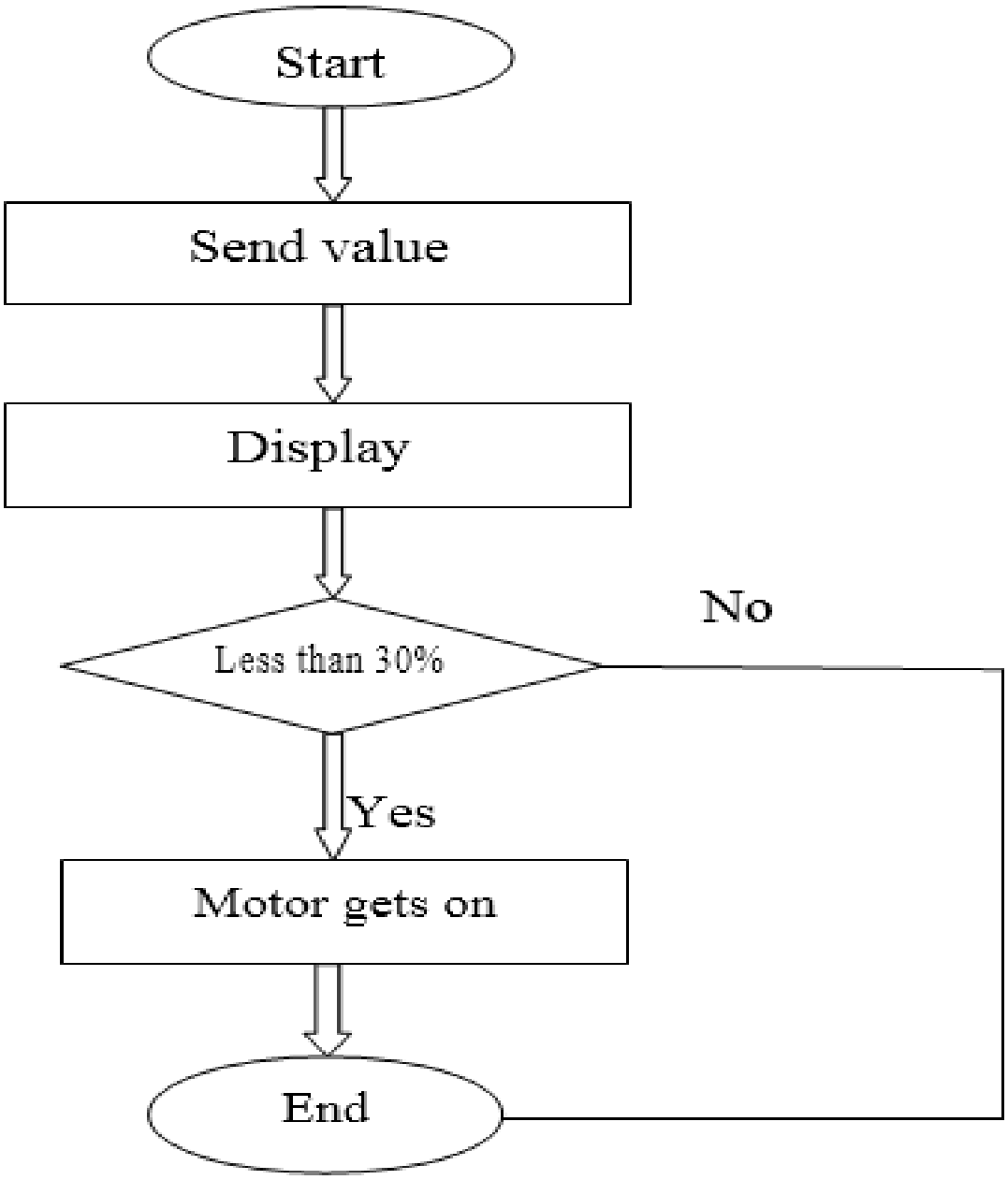
- Soil moisture sensor
- Temperature sensor
- Humidity sensor
- ARDUINO Uno
- NodeMCUESP8266
- Motor
- Pump
- Battery
- Relay

Components Description

- **Soil moisture sensor**



Soil moisture sensors measure water content in the soil. Ground moisture is an important factor in the atmospheric water cycle. It has both digital and analog effects. Digital emissions are easy to use, but not as accurate as analog emissions based on auto humidity auto on / off automatically. It uses a capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil. The measurement of soil moisture is the basis for the refinement of agriculture to implement water-saving irrigation. The results show that the sensor has stable and reliable working performance, high measurement accuracy and good linearity, and is suitable for moisture measurement in most types of soil.



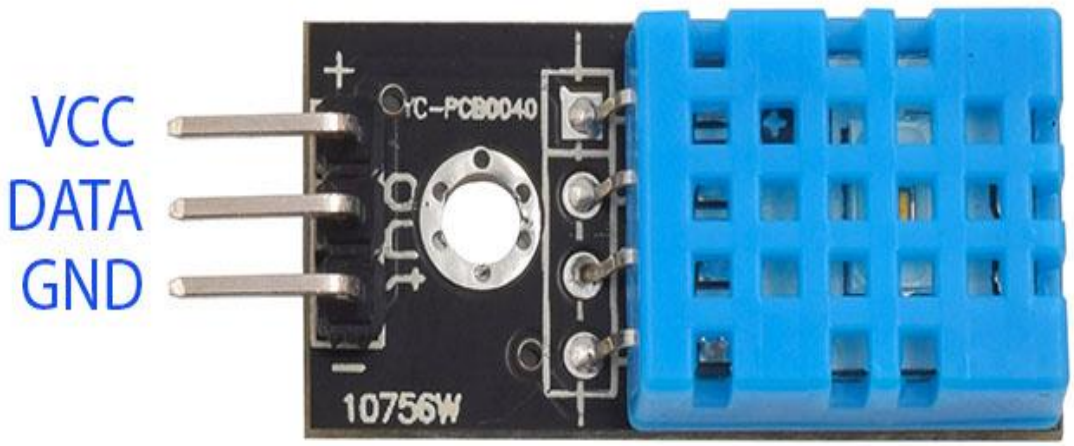
Flow chart of soil moisture sensor

- **Temperature sensor**

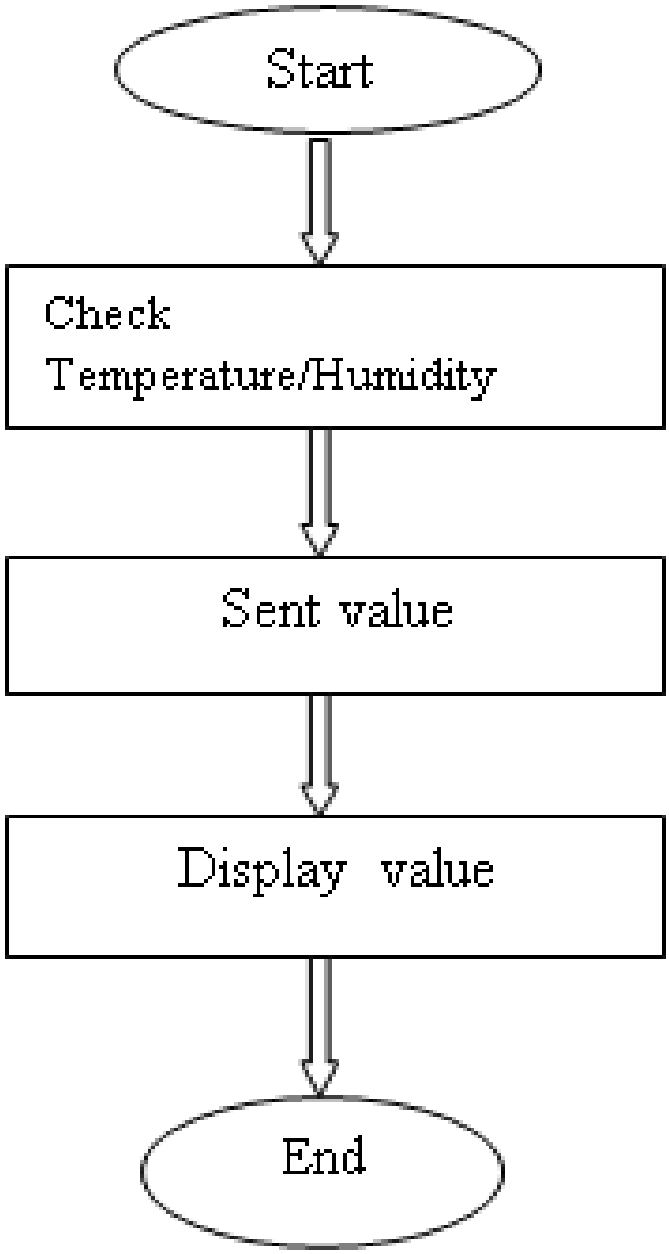
THERM200 is one of our most useful sensors, because soil temperature is very important for the growth and health of your garden. ITHERM200 tells you when to plant and when to plant. They can be used in green houses to monitor the temperature, and make sure your plants are not too hot. Failure to monitor and protect your plants from excessive heat can lead to problematic and frost-prone plants. They can tell you when the earth has melted in the spring, so you can dig, install fence posts, or lay foundations.

The temperature of plant growth is important. The ideal temperature for most plants to grow is 21 ° C (70 ° F). Without monitoring your temperature, it is easy for your seeds to become too hot or too cold to prevent your seeds from growing .THERM200 also helps when you know when to water the plants. If it is cold outside you often do not want to irrigate your plants, especially if you use a sprayer, even if the soil is dry. If their irrigation was delayed, they would have survived. The THERM200 and VH400 soil moisture sensor, allow you to effectively control your irrigation. The VH400 tells you when the soil is very dry and THERM200 tells you when it is warm enough to water.

THERM200 helps you protect your crops, and quickly detect field problems. When used with our Vege-Hub WiFi Sensor Hub, you can receive instant messaging and email alerts, letting you know if your plants are in danger from extreme temperatures.



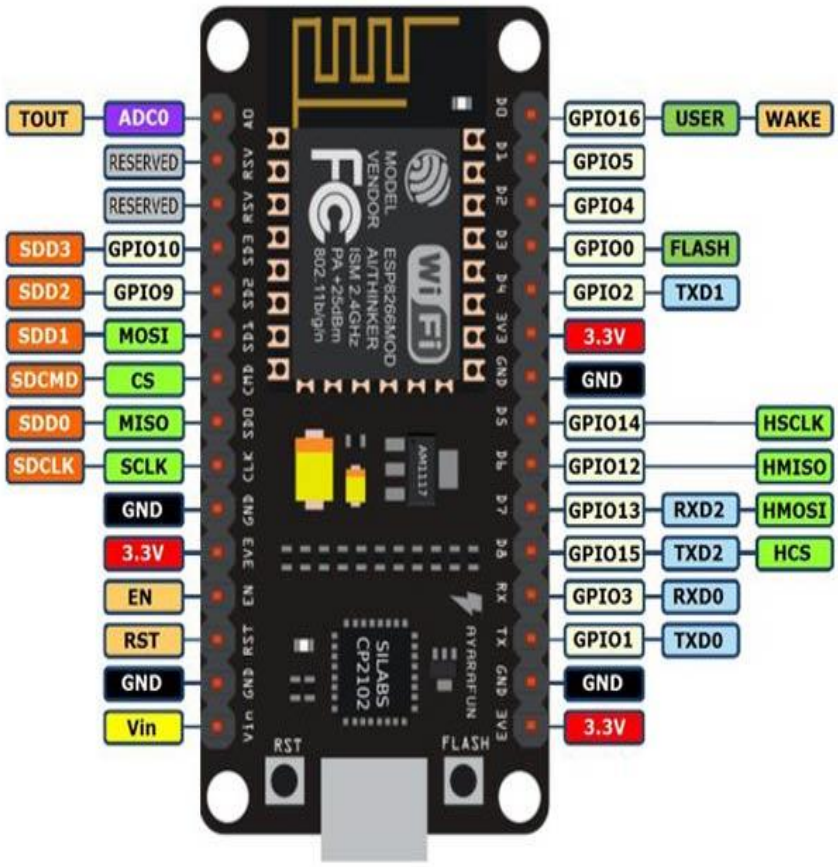
- **Humidity sensor**



flow chart of temperature/humidity sensor

It uses a capacitive humidity sensor and thermister to measure ambient air, and pulls the digital signal to the data pin (no analog pins required) It is easy to use, but requires careful time to capture data. Moisture sensors are used to measure moisture content in the air. At the current temperature, moisture values are sent to the micro controller, those values will be displayed in the android app for users.

- **NODEMCU ESP8266**



NodeMCU (Node MicroController Unit) is an open source and environment hardware development software built next to a low-cost system-on-a-chip (SoC) system called ESP8266. ESP8266 connects to 802.11b / g / n Wi-Fi network and connects to the Internet, but can also set up its own network, allowing other devices to connect directly to it. This makes NodeMCUESP8266 very interactive.

Since the operating range of ESP8266 is 3V to 3.6V, the board comes with a strong LDO voltage of 3.3V. It can provide reliable up to 600mA, which should be more than enough when ESP8266 pulls as much as 80mA during RF transmission. The control effect is also broken on one side of the board and labeled as 3V. This pin can be used to power the external parts. NodeMCUESP8266 power is supplied via a Micro USB board connector. Alternatively, if you have a controlled 5V voltage source, the VIN pin can be used to directly supply ESP8266 and its parameters.

Peripherals and I/O

The NodeMCUESP8266 has 17 GPIO cracked pins on the pin heads on both sides of the development board. These anchors can be assigned to all types of manufacturing operations, including:

ADC Channel - 10-bit ADC Channel.

UART display - UART display is used for loading code sequentially.

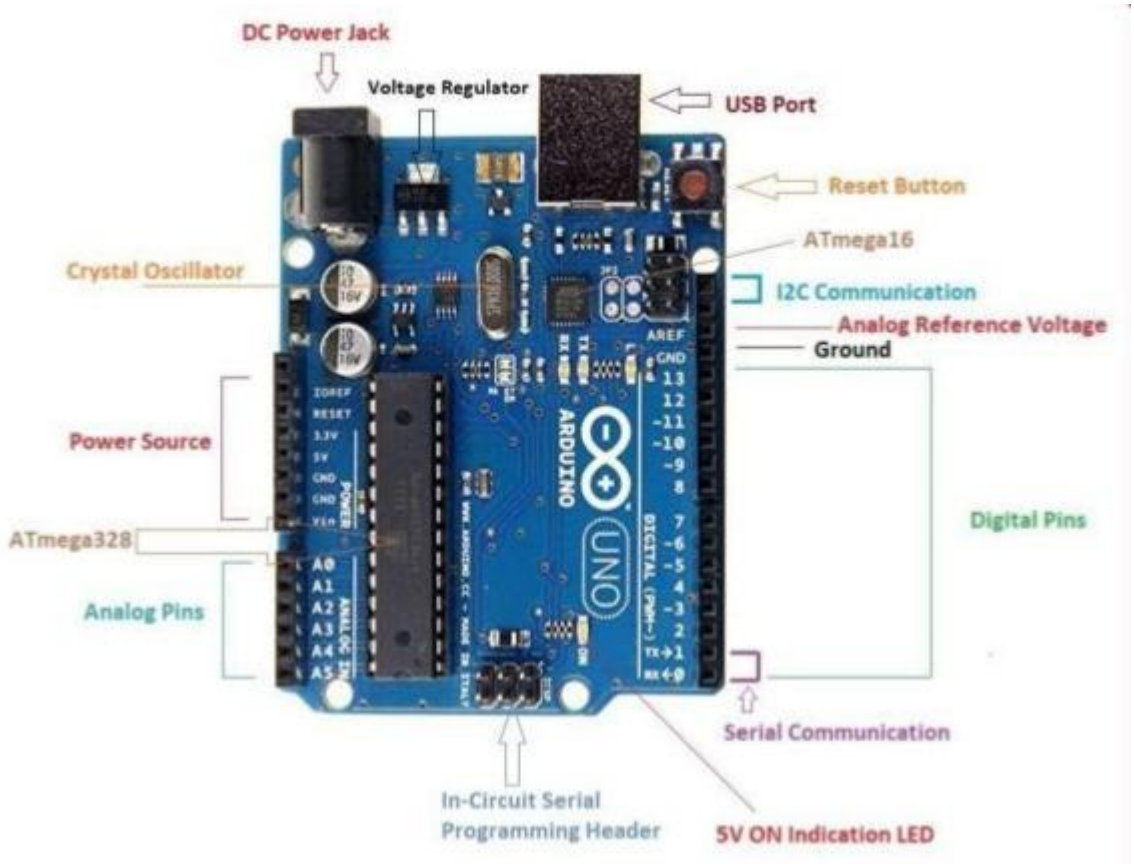
• PWM effects - PWM pins for blurring LEDs or control engines.

• SPI, I2C and I2S interface - SPI and I2C interface to connect all types of sensors and frameworks.

I2S interface - I2S interface if you want to add audio to your project.

ESP8266 NodeMCU features two buttons. Marked as the RST located in the upper left corner is the reset button, used to reset the ESP8266 chip. Another button in the lower left corner is the download button used while upgrading the firmware. The board also has a user-friendly and connected motherboard's D0 pin.

- ARDUINO Uno

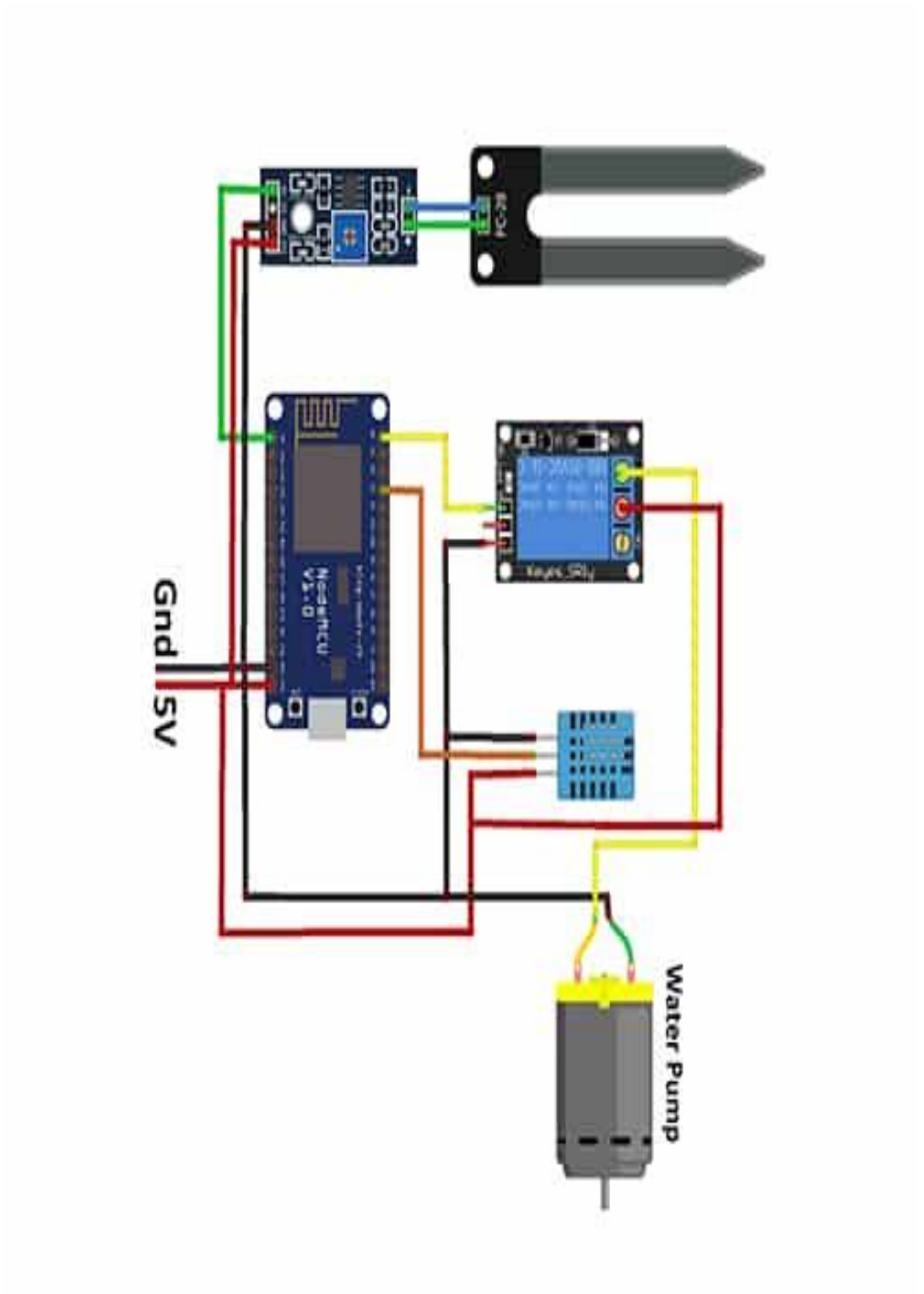


Arduino you have got a microcontroller board developed by Arduino.cc that is Associate in Nursing open supply electronic platform principally supported the AVR microcontroller Atmega328.

The first Arduino project was launched at the Interaction style Institute Ivrea in 2003 by David Cuartielles and Massimo Banzi with the aim of providing a less expensive and a lot of versatile approach for college kids and professionals to regulate multiple devices within the world.

The current version of Arduino Uno comes with a USB port instrumentality, half dozen input pins, fourteen I / O holes used for connecting and external electrical circuits. In fourteen I / O ports, half dozen pins is used for PWM extraction. Permits designers to regulate and listen to external electronic devices within the world.

CIRCUIT DIAGRAM



WORKING OF PROJECT

In the agricultural sector, sensors are used as soil moisture. Information obtained from the sensor is sent to the data folder via the Android device. In the control phase, the program is started using the app, this is completed using the ON / OFF buttons in the app. Also, the system is automatically turned on when the soil moisture is low, the pump is turned on depending on the humidity.

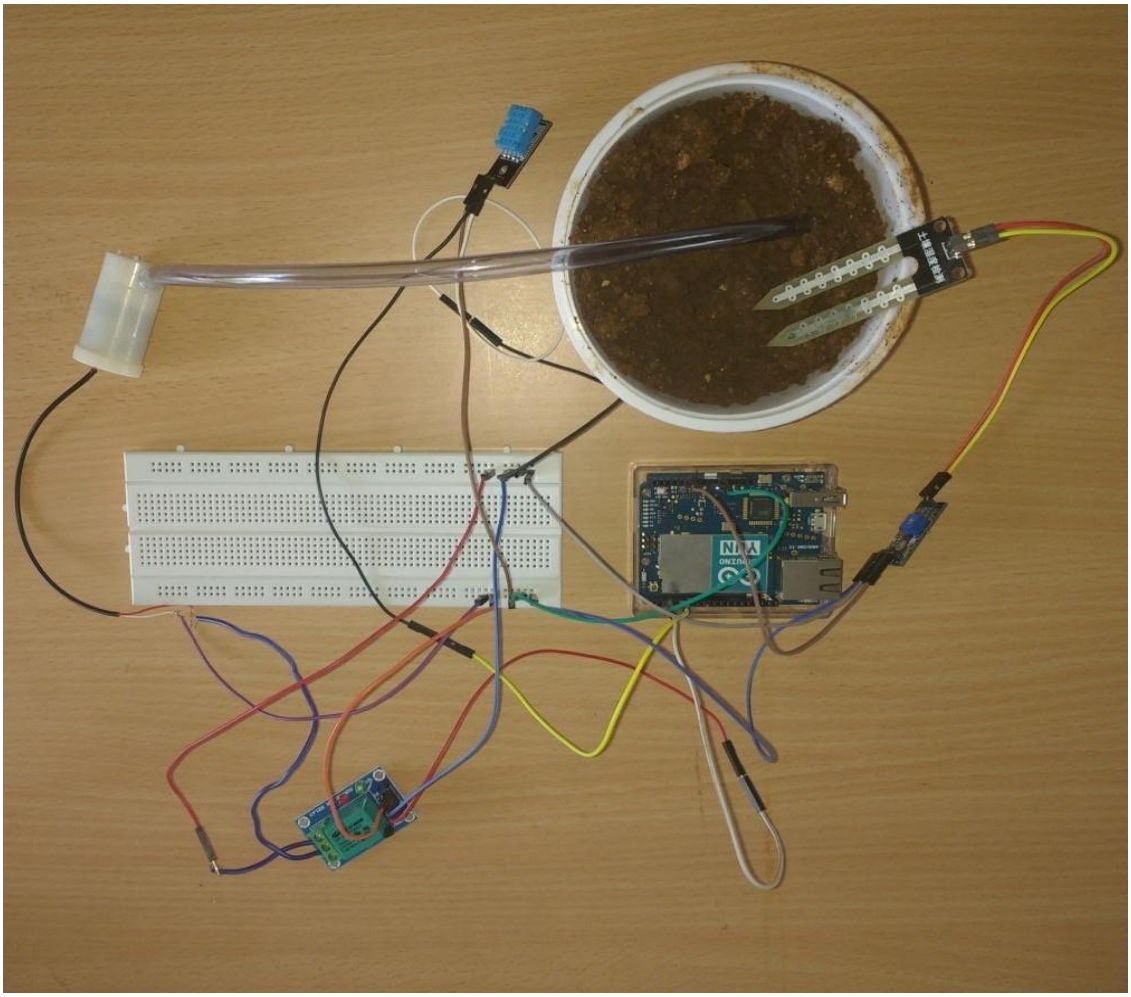
The app has something like take some time off from the user and irrigate the agricultural field when the time comes. In this system, there is a switch that is used to turn off the water supply if the system fails. Other parameters such as moisture sensor indicate the limit price and water level in the ground.

In addition, the project can be improved by designing this hectare program of land. Also, this project can be implemented to ensure soil value and increased yields on each soil. The microcontroller and sensors are successfully connected and wireless communication is available between various locations.

Also, the continuation of the proposed program can be enhanced by adding algorithms for machine learning, learning and identification of plant needs, which can help the agricultural sector to become an automated system. Tests and results tell us that this effect can be made to reduce water loss and reduce the number of workers needed in the field.

From the above information, we can conclude that the computer components of this system are compatible with all sensors. The system is powered by a power source, and the system has been tested to irrigate the agricultural field.

HARDWARE PICTURE



Implementation

PLANNING PROGRAMS

This editing process includes the THINGSPEAK web server definition and uses the JSON format to convert stored data into readable human form.

ITHINGSPEAK

According to its developers, "Thing-Speak is an open source Internet of Things (IoT) and API for storing and extracting data from HTTP protocols on the Internet or Local Network. Thing-Speak enables application login use , as well as network connectivity and status updates ". Thing-Speak was originally launched by IO-Bridge in 2010 as a support service for IoT programs. Thing-Speak has included support from the MATLAB number software from Math functions. Allows Thing-Speak users to analyze and visualize uploaded data using Matlab without the need to purchase a MATLAB license for Math operations. Thing-Speak has a close relationship with Math activities. In fact, all Thing-Speak documents are embedded in the Math works' MATLAB web site and enable accounts for registered users as login credentials for the Thing-Speak website. The ThingSpeak.com Terms of Service and Privacy Policy are subject to user consent and Math activities.

JSON FORM

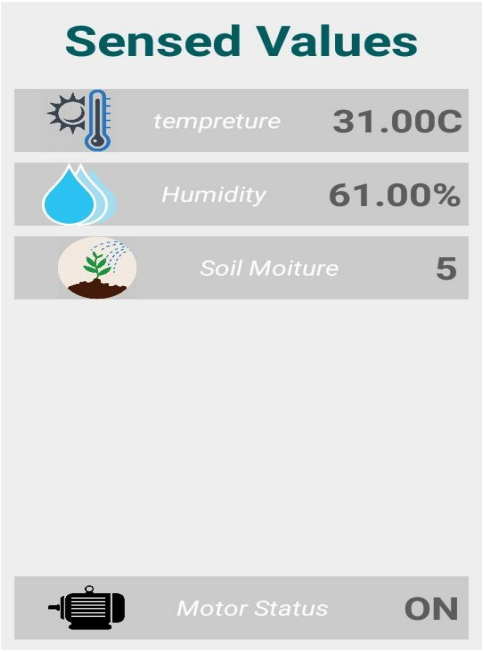
In computer applications, JavaScript Object Notation or JSON is a standard open file format that uses human readable text to transfer valuable data objects – pairs of values and types of fixed data (or other non-removable values). It is a standard data format used for a variety of browser / server connections, including installing XML in some AJAX style programs.

JSON is a standalone data format in the language. Based on JavaScript, but since 2017 most programming languages include code for generating and scanning JSON format data. The official online version of JSON says application / JSON.

JSON filenames use the .json extension. Douglas Crockford had originally specified the JSON format in the early 200's.

OUTCOMES FROM PROPOSED SYSTEM

HOME PAGE



Sensed values displayed on user application

ADVANTAGES AND DISADVANTAGES

Advantages

Not surprisingly, agriculture in particular is one of the key drivers of Internet of Things (IoT) development. Modern technology is essential for food producers to support the world's growing population. In addition, IoT enables farmers to make the domestic industry as efficient as possible, as well as to generate new sources of income.

• To put it bluntly, some of the equipment that allows the lease of production stocks with the help of exporters and sensors is very helpful in agriculture. It also enables farmers to set and apply alerts whenever there are differences found and / or corrected by senders.

• The IoT theme is integrated with human and environmental interactions on a large scale. The level of water and air changes with caution, and solar energy is one of the most obvious sources of intelligent sensory use. The vulnerability of climate change, the ability to transfer hundreds of thousands of kilometers of data and the ability to translate raw data into business intelligence (BI) make IoT very important when it comes to modern agriculture.

Disadvantages

The use of technology and agriculture, which makes it a viable crop, is a positive and necessary step in the current growing need for food security.

But there is a chance that clever farming will require sets of specific skills to understand and use machinery.

In the case of machines such as robots and computer-assisted use, it is unlikely that the average farmer would be able to access or improve this information.

Farmers are not accustomed to this high technology. They do not understand computer language or artificial intelligence .In smart agriculture, the Internet of Things is important that will require artificial intelligence and computer-based intelligence. This cannot be measured here .To overcome this challenge, the devices will need to be completely redesigned to be understandable to farmers.

This also means that the devices must be somewhere between the technical experts and the farmers who can communicate with both.

Costs involving smart agriculture

• Although the use of good agricultural technology is impressive, it brings many costs.

• If the equipment is to be repaired at the farmers' level, it will cost more to replace these types of equipment.

There may be incorrect weather analysis

• In the case of agriculture, the main process depends on the weather conditions.

• It is a natural habit that although new technologies can be expected.

• No force can change or control weather conditions such as rain, sunlight, drought etc.

• Even with smart plans, the significance of natural events cannot be changed.

• There is a problem where the technology used in smart agriculture can adversely affect the environment.

FUTURE WORK

To improve the efficiency of the system, the following recommendations can be considered. The control option The water pump control option can be given to the farmer so that he can turn on / off the pump to start / stop the irrigation process without being present on the farm. The farmer can choose to stop the growth of the crop or the crops may be damaged by adverse weather conditions. In such cases the farmer may have to set up the system remotely. The idea of using IoT for irrigation can be extended to other agricultural activities such as cattle management, firefighting and control. This will reduce human intervention in agricultural activities.

CONCLUSION

A soil moisture system was established to monitor soil moisture and the project provided an opportunity to study what systems were in place, their features and specific constraints. The proposed system can be used to turn on / off the Sprinkler of water according to soil moisture levels thus making the automatic irrigation process one of the most time-consuming tasks to complete farming. Agriculture is one of the most water-intensive activities. The system uses information from soil moisture content to irrigate the soil which helps to prevent irrigated or low irrigation of the soil thus avoiding damage to the plants. The farm owner is able to monitor the process online through the website. In this project it can be concluded that there can be significant progress in agriculture and the use of IoT and automation. Therefore, the system is a solution to the problems facing the existing manual file system and the difficulty of irrigation for efficient use of water resources.

REFERENCES

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- https://www.ijser.org/researchpaper/AN-IoT-BASED-SMART-IRRIGATION-SYSTEM.pdf

THANK YOU