

# Smart Irrigation System in Farming Using IOT

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## ABSTRACT

*The irrigation system could also be a way that ensures that every one plants get enough water for growth. However, because of the climate exchange, especially in season, the soil tends to lose its moisture. Although the automated irrigation system has been applied within the agriculture sector, water consumption and energy cannot be controlled through this system because of the system operated under time delay. Usually, farmers only can activate or off the system manually depends on the weather. Therefore, this paper introduced the automated irrigation system using blynk application wireless communication. The system features a distributed wireless network of soil-moisture, humidity and temperature sensors. Using this technique, the monitoring and controlling irrigation are often done via BLYNK application from any location.*

**Keyword:** - Arduino IDE, Node MCU, Soil moisture sensor, DHT11, BLYNK App.

## 1. INTRODUCTION

Agriculture is the backbone of all developed countries. It uses 85% of obtainable water resources worldwide and this percentage continues to be dominant in water consumption due to increase and increased food demand. Due to this, efficient water management is the major concern in many cropping systems in arid and semi- arid areas. An automated irrigation system is required to optimize water use for agricultural crops. The need of automated irrigation system is to beat over irrigation and under irrigation. Proposed a paper during which the humidity and soil moisture sensors are placed within the root zone of the plant. Based on the sensed values the microcontroller is employed to regulate the availability of water to the sector . This system doesn't intimate the farmer about the field status. A paper during which soil parameters like humidity, moisture and temperature are measured for getting high yield from soil. This system is fully automated which turns the motor pump ON/OFF as per the extent of moisture within the soil. The current field status isn't intimated to the farmer. The soil moisture sensor has been used and based on the sensed values ESP8266 is used to ON/OFF the motor pump. Weather forecasting is not included in this system. A paper to make irrigation system simpler, the complexities involved in irrigation is tackled with automation system using ESP8266. Based on the sensed values from soil moisture, temperature and humidity sensors, the ESP8266 sends message to the farmer when the parameters exceed the threshold value set in the program. The nutrient content within the soil isn't determined by this technique.

## 2. LITERATURE SURVEY

Various researches are administered on how soil irrigation are often made more efficient .The researchers have used different ideas counting on the condition of the soil and quantity of water Different technologies used and therefore the design of the system was discussed by the researchers. This paper aims at reducing the wastage of water and therefore the labor that's wont to perform irrigation manually. The proposed system aims at detecting the moisture content of the soil using sensors that are placed directly into the soil. This sensors sense the water level of the soil and if the water level isn't adequate then the user are going to be notified through a message which will be sent to the application which would be installed on the users mobile phone. The Arduino board, a microcontroller, controls the digital connection and interaction between objects within the proposed system, enabling the objects to sense and act [1,2]. Also, with its powerful on-board processing, various sensors and other application specific devices are often integrated thereto . In the system, sensors detect the water and moisture level and send readings to a hard and fast access point, like a private computer, which successively can access irrigation modules installed within the field or the physical module within the cistern , wirelessly over the web . A wireless application of drip irrigation automation supported by soil moisture sensors Irrigation by help of freshwater resources in agricultural areas features a crucial importance. Traditional instrumentation supported discrete and wired solutions, presents many difficulties on measuring and control systems especially over the massive geographical areas. If different kinds of sensors (i.e. humidity, and etc.) are involved in such irrigation in future works, it can be said that an internet based remote control

of irrigation automation will be possible [3]. An automated irrigation system was developed to optimize water use for agricultural crops. The system in the root zone of the plants. In addition, a gateway unit handles sensor information, triggers actuators, and transmits data to an android application [4]. Automated drip irrigation technique using the fuzzy time-series based algorithm and a WSN system consisting of radio frequencies trans receivers, sensors, microcontroller [5]. Zigbee-based agriculture monitoring system. The nodes send data wirelessly to a central server, which can also sent to the client mobile [6]. Arduino based smart irrigation system using IOT based on soil humidity or user input. Humidity sensor is employed to seek out the soil humidity and supported this microcontroller drives the solenoid valve, irrigation status is updated to server or local host using pc . In addition for better cropping system, soil conditions are monitored using soil PH level, LCD is used to display the PH [7].

### 3. SYSTEM DEVELOPMENT

Nowadays agricultural field is facing lot of problems thanks to lack of water resources. In order to assist the farmers to beat the difficulties, smart irrigation system has been used. In this system, various sensors such as soil moisture, DHT11 are connected to the input pins of ESP8265 WiFi module. The sensed values from the sensors are displayed in BLYNK. If the sensed value goes beyond the edge values set within the program, the pump are going to be automatically switched ON/OFF by the relay circuit and it's connected to the driver circuit which helps to modify the voltage. The farmer will be intimated about the current field condition through ESP8266 module and also updated in the APP. By using this technique, the farmer can access the small print about the condition of the sector anywhere at any time.

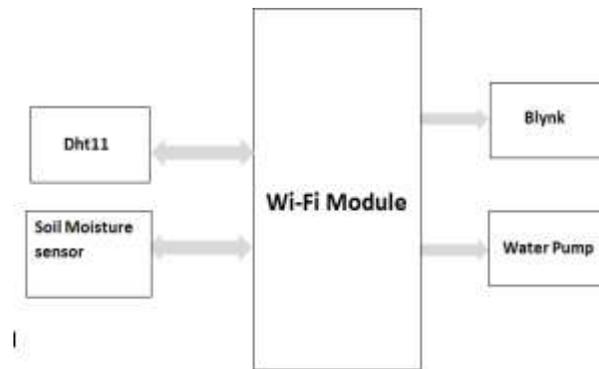


Fig -1: Block Diagram

#### 3.1 Wi-Fi Module (Node MCU)

The NodeMCU ESP-12E is the integrated version of the popular ESP8266. The ESP8266 Wi-Fi module is a self-contained SOC (System on Chip) with integrated TCP/IP (Transmission Control Protocol/Internet Protocol) protocol stack that can give any microcontroller access to any Wi-Fi network. Each ESP8266 module comes pre-programmed meaning, it are often simply attached to Arduino device to urge Wi-Fi ability. This module features a powerful enough on-boarding process and high storage capacity that permits it to be integrated with the sensors and other application specific devices.



Fig -2: Node MCU

### 3.2 Soil Moisture Sensor

Soil Moisture sensor is employed to live the moisture content present within the soil. When the soil moisture value read by the sensor is above the edge value, low level (0V) are going to be the digital output and if it's below the edge level, high level (5V) are going to be the digital output. The digital pin is employed to directly read current soil moisture value to ascertain if it's above threshold or not. The threshold voltage are often regulated with help of potentiometer.

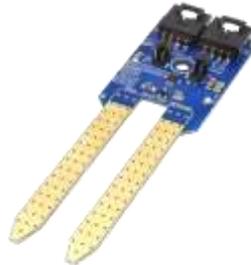


Fig -3: Soil Moisture Sensor

### 3.3 DHT11 Sensor

DHT11 sensor is employed for measuring temperature and humidity. It uses a capacitive humidity sensor and a thermostat to live the encompassing air. This sensor is cost effective, provides low power consumption and up- to 20-meter signal transmission is feasible.



Fig -4: DHT11 Sensor

Table -1: Specifications of DHT11

Item	Measurement Range	Humidity Accuracy	Temperature Accuracy	Resolution	Package
DHT11	20-90%RH 0-50 °C	±5%RH	±2°C	1	4 Pin Single Row

### 3.4 Blynk app

It is a Platform with IOS and Android apps to regulate Arduino, Raspberry Pi and therefore the likes over the web . It's a digital dashboard where you'll build a graphic interface for your project by simply dragging and dropping widgets. Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

There are three major components in the platform:

- Blynk App - allows to you create amazing interfaces for your projects using various widgets we offer .
- Blynk Server - Lliable for all the communications between the Smartphone and hardware. It is open-source, could easily handle thousands of devices and may even be launched on a Raspberry Pi.
- Blynk Libraries - For all the favored hardware platforms - enable communication with the server and process all the incoming and out coming commands.

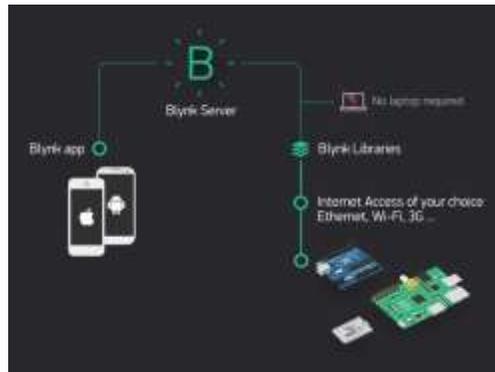


Fig -5: Blynk app working

### 3.5 Arduino IDE

The Arduino Integrated Development Environment (IDE) may be a cross-platform application (for Windows, macOS, Linux) that's written in functions from C and C++. it's wont to write and upload programs to Arduino compatible boards, but also, with the assistance of 3rd party cores, other vendor development boards. The ASCII text file for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and therefore the main program loop, that are compiled and linked with a program stub main() into an executable cyclic supervisory program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program arduino to convert the executable code into a document in hexadecimal encoding that's loaded into the Arduino board by a loader program within the board's firmware.

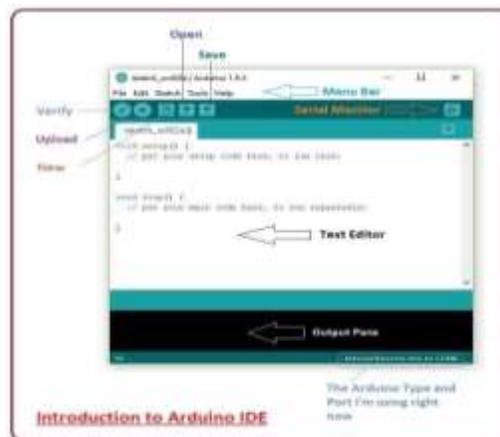


Fig -6: Arduino IDE

### 3.6 Water Pump

It is used in this project to pump the water needed for irrigation from the main water tank through pipes. This pump can be used for different applications, in household include cleaning, bathing, space heating and flower of water. This pump is selected for this seminar because it has good advantages. Such as, it has a lightweight. Also, it has a small size, so it is easy to install and replace it. Furthermore, it has an enough efficiency to pump water for irrigation. Since it operates in 12 volts, so it consumes lower power. In addition, this pump has a very Low of noise Finally, the cost of this pump is very cheap.

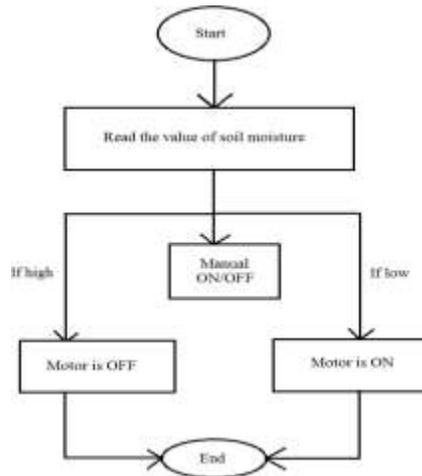


Fig -7: Simple Flowchart of system

#### 4. RESULT

The BLYNK is the application to monitor the status of the soil moisture condition, temperature condition and also can control the water pump. This android application is available on playstore and appstore. The features that are going to be in this application is shown in Figure 9 and 10. In this system we are using such a crop which will require a soil moisture of about 50% So when the soil loses its moisture to less than 50% then Motor pump will turn on automatically to sprinkle the water and it will continue to sprinkle the water until the moisture goes above 50% and after that the pump will be turned off. Here the value we have consider is 1000 and 50% of it means 500, so 500 will be our threshold value.



Fig -8: System

Moisture value < Threshold value : When the moisture value is less than 500, then the pump will be ON. Moisture value > Threshold value : When the moisture value is greater than 500, then the pump will be OFF



Fig -8: Pump ON

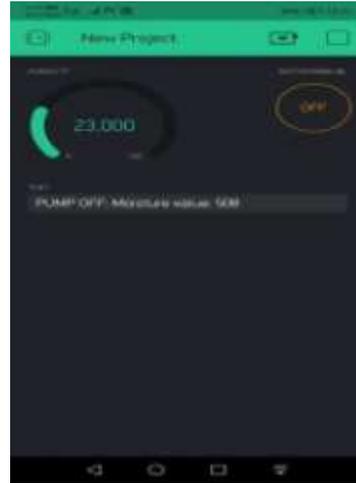


Fig -9: Pump OFF

## 5. CONCLUSIONS

This paper presents Smart Irrigation System in Farming Using IOT which benefits in several ways, such as saving water, time, manpower and ultimately increase profit. It is a portable and convenient system which consists of a wireless mobile-based system, mobile remote application. The results were within the expected range and accurate. The main objective of this smart irrigation system is to make it more innovative, user friendly, time saving and more efficient than the existing system. In this system, we are measuring three parameters such as soil moisture, temperature and humidity. Using this system, users easily monitor their plant soil moistures, temperature level and water pump status from any location.

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