

# **IOT BASED SELF AUTOMATED AGRICULTURE SYSTEM**

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**ABSTRACT** -*In the area of Agriculture automation system, Internet of Things (IOT) performs an important role. Connecting devices to Internet helps users to attain every controlling measures in handy. Probably in internet of things, for data transmission we use NodeMCU (ESP8266) which potentially controls the connected hardware's such as DHT 11, 4-Channel relay controlling module, and DC- submerged mini motor pump. Hence this is the small and simple way of module to enhance four different AC powered system within it. The data's taken form following sensors and transmitted to server using specific API key that assigned to individual users. Transmission of piece of information is done by HTTP request and server uses PHP code to intake data. Data`s are collected in MySQL database. The processing and dividing the working of hardware is done by Specific PHP program. Tasks are embedded in between PHP and arduino C coding. The Continuous data handling with a delay of one second in between Client node and server helps users to know the live update of information. Users can view the details in Web application and Mobile application. Here we use AJAX to process the live updated information to users. Users can get the live data`s and can control the hardware from any ware with the help of internet*

*connection, as the users can also set timers in the hardware.*

## **I. INTRODUCTION**

The internet performs a vital role in everyone life and all the things are in the progress to connect with internet. Also the self-automated system started ruling the world with the help of internet. In the area of Agriculture automation system, Internet of Things (IOT) performs an important role. Connecting devices to Internet helps users to attain every controlling measures in handy. Probably in internet of things, for data transmission we use NodeMCU (ESP8266) which potentially controls the connected hardware's such as DHT 11, 4-Channel relay used to controlling module, and DC- submerged mini motor pump (3v-6v ).

Here we use AJAX to process the live updated information to users. Users can get the live data`s and can control the hardware from any ware with the help of internet connection, as the users can also set timers in the hardware. Direct web URL`s are used to control the

information. Which includes the user key as a parameter? This system can be integrated using high level arduino boards; they are arduino Uno, arduino Nano, arduino Micro, arduino due and etc. These boards are used to take multiple parameters from different sensors. The sensors such as SparkFun Soil Moisture Sensor (with Screw Terminals), PIR Sensor module, water flow indicator, plant growth monitoring sensors, DHT 22 and etc. 9

Hence this is the small and simple way of module to enhance four different AC powered system within it. The data's taken from following sensors and transmitted to server using specific API key that assigned to individual users. Transmission of piece of information is done by HTTP request and server uses PHP code to intake data. Data's are collected in MySQL database. The processing and dividing the working of hardware is done by Specific PHP program. Tasks are embedded in between PHP and arduino C coding. The Continuous data handling with a delay of one second in between Client node and server helps users to know the live update of information. Users can view the details in Web application and Mobile application.

## **II. LITERATURE SURVEY**

### **2.1 INTELLIGENT FARMING SYSTEM & WEATHER FORECAST SUPPORT AND CROP PREDICTION**

Agriculture has been a primacy of the Indian economy. Even though it is a main source of income for a majority of the Indian population, it still stands technologically backward. To quash the problems of farmers, the proposed system helps employing a smart irrigation system in the field of agriculture. In the proposed system, we have used state-of-the-art technology to provide the water to the agricultural field based on the soil moisture value, which is detected using IoT sensor. The information received by the sensors is sent to the micro-controller. The system is activated using the mobile application, this can be accomplished with the help of ON/OFF buttons provided in the application. Also, this system when switched to automatic, it irrigates the field to a particular threshold soil moisture value when the soil moisture is low. The pump is switched ON based on the moisture content. Further, the system also provides data of the previous year's crop production in a particular area and weather forecast through an android application. This application also provides information about the latest agriculture advice, Government schemes for farmers, latest market prices, various farming tips in regional language.

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### **2.2 SMART IRRIGATION USING INTERNET OF THINGS**

Automation in agriculture system is very important these days. This paper proposes an automated system for irrigating the fields. ESP-8266 WIFI module chip is used to connect the system to the internet. Various types of sensors are used to check the content of moisture in the soil, and the water is supplied to the soil through the motor pump. IOT is used to inform the farmers of the supply of water to the soil through an android application. Every time water is given to the soil, the farmer will get to know about that.

### **2.3 EFFICIENT MACHINE LEARNING ALGORITHM FOR SMART IRRIGATION**

The shortage of water around the world force us to minimize the usage of water. More than 75% of fresh water resources were using for irrigation purpose so efficient utilization of water in irrigation system with advanced method is required. This paper presents an advanced technology based smart system to predict the irrigation requirements of a field by sensing of ground parameter like moisture of the soil, temperature-humidity and water level using Machine learning algorithm (ML). Existing algorithms like K-mean and SVM are facing overfitting problem to overcome this problem we are using K-Nearest neighbor method along with this proposed system has a capacity to realize a fully automated irrigation scheme and discussed in detail about the information processing results with three weeks pre- defined data based on the proposed algorithm. The system is capable and the

prediction results are more accurate. 12

### **2.4 SUPER SMART IRRIGATION SYSTEM USING IOT**

In this generation where technology is advancing rapidly, the field of agriculture and farming requires the application of the latest technology to make the life of farmers much simpler. The primary purpose of automating the irrigation setup is to enable remote control and monitoring of the status of the setup even when farmer is away from the location. This paper proposes a new system with the use of advanced sensors and a GSM module to provide SMS acknowledgment whenever there is any critical action that is initiated during the process. This includes water being pumped in excess to a crop, there is too much of sunlight for a sustained period and many other critical situations. The farmer will then have opportunity to take necessary action.

### **2.5 IOT BASED SMART GARDEN IRRIGATION SYSTEM**

Rapid technological developments have been applied in various sectors of life, one of which is in the agricultural sector. By applying technology in the agricultural sector, it can reduce energy and time wasted due to the application of conventional methods. One of the innovations that are currently trending in technology is the Internet of Things (IoT) . Internet of Things (IoT) is a technology that allows physical objects to be connected to the internet in realtime. This research applies the Internet of Things to the garden irrigation system, by remotely controlling water pump and monitoring soil moisture in the garden. Using the application of the Internet of Things the garden owners can measure and detect soil moisture in their plantations. Then efficiently, can manage the use of water used in real-time. The water supply inside the garden is connected to water pump, that will be activated when the soil moisture sensor detects low moisture level, and will be automatically adjust the moisture parameter on its optimum number. In addition, the owner of the garden can monitor the condition of soil moisture through mobileapp.

### **III. EXISTING SYSTEM**

Agriculture automation usually done with IOT based systematic approach. This process is done with GSM module with SMS protocol. Probably the information are send to users are done with text message and take response from client as numerical values. Here in this module we need to use Specific SIM module for data transmission. This could be make data to transfer at each and every critical situation. Here the live information's are send to client side, this usually make peer-to-peer communication where no data's are saved. Security and Encryption are not mentioned in the system, this make a problem of control and data breach. Types of Implemented system defined:-

- 1) Numerical Keypad controlling system
- 2) Automated SMS tracking module
- 3) Text based communication through GSM modules Based on this concept the existing systemworks.

#### **DISADVANTAGE**

- Less precision of data
- Need SIM module to work with the module
- No backup storage is assigned

### **IV. PROPOSED SYSTEM**

The goal is to provide the agriculture system from semi-automated to fully automated system. This is done with NodeMCU (ESP8266), this helps the module to transfer data in the form of HTTP Request to server. The server will perform numerical validation according to the logics applied to the requested Server. Hence the data's are stored in MySQL server and updated to client in the form of Web application. The web application provides security and flexibility to user to control and monitor the module. The NodeMCU is coded using embedded C programming, Sensors such as DHT11, Relay Module, and DC motor. Live information are posted using AJAX framework to make user aware of the motor current situation.

### **V. HARDWARE SETUP**

#### **5.1 NODE MCU (ESP 8266)**

The NodeMCU ESP8266 development board comes with the ESP-12E module Containing ESP8266 chip having TensilicaXtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high

processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects.

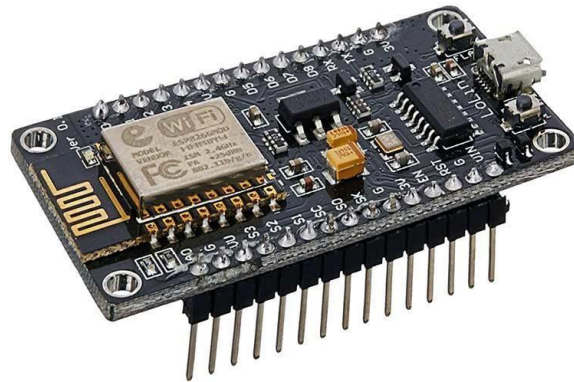


Figure 5.1 NodeMCU ESP8266

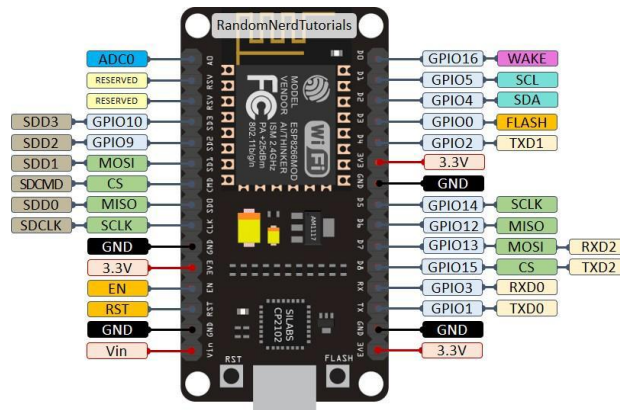
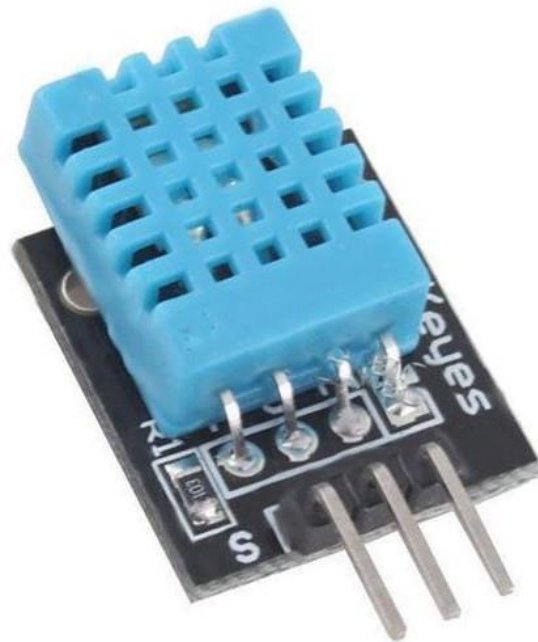


Figure5.1.1NODEMCU ESP8266 PINOUT

Applications of NODEMCU are Prototyping of IoT devices, Low power battery operated applications, Network projects, Projects requiring multiple I/O interfaces with Wi-Fi and Bluetooth functionalities.

## 5.2 DHT11–TEMPERATURE AND HUMIDITY SENSOR

The DHT11 is a commonly used Temperature and humidity sensor. The sensor comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. The sensor is also factory calibrated and hence easy to interface with other microcontrollers. The sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90% with an accuracy of  $\pm 1^\circ\text{C}$  and  $\pm 1\%$ . So if you are looking to measure in this range then this sensor might be the right choice for you.

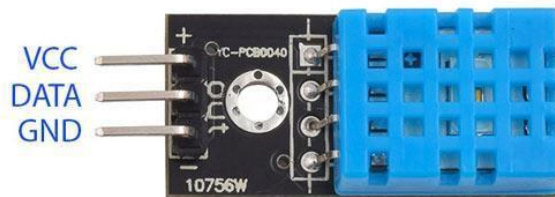


**Figure 5.2. DHT11–Temperature and Humidity Sensor**

Pin Identification and Configuration

1	Vcc	Power supply 3.5V to 5.5V
2	Data	Outputs both Temperature and Humidity through serial Data
3	Ground	Connected to the ground of the circuit

**5.3 DHT11 SENSOR PINOUT**



**5.4 5V FOUR-CHANNEL RELAY MODULE**

The four-channel relay module contains four 5V relay and the associated switching and isolating components, which makes interfacing with a microcontroller or sensor easy with minimum components and connections. There are two terminal blocks with six terminals each,

and each block is shared by two relays. The terminals are screw type, which makes connections to mains wiring easy and changeable. The four relays on the module are rated for 5V, which means the relay is activated when there is approximately 5V across the coil. The contacts on each relay are specified for 250VAC and 30VDC and 10A in each case, as marked on the body of the relays.

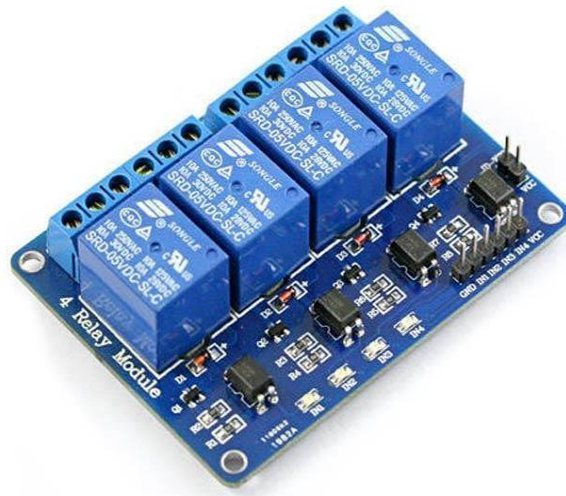


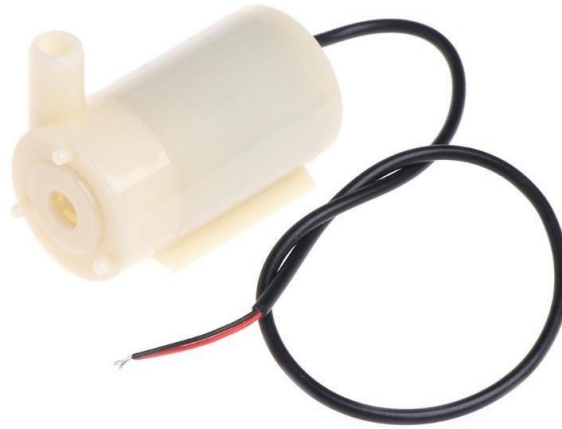
Figure 5.4. 5V Four-Channel Relay Module

Pin Number	Pin Name	Description
1	GND	Ground reference for the module
2	IN1	Input to activate relay 1
3	IN2	Input to activate relay 2
4	IN3	Input to activate relay 3
5	IN4	Input to activate relay 4
6	Vcc	Power supply for the relay module
7	Vcc	Power supply selection jumper

8	JD-Vcc	Alternate power pin for the relay module

### 5.5 DC 3-6V WATER PUMP

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA.

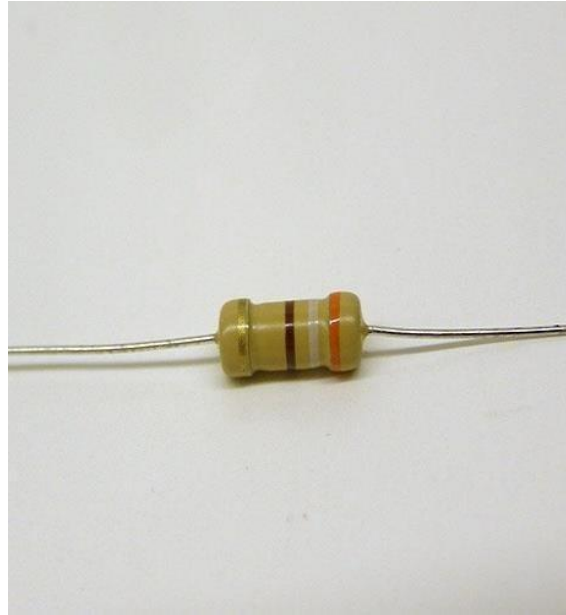


**Figure 5.5 DC 3-6V WATER PUMP**

### 5.6 RESISTOR 4.7kohm

Resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

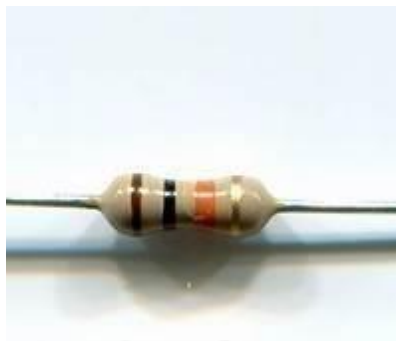




**Figure 5.6 Resistor 4.75K ohm**

### **5.7 RESISTOR 10kohm**

A 10k ohm resistor has brown, black and orange stripes in that order the last stripe represents the tolerance. Gold means  $\pm 5\%$ .



**Figure 5.7 Resistor 10K ohm**

## **VI. CONCLUSION**

Using this system agriculture information can be managed easily with the help of internet. This provides client user to analysis their system efficiency in the form of animated information. Simple HTTP protocol helps user to login the system for any time at any place. This system is independent of system, where users can use any type of web application to visualize the information. Timer for controlling the hardware module like motor, pump, and valve. User can view the old data's stored in the system. The logics are applied for controlling the node system

using specific user key which will protect the user from data breach. Here we can control the motor using simple and efficient way with the help of light weight web application.

## **VII. FUTURE ENHANCEMENT**

In future research, we hope to modify this system to have specific login credential. Also to improve the encryption of the peer-to-peer system. Users data's should be stored as datasets as CSV file format, this will feed raw information to node system for self-evaluation and validation. Process of inter communication node system can be created to solve problems with the help of client users real-time query and solutions based system.

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