SMART IRRIGATION USING IOT

BY

ESTHER TAMILARASI P (2018505011)

GEETHA PRIYA S (2018505014)

JAYASHREE B (2018505515)

SRINIDHI R (2018505059)

VIJAYALAKSHMI B (2018505554)

A project report submitted for

DEXBOT 2020

MADRAS INSTITUTE OF TECHNOLOGY

ANNA UNIVERSITY

CHENNAI – 600 044

MARCH 2020

CONTENTS

1. ABSTRACT

Interconnection of number of devices through internet describes the Internet of things (IoT). Every object is connected with each other through unique identifier so that data can be transferred without human to human interaction. It allows establishing solutions for better management of natural resources.It shows the use of Node MCU ESP8266 based monitored and controlled smart irrigation systems, which is also cost-effective and simple. It is beneficial for farmers to irrigate there land conveniently by the application of automatic irrigation system. This smart irrigation system humidity and moisture sensor that measure respectively and based on these sensors, microcontroller drives the servo motor and pump. NodeMCU received the information and transmitted wirelessly to the website through internet. This transmitted information is monitored and controlled by using IOT. This enables the remote control mechanism through a secure internet web connection to the user. Smart farm irrigation system uses android phone for remote monitoring and controlling of drips through sensor network. THINGSPEAK is used for communication between sensor nodes and base station. Wireless monitoring of field irrigation system reduces human intervention and allows remote monitoring. Cloud Computing is an attractive solution to the large amount of data generated by the wireless sensor network.

2. INTRODUCTION

2.1 SMART IRRIGATION:

Smart irrigation systems tailor watering schedules and run times automatically to meet specific landscape needs. These controllers significantly improve outdoor water use efficiencies. Unlike traditional irrigation controllers that operate on a preset programmed schedule and timers, smart irrigation controllers monitor weather, soil conditions, evaporation and plant water use to automatically adjust the watering schedule to actual conditions of the site.
The Smart irrigation System has wide scope to automate the complete irrigation system. Here we are building a **IoT based Irrigation System** using ESP8266 NodeMCU Module. It will not only automatically irrigate the water based on the moisture level in the soil but also send the Data to ThingSpeak Server to keep track of the land condition. The System will consist a water pump which will be used to sprinkle water on the land depending upon the land environmental condition.

2.2 COMPONENTS USED:

- NodeMCU8266
- Soil moisture sensor module
- Water pump module
- Relay module

2.3 CIRCUIT DIAGRAM:

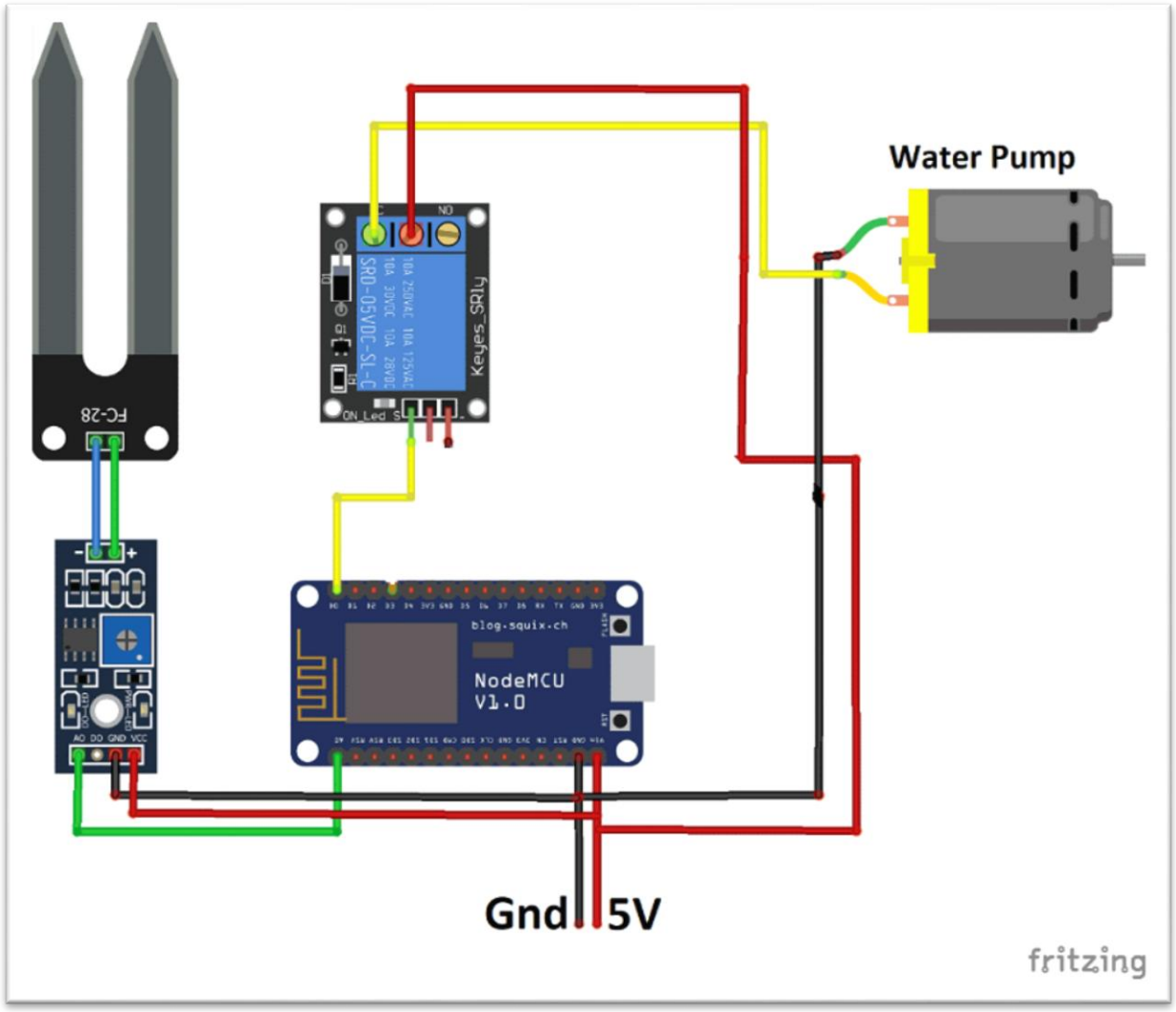

Fig 1: Circuit diagram

3. SOFTWARE REQUIREMENTS

3.1 ARDUINO IDE:

The Arduino Integrated Development Environment (IDE) is a cross-platform application that is written in functions from C and C++. The Arduino IDE supports the languages C and C++ using special rules of code structuring.[5] 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 the main program loop, that are compiled and linked with a program stub *main()* into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution.

3.2 THINGSPEAK:

According to its developers, ThingSpeak is an open-source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP and MQTT protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. ThingSpeak is an Internet of Things (IoT) platform that lets you collect and store sensor data in the cloud and develop IoT applications. The ThingSpeaK IoT platform provides apps that let you analyze and visualize your data in MATLAB, and then act on the data.

4. HARDWARE REQUIREMENTS

4.1 NodeMCU 8266:

NodeMCU is an open-source firmware and development kit that helps you to prototype or build IoT products. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.

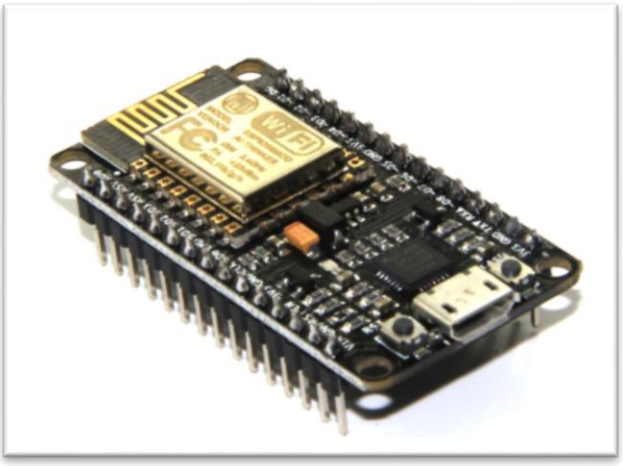

Fig 2.1: NodeMCU

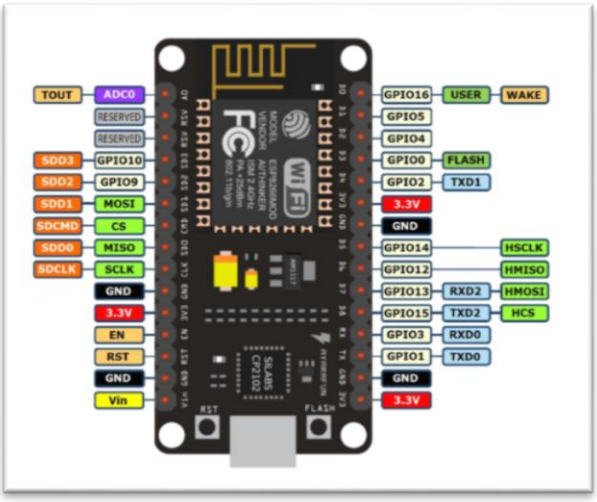

Fig 2.2: Pin Configuration

4.2 SPECIFICATIONS OF NodeMCU:

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- UARTs: 1
- SPIs: 1
- I2Cs: 1
- Flash Memory: 4 MB
- SRAM: 64 KB
- Clock Speed: 80 Mhz
- Wi-Fi: IEEE 802.11 b/g/n
- Integrated TR switch, LNA, power amplifier and matching network
- WEP or WPA/WPA2 authentication, or open networks

4.3 MOISTURE SENSOR:

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value. When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

Fig 3: Moisture Sensor with amplifier

4.4 RELAY MODULE:

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. The relay module is a separate hardware device used for remote device switching.

Fig 4: Relay Module

4.5 PUMP:

The water pump works using water suction method which drain the water through its inlet and released it through the outlet. A submersible pump pushes water to the surface by converting rotary energy into kinetic energy into pressure energy. This is done by the water being pulled into the pump: first in the intake, where the rotation of the impeller pushes the water through the diffuser.

Fig 5: Submersible micro pump

5. OBJECTIVE

- To save water and reduce human intervention in agriculture field.
- To monitor the status of soil through sensors and to provide signals for taking actions.
- To get the output of sensors and provide water to crop.

6. EXPERIMENTAL SETUP

Fig 6: Experimental Setup

7. EXPERIMENTAL RESULTS

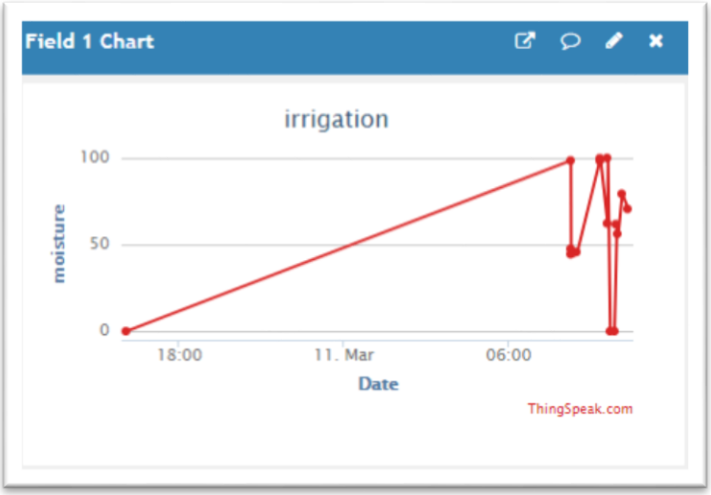

Fig 7: Thingspeak chart

8. CONCLUSION

We have achieved remote monitoring of moisture and automatic irrigation via this project. This can be expanded into complete remote monitoring of climatic conditions, tracking livestock and automatic pest control. The data sent to the cloud can also be analyzed continuously and better watering techniques may be applied. The type of soil, the crop planted – these conditions can also be taken into consideration for the irrigation to be more effective.