Don Bosco Institute of Technology
Department of Information Technology
IoT Mini Project
Smart Irrigation System

Introduction

Agriculture is the backbone of all developed countries. It uses 85% of available fresh water resources worldwide and this percentage continues to be dominant in water consumption because of population growth and increased food demand. Due to this, efficient water management is the major concern in many cropping system in arid and semi-arid areas. An automated irrigation system is needed to optimize water use for agricultural crops. The need of automated irrigation system is to overcome over irrigation and under irrigation.

Over irrigation occurs because of poor distribution or management of waste water, chemical which leads to water pollution. Under irrigation leads to increased soil salinity with consequent buildup of toxic salts on the soil surface in areas with high evaporation.To overcome these problems and to reduce the man power smart irrigation system has been used.

***Scope of the Project* :**A recent Beecham's report entitled predicts that food production must increase by 70% in the year 2050 in order to meet our estimated world population of 9.6 billion people. It also describes growing concerns about farming in the future : climate change, limited arable land, and costs/availability of fossil fuels. So what's the solution ? Smart Farming using IOT

Review of Literature

G.Parameswaran and K.Sivaprasath (2016) proposed a smart drip irrigation system using IOT in which humidity, temperature and pH sensors are used. Irrigation status is updated to the server or local host using personal computer. The farmer can't access about the field condition without internet.

Karan kansara (2015) proposed an automated irrigation system where the humidity and temperature sensors are used to sense the soil conditions and based on that microcontroller will control the water flow. Farmer will be intimated through GSM. This system doesn't monitor the nutrient content in the soil.

Links referred:

https://nodemcu.readthedocs.io/en/master/en/modules/http/
https://circuits4you.com/2018/03/10/esp8266-nodemcu-post-request-data-to-website/ https://www.instructables.com/id/Interface-L298N-Using-NodeMCU/
https://www.hackster.io/neetithakur/automatic-plant-watering-system-using-arduino-uno-8764ba

https://www.hackster.io/waisemanz/plant-recomender-irrigation-system-using-iot-02e999#story
https://www.hackster.io/Nyceane/smart-plant-iot-59cbc3
http://www.electronicwings.com/nodemcu/soil-moisture-sensor-interfacing-with-nodemcu

Datasheets Referred:

NodeMCU
Soil Moisture
Sensor Water Level
Sensor L289 Driver
Circuit DHT11

Analysis and Design

Proposed System

Nowadays agricultural field is facing lot of problems due to lack of water resources. In order to help the farmers to overcome the difficulties, smart irrigation system has been used. In this System, various sensors such as Soil Moisture Sensor,Water level Sensor,Temperature and Humidity Sensor are connected to the input pins of the NODEMCu microcontroller. The sensed values are displayed on webpage .If the sensed value goes beyond the threshold values set in the program, the pump will automatically switched ON/OFF by the Driver Circuit which helps to switch the voltage. The farmer will be intimated about the current condition through WiFi module and also be updated in the web page. By using this system, the farmer can access the details about the condition of the field anywhere at any time.

1) NodeMCU

NodeMCU is a Wifi SOC (System on a Chip). It is based on ESP8266-12E WiFi Module. It can be programmed directly through USB port using LUA programming or Arduino IDE.

2) Soil Moisture Sensor

Soil Moisture sensor is used to measure the moisture content present in the soil. When the soil moisture value read by the sensor is above the threshold value, low level (0V) will be the digital output and if it is below the threshold level, high level (5V) will be the digital output. The digital pin is used to directly read current soil moisture value to see if it is above threshold or not. The threshold voltage can be regulated with help of potentiometer.

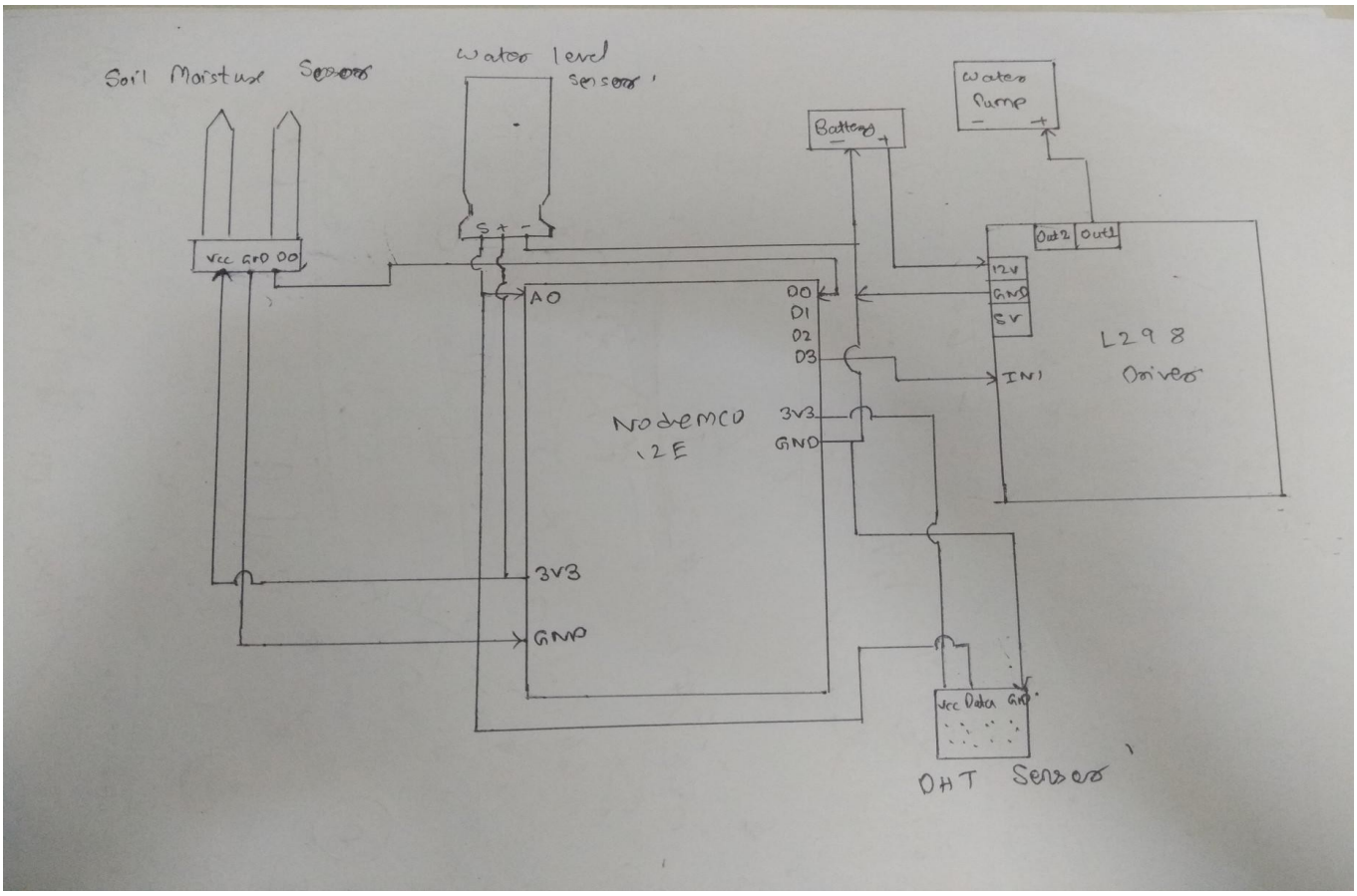
3) DHT11 Sensor

DHT11 sensor is used for measuring temperature and humidity. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air. This sensor is cost effective, provides low power consumption and up-to 20 meter signal transmission is possible.

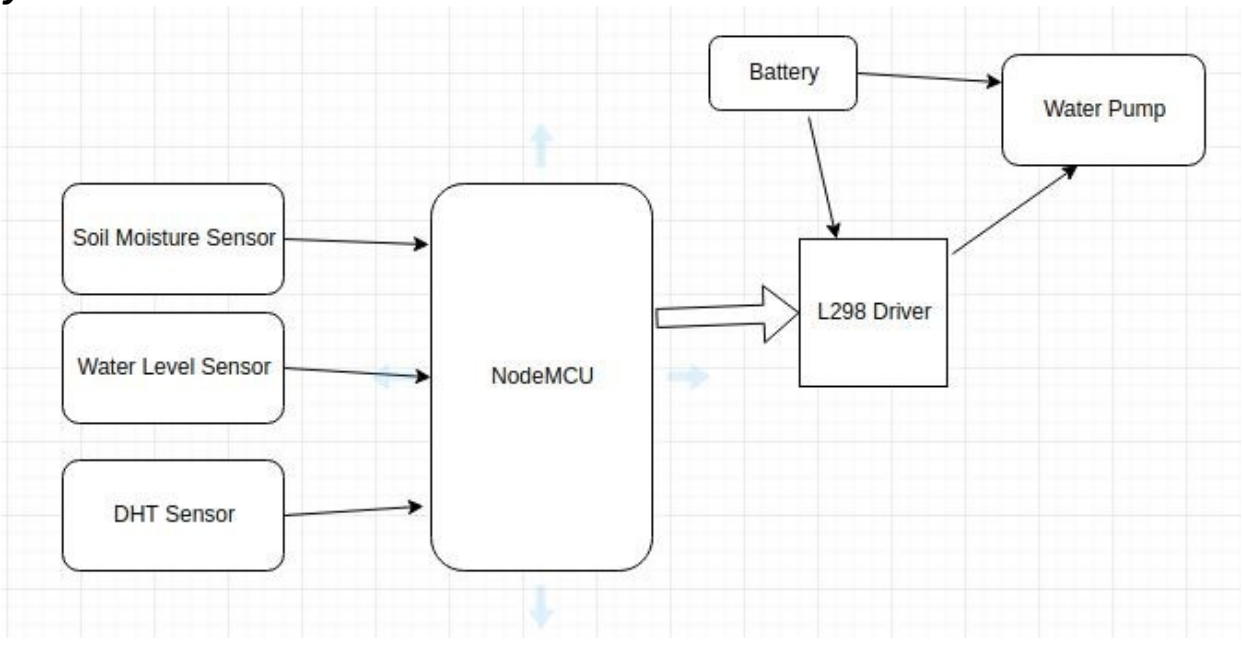
4) Water Level Sensor

Water Level Sensor is used to check the the water level in a container.

Circuit Diagram



System architecture

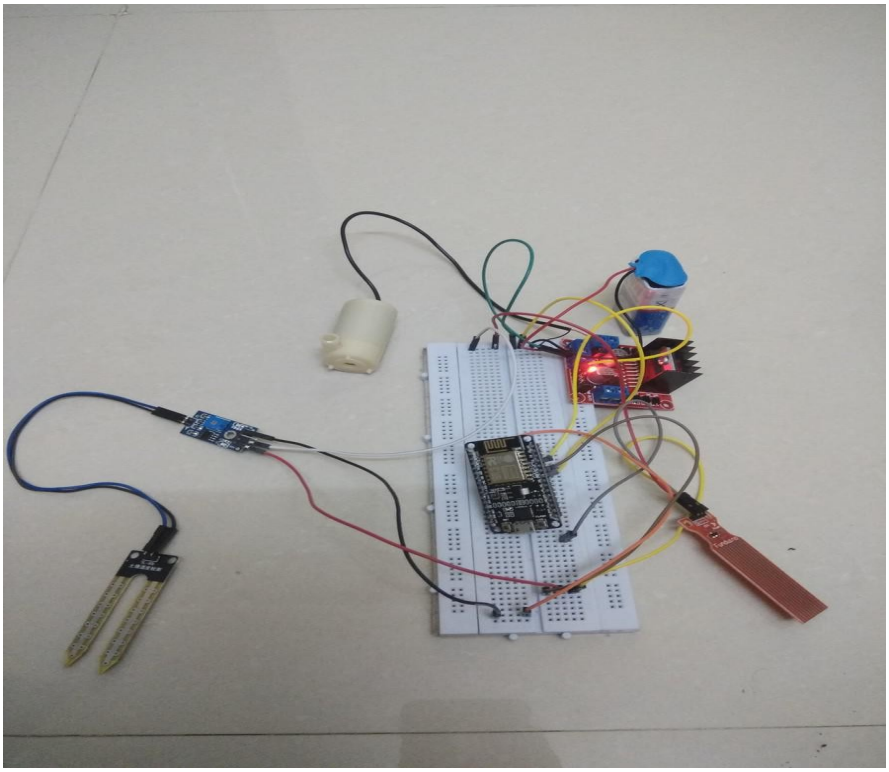


Budget:

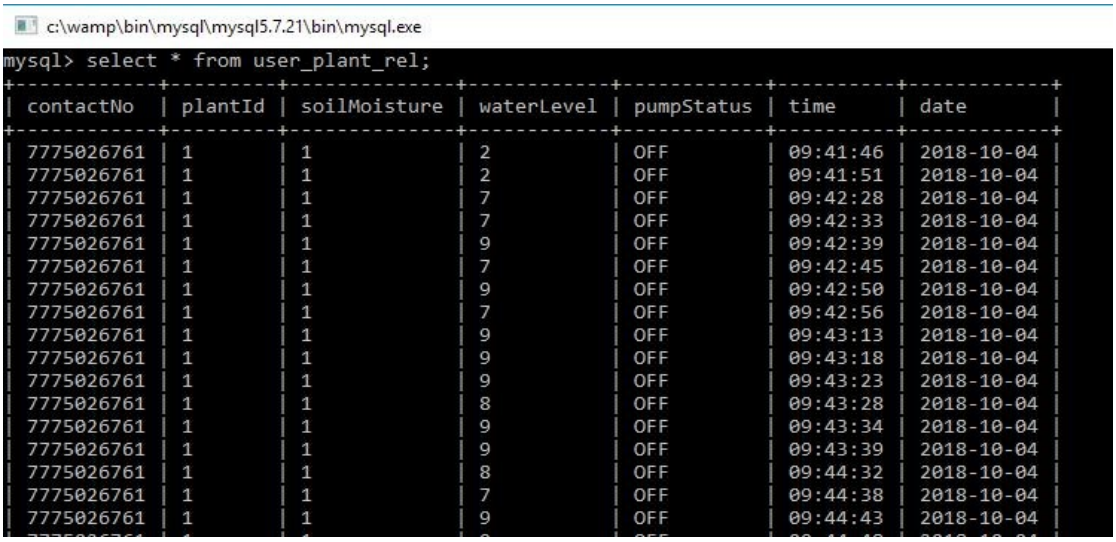
Sr. No	Item Name	Price
1	Node MCU	300
2	Soil Moisture Sensor	120
3	Driver Circuit	120
4	BreadBoard	80
5	Water Pump	156
6	Relay	120
7	Jumper	70
8	Battery	18
9	Water Tank	-
10	Total	984

Results and Discussion

Hardware:



Output:



contactNo	plantId	soilMoisture	waterLevel	pumpStatus	time	date
7775026761	1	1	2	OFF	09:41:46	2018-10-04
7775026761	1	1	2	OFF	09:41:51	2018-10-04
7775026761	1	1	7	OFF	09:42:28	2018-10-04
7775026761	1	1	7	OFF	09:42:33	2018-10-04
7775026761	1	1	9	OFF	09:42:39	2018-10-04
7775026761	1	1	7	OFF	09:42:45	2018-10-04
7775026761	1	1	9	OFF	09:42:50	2018-10-04
7775026761	1	1	7	OFF	09:42:56	2018-10-04
7775026761	1	1	9	OFF	09:43:13	2018-10-04
7775026761	1	1	9	OFF	09:43:18	2018-10-04
7775026761	1	1	9	OFF	09:43:23	2018-10-04
7775026761	1	1	8	OFF	09:43:28	2018-10-04
7775026761	1	1	9	OFF	09:43:34	2018-10-04
7775026761	1	1	9	OFF	09:43:39	2018-10-04
7775026761	1	1	8	OFF	09:44:32	2018-10-04
7775026761	1	1	7	OFF	09:44:38	2018-10-04
7775026761	1	1	9	OFF	09:44:43	2018-10-04

Conclusion

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. Measuring three parameters such as soil moisture, temperature, humidity values. Due to server updates farmer can know about crop field nature at anytime, anywhere.

Team Members:

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