IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# SMART PLANT WATERING SYSTEM USING NODE MCU

[1]Nalband Sumaiyya, [2]Kalbhor Supriya, [3]Kshirsagar Shubham, [4]Prof. Hirolikar D.S.

[1]Documentation and coading, [2]Analysis and Structural Design, [3]Documentation and testing,[4]Guidance and Teaching

[1]PDEA's College Of Engineering,

[2]PDEA's College Of Engineering,

[3]PDEA's College Of Engineering,

[4]PDEA's College Of Engineering,

**Abstract:** Watering is that the most vital cultural practice and most labour-intensive task in daily greenhouse operation. Watering systems ease the burden of getting water to plants once they need it. Knowing when and the way much to water is 2 important aspects of watering process. To make the gardener works easily, the automated plant watering system is made. This project aims at achieving automation for the purpose of plant monitoring and irrigation system, using Node MCU. Sensors are used for monitoring the environmental conditions surrounding the plant, whose outputs are obtained on an Android based mobile application. The updates of the atmospheric conditions such as temperature, humidity and soil moisture can be fetched from anywhere in the world as the data is shared on the cloud platform.

***Keywords*- Smart Plant, Humidity, Temperature, ThingSpeak.**

**Introduction:** Smart plant watering system is a real time monitoring system It monitor the soil properties like temperature, humidity soil moisture PH etc. it's possible to regulate many operations of the plant remotely from anywhere, anytime by IOT. It offers a futuristic way of life during which a private gets to regulate his electronic devices employing a smart phone, it also offers an efficient use of energy. It applied altogether areas of industry, including smart agriculture, smart parking, smart building environmental monitoring, healthcare transportation and lots of more.

**Problem Statement:** To develop a Smart Plant Watering System which has the following features: To start the pump motor (irrigation) automatically using relays when sensed by Soil Moisture Sensor. To alert user about the Temperature in the surrounding of plant. To alert user about the Humidity in the surrounding of plant. To alert user when the level of water in the container goes below a threshold value. To develop an Android App that monitors all this data. To send a SMS in case of alert.

**Proposed Methodology**: This project uses Node MCU as the microcontroller. It has various sensors for controlling the system. A Water Sensor (IR Sensor) is used to determine the level of water in the water source container. A Soil Moisture Sensor is used to detect the moisture content of the soil. DHT sensor is used in order to determine the temperature and humidity of the soil. The device would be powered by USB charger as well as it can be operated using power banks or any other power source. Relays are used to automate the process of watering by making use of 12V water pumps to water the plant. The android app for the Smart Plant Watering System will have data such as soil moisture contents, water level and temperature and humidity. It will send a message on alert condition. The android app will be developed on MIT App Inventor 2.

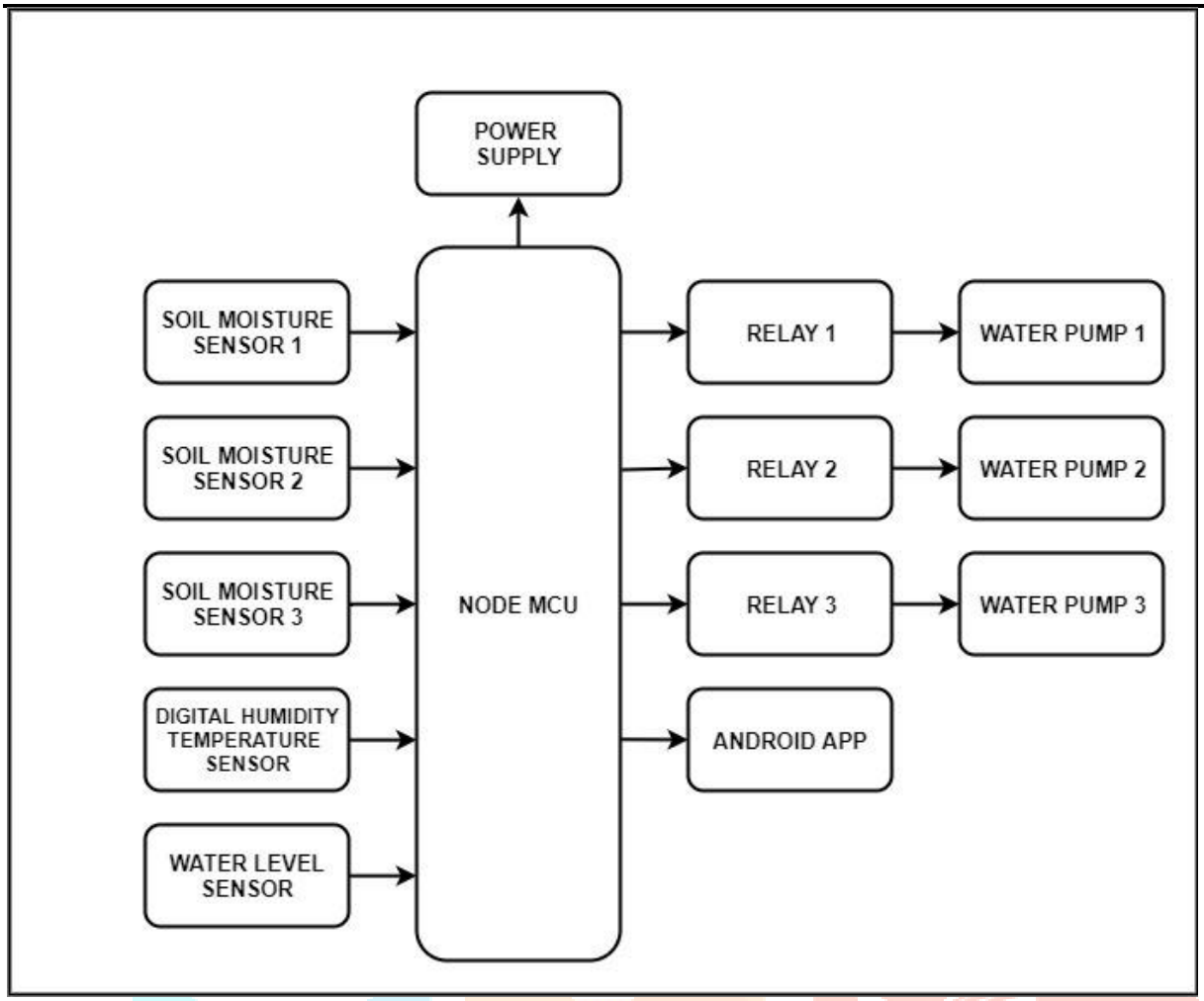


**Fig1**: System Architecture

**Algorithm(Mathematical Model)**

Inputs: sm1, sm2, sm3, t, h, ir.
Outputs: sm1stat, sm2stat, sm3stat, temp, hum, waterstat, r1, r2, r3.
Notations:
sm1 = Value of Soil Moisture Sensor 1
sm2 = Value of Soil Moisture Sensor 2
sm3 = Value of Soil Moisture Sensor 3
t = Value of Temperature sensor
h = Value of Humidity sensor
ir = Value of Water Level sensor
sm1stat = Alert from Soil Moisture Sensor 1
sm2stat = Alert from Soil Moisture Sensor 2
sm3stat = Alert from Soil Moisture Sensor 3
temp = Alert from Temperature sensor
hum = Alert from Humidity sensor
waterstat = Alert from Water Level sensor
r1 = Relay 1
r2 = Relay 2
r3 = Relay 3

Mathematics:
if (sm1 < 40%) then generate high on sm1stat
    if (sm1stat == high) then generate high on r1
else if (sm1 > 40%) then generate low on sm1stat
    if (sm1stat == low) then generate low on r1
if (sm2 < 40%) then generate high on sm2stat
    if (sm2stat == high) then generate high on r2
else if (sm2 > 40%) then generate low on sm2stat
    if (sm2stat == low) then generate low on r2
if (sm3 < 40%) then generate high on sm3stat
    if (sm3stat == high) then generate high on r3
else if (sm3 > 40%) then generate low on sm3stat
    if (sm3stat == low) then generate low on r3
if (t > 30 C) then generate alert temp.
if (h < 45%) then generate alert hum.
if (ir <= 1L) then generate alert waterstat.
display sm1, sm2, sm3, t, h and it to android app.

**Softwares used:**

1]ARDUINO IDE

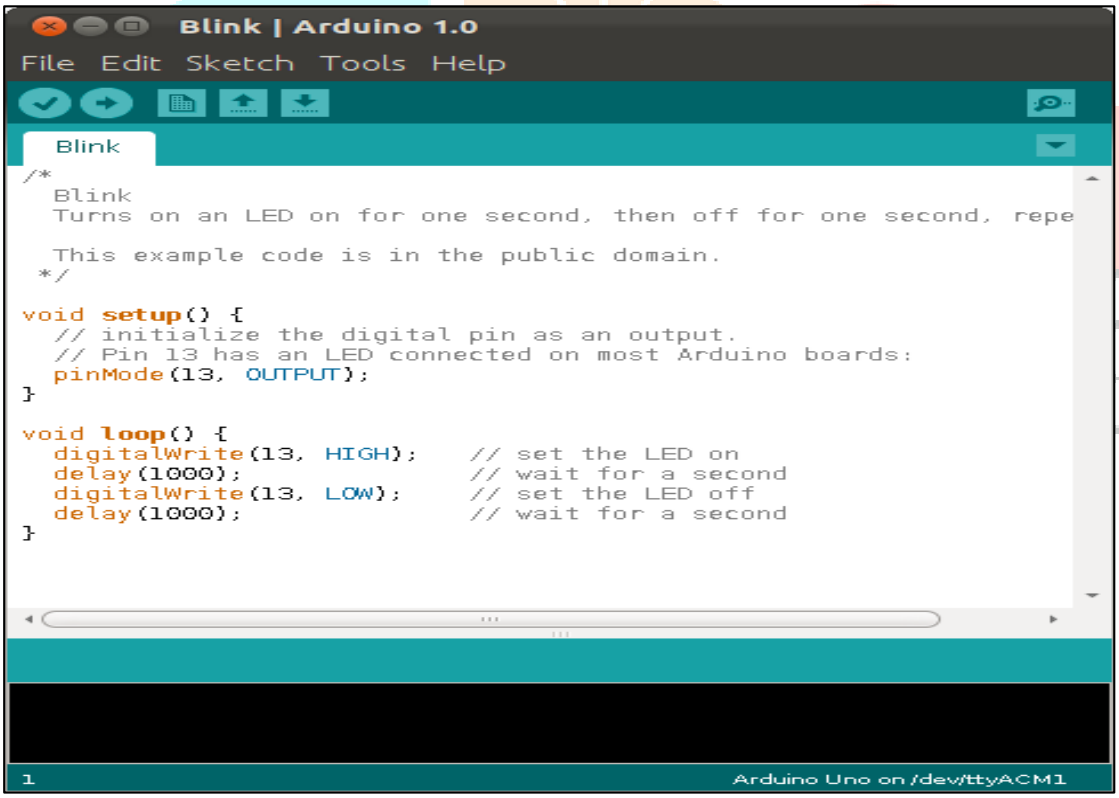


**Fig 2:** ARDUINO IDE

2]MIT APP INVENTOR 2

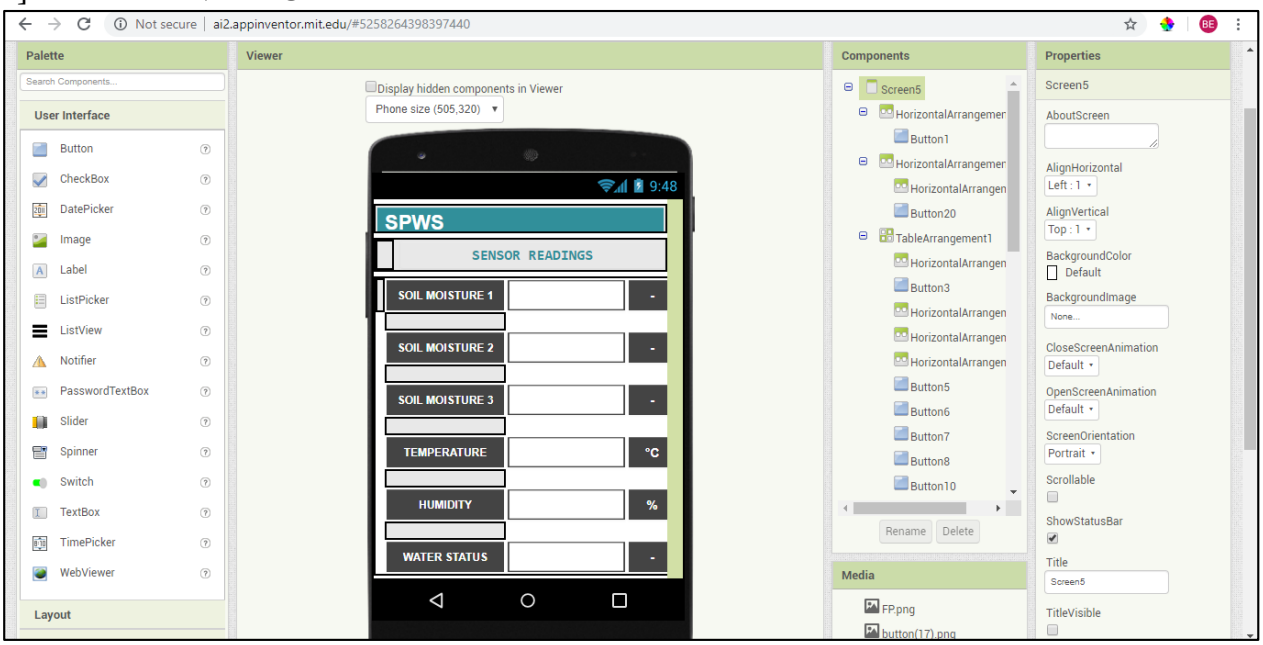


**Fig 3:** MIT APP INVENTOR 2

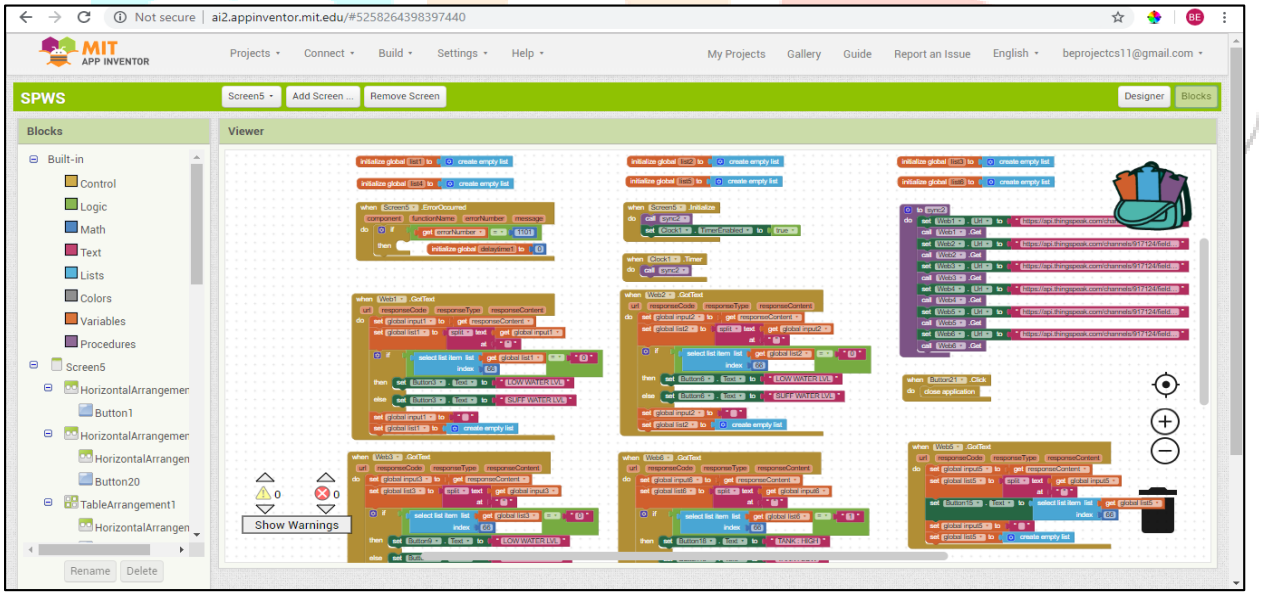


**Fig 4** MIT APP INVENTOR 2

3]ThingSpeak cloud

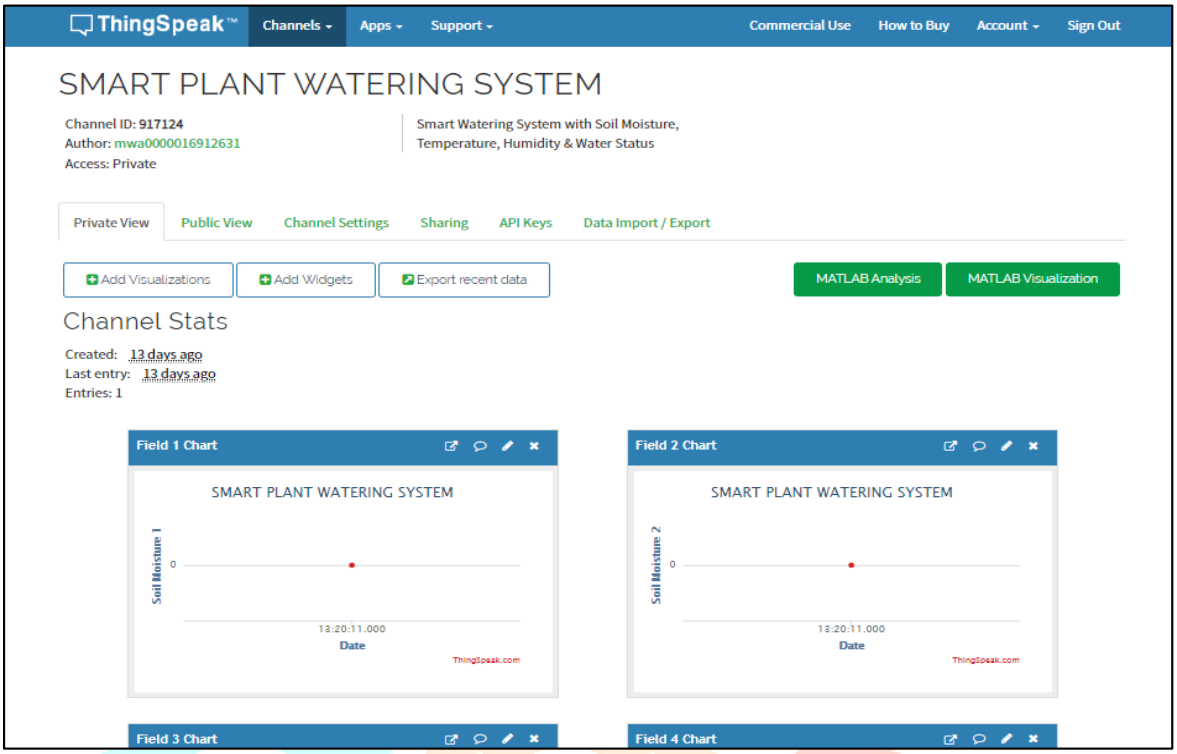


**Fig 5:** ThingSpeak cloud

**Experimental Results**

This project uses Node MCU as the microcontroller. It has various sensors for controlling the system. A Water Sensor (IR Sensor) is used to determine the level of water in the water source container. A Soil Moisture Sensor is used to detect the moisture content of the soil. DHT sensor is used in order to determine the temperature and humidity of the soil. The device is powered by USB charger. Relays are used to automate the process of watering by making use of 12V water pumps to water the plant. If any of the sensors value goes beyond threshold then the system determines the state and takes action respectively. For instance if soil moisture content of plant 1 goes beyond threshold then the relay 1 is activated which in turn activates water pump. Once the water level is sufficient in plant 1 the relay and water pump 1 turns off. Changes in humidity and temperature are reported to app .If water in the main container goes beyond threshold then it is also reported to app. It will send a message on alert condition.

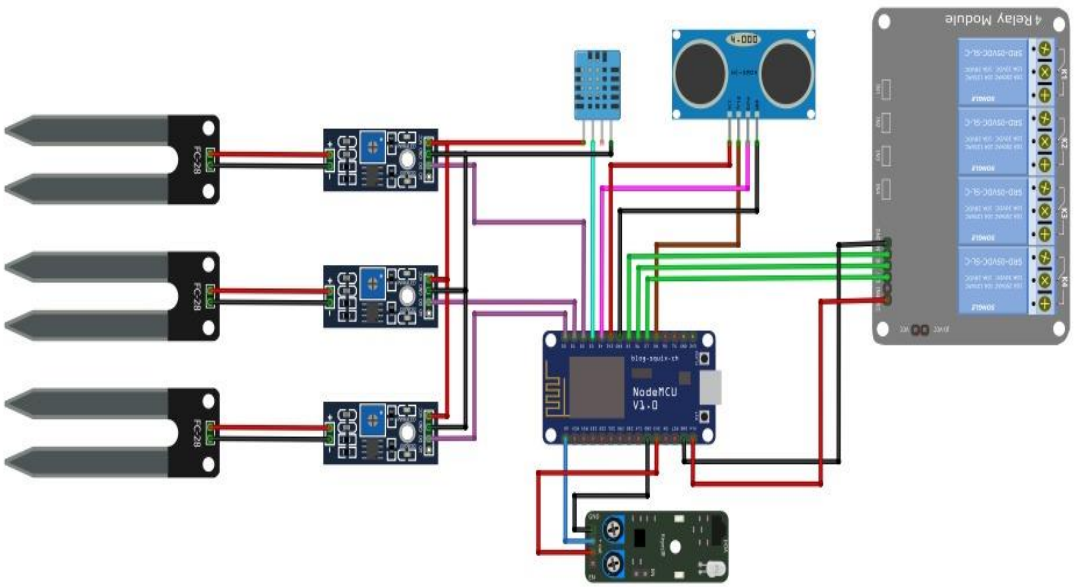


**Fig 6:** Circuit Diagram

**Advantages**

1. It saves time by using smart plant watering system equipped with multiple sensors.
2. It helps plants growth.
3. Over watering of plant is avoided.
4. DHT sensors play important role in monitoring temperature and humidity.
5. Automatic water reduces human efforts.

**Disadvantages**

1. The main water container needs to be filled.
2. Since the system is internet operated; a no internet case affects the plants.

**Applications**

1. Plant watering.
2. Farms.
3. Gardens.
4. Lawns.

**Conclusion**

This project presented a smart watering system which could be deployed in gardens or fields. The Smart Plant Watering System operates perfectly and sends all the sensor values to ThingSpeak. This data is then sent to app. The app and the system works perfectly as they were expected to be. Automation has been implemented and organised properly in this system.

**Future scope**

1. A digital water sensor can be used in order to precisely measure the data of water.
2. We can provide cloud notifications along with the SMS regarding status of plants.

**References**

[1] W.Dargie and C.Poellabauer. "Motivation for a Network of Wireless Sensor Nodes," in Fundamentals of Wireless Sensor Networks Theory and Practice, 1st ed. United Kingdom : Wiley, 2010, ch. 1, pp. 3-16.

[2] M.llyas and l.Mahgoub, "Opportunities and Challenges in Wireless Sensor Networks," in Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems, 1 st ed. Florida: CRC PRESS, 2005, ch. 1.

[3] K.Sohraby et al., "INTRODUCTION AND OVERVIEW OF WIRELESS SENSOR NETWORKS," in Wireless Sensor Networks Technology, Protocols, and Applications, 1st ed. New Jersey: Wiley, 2007, ch.l, pp. 1-37.

[4] Wageningen-UR and Hortinfo. (2009). FLOW-AiD Brochure [Online].

[5] Grove soil moisture sensor datasheet , 0.9 ed., Grove System Co., 2011.

[6] LD1 i 17 Series, STMicroelectronics Co., 2005.

[7] MTSIMDA Sensor Board Users Manual, Crossbow Technology Inc., 2007.

[8] D.Gay et aI., 'The nesC Language: A Holistic Approach to Networked Embedded Systems ," in Proc. 2003 Programming Language Design and implementation Conf

[9] C.M.Angelopoulos et aI., "A Smart System for Garden Watering using Wireless Sensor Network," in Proc. 2011 9th ACM Int. Symp. On Mobility management and wireless access, pp. 167-170.