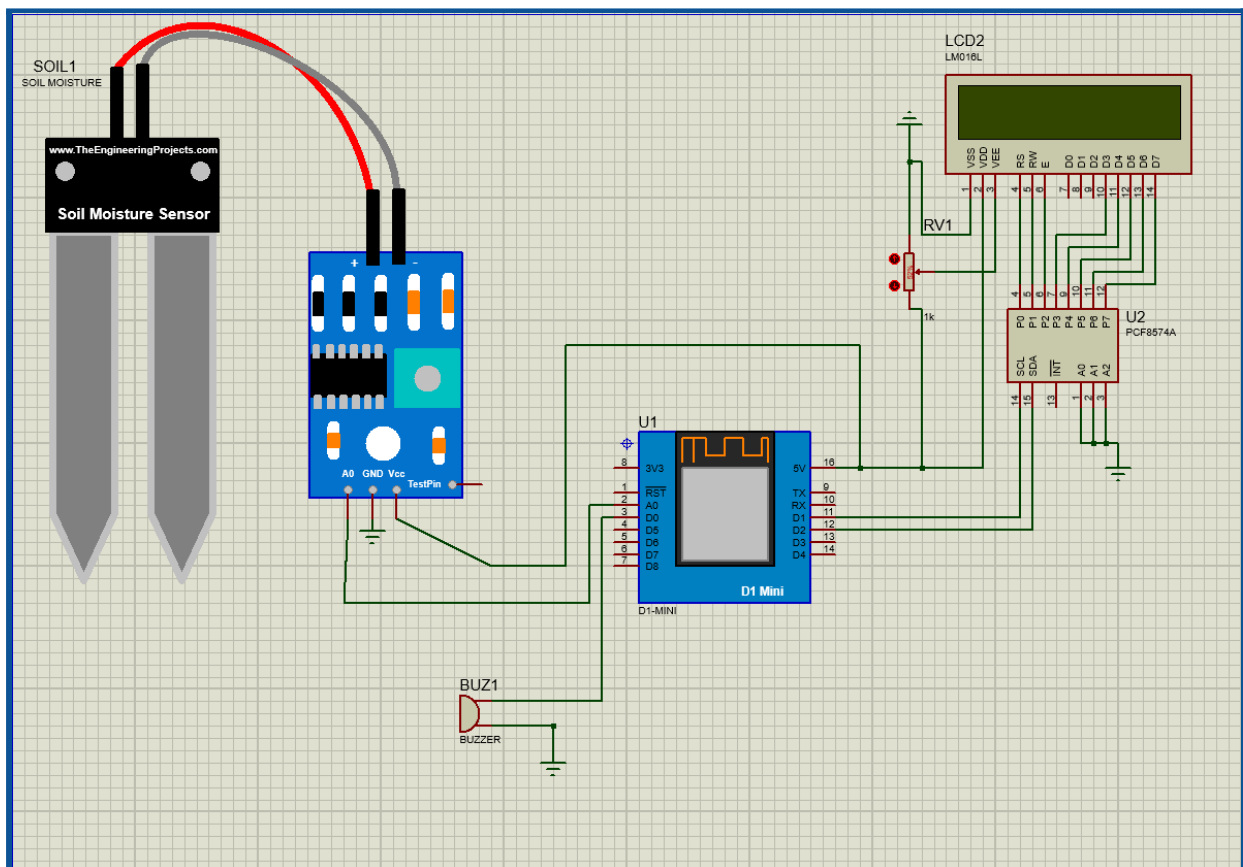


## Introduction:

- There are still villages in India , where there is only one source of water or no sources of water at all.
- In these scenarios , the government needs to send water tankers to these remote places.
- Villages in India are facing an acute shortage of water for households and agriculture activities with farmers bearing the brunt during cropping season.
- The agriculture sector, which consumes 80% of India's water resources and accounts for 90% of the groundwater withdrawals, uses water inefficiently.
- India's dominant portfolio of water intensive crops coupled with low water use efficiency and unregulated groundwater are key reasons that account for agriculture water demand.
- The country has low irrigation efficiency of 30% and 55% for surface and groundwater respectively because of the extensive use of flood irrigation methods and inappropriate selection of crops.
- The other driver of unsustainable supply of water is the level of pollution increasing in water bodies due to flow of untreated sewage and effluents.
- These challenges have major consequences with regard to water and might worsen issues related to climate change, rising population and industrialization.

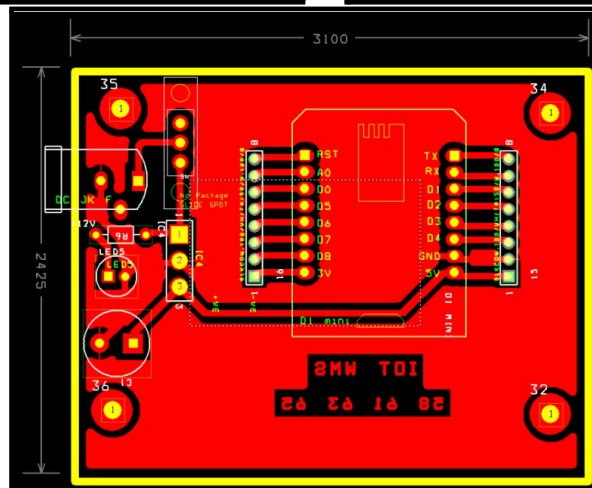
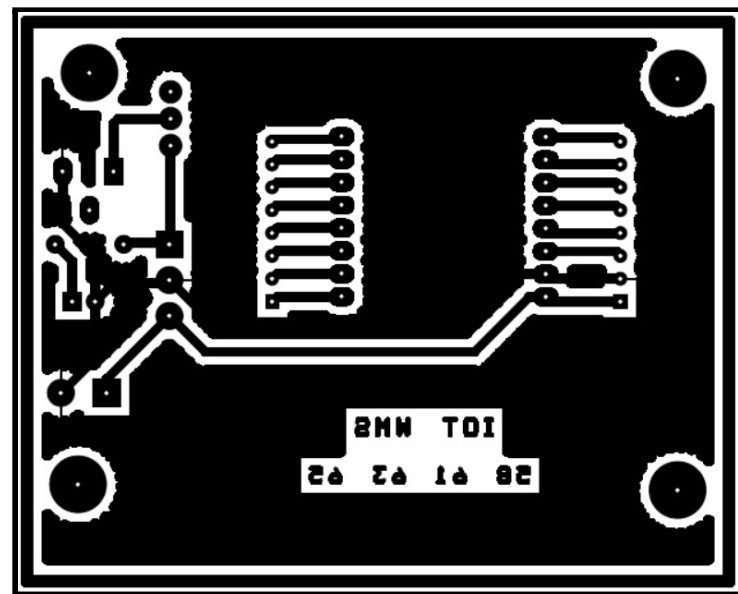
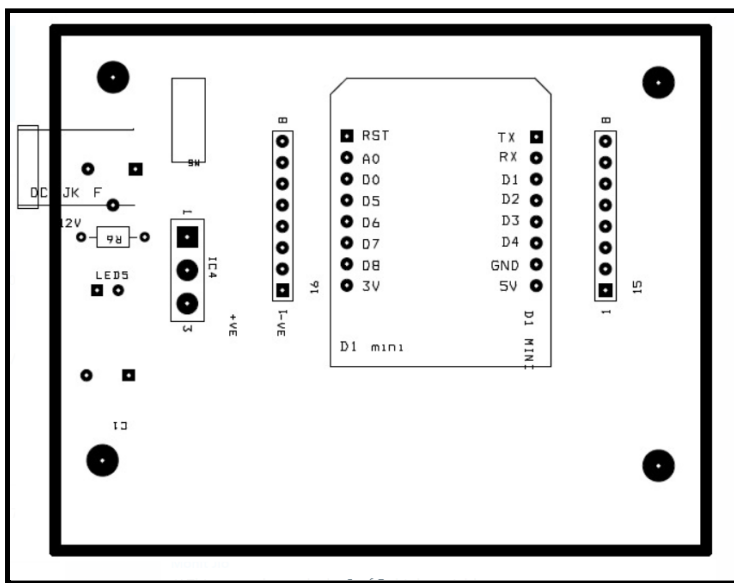
### 1. Schematic (Proteus Circuit):

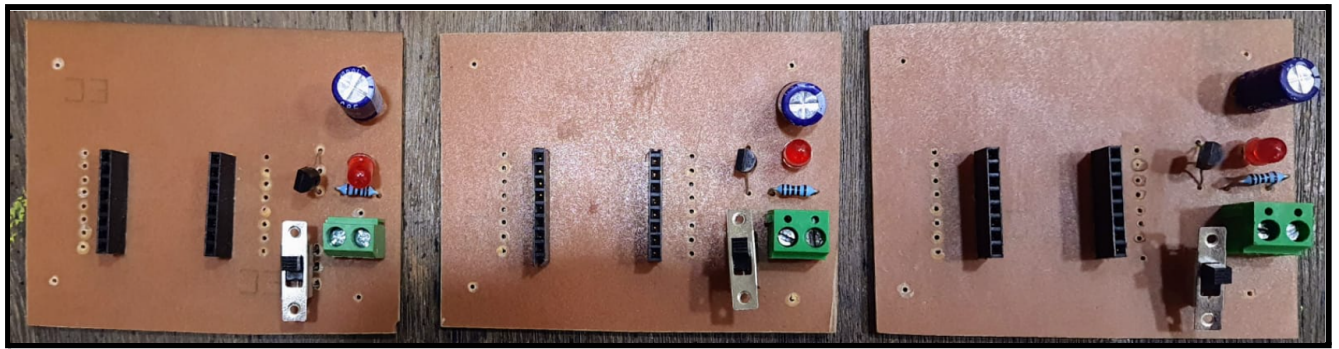


## 2. Working of Circuit :

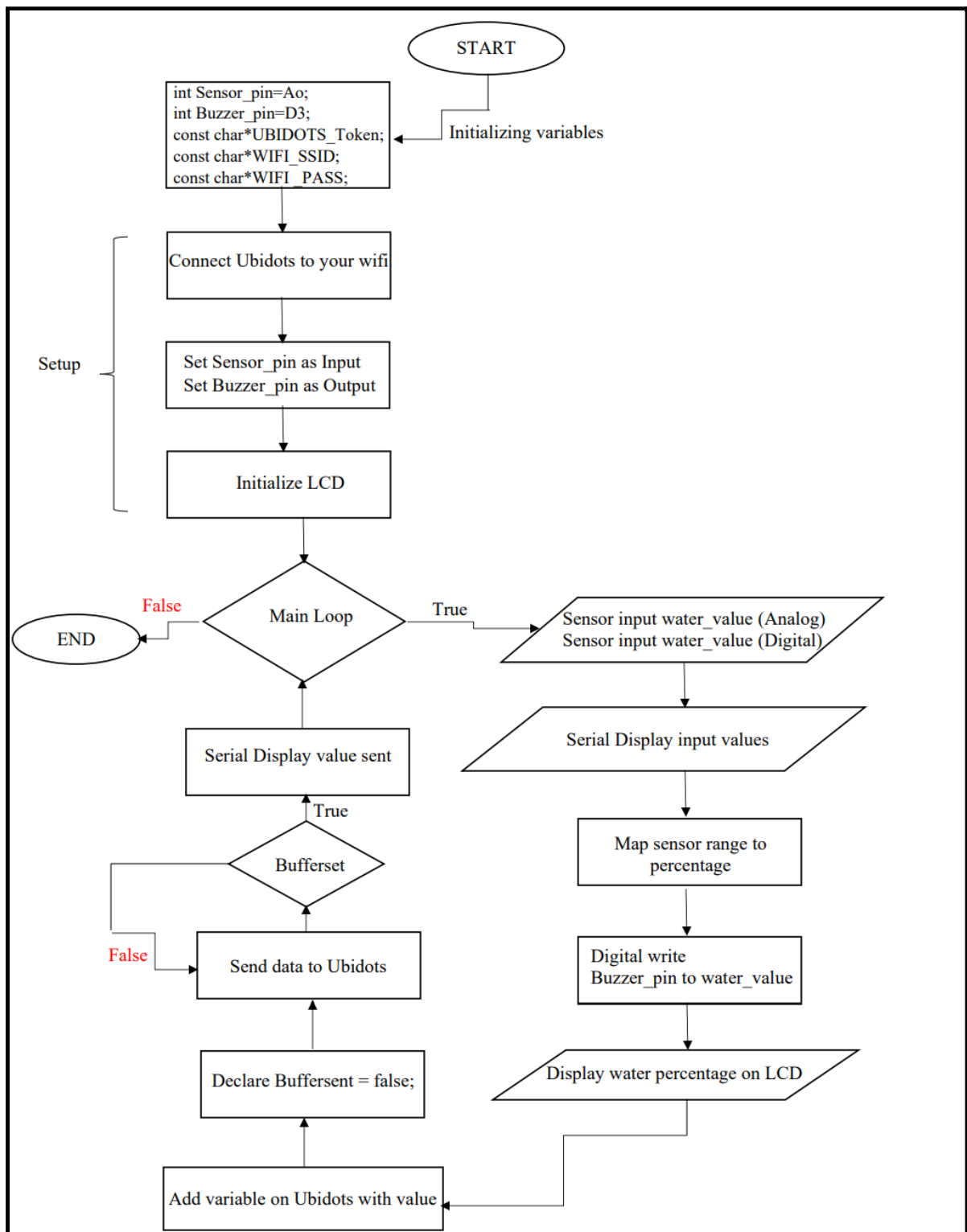
- DC power supply of 9v is supplied to the circuit.
- A Red LED is connected and a switch is placed for ON/OFF.
- A 10 K-ohm resistor is connected in series with the LED along with the voltage regulator IC, further connected to the capacitor.
- As a result, the 9v power supply is stepped down to 5v and the terminal of the capacitor is connected to the 5v VCC pin of Wemos D1-Mini.
- An LCD is interfaced with the Wemos D1-Mini via IIC (I2C module) for 16x2 LCD.
- The SCL and SDA pins of IIC are connected to the D1 and D2 pins of D1-Mini respectively.
- The Ao and Do pins of the soil moisture sensor are connected to respective Ao and Do pins of D1-Mini.
- The Buzzer is connected to D3 pins of D1-Mini.
- The Buzzer is activated if the value of Water Level is  $\sim < 30\%$ .
- Simultaneously water level is also displayed on the LCD.
- After the code is dumped in Wemos D1-Mini, it is connected to UBIDOTS Dashboard, on which respective values are reflected.

## 3. PCB Design:





### 3. Code Implementation:



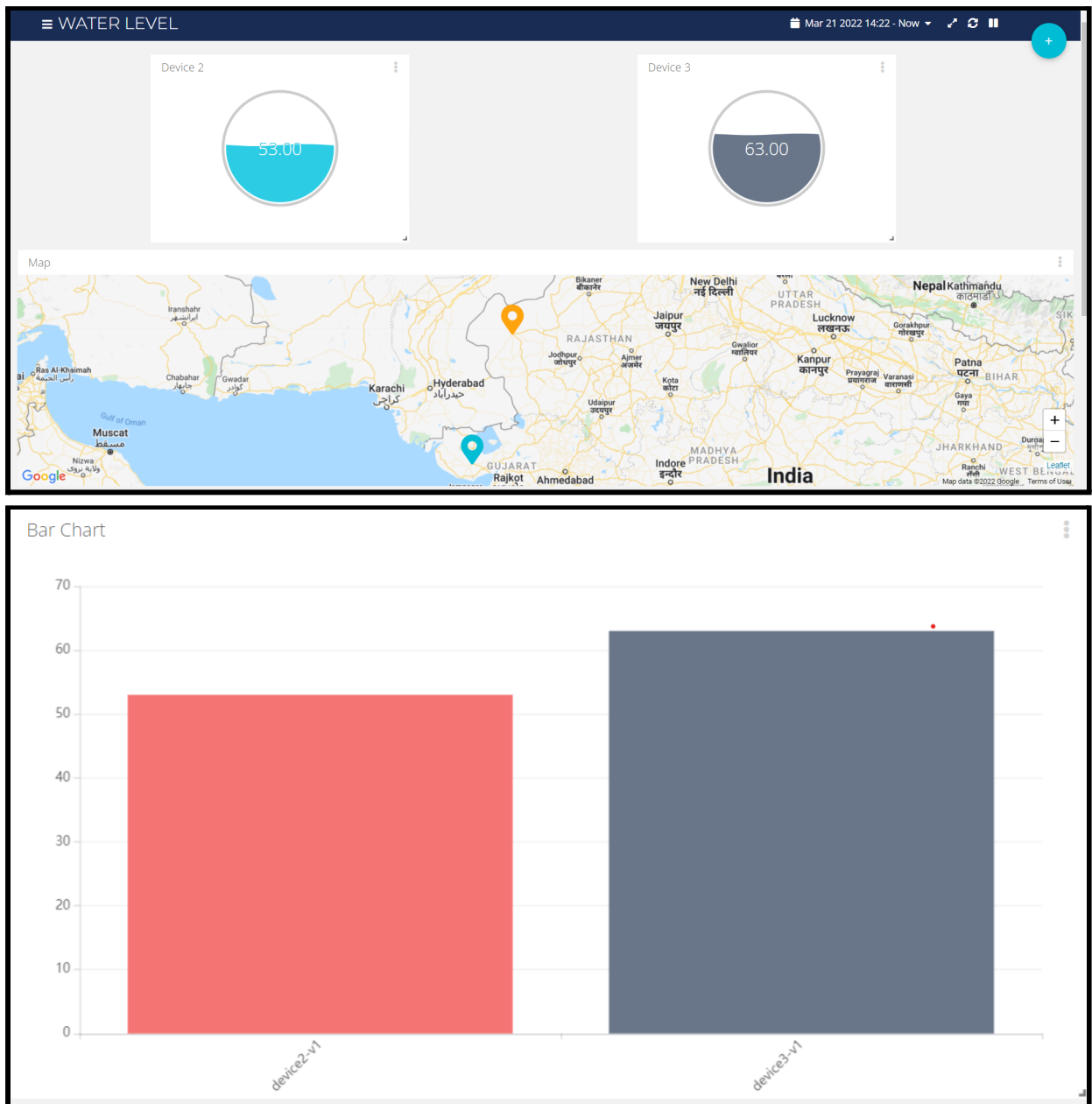
#### **4. IoT Dashboard Implementation:**

- We are using UBIDOTS as our IOT Platform.
- All the readings and important values are sent to the dashboard created on ubidots.
- Our dashboard includes 3 tank widgets, selected to indicate the water level, value of which is sent via calibration done by soil moisture sensor.
- Next, we have also added a maps widget in our dashboard, in order to locate where my device is actually located.
- However, we are not using any kind of GSM module in our project.
- In the maps widget, we are manually fixing a constant location of the IOT devices and as no motion/movement is taking place, the location will always be fixed and the same is done in the maps widget on UBIDOTS.
- Next we have also added a graph widget in our dashboard.
- Through this graph, we can monitor at what time & date, what percentage of water value was present. Such kind of information is very useful for further data analysis.
- Lastly , we have also added a Bar chart, which simultaneously shows the percentage level of water calibrated in all the three devices at the very present moment. Such type of data visualization is necessary and useful.
- If the water level is quite low then the email notification will be sent by the UBIDOTS system , to send an alert message.
- Similarly , if the water overflows from the tank/system , then the email notification will be sent by the UBIDOTS system , to send an alert message.

#### **5. Future Scope:**

- Sensor upgradation and accuracy can be improved by either improving the quality of Moisture Sensor or replacing the sensor with the Ultrasonic sensor.
- This implementation is applicable for a smaller depth range, for larger depths we can use an arrangement similar to an array of sensors to cover the complete depth.
- In an array of sensors instead of covering complete depth , the sensors can be calibrated at particular intervals by leaving regular gaps.

## 6. Results:





### Snap-Shots of Alert Email Notifications

## 6. References:

- 1] Jal Jeevan mission report from ministry of Jal-Shakti. ([LINK](#))
- 2] Journal of Chemical and Pharmaceutical Sciences on :  
A Smart Water Management System for Rural Area Water Tanks. ([LINK](#))
- 3] Website on How IOT can help in effective Water Management ? ([LINK](#))
- 4] Research Paper on Water Management System using IOT from IJERT. ([LINK](#))
- 5] Connect a WEMOS D1 to Ubidots over HTTP. ([LINK](#))