Boodskap

Network of Things

BSKAP-A-THON 2k18 IoT Competition

SMART FARMING e-MONITORING SYSTEM

TEAM MEMBERS

1) SURESH

2) POOJA

3) VINOTH

4) KRISHNA

IDEATION:

The main idea of my project is about the development of **'Smart Farming e-Monitoring System'.** The objective of this project is the farmers can monitor his agriculture lands by using his mobile phone. **Smart farming** brings out the concept of **Internet of Things** through which he monitors the data obtained from the sensors. IoT sensors capable of providing farmers with information about crop yields, rainfall, pest infestation, and soil nutrition are invaluable to production and offer precise data which can be used to improve farming techniques.

INTRODUCTION:

Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. It plays vital role in the growth of country's economy. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. It also provides large ample employment opportunities to the people. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved.

Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield. Most of the papers signifies the use of

wireless sensor network which collects the data from different types of sensors and then send it to main server using wireless protocol. The collected data provides the information about different environmental factors which in turns helps to monitor the system.

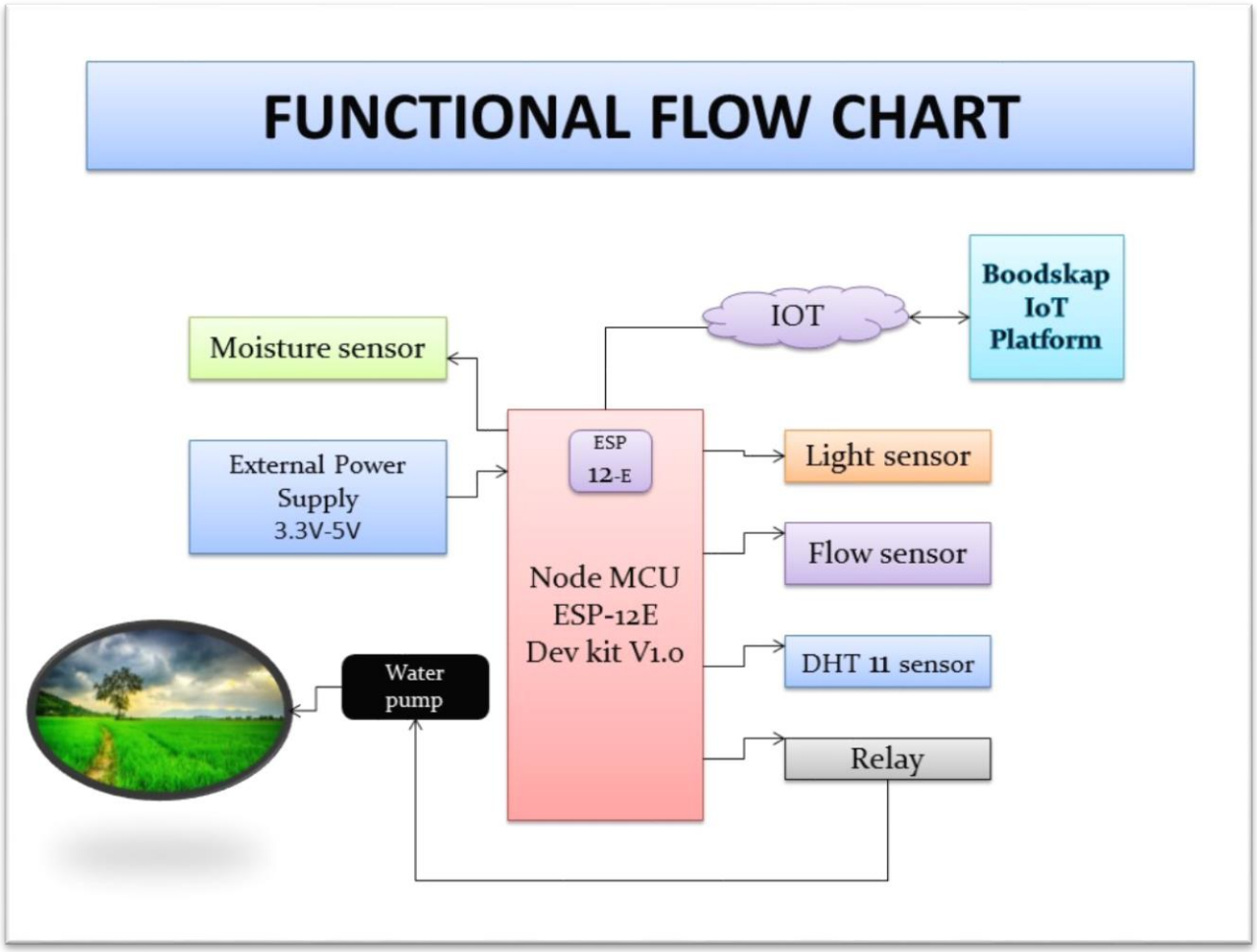
PROBLEMS FACING:

The problems facing by farmers in agriculture is they were struggling hard in the agricultural fields round the clock. In the agricultural sector, water pumps are used for irrigating small tracts of land from tube wells or open wells. Agriculture receives power mostly during mid night as this reduces the cost of electricity supply for the transmission and Distribution Company. The farmers have to be on their guard all the time due to the unpredictable nature of supply of electrical energy. And the farmers have to switch on their motor after electricity supply resumes.

Due to their negligence, sometimes they switch on the motor and then forget to switch off, which may lead to wastage of water. To overcome this problem, we are going for '**Smart Farming e-Monitoring System'** to monitor the realtime farming processes with critical historical data, such as weather events, climate changes, resources' availability, economics, product information.

WORKING OF THE PROJECT:

In this project we are using Node MCU board ultra-small computing platform as it supports Wi-Fi(ESP8266) connect feature and the sensors (Moisture Sensor, Temperature Sensor, Humidity sensor, Light sensor, Flow sensor) which will be placed in the field and able to monitor amount of light falling on the plants, Temperature and Humidity level, water flow rate and the moisture content in the soil. When the moisture content in the soil is too low, the system will give command to switch ON the motor and water the soil. The flow meter monitors the water consumption.



The data obtained from the sensors will be send to the Cloud (**BOODSKAP PLATFORM)** where the farmer can monitor the status of his land, availability of water and light intensity. Based on the moisture content, the Water Pump will be automatically Switched ON for watering the plant. Finally, the Notification message will be send to the Farmer's Mobile regarding the amount of water flows to the land.

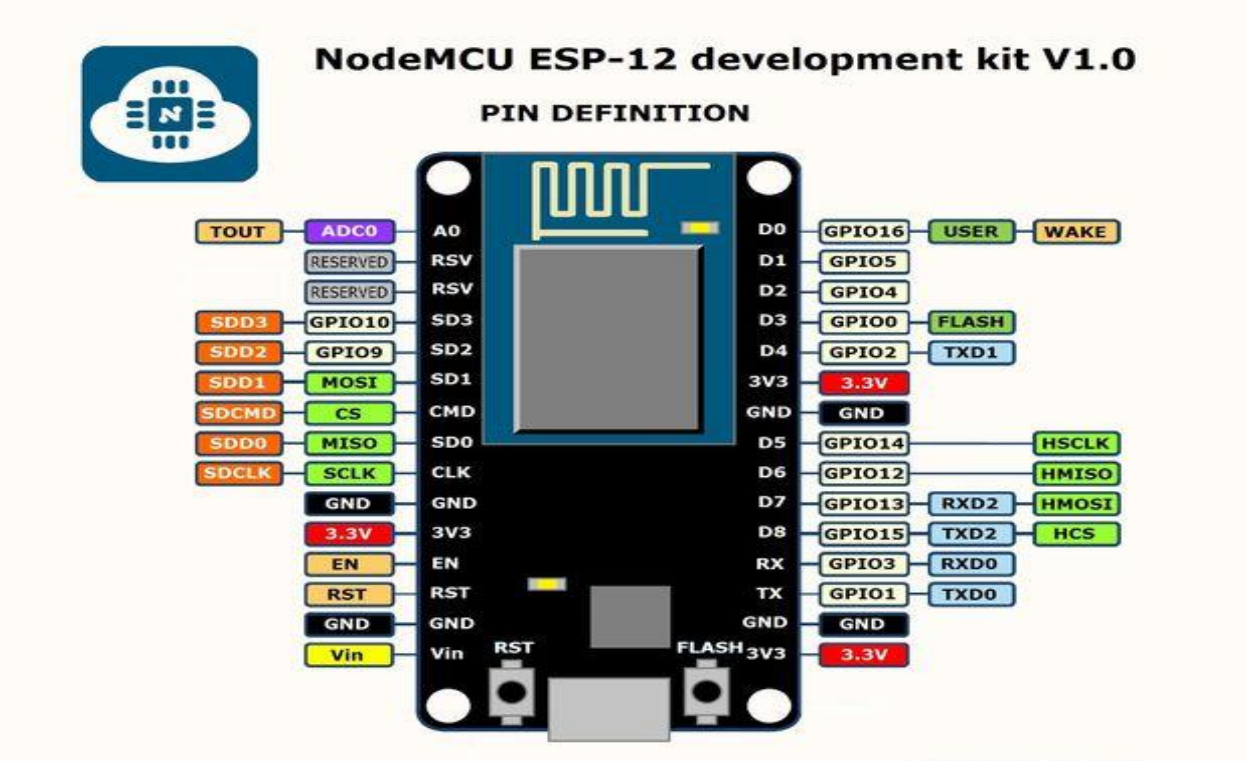
REQUIREMENTS FOR THE EXECUTION OF THE PROJECT:

SOFTWARE	HARDWARE	SYSTEM
Arduino IDE	**1.** Node MCU **2.** Relay **3.** DHT11 Sensor **4.** Moisture Sensor **5.** Light Sensor **6.** Flow Sensor **7.** 6V DC motor **8.** 9V Battery **9.** Bread Board **10.** Jumper Wires **11.** USB Cable **12.** 1 inch Water Pipe	Laptop/ Mobile Phone

HARDWARE TOOL:

NODEMCU:

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than dev kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source project, such as luacjson, and spiffs.



NodeMCU Dev kit V1.0

Developer	ESP8266 Open source Community
Type	Single board microcontroller
Operating System	XTOS
CPU	ESP8266 (LX106)
Memory	128 Kilobytes
Storage	4 Megabytes
Power	USB

FEATURES OF NodeMCU:

- Programmable WiFi module.
- Arduino-like (software defined) hardware IO.
- USB-TTL included, plug and play.
- 10 GPIOs D0-D10, PWM functionality, IIC and SPI communication, 1-wire and ADC A0 etc. all in one board.
- WiFi networking (can be used as access point and/or station ,host a web server), connect to internet to fetch or upload data.
- Event- driven API for networking application.
- PCB Antenna.

SOFTWARE TOOL:

ARDUINO IDE:

The Node Micro Controller Unit (MCU) is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards. The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Node MCU board to upload programs and communicate with them.

BOODSKAP IoT PLATFORM:

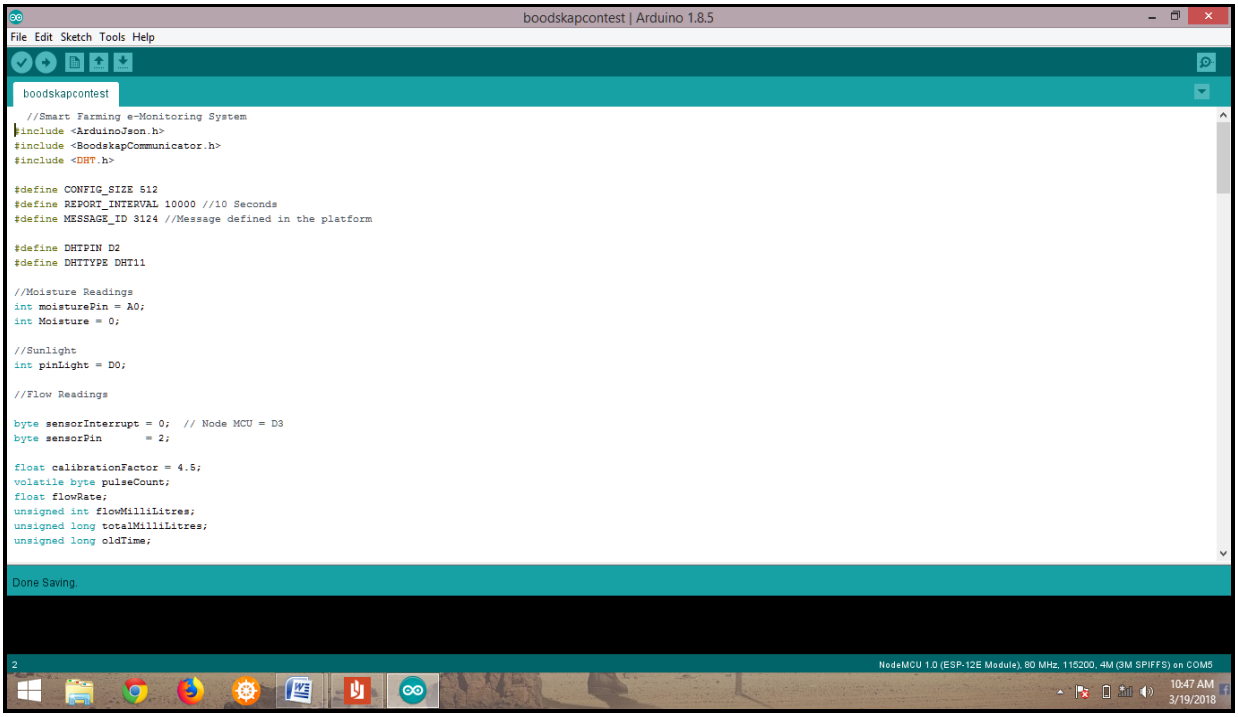
Boodskap is a disruptive (IoT) Platform helps to quickly connect any hardware devices and to rapidly build connected applications in a cost-efficient manner. A Platform / Infrastructure exclusively developed for IOT, that enables you to create your own control logics and ascertain communication between the devices from different manufacturers.

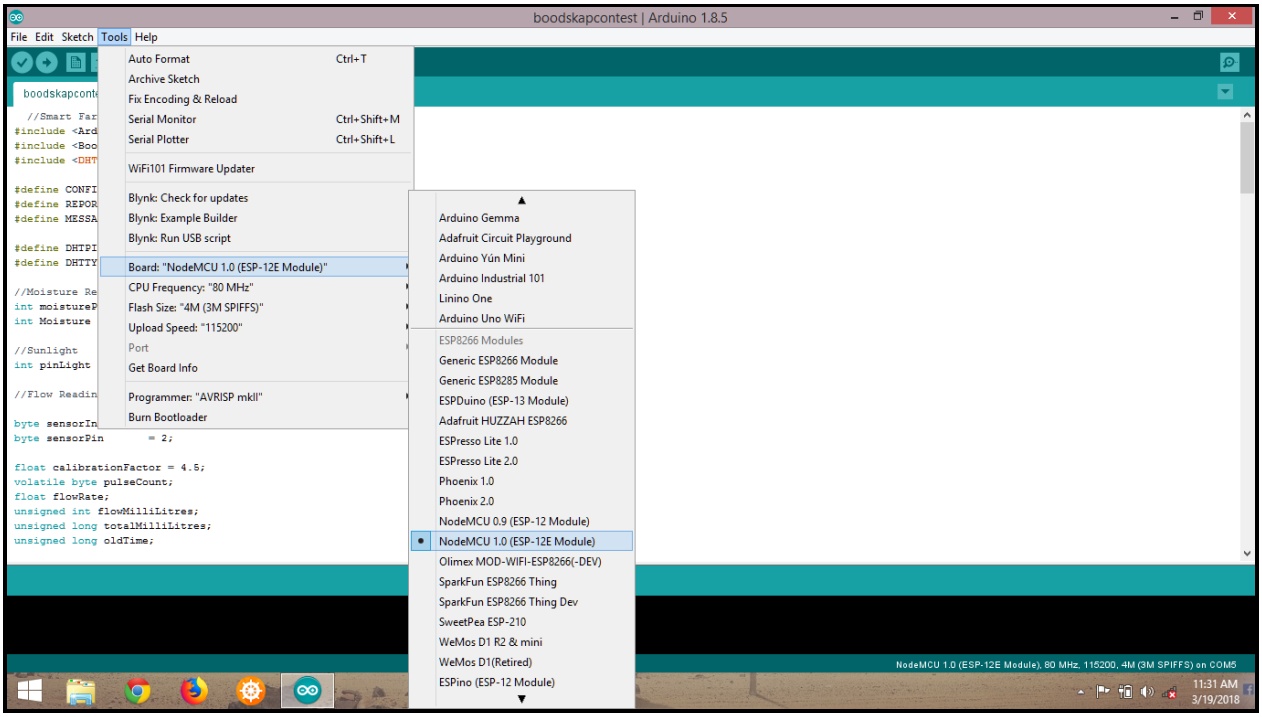
Boodskap Platform

WHY BOODSKAP?

- It is a powerful and Flexible platform .
- It has its own Boodskap Server.
- It's a digital dashboard where we can build a graphic interface for our project by simply dragging and dropping widgets.
- It works on the Web Application.

CODING-> NODEMCU WITH ARDUINO IDE:





LIBRARIES:

The Libraries which needs to be installed before starting with **Boodskap Platfrom**.

1) ArduinoJson / 5.12.0 (by Benoit Blanchon)
2) DHT / 1.2.3 (by Adafruit)
3) WiFiManager / 0.12.0 (by tzapu)
4) PubSubClient / 2.6.0 (by Nick O'Leary)

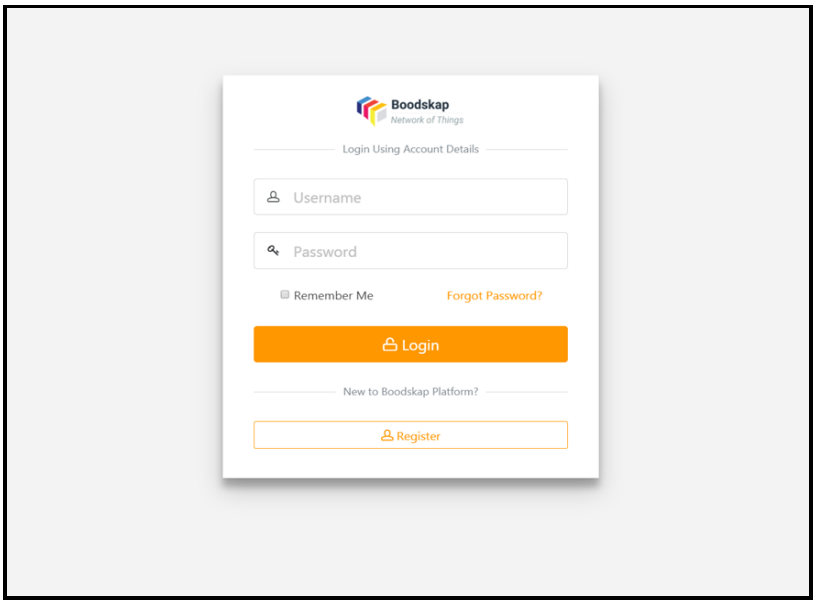
To connect our device with server**, Boodskap Transceiver Library** has been added to Arduino libraries.

After required libraries are added Next step is to register with boodskap platform.

Boodskap IoT Platform:

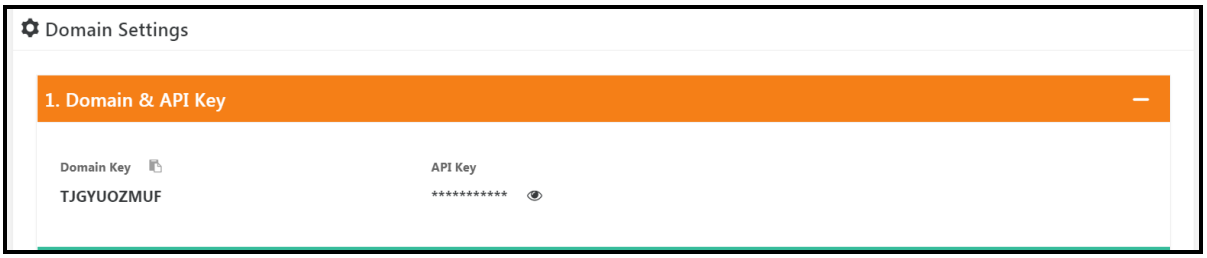
https://platform.boodskap.io/

Login to Boodskap Platform using **Username** and **Password.**



DOMAIN KEY:

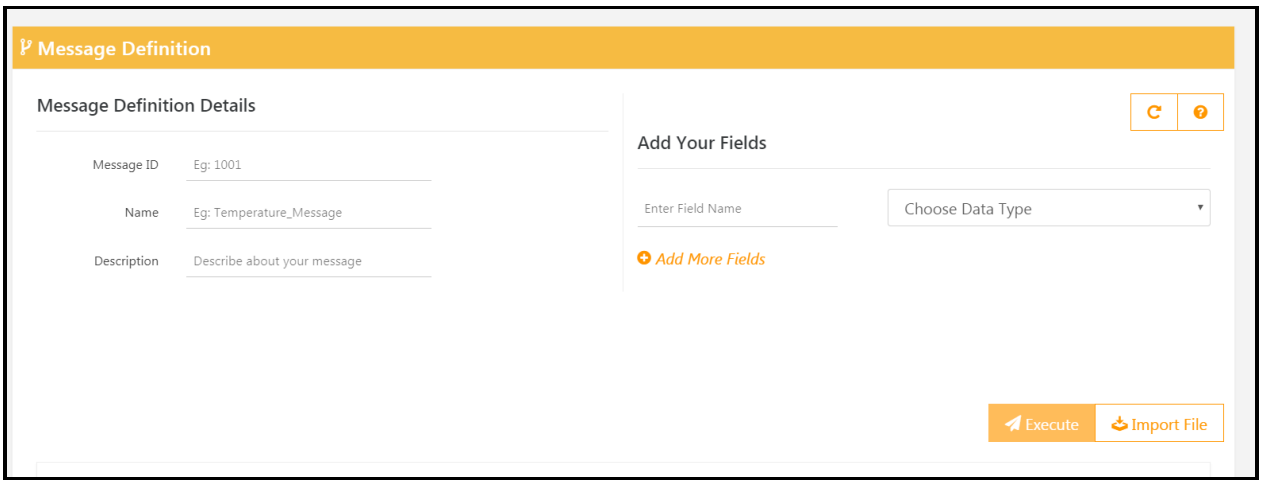
From the Boodskap Dashboard, Domain key and API key details are copied and pasted in the code to get device connected.



#define DEF_DOMAIN_KEY "**TJGYUOZMUF**" //your DOMAIN Key

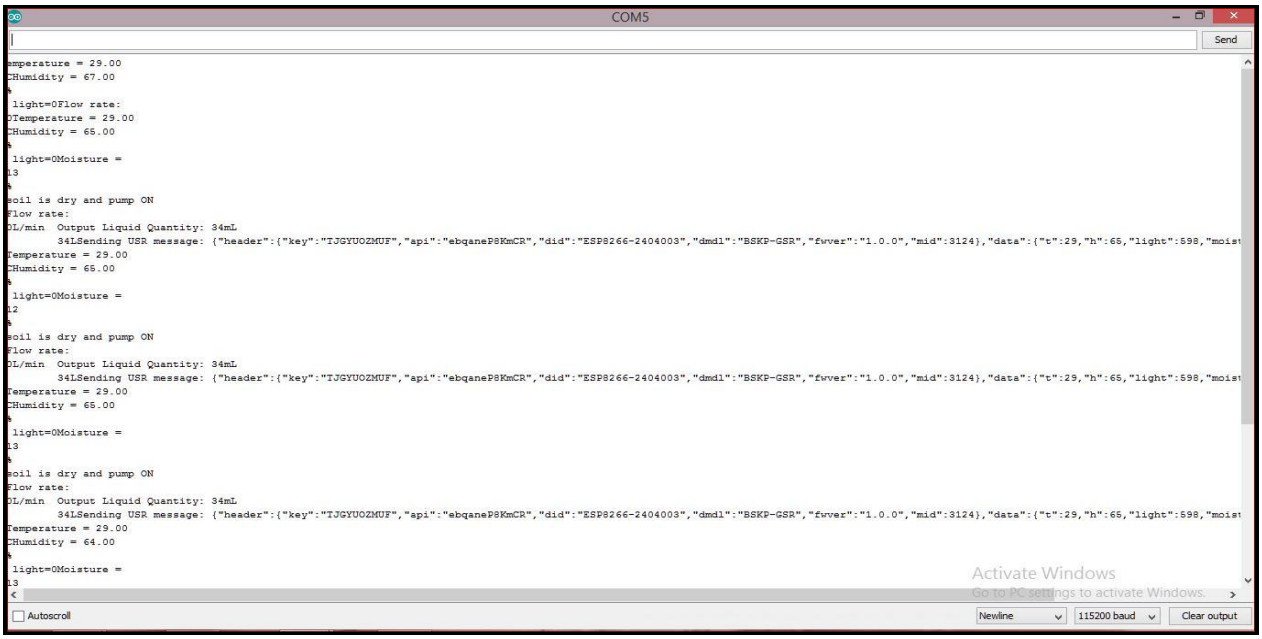
#define DEF_API_KEY "**ebqaneP8KmCR**" //Your API Key

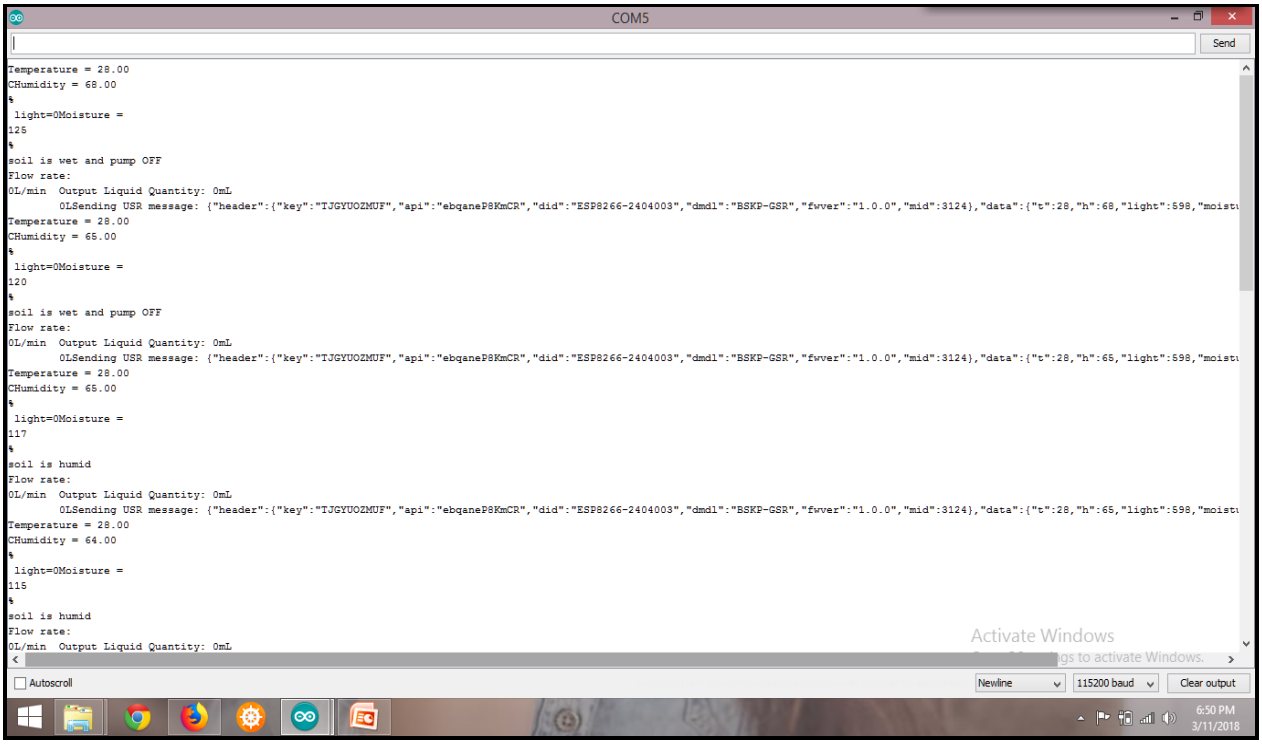
Message ID needs to be created with all necessary Fields in the Boodskap platform.



Serial monitor output:

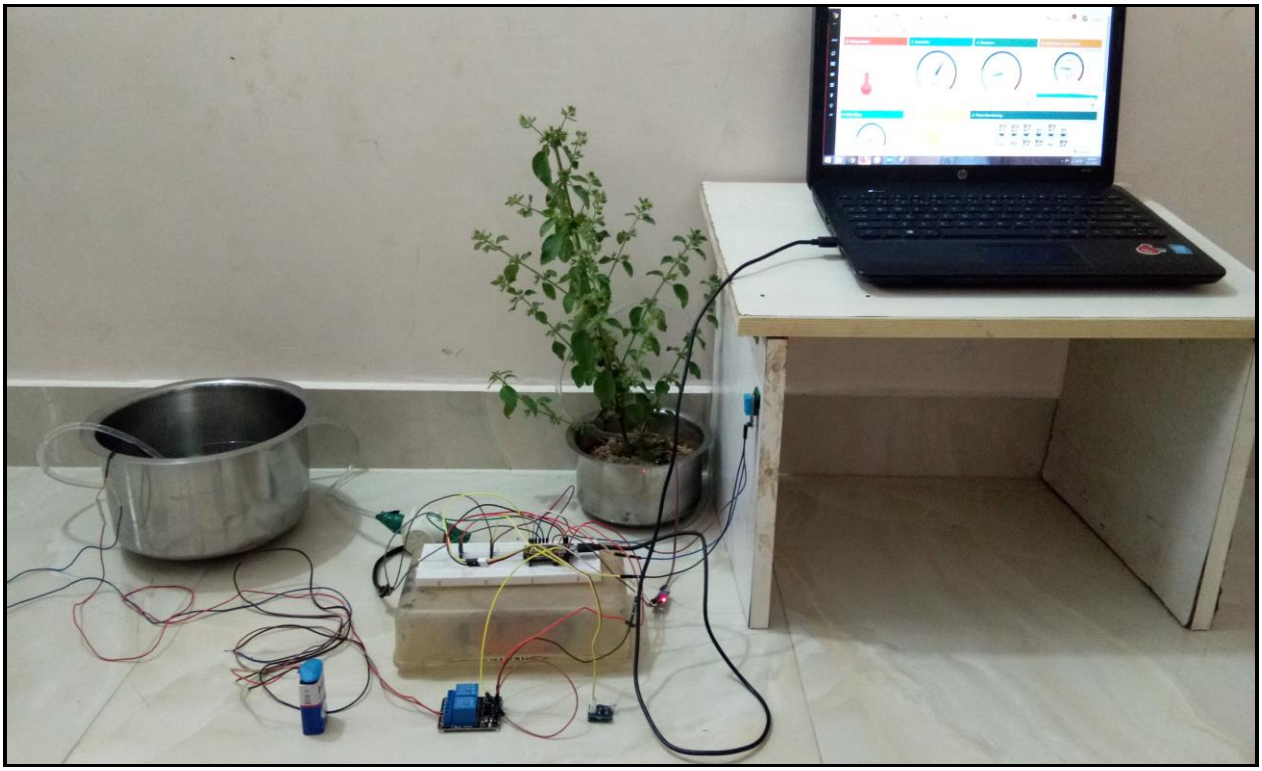
The values were sent in the form of **JSON** data to **Boodskap Server** from Node MCU. These values are captured in serial monitor.





EXPERIMENTAL SETUP:

In this project we are using Node MCU board ultra-small computing platform as it supports Wi-Fi(ESP8266) connect feature and the sensors (Moisture Sensor, Temperature Sensor, Humidity sensor, Light sensor, Flow sensor) which will be placed in the field and the Boodskap Platform for monitoring Agricultural Patterns

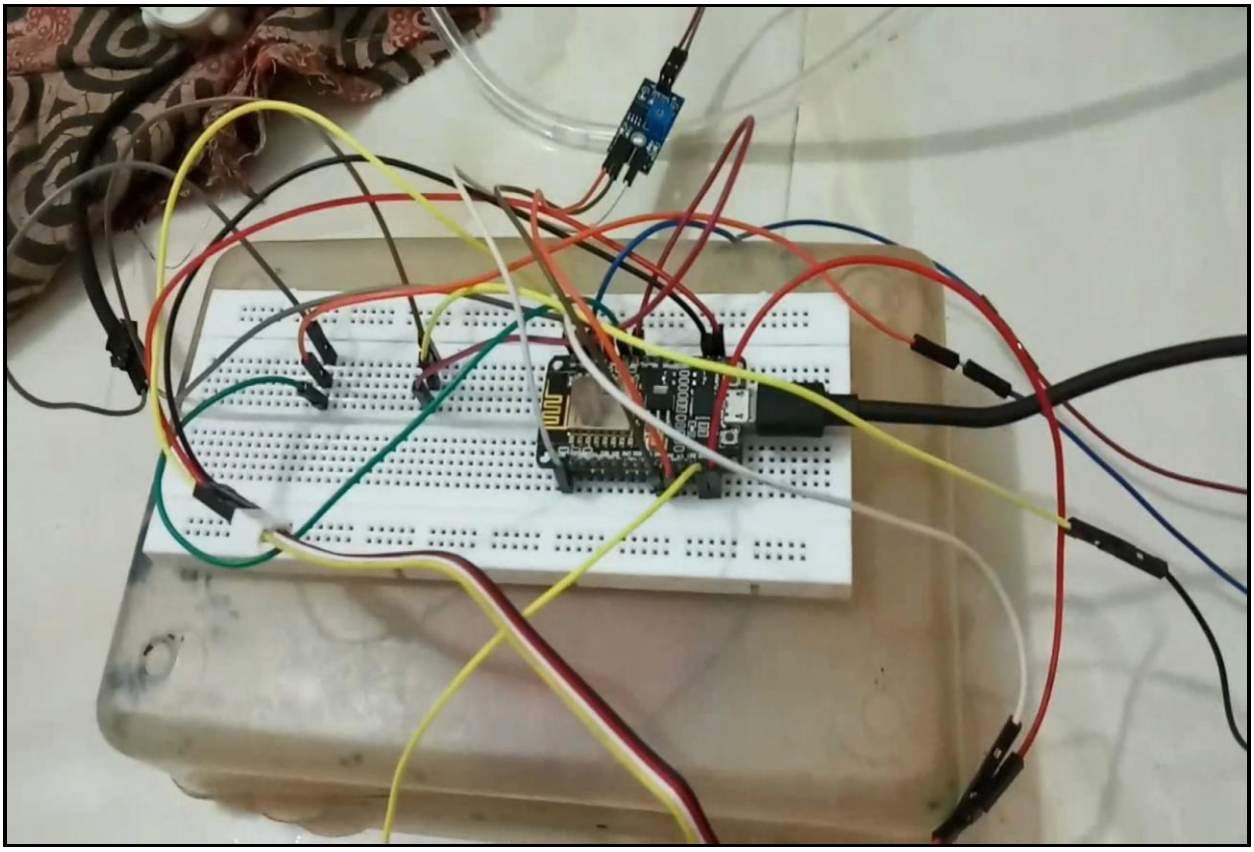


Experimental Setup

The plants need watering when the soil moisture content reaches a certain low level. If the plants are not watered at this stage they show signs of stress and after sometimes they start wilting. When you water the plants, you also consider the

moisture holding capacity of the soil and stop watering when the soil reaches the maximum level. Watering beyond this point may lead to over-watering and is also harmful to plants. So, we collect soil samples from the garden and conduct a test to find out both these levels.

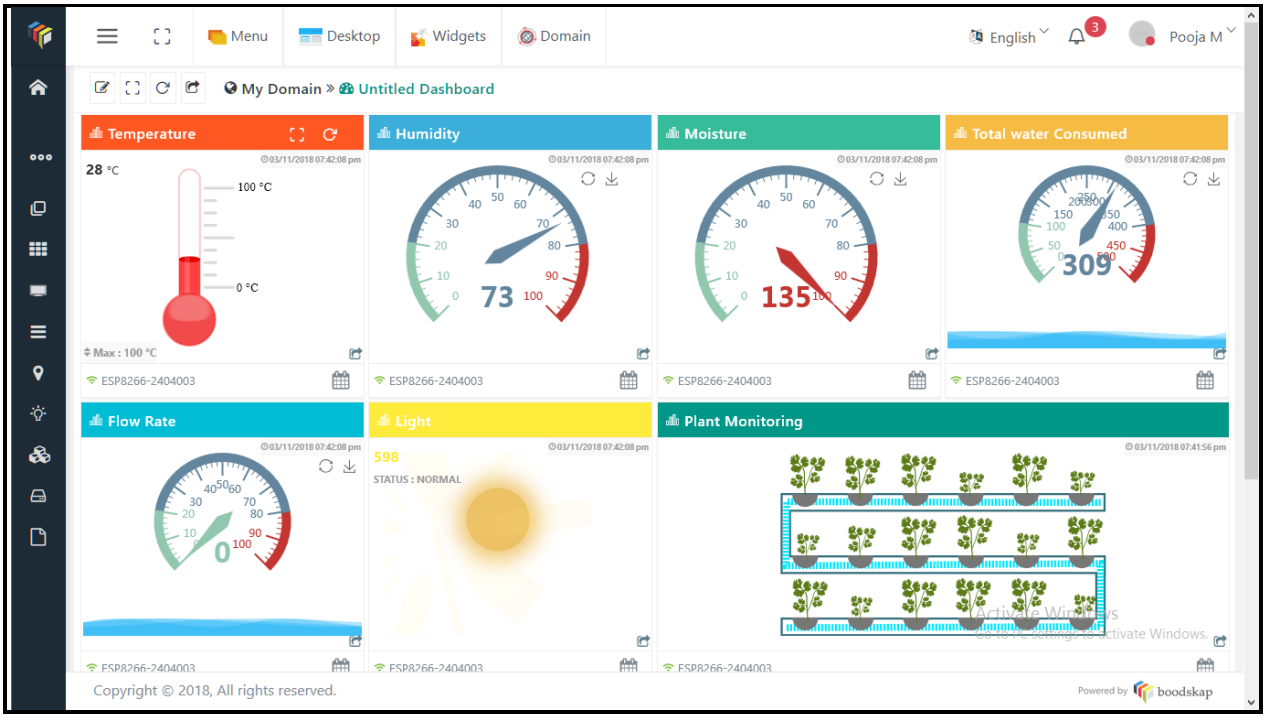
Do conduct tests on the same type of soil you use for your potted plants as these levels may vary for different type of soils (eg. Clay, Silt, Sand, loam and combinations of them...)



BOODSKAP DASHBOARD:

Boodskap Dashboard shows the Monitoring Section of all Agricultural Patterns. This Dashboard provides farmers with clear information about Mositure, Temperature, Humidity and amount of light falling on the plants which offers precise data which can be used to improve farming techniques. When the moisture content in the soil is too low, the system will give command to switch ON the motor and water the soil. The flow meter monitors the water consumption. The data obtained from the sensors will be send to the Boodskap Cloud where the farmer monitors the status of the land, availability of water and light intensity. Based on the moisture content, the Water Pump will be automatically Switched ON for watering the plant.

When the soil is wet:



When the is soil is dry:

CONCLUSION:

This Project enables precision agriculture in order to maximize food production, minimize environmental impact and reduce costs. This proposed idea of '**Smart Farming e-Monitoring System**' turning out to be an eye-opener to the whole world considering the realistic and innovative prospects offered in the domain. The embedded system is innovative for farming, which changes a traditional farm to a "Smart Farm" or "Intelligent Farm". In addition, the system could work on applications of Smart phones helping the farmers to control and monitor real time environmental contexts such as temperature, weather condition and quality, humidity, light and filter fan switches. The intelligent system can reduce cost, time, and labor and is highly user friendly for farmers.

MARKET OVERVIEW:

Since, India is an Agricultural country, this product is feasible for all types of Farmers cultivating different types of crops. With the world's population growing day by day, and land resources remaining unchanged, there is a growing need in optimization of agricultural productivity, and this can be achieved by automation of agriculture. Growth in agricultural sector is necessary for the development of economic condition of the country.

TARGET CUSTOMERS:

The Customers we are targeting is the Farmers by giving low cost agricultural products. Now a days Government is offering discounts to Farmers to use the new technology products for agriculture. This product we have developed is for social cause and thus by collaborated with Government it will be delivered to all the customers especially farmers.

FUTURE SCOPE:

The future of the technology is that implementation of machine learning using sensors data can lead to optimized fertilizer suggestions. The sensors can also be scaled up to be used in Drones and Tractors for cultivation. Using Drones for spraying Fertilizers to the affected crops. The data gathered can be used to find efficiency of a certain yield.

This project is useful for the upcoming younger generations because they don't know the agricultural parameters how it is to be measured. Now with the help of this project they can monitor their lands through his mobile phones and they can take necessary steps before its self to solve the problems in the field.

SOURCE CODE LINK:

Source code and presentation are available in this **GIT Link**,

https://github.com/suresh1995/BSKAP-A-THON.git

VIDEO LINK:

Here is the **YouTube Video** demonstration of our project,

Have a look at it!!

https://youtu.be/fb0veSTwwYo