A project report on

SMART AGRICULTURE SYSTEM USING IOT

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1.INTRODUCTION

1.1 OVER VIEW

India has agriculture as its primary occupation. According to IBEF (India Brand Equity Foundation), 58% of the people living in rural areas in India are dependent on agriculture. As per the Central Statistics Office 2nd advised estimate, the contribution of agriculture to the Gross Value Addition (India) is estimated to be roughly around 8% which is very significant contribution. Under such a scenario, the usage of water especially the fresh water resource by agriculture will be enormous and according to the current market surveys it is estimated that agriculture uses 85% of available freshwater resources worldwide, and this percentage will continue to be dominant because of population growth and increased food demand. This calls for planning and strategies to use water sensibly by utilizing the advancements in science and technology.

1.2 PURPOSE

In addition to managing scarcity and conflict between water users, the available fresh water is further contaminated by the human and animal population and the pollution levels have increased at an alarming rate. This if continues, will be leading to limitation of food production which in turn will affect the human productivity and thus the entire ecosystem will be affected in the years to come. The primary and the most important reason for this problem is the tremendous increase in the population which has increased at a rate which is faster than the food production rate. This population growth especially in water short countries will directly have an impact on its growth on the world map. The food production needs to be increased by at least 50% for the projected population growth.

LITERATURE SURVEY

2.1 EXISTING PROBLEM

Agriculture accounts for 85% of freshwater consumption globally. This leads to the water availability problem and thus calls for a sincere effort in sustainable water usage. For a variety of reasons, feasible expansion of irrigated agriculture will be able to accommodate only a portion of this increased demand, and the rest must come from an increase in the productivity of rain fed agriculture. In the absence of coordinated planning and international cooperation at an unprecedented scale, the next half century will be plagued by a host of severe water related problems, threatening the wellbeing of many terrestrial ecosystems and drastically impairing human health, particularly in the poorest regions of the world

2.2 PROPOSED SOLUTION

There are many systems to achieve water savings in various crops, from basic ones to more technologically advanced ones. One of the existing systems use thermal imaging to monitor the plant water status and irrigation scheduling. Automation of irrigation systems is also possible by measuring the water level in the soil and control actuators to irrigate as and when needed instead of predefining the irrigation schedule, thus saving and hence utilizing the water in a more sensible manner.

We aim at developing a smart and intelligent agriculture system which can help the farmer to utilize the water level sensibly.

2.3 OBJECTIVES

To develop a smart agriculture system that

- Measures the water level in soil
- Receives temperature and humidity value
- Controls pump for better irrigation

2.4 DELIVERABLES

A web app that gives provides

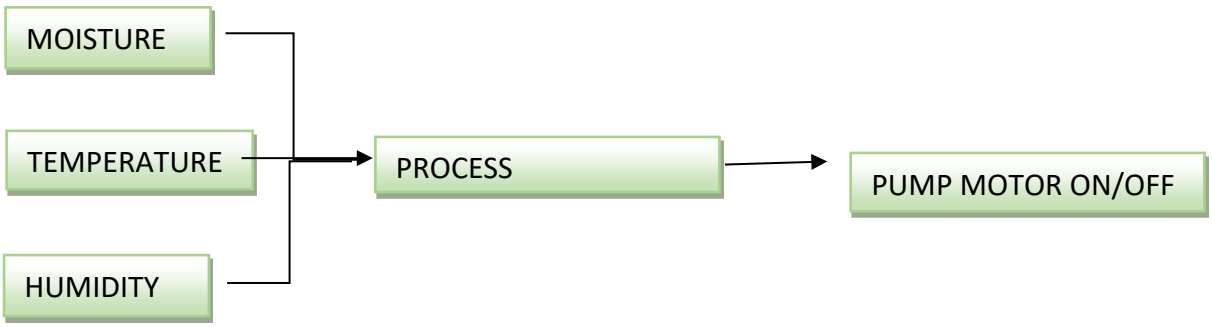
- Weather data
- Soil moisture data
- Control motors and lights

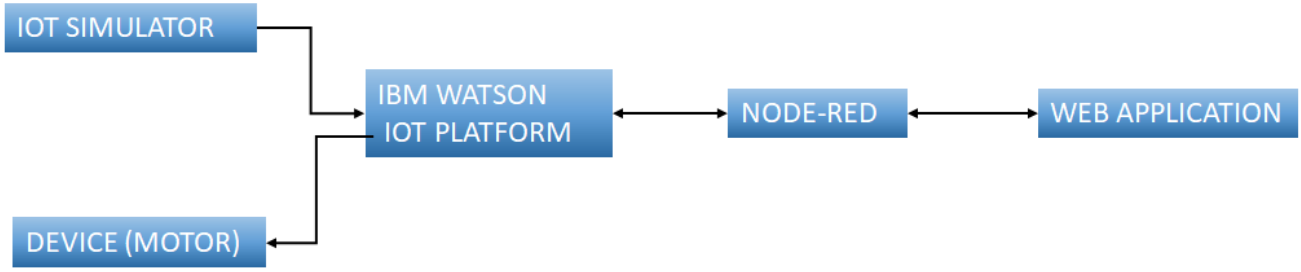
2.5 ASSUMPTIONS

IOT simulator is used for simulation purposes and the data from the same will be used.

3 THEORETICAL ANALYSIS

3.1 BLOCK DIAGRAM

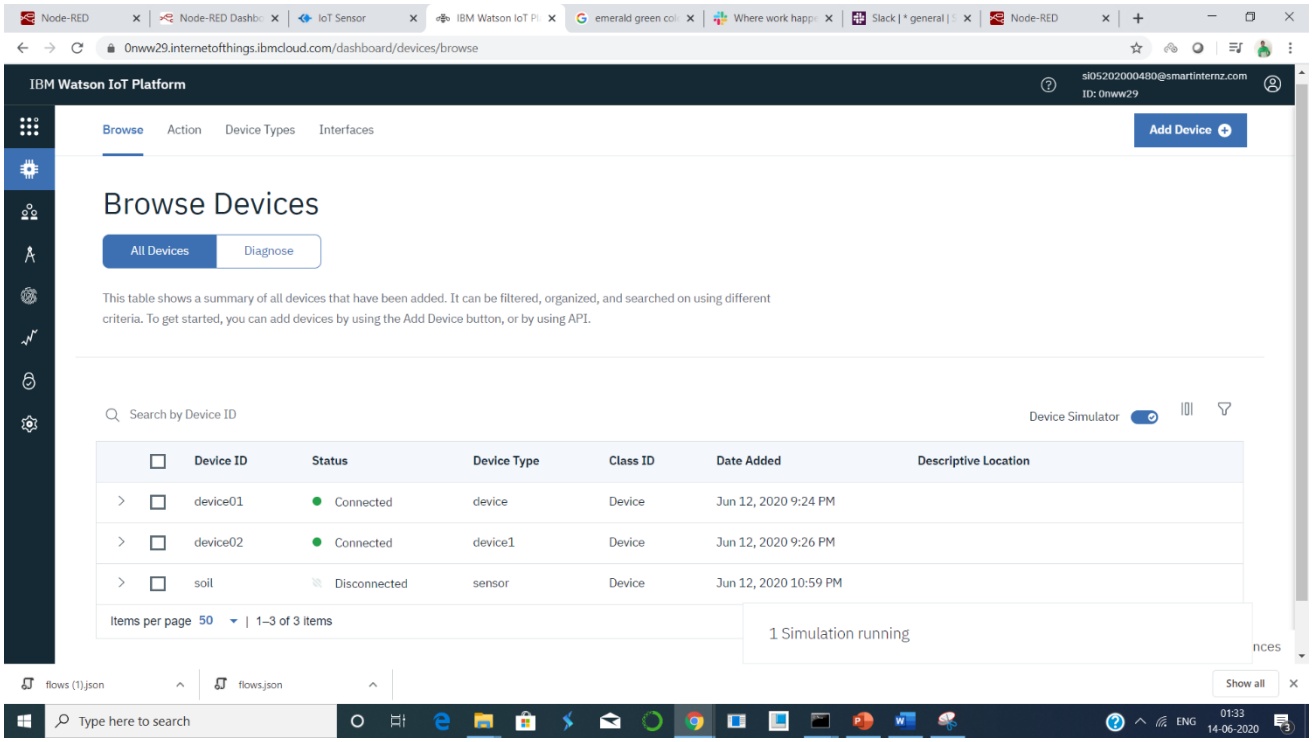




3.2 HARDWARE AND SOFTWARE

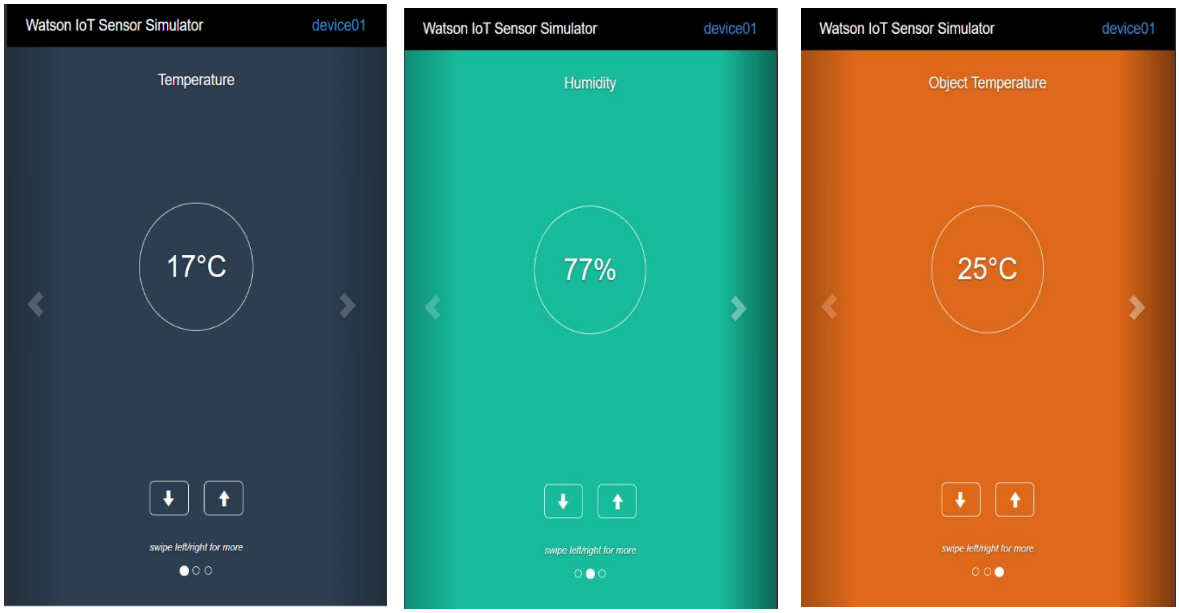
IBM IOT PLATFORM

It is a fully managed, cloud-hosted service with capabilities for device registration, connectivity, control, rapid visualization and data storage. The temperature, humidity, object temperature values are simulated by IOT sensor and the values are stored in IBM IOT PLATFORM. The devices like motor and lights are connected through this platform. It sends the commands to the connected devices and get the events from the connected devices. Soil moisture sensor value is simulated from the platform.



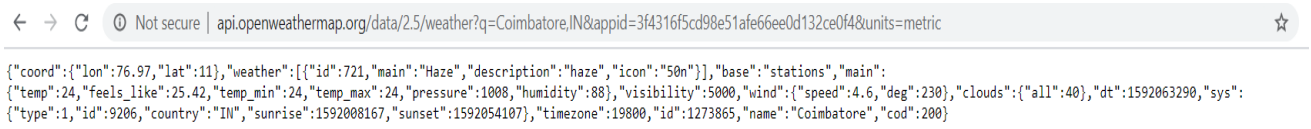
IOT SENSOR

The temperature, humidity, object temperature values are simulated by IOT sensor.



WEATHER API

The temperature, humidity, pressure values are obtained from Open Weather API.



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NODE-RED

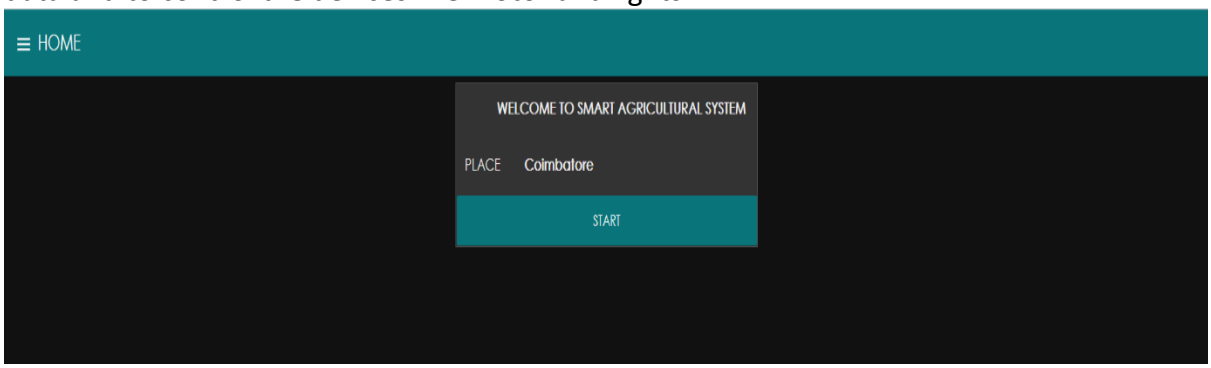
Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways. It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click. All the devices are wired and the user interface is created using node-red.

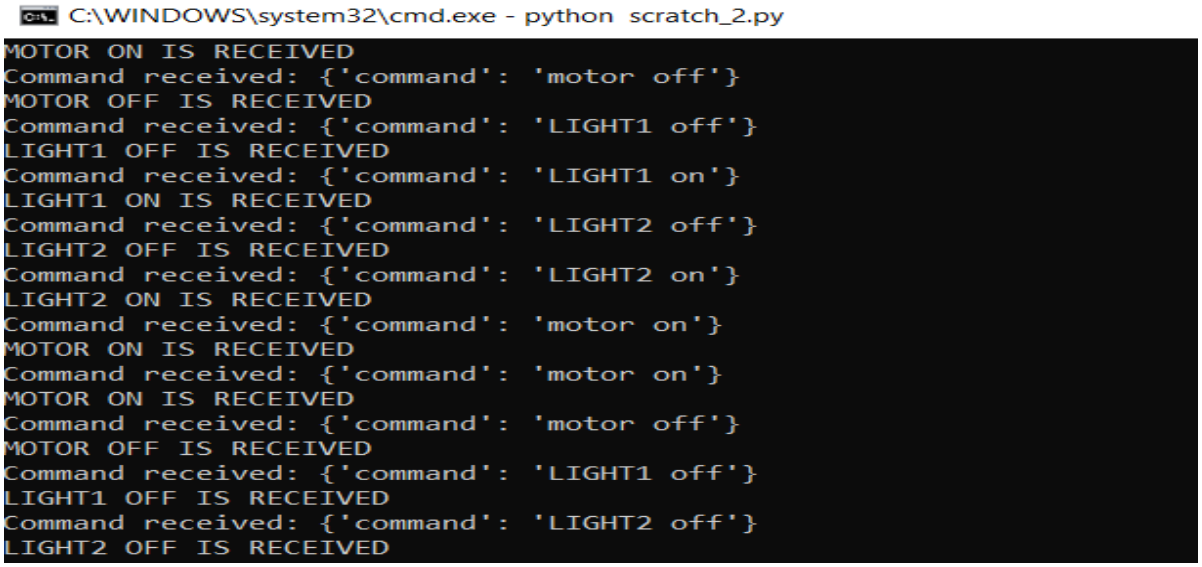
4 EXPERIMENTAL INVESTIGATIONS

- ✓ After creating an IBM account, create an IOT service and create required devices with credentials.
- ✓ After installing node-red with required pallet, connect with the IBM IOT device and receive data from simulator (temperature, humidity, object temperature).
- ✓ Using dashboard pallet, display the data from the simulator
- ✓ Using http requests, the weather forecasting data is received and displayed in ui
- ✓ Create buttons for motor on and off control and send the data command to the devices.
- ✓ Create 2 light switches and send respective command to the devices through IBM IOT platform
- ✓ Run the python code to subscribe to the command.

5. RESULT

A smart agriculture system is built such as to show the weather and soil moisture data and to control the devices like motor and lights.





6. ADVANTAGES & DISADVANTAGES

Advantages:

- It provides a remote control of devices like pump motor
- It provides data on the weather conditions and soil moisture content
- Lights can also be controlled using web application

Disadvantages:

- Internet connectivity is required
- The success of the process depends on the accuracy of the sensors used.
- The user is required to have a basic knowledge on the threshold values after which they should turn on pump motor.

7. APPLICATION

- It is greatly used for farmers to remote control the irrigation process
- Micro controllers such as Arduino, raspberry pi can be used.
- The use of sensors like soil moisture sensor, temperature sensor can be implemented.

8. CONCLUSION

IOT based smart agriculture system can prove to be very helpful for farmers since over as well as less irrigation is not good for agriculture. Threshold values for climatic conditions like humidity, temperature, moisture can be fixed based on the environmental conditions of that particular region. This system generates irrigation schedule based on the sensed real time data from field and data from the weather repository. This system can recommend the farmer whether or not, is there a need for irrigation.

9. FUTURE SCOPE

Considering the need for water savings, the smart agriculture system will play a major role. To face the increased need for production of food with available limited water resource, we need to deploy many such systems. IOT plays a major role in today's modern world. For this system continuous internet connectivity is required. This can be overcome by extending the system to send suggestion via SMS to the farmer directly on his mobile using GSM module instead of mobile app.

10 BIBILOGRAPHY

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2. NODE RED GUIDE- https://thesmartbridge.com/documents/iot/doc2.pdf
3. OPEN WEATHER API- https://openweathermap.org/
4. IOT SENSOR- https://watson-iot-sensor-simulator.mybluemix.net/

APPENDIX

A. Source code: https://github.com/rachuriharish23/ibmsubscribe