

SMART AGRICULTURE SYSTEM BASED ON IOT

PROJECT ID : SPS_PRO_101

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SUMMARY

Smart Agriculture System based on IoT can monitor soil moisture and climatic conditions to grow and yield a good crop. The farmer can also get the real time weather forecasting data by using external platforms like Open Weather API etc. Farmer is provided a mobile app or a web app using which he can monitor the temperature, humidity and soil moisture parameters along with weather forecasting details. Based on all the parameters he can water his crop by controlling the motors using the mobile application. Even if the farmer is not present near his crop he can water his crop by controlling the motors using the mobile application from anywhere. Here we are using the Online IoT simulator for getting the Temperature, Humidity and Soil Moisture values.

Keywords:

Open weather API, Online IoT simulator.

1. Objective:

The main aim of the project is to help the farmer to monitor the conditions of the crops like the temperature of the soil, moisture content in the soil, Water content etc. The farmer additionally gets the weather data from weather API so the based on the weather conditions he can make the required arrangements. In addition to this, the crops could be watered remotely using this mobile application. So the major benefit is, even if the farmers are not present near their crops, they can water the crops and monitor the condition of the crops through this mobile application anytime anywhere.

2. Expected outcome:

The expected outcome of our proposal is **THE COMPLETELY SMART SYSTEM** that can be implemented in various Agricultural land on a large scale. This is planned to be achieved, by analyzing the temperature, humidity, moisture values. By implementing this method we could **increase the quality** of the agricultural crops, **reduce the time duration & manual labor**.

3. Origin of the proposal:

Mostly the moisture content & the motor operation is done manually. But this technique involves lots of man power and consumes more time. Sometimes the moisture content differs from one part of land to another part there are many complications if done manually. So in order to overcome the misjudgments and delay caused due to these manual methods, the concept of smart farming is suggested.

4. Importance of proposed project in the context of the current status:

In present day scenario the yield produced is reduced to a greater extent. And the available yield also is not used efficiently. For example there is a pile of rice seeds kept ready to be sowed and to be cultivated in 90 days. In general there are a lot of factors like climate, water availability etc... which cause hindrance to the growing process. The water must be supplied as per the requirement in the particular area, if water is supplied more it may lead to decay of crops and if water is supplied less it may lead the crops to get dried. So in order to overcome this, the smart agriculture method must be implemented widely.

5. Location specific highlights:

In India, there are many agricultural lands. Especially there is a lot of farming land in the southern part of the country So in those areas this proposal could be implemented.

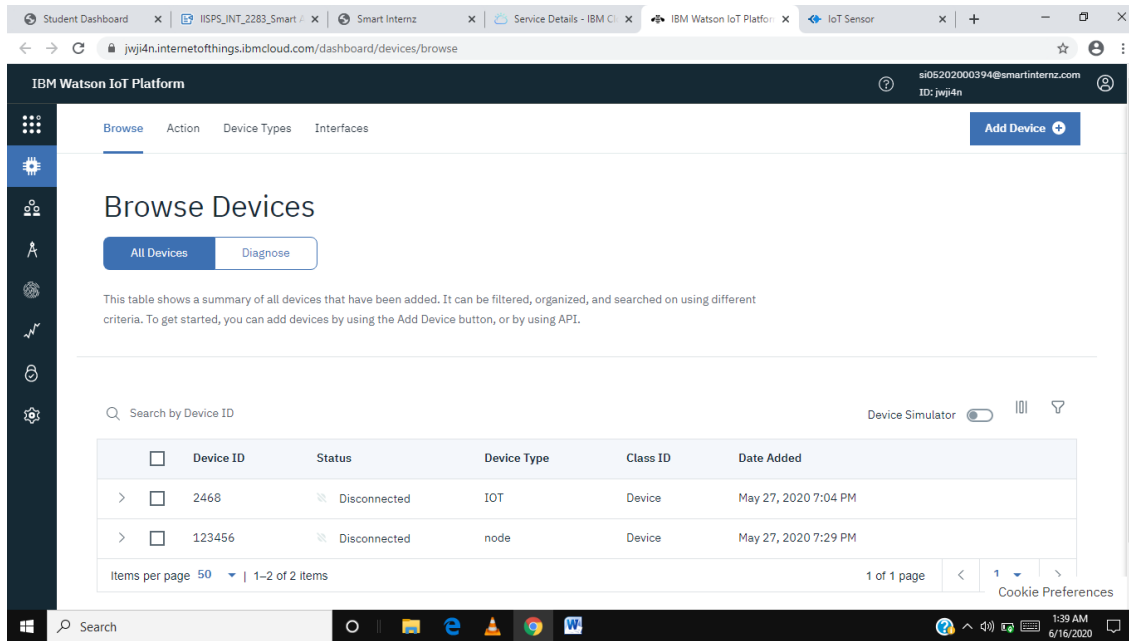
6. Methodology:

6.1 Introduction:

First the sensors are mounted on the areas where the major of the crops are to be planted. In this project we use online simulated sensors to get the required value. Now the sensor data's are sent to a cloud device, here we use the IBM Watson cloud. The output data of the cloud is given to the web based application through the NODERED software. The weather data is also processed in the NODERED and its output is sent to the web application. In the software the data is processed based on a simple flow arrangement and the certain data alone is sent to the IBM cloud. Based on the input given to the motor switch, it controls the motor in the farm. Thus the crops can get water even if the farmer is not near the farm.

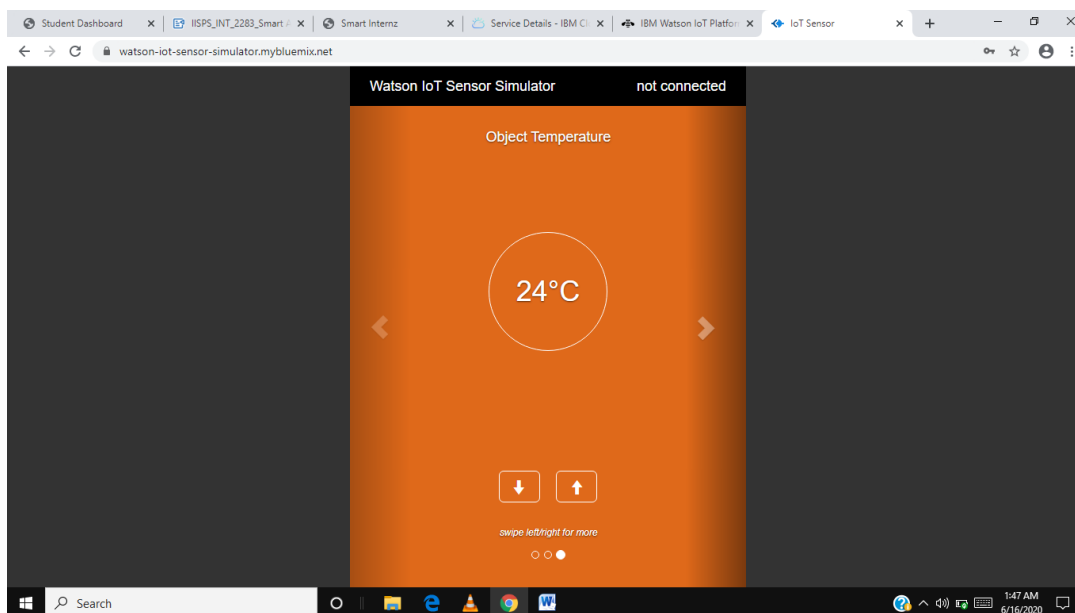
6.2 IBM Watson cloud

Watson IoT Platform connects devices, ingests device data, and transforms that data into meaningful insights. Watson IoT Platform and its additional add on services enable organizations to capture and explore data for devices, equipment, and machines, and discover insights that can drive better decision-making. It is a useful platform where the services like cloud, Iot, AI can be easily implemented. Using this platform we got the data from the online sensor and sent to the software and also got the finished product from the software.



6.3 IOT Sensor

It is an online simulated sensor from the IBM IoT group. The device credentials from the IBM Watson is entered into the sensor page and it gives simulated data's like Temperature, humidity and moisture content of the soil .



6.4 Open weather API

Weather data of where the farm is located can be obtained through some of the weather API. In this project we use the application open weather API. The values like temperature of the climate, the moisture content in the air the atmospheric pressure levels and the weather like sunny cloudy or rainy like this information can be obtained from this API.

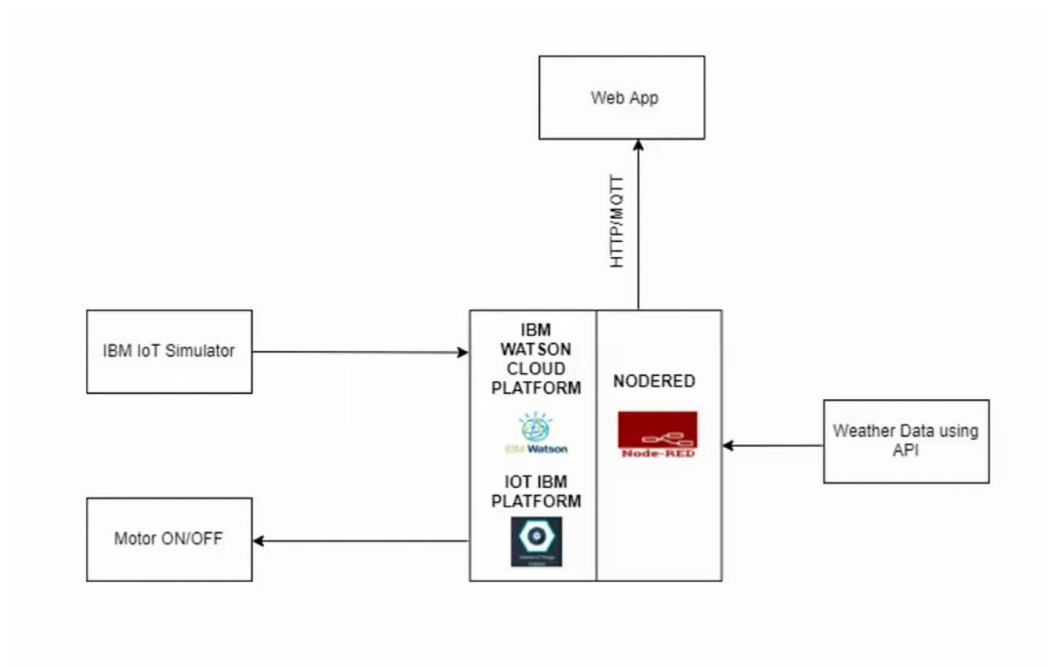
6.5 NODE-RED

Node-RED is a flow-based development tool for visual programming developed originally by IBM for wiring together hardware devices, APIs and online services as part of the Internet of Things. Node-RED provides a web browser-based flow editor, which can be used to create JavaScript functions. Elements of applications can be saved or shared for re-use. The runtime is built on Node.js. The flows created in Node-RED are stored using JSON.

6.6 GIT HUB

GitHub, Inc. is a United States-based global company that provides hosting for software development version control using Git. In 2018, it became a subsidiary of Microsoft. It is a open platform where the codes or research can be shared .In this project we use git hub to upload our finished data for evaluation.

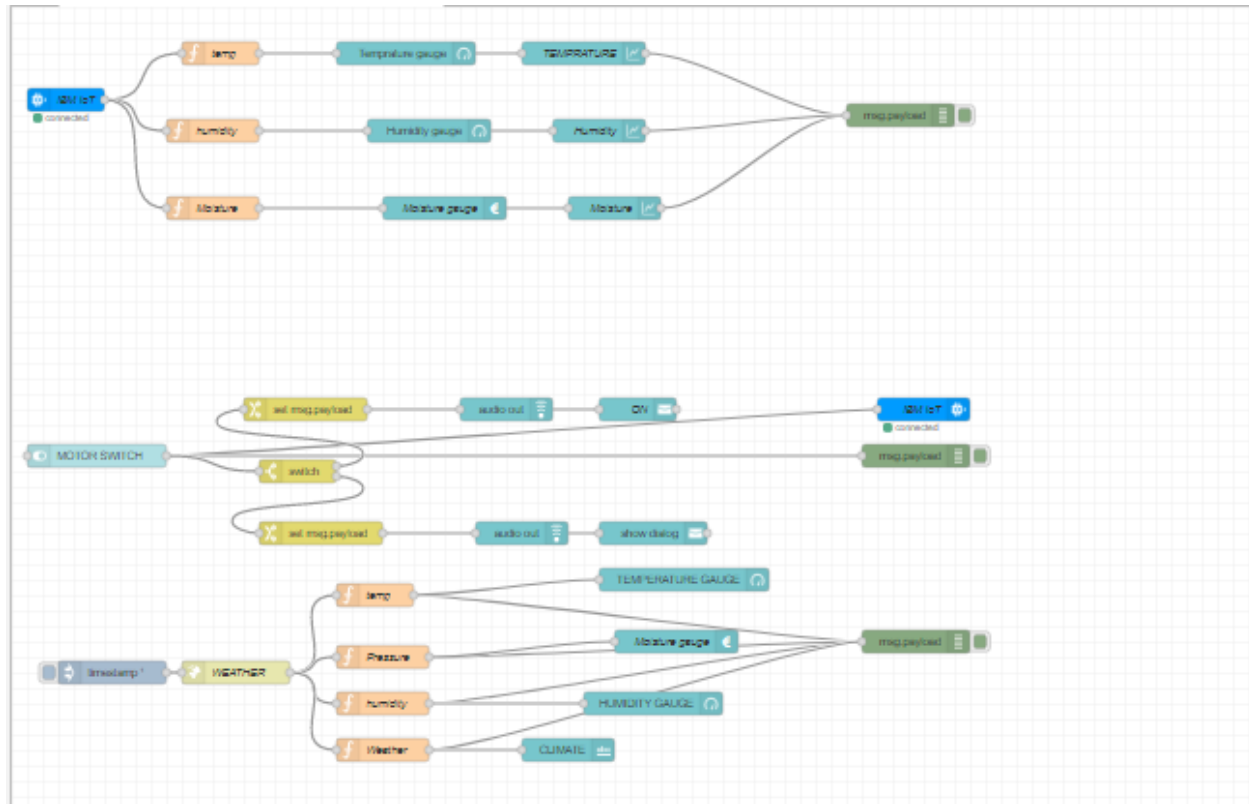
7. BLOCK DIAGRAM REPRESENTATION



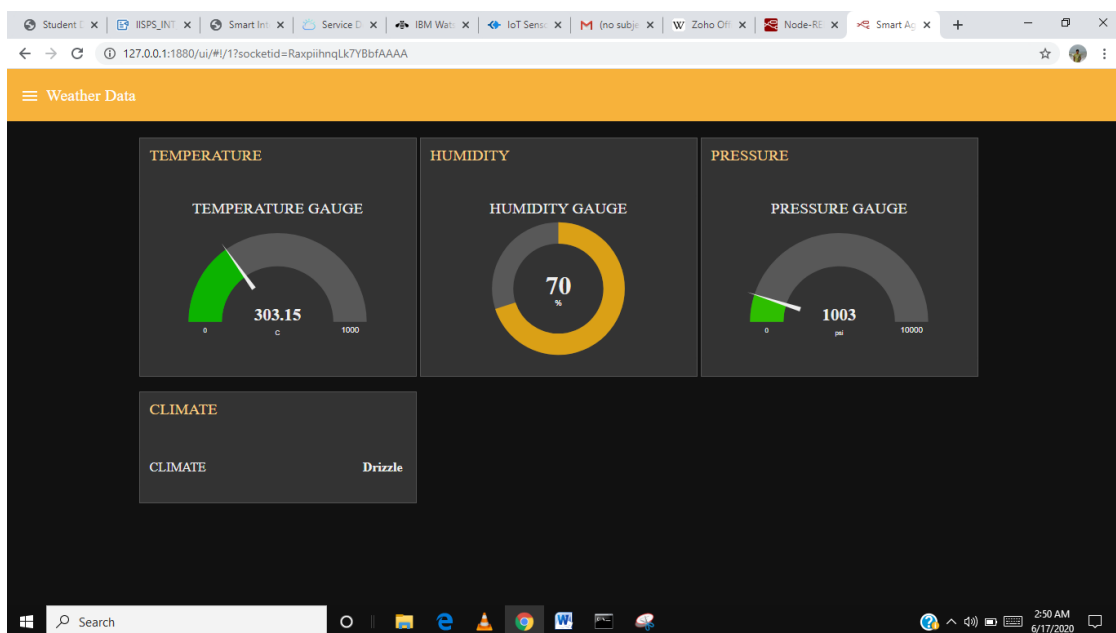
8. Functions of NODE-RED

In node-red the flow is created using some nodes. To send and receive data from IBM cloud 2 nodes of IBM is installed the sensor data's are received to the node red through this IBM input node. To separate the data's from them a function node is used in which the java script code is typed to get the required object from the input .Similarly the data's from the open weather API is obtained through an https request node and by writing the same java script function we can separate the required data's from the platform. Then after getting the data we have to develop a UI which is accomplished by using the dashboard nodes .Now the motor on/off command is slightly different the signal must be sent from the Web UI to the terminal, so for that we have to use the IBM out node to get the required command. Thus the data's are received processed and transferred and a web User Interface is created using a single software Node-Red.

FINAL FLOW OF THE PROJECT



WEB APP IMAGE



11. Suggested plan of action for utilization of research outcome expected from the project

Implementing the above proposal in

- In few of the agricultural lands in down south.
- In few bore wells

12. FUTURE SCOPES

This project is a base for smart farming. Smart farming is a concept quickly catching on in the agricultural business. Offering high-precision crop control, useful data collection, and automated farming techniques, there are clearly many advantages a networked farm has to offer. We can expect IoT will forever change the way we grow food.

13. Resources used for executing the project

1. Smartintern's dashboard
2. Gitbub
3. ZOHO writer
4. SLACK channel
5. IBM cloud
6. IBM Watson
7. OPEN WEATHER API
8. NODE-RED

14. Innovation in the proposal:

- Our proposal combines two developing technologies namely IBM WATSON & NODE-RED concepts to provide an innovative solution for SMART AGRICULTURE.
- The chief aim of our proposal is the implementation of COMPLETELY MONITERED & REMOTELY ACCESSED SYSTEM that can be implemented in various parts of farming lands across India in a larger scale.

CONCLUSION:

Farming being the primary requirement for food of the human beings its quality must be ensured. So this suggestion implementing smart agriculture technique will surely provide a smart production in the agricultural crops.

- **The future doesn't need any dramatic scientific breakthroughs ,but a series of innovation & improvisation of the current technologies.**
- Likewise our proposal too suggests a concept, which on implementation would increase **THE EFFICIENCY** of the process & **QUALITY** of the agricultural crops.

Thus, I have presented an **“INNOVATIVE SOLUTION FOR SMART AGRICULTURE”**