SMART AGRICULTURE SYSTEM USING IOT

Submitted By –

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It brings us great pleasure in submitting this project report with deep sense of gratitude and profound respect.

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I am thankful for the wonderful opportunity provided.

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ABSTRACT

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 .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.

INTRODUCTION

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.

2.1 Objective

The Main Objective Of this Project Is to develop a Smart agriculture System that uses advantages of cutting-edge technologies such as Arduino, IOT and Wireless Sensor Network Using IoT & IBM Cloud Service. Node Red Is to Solve the Basic Problems of farmers working in the farm lands are solely dependent on the rains and bore wells for irrigation of their land. Monitoring environmental conditions is the major factor to improve yield of the efficient crops. This will help us to develop a system which can monitor temperature, humidity, moisture and even the movement of animals which may destroy the crops in agricultural field through sensors.

2.2 IOT TECHNOLOGY AND AGRICULTURE

Internet of things IOT consists of two words Internet and things. The term things in IOT refers to various IOT devices having unique identities and have capabilities to perform remote sensing, actuating and live monitoring of certain sort of data. IOT devices are also enable to have live exchange of data with other connected devices and application either directly or indirectly, or collected data from other devices and process the data and send the data to various servers. The other term internet is define as Global communication Network connecting Trillions of computers across the planets enabling sharing of information .Thus the IOT can be define as :"A dynamic Global Network Infrusture with self configuring capabilities based on standard and inter operable communication to protocol where physical and virtual things have identities, physical attributes ,and virtual personalities and use intelligent interfaces and are seamlessly integrated into the information network ,often communicate data associated with user and their environment." An ideal IoT device consists of various interfaces for making connectivity to other devices which can either be wired or wireless.

Any IoT based device consists of following components:

- I/O interface for Sensors.
- Interface for connecting to Internet.
- Interface for Memory and Storage.
- Interface for Audio/Video

ADVANTAGES, DISADVANTAGES AND APPLICATION

Advantages of IoT in the agricultural sector

Let's check out the main benefits of IoT in farming.

Data collection

All data can be collected with the help of installed sensors. Such data like weather condition, health condition of cattle, crops, etc. Data is stored in one place, and farmers can easily check it and analyze to make the right decision.

Reduction of risks

When farmers up-to-date information collected, they can understand what situation will be in the future, and they can predict some problems that may arise. Moreover, farmers may use data to improve their sales and change business processes.

Business goes automated

Many business processes become automated and their efficiency is growing. Thus, farmers may pay attention to other important processes.

Higher quality

Smart agriculture makes it possible to avoid challenges and remove all issues that may arise during farming processes. So

the quality of the product is growing and consumers get a good product of high quality.

Disadvantage

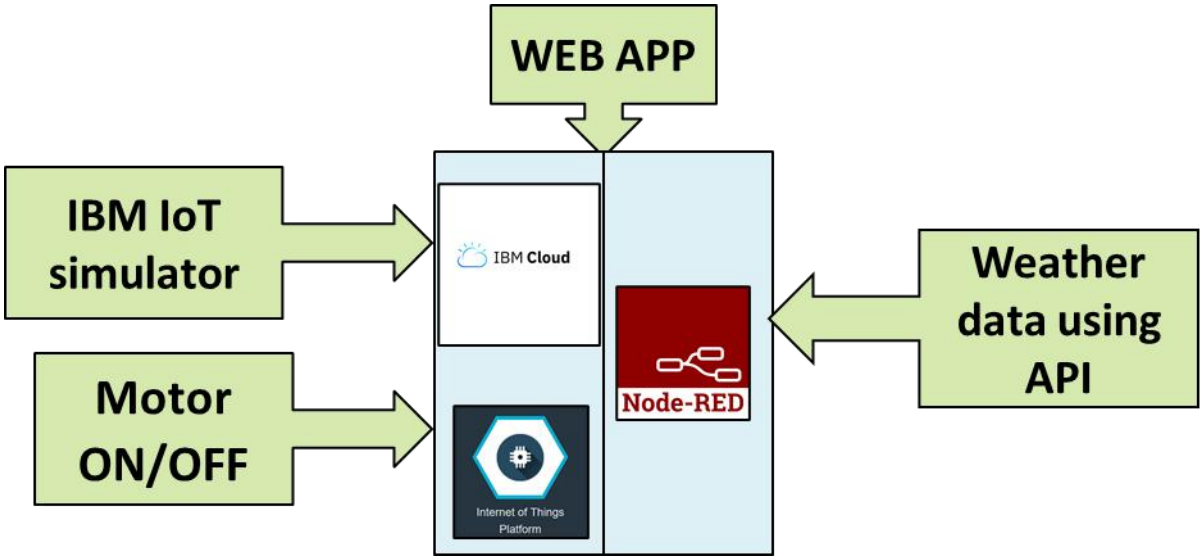
One huge disadvantage of smart farming is that it requires an unlimited or continuous internet connection to be successful. This means that in rural communities, especially in the developing countries where we have mass crop production, it is completely impossible to operate this farming method. In places where internet connections are frustratingly slow, smart farming will be an impossibility.

As pointed out earlier, smart farming makes use of high techs that require technical skill and precision to make it a success. It requires an understanding of robotics and ICT. However, many farmers do not have these skills. Even finding someone with this technical ability is difficult or even expensive to come by, at most. And, this can be a discouraging factor hindering a lot of promising farmers from adopting it.

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.

BLOCK DIAGRAM



In the above diagram can be taken as a reference in order to complete the project. Here it can be explained as initially we will be creating a device using IoT IBM platform and device credentials is to be saved for the further use, later we will connect the device to Watson IoT simulator using the device credentials. Now we should have to install the required IBM IoT node in our node-red flow later on we should have to configures the nodes in such a way that we should have to get the simulator data in the UI which has been created. The next step to be followed is we should have to check that our device is properly connected or not in IoT platform, later we should have to create an account in Open Weather Maps and should have to generate API key and should have to get the weather data of any city of our preference. After getting the data, in node-red flow we should have to configure nodes and here we will be using HTTP protocol to retrieve the data.

Now we are ready to display simulator data and live weather data of a city. The next step to be followed is to creating buttons which are used to control the motor. The motor status command to be displayed in the UI by setting the required notes, next we will be writing a python code where it displays the motor command which is being pressed by the user.

BUILDING BLOCKS

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.

IBM Cloud

The IBM Smart Cloud brand includes infrastructure as a service, software as a service and platform as a service offered through public, private and hybrid cloud delivery models. IBM places these offerings under three umbrellas: Smart Cloud Foundation, Smart Cloud Services and Smart Cloud Solutions.[14] Smart Cloud Foundation consists of the infrastructure, hardware, provisioning, management, integration and security that serve as the underpinnings of a private or hybrid cloud. Built using those foundational components, PaaS, IaaS and backup services make up Smart Cloud Services. Running on this cloud platform and infrastructure, Smart Cloud Solutions consist of a number of collaborations, analytics and marketing SaaS applications.

IBM also builds cloud environments for clients that are not necessarily on the Smart Cloud Platform.

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.

WEATHER API

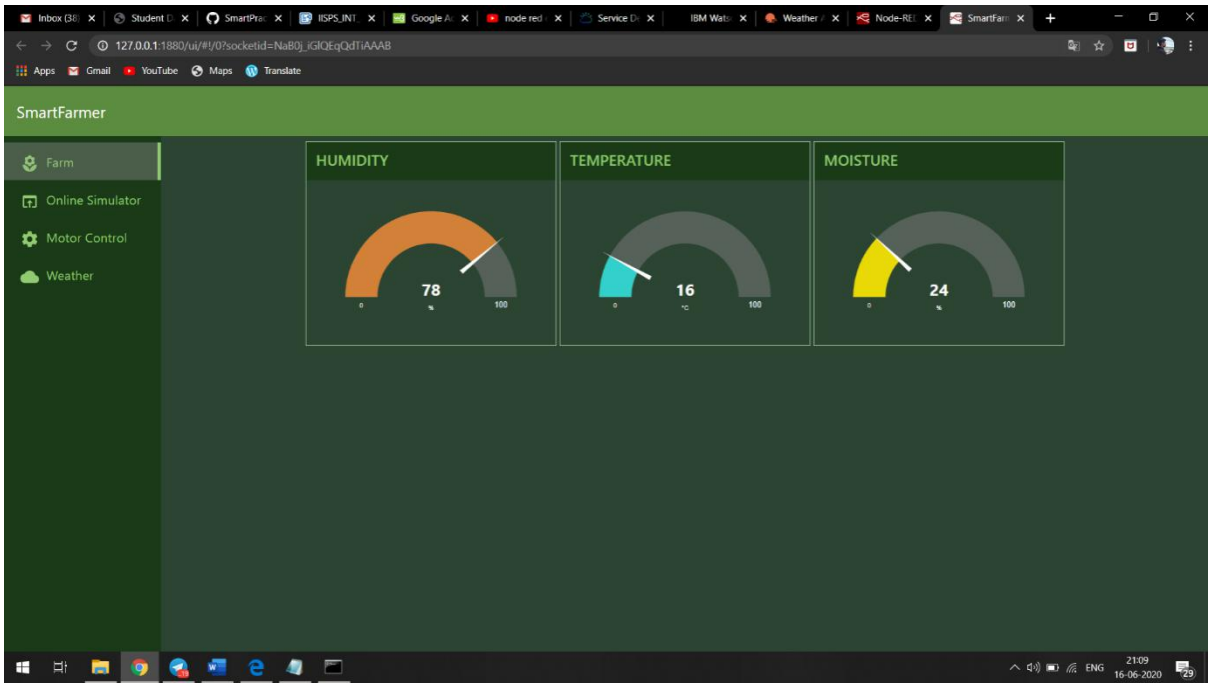
The temperature, humidity, pressure values are obtained from Open Weather API.

The "Open Weather Map API Guide" helps you find useful information, links, documents to start using our weather

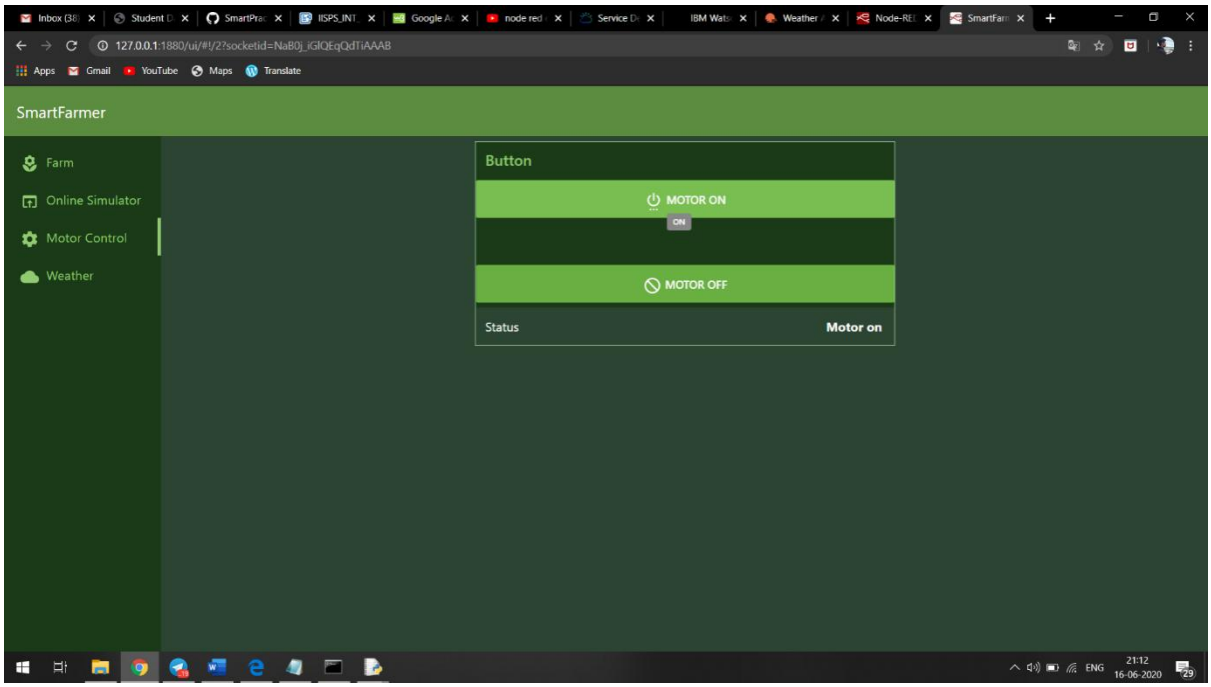
API services smoothly.
Open Weather Map is one of the leading digital weather information providers. We are a small IT company, established in 2014 by a group of engineers and experts in Big Data, data processing, and satellite imagery processing. Our headquarters is in the UK, we have an office in the USA, and the development team in Latvia (EU).

RESULTS

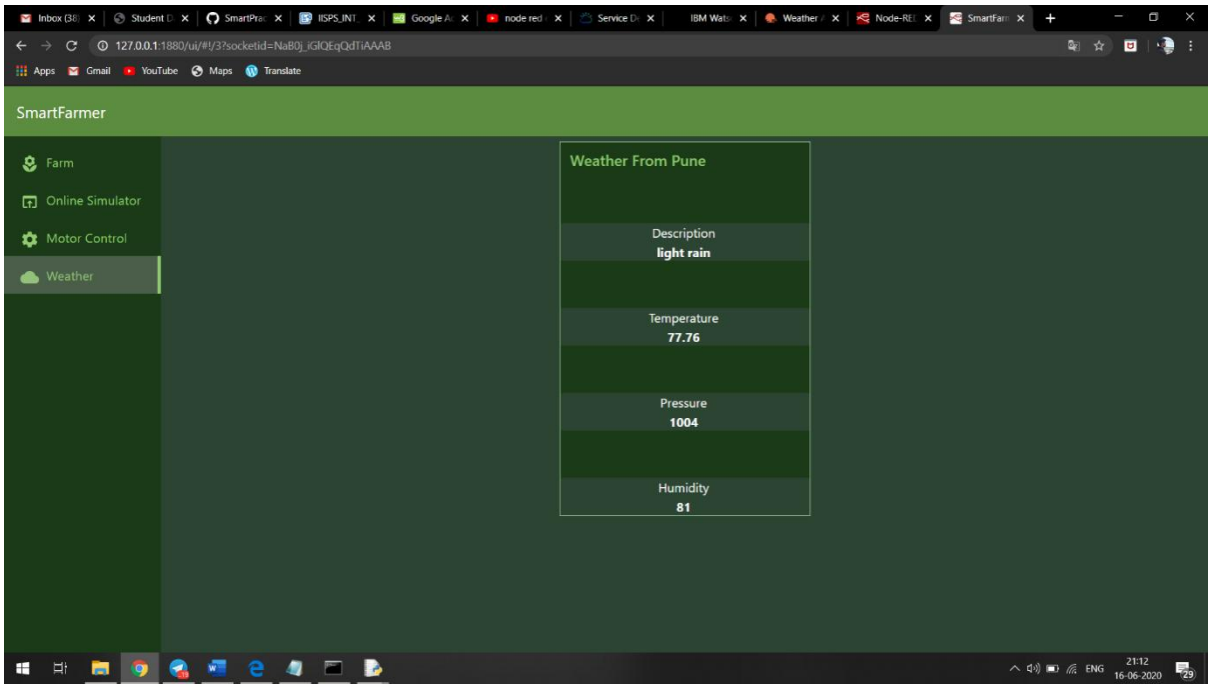
a. Below shows the details which are obtained from IoT simulator



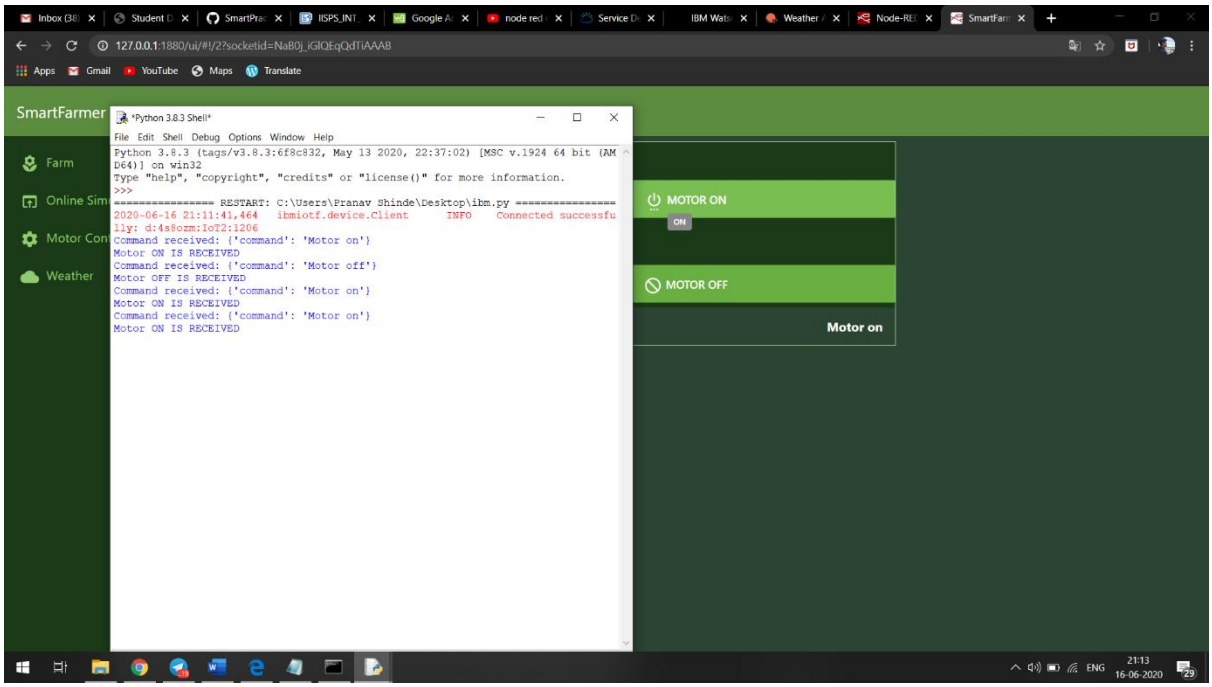
b. It displays the motor button and its status



c. shows the parameters obtained from Open Weather Map



d. Below shows the commands received when we click the motor ON/OFF buttons



CONCLUSION

IoT based SMART FARMING SYSTEM for Live Monitoring of Temperature and Humidity has been proposed using Cloud Computing. The System has high efficiency and accuracy in fetching the live data of temperature and soil moisture. The IoT based smart farming System being proposed via this report will assist farmers in increasing the agriculture yield and take efficient care of food production as the System will always provide helping hand to farmers for getting accurate live feed of environmental temperature and soil moisture with more than 99% accurate results.

FUTURESCOPE

Future work would be focused more on increasing other features on this system to fetch more data especially with regard to Pest Control and by also integrating GPS module in this system to enhance this Agriculture IoT Technology to full-fledged Agriculture Precision ready product. we can also add some external features like we can find the soil nutrients contents and help the farm to yield a better crop.

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