Project Report

Name : Vishakha Arun Dakhane

Project Title: Smart Agriculture system based on IoT.

Category: Internet of Things

Skills Required: IoT Application Development, IoT Cloud Platform.

Internship Mentor: Mr. Durga Prasad

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1. INTRODUCTION

Agriculture is certainly a backbone of every nation. It is the science or practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool, and other products. Farmers have to struggle hard to take a good care of their plants and crops so that they can produce good quality crops. The Internet of Things is a technology which connects things with internet. In here, agriculture gets connected to the Internet. Today IoT has started touching people everywhere and from the point of normal use, IoT is laying the foundation of development of various products like smart health services, smart living, smart education in schools and automation. The most researched area of IoT is agriculture. Because it is a decisive sector to ensure the food security as global population is exploding.

1.1 Overview

Internet of Things (IoT) is present and future of every field impacting everyone's life by making everything intelligent. It is a network of different devices which make a self-configuring network. The new developments of Smart Farming with use of IoT, by day turning the face of conventional agriculture methods by not only making it optimal but also making it cost-efficient for farmers and reducing crop wastage.

1.2 Purpose

The main aim of this project is to propose a technology which will help farmers to know the current situation of their crops from anywhere and anytime so that they can perform actions according to the situation with less efforts. The product will assist farmers by getting live data (Temperature, humidity, soil moisture) from the farmland to take necessary steps to enable them to do smart farming by also increasing their crop yields and saving resources (water). In this project we have developed an application or app through which farmers can keep an eye on their farms 24/7. All they need to do is just open the app and check the current situation and do actions accordingly. Here, action means watering the plants by turning on/off the motor. For that, buttons are provided on the app so that they can perform actions accordingly.

2. LITERATURE SURVEY

2.1 Existing problem

In traditional farming, farmers figure the ripeness of the soil. However, they are not much concerned about the climate conditions, the level of water, humidity and temperature. There is no denying the fact that they sow the seeds according to the seasons but still if there is an emergency in a farm like bad weather or pest attack then in such situations they get baffled and which results in crop wastage. Secondly, farmers have to stay in farms or hire some people to take care of their farms which is quite costly. Also, it is not always possible for a farmer to stay 24/7 in the farm. Thirdly, whenever there is a pest attack on the farm, the situation gets out of control and farmers end up using too much pesticides which can badly affect the quality of crops. Hence there is a need of continuous monitoring on crops 24/7 which is not possible for humans. So traditional methods will not be applicable in this modern world anymore since the climate situations are changing drastically.

2.2 Proposed Solution

To overcome the disadvantages of traditional farming methods, IoT plays a very essential role for improving the quality of crops with less efforts which increases the productivity. If farmers use IoT the process of agriculture becomes simple. If farmers get the forecasting/ predictions about the current weather or situations in farm before hand then they can take actions early to save their crops. With the use of smart farming, farmers can effectively use fertilizers and other resources to increase the quality and quantity of their crops. IoT provides them with the automated system which can function without any human supervision and can notify them to make proper decisions to deal with kinds of problems they may face during farming. It has the capability to reach and notify the farmers even if farmers are not on the field, which can allow farmers to manage more farmland, thus improving their production. Because of Global warming unpredictable weather conditions is affecting the crops and farmers are facing major losses so the IoT Smart Farming application will allow them to take quick measures to prevent that from happening.

3. THEORITICAL ANALYSIS

The IoT application monitors the farm or greenhouse and based upon the readings of different kind of sensors like temperature, humidity, soil moisture and displays the current readings of temperature, humidity, and soil moisture so that farmers get the update about the present conditions so that the farmers can take quick action. The quick actions taken by the farmers will help them increase the productivity in their farming and proper use of natural resources will be done, which will make our app environment friendly also. As a result there is increase in quality and quantity of the crop.

3.1 Block diagram

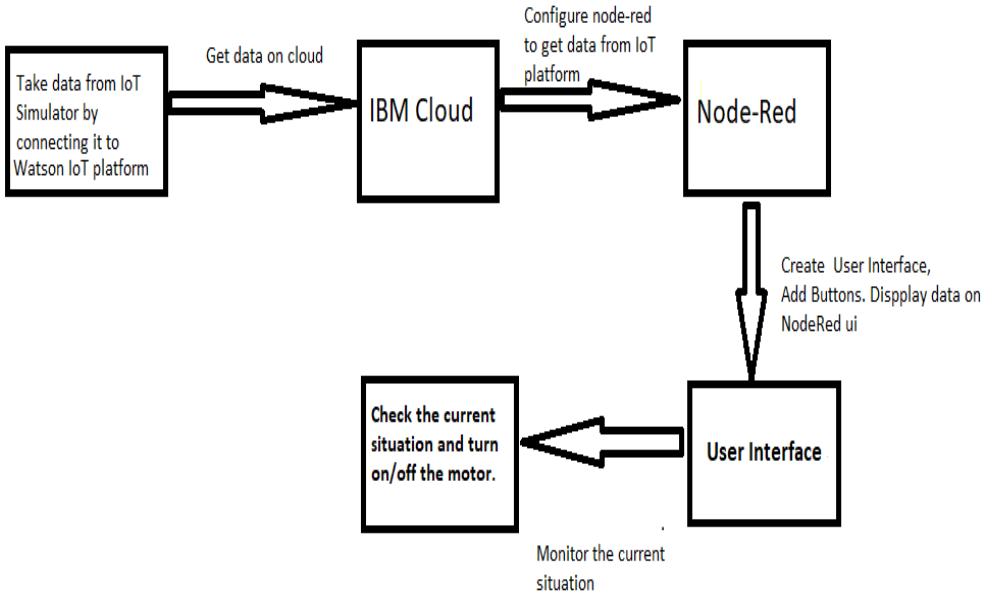


Fig. 1 Block Diagram of the project

3.2 Software Designing

Before getting started with the project, it is important to first set up the environment. We need to install the softwares like Node-Red, Python and also create account on IBM Cloud platform so that we can access IoT platform. After setting up the scene, create the device on IoT platform. We have to connect the online IoT simulator to the cloud platform which can be done by putting the proper device credentials which we have created on IBM cloud. We can also turn on the simulation which is present on cloud itself to display the data in graphical format as shown in the figure below.

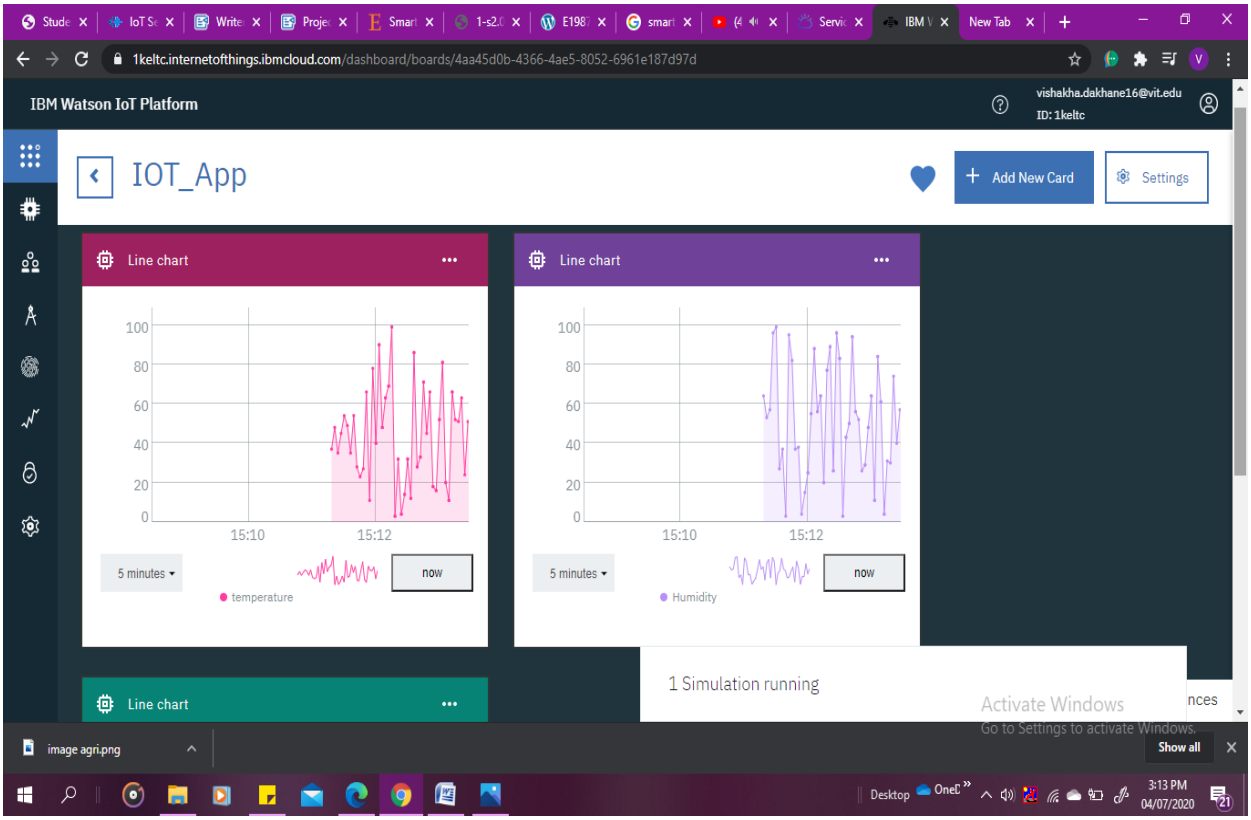


Fig. 2 Graphical representation of data.

After connecting the simulator to IoT platform we have to configure Node-Red for developing our application. After installing the Node_Red, we have to install the required nodes such as ibmiot in and ibmiot out nodes. Now we have to display the data from cloud on Node-Red debug window which represents that cloud is

connected to Node-Red. To get the current data of particular city or place, we can create the account on Open Weather API and configure it. We can also configure the Node-Red to get weather forecasting data using http request node as shown in the figure below.

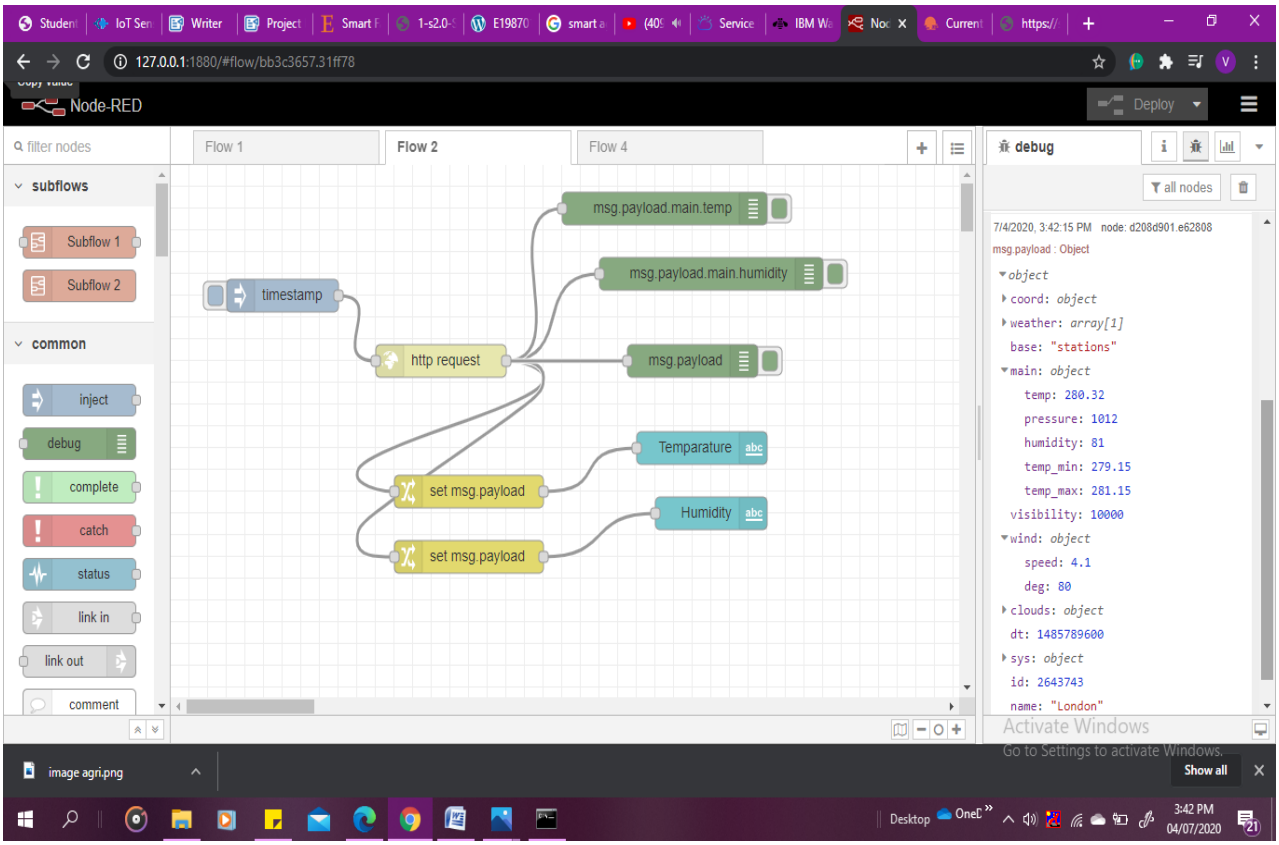


Fig. 3 Configure Node-Red to get weather forecasting data using http requests.

After this configure, the nodes to display weather parameters which we got from IoT simulator in UI. Also, create and configure the buttons to turn on/off the motor on user interface as shown in the figure below.

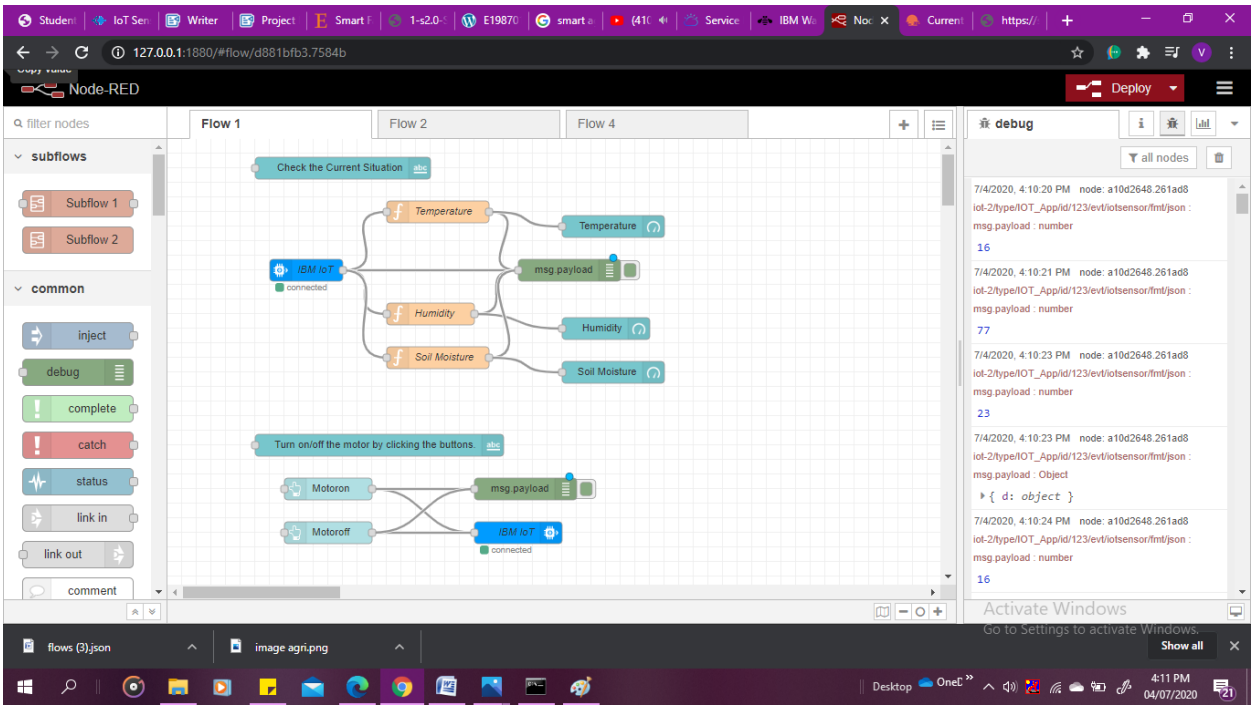


Fig. 4 Configure nodes to display weather parameters received from IoT simulator.

4. RESULT

Now, we have to check if we can see the same data on the user interface as well as shown in the figure.

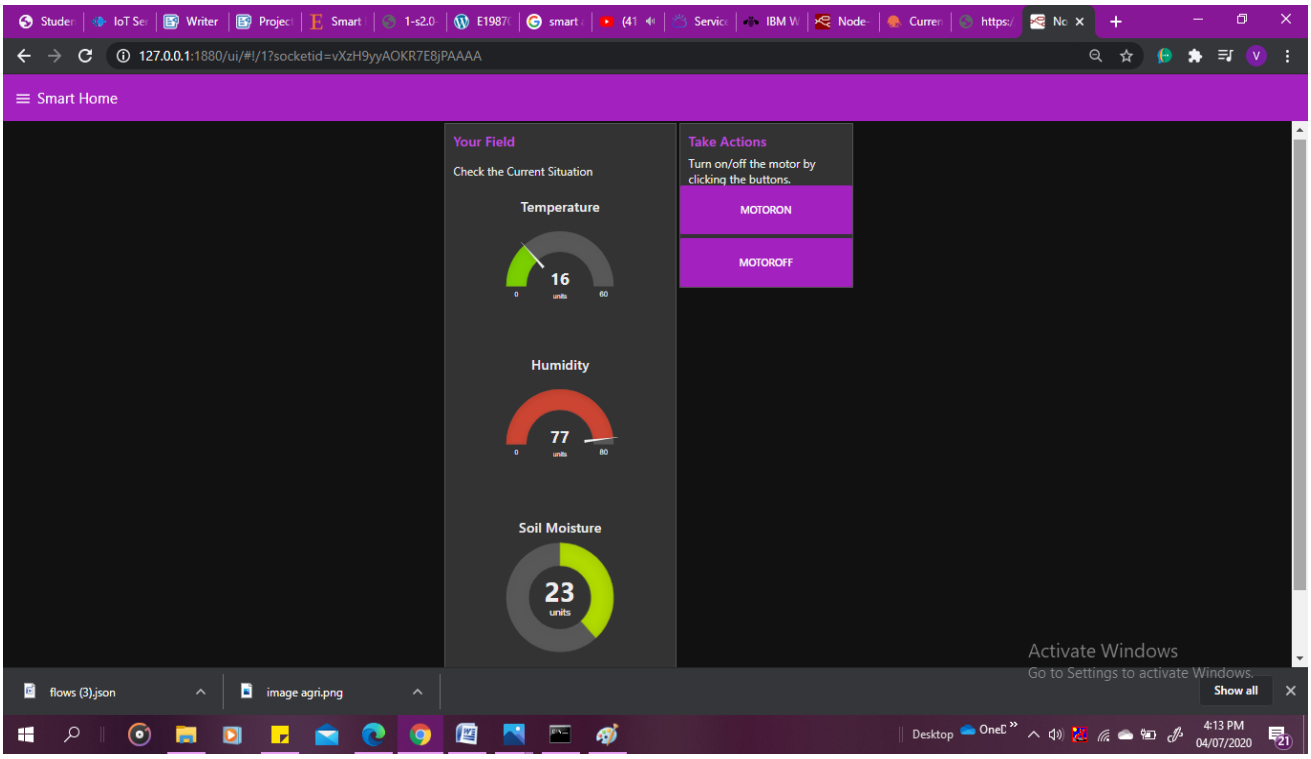
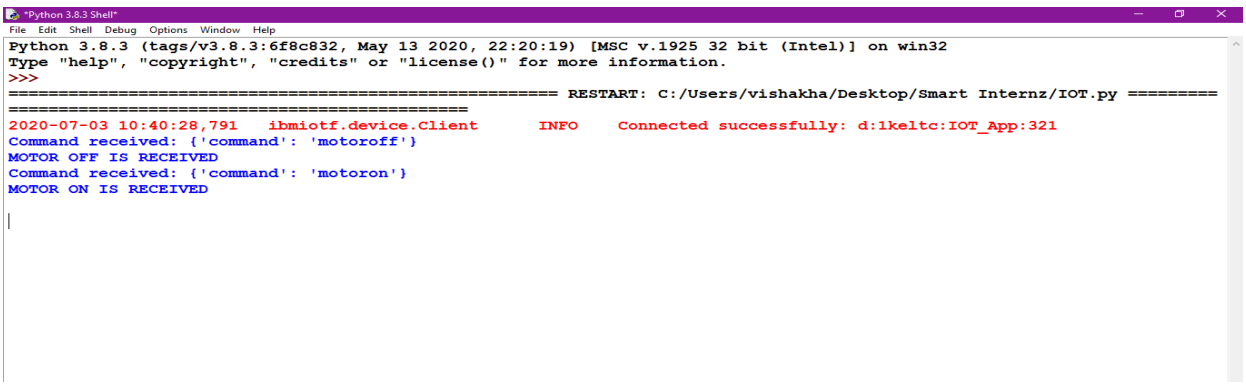


Fig. 5 User Interface

We can also get the commands of motor on and off on Python IDLE by putting proper device credentials in the subscribeibm code.



5. ADVANTAGES & DISADVANTAGES

There are many advantages of smart farming.People are still working on different Smart Farming technology using IoT, so the anticipated benefits of this technology are, Remote monitoring for farmers, water and other natural resource conservation, good management also allows improved livestock farming, the things which are not visible to necked eye can be seen resulting is accurate farmland and crop evaluation, good quality as well as improved quantity, the facility to get the real-time data for useful insights.

On the other hand, Agriculture being a natural phenomenon relies mostly on nature, and man can never predict or control nature let it be rain, drought, sunlight availability, pest control etc. The smart agriculture need availability on internet continuously. Rural part of the developing countries do not fulfill this requirement. Moreover, internet is slower. Fault sensor or data processing engines can cause faulty decisions which may lead to over use of water, fertilizers and other wastage of resources. The smart farming-based equipment requires farmer to understand and learn the use of technology. This is the major challenge in adopting smart agriculture framing at large scale across the continent.

6. APPLICATIONS

This project gives user interface and displays data on ui with buttons to control motors. This will help farmers to take quick steps. But there is still scope, the future work can be focused on, adding more more parameters of weather condition or putting more sensors in system to get the accurate guess of current situation. Also we can give messages and emails to farmers to notify them about the situation. In true IoT sense and with the help of artificial intelligence making this whole network of nodes which will be able to make the decisions on its own and trigger the necessary steps to nullify that situation. The research is going on in drone technology as well, connecting this system to the drones will provide 3D mapping of the farmlands, which will be able to monitor crop production and live conditions as well.Thus, the future for smart farming is bright. With the help of proper technology and government subsidies this area can really take our world to the betterment.

8. CONCLUSION

From our literature survey and results we can conclude that Smart Farming is the need of an hour. We have to accept this technology gradually and practice it on a global scale to help our farmers yield good crop in less effort and time. This will not only save the time of farmers but also will help to increase the productivity of the agriculture. Thus, we can conclude that this app will definitely help farmers in small farmland to effectively monitor their crops with this user-friendly app.