A Project Report on

Smart Agriculture System Based On IoT

Carried out as part of the interhip during

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At

The Smart Bridge

Information Technology and Services
Hyderabad,Telangana

Submitted by

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Contents

1 INTRODUCTION

In Agriculture, data is very important for the success of a specific crop in a given geographical climate. Such information is particularly of interest to the farmer, Agriculture consultants, and Agriculture companies. Agriculture depends on data for information such as realtime weather forecasting, temperature, humidity, soil moisture, success rate of fertilizers, the impact of natural calamities on soil and more. Exchange of such information between farmers and consultants, however, are limited. Hence, there is a necessity for Smart Agriculture.

1.1 Ovrerview

IoT based Smart Farming improves the entire Agriculture system by monitoring the field in real-time. With the help of sensors and interconnectivity, the Internet of Things in Agriculture has not only saved the time of the farmers but has also reduced the extravagant use of resources such as Water and Electricity. It keeps various factors like humidity, temperature, soil etc. under check and gives a crystal clear real-time observation.

1.2 Purpose

Smart agriculture involves integration of advanced technologies into already persisting agricultural practices with a view to boost production quality and efficiency for farming products. It helps in automated farming with the collection of data for further analysis to provide the operator with accurate information for better decision making to gain high quality output of the product.

2 LITERATURE SURVEY

In the scenario of increasing temperatures and decreasing soil moisture, there is a need for such a device that gives updates to the farmers regarding temperature, humidity and soil moisture to the farmer. After exploring a lot of options the best one found was to use IBM cloud and Open Weather API along with node-red to develop an application that shows temperature , humidity and soil moisture along with motor on and options to help the farmer have a look at the farm from anywhere.

2.1 Existing system

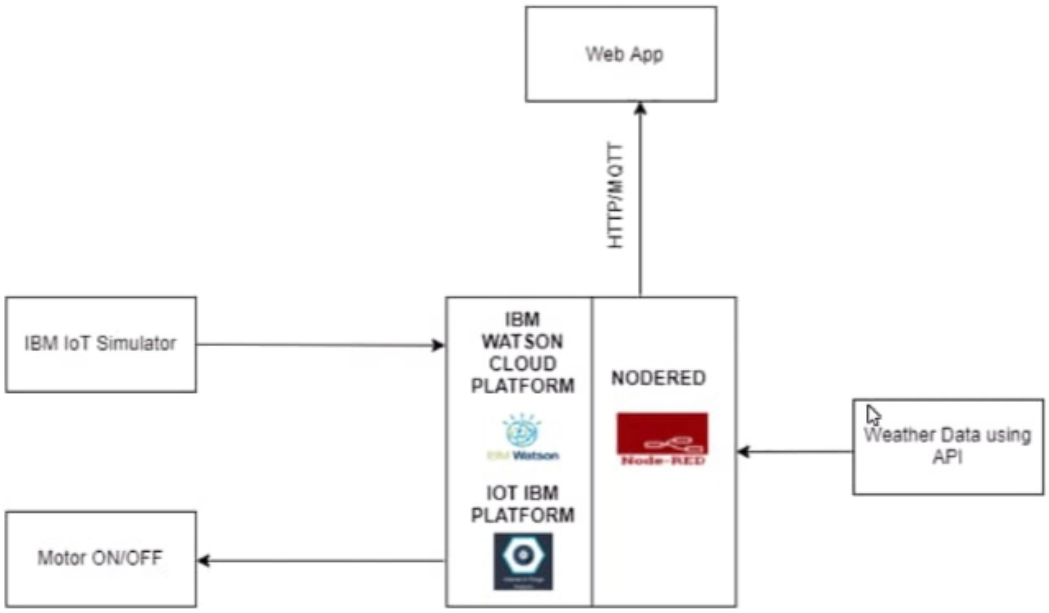
Farmer himself had to go the farm to water plants with the help of motor and check the weather conditions and soil moisture of the plants which is a very hectic and tiresome work.

2.2 Proposed solution

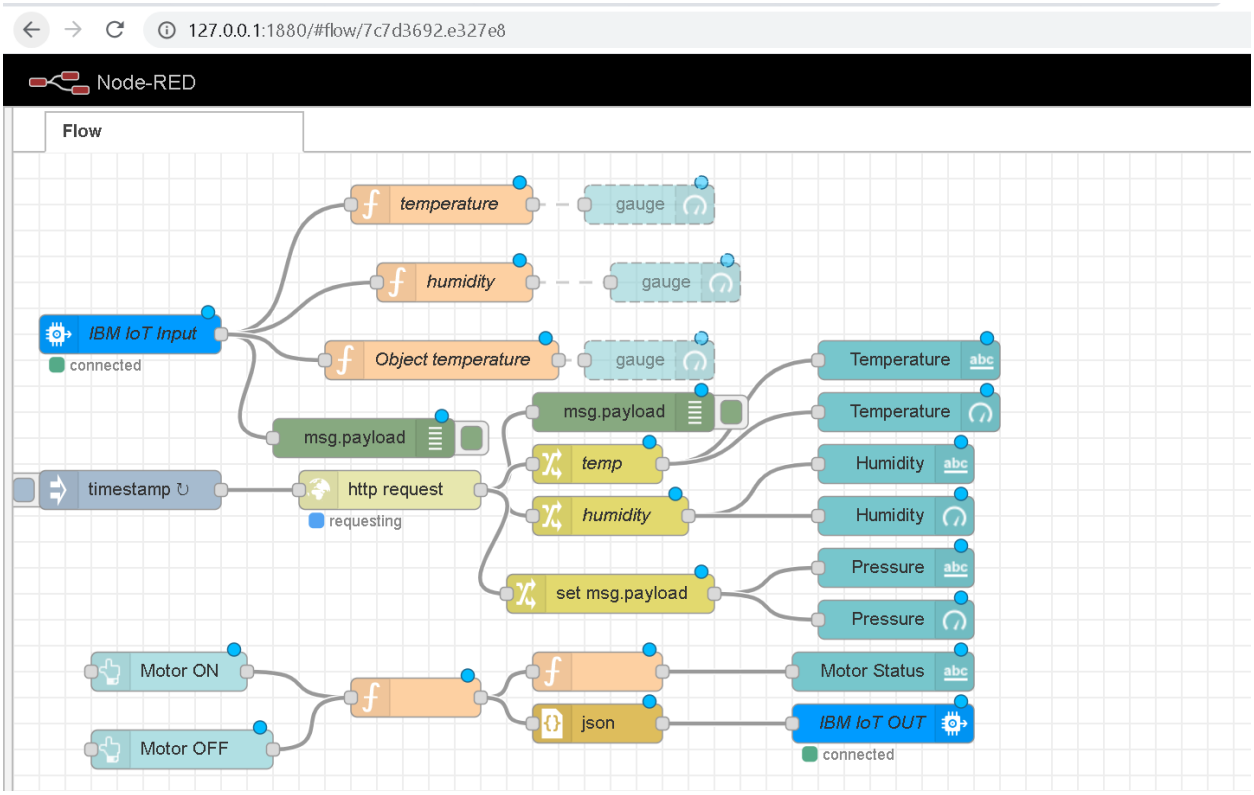
Build an app using which a farmer monitor the temperature, humidity and soil moisture parameters along with weather forecasting details. The app should should be able to water the crops by controlling the motors from anywhere.

3 THEORETICAL ANALYSIS

3.1 Block Diagram

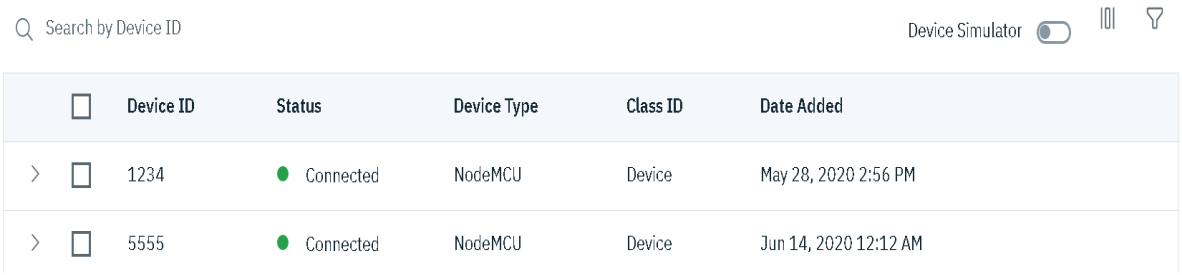


3.2 Flow Design

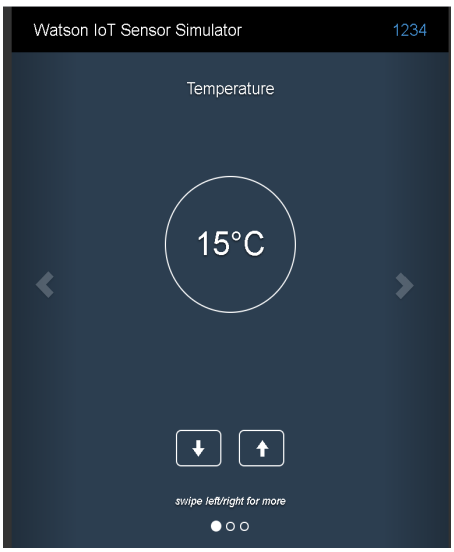


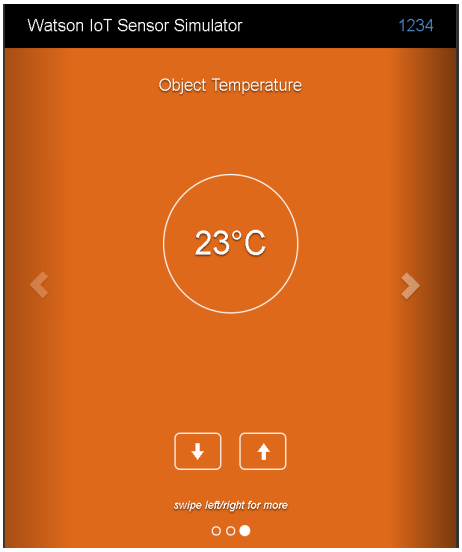
4 EXPERIMENTAL INVESTIGATIONS

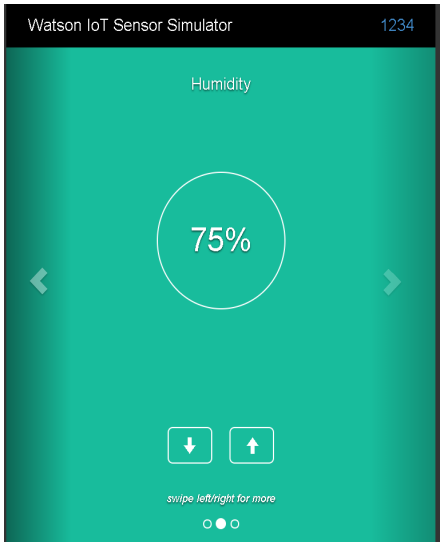
Device Creation



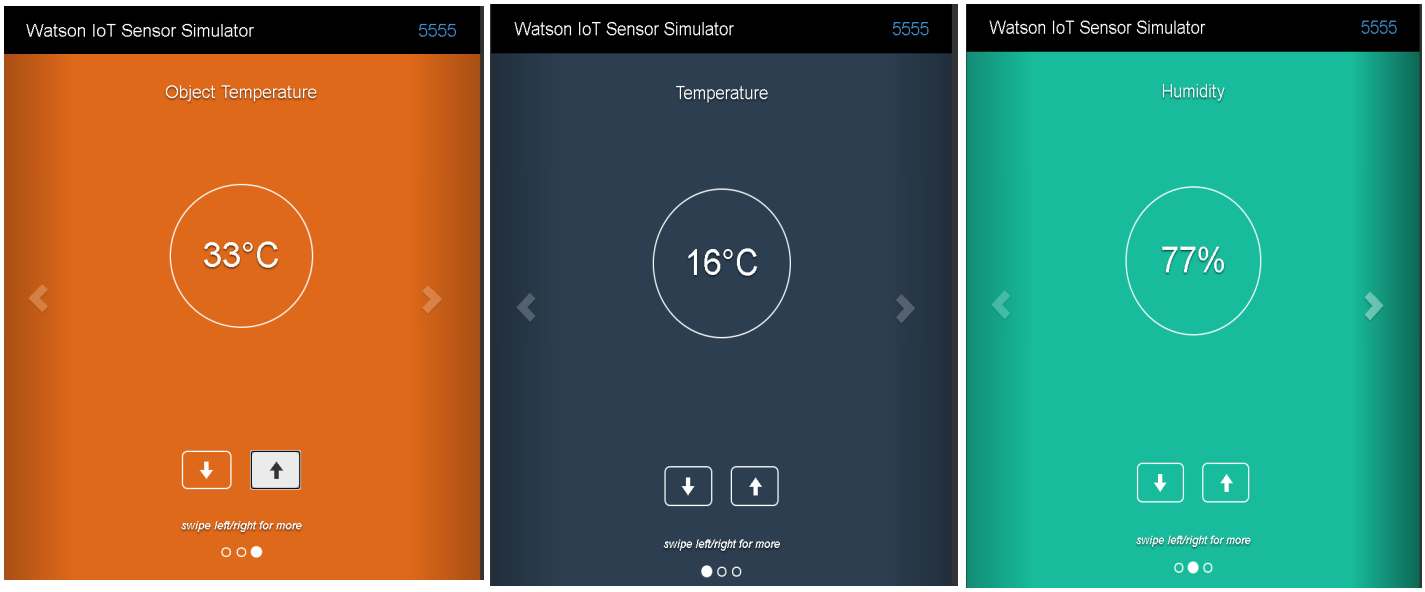
IOT Device 1 simulator



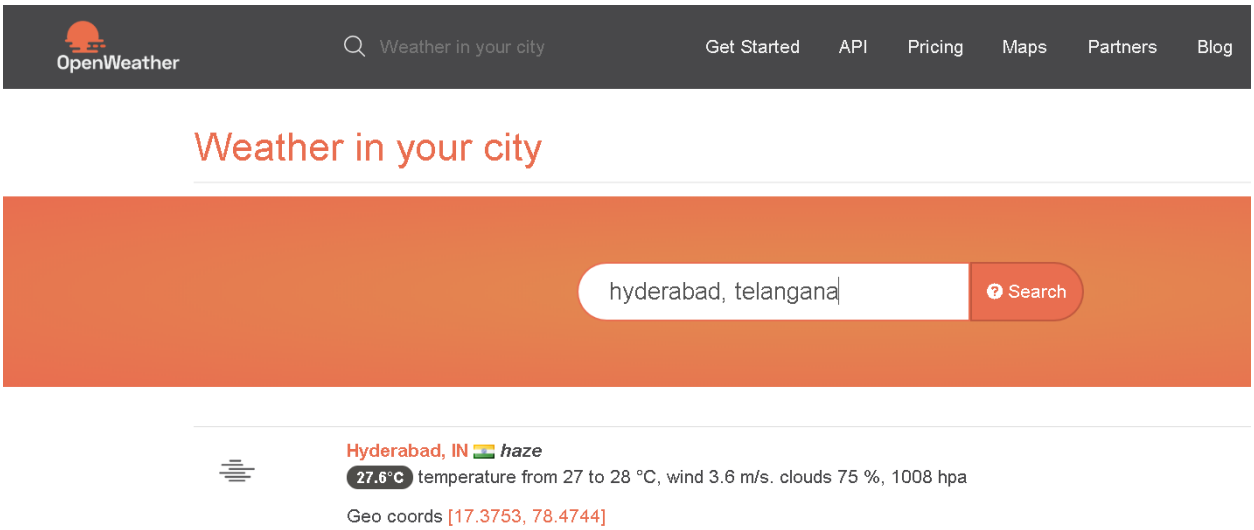




IOT Device 2 simulator



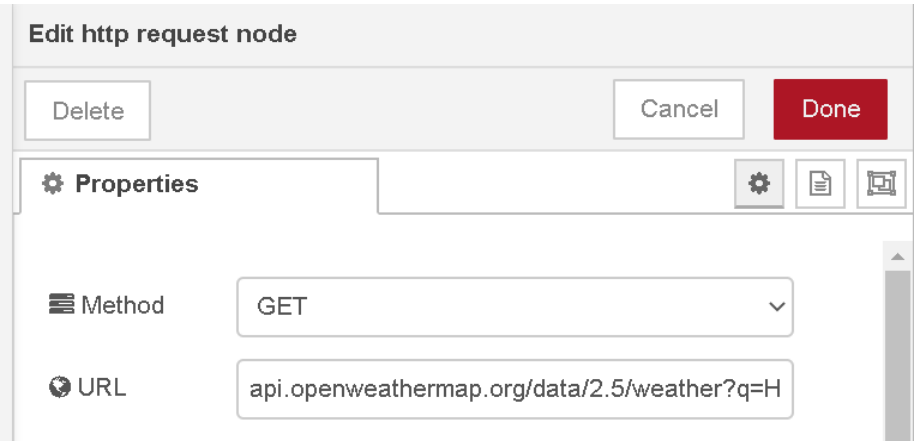
Open Weather API



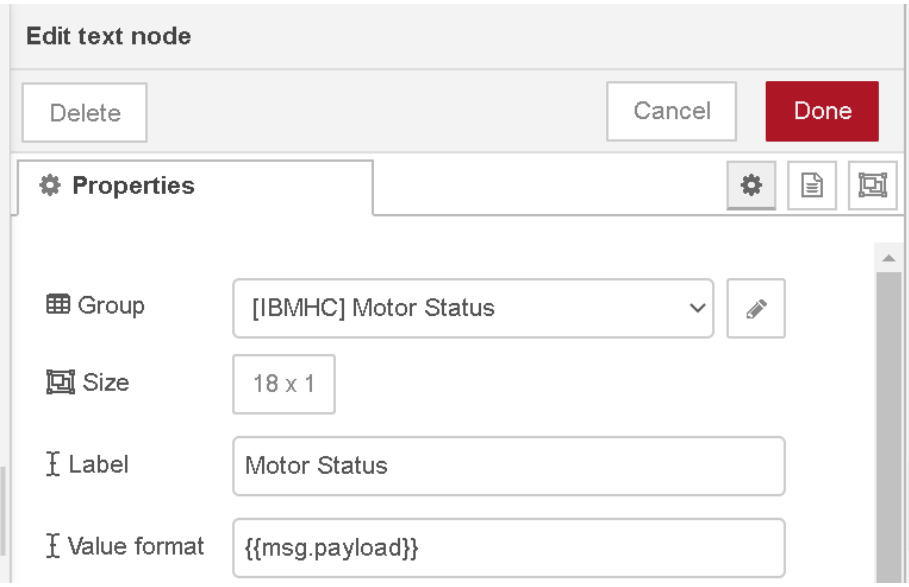
JSON data fetched from API

{"coord":{"lon":78.47,"lat":17.38},"weather":[{"id":721,"main":"Haze","description":"haze","icon":"50d"}],"base":"stations","main":
{"temp":301.74,"feels_like":304.39,"temp_min":301.15,"temp_max":302.15,"pressure":1007,"humidity":74},"visibility":5000,"wind":{"speed":4.1,"deg":240},"clouds":
{"all":75},"dt":1592117827,"sys":{"type":1,"id":9214,"country":"IN","sunrise":1592093502,"sunset":1592140876},"timezone":19800,"id":1269843,"name":"Hyderabad","cod":200}

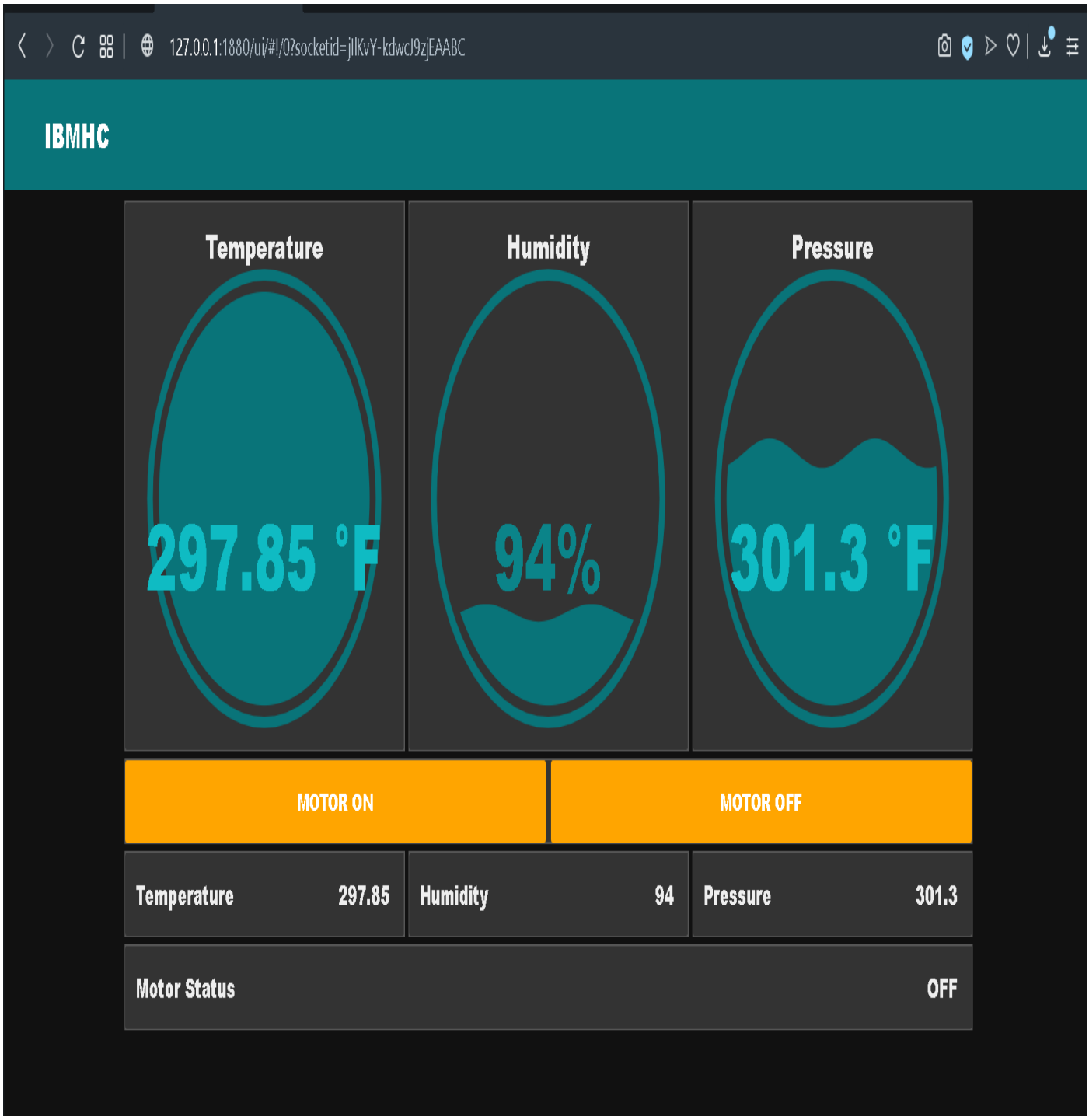
Node Red HTTP Request



Node Red Motor Status



Node Red UI Dashboard



7 Advantages And Disadvantages

Advantages

Increases crop production and it is quality, leads to conservation of natural resources. farming process become burden free, remote monitoring is possible, beneficial in water limited geographical isolated areas. Due to low cost, it is available to all farmers. It reduced Environment footprint. Increased efficiency via automation.
Increased business efficiency through automation process.

Disadvantages

It requires continuous internet connection which cannot be fulfilled by farmers, who were mostly in rural areas.Fault sensors or data processing engines can cause faulty decisions which may lead to over usage of water,fertilisers etc. Smart farming based app requires farmer to understand and learn the use of technology. This is the major challenge in adopting smart agriculture at large scale across the country.

8 Applications

The health of farm animals such as cattle or chicken can be monitored to detect potential signs of disease. This can be linked to a central system which can trigger relevant advice to be sent to farmers, and contribute towards analytics that can be used to identify any outbreaks or trends.Just like weather stations, crop management devices should be placed in the field to collect data specific to crop farming; from temperature and precipitation to leaf water potential and overall crop health, these can all be used to collect data and information for improved farming practices readily. Precision Agriculture/Precision Farming is one of the most famous applications of IoT in Agriculture. It makes the farming practice more precise and controlled by realising smart farming applications such as livestock monitoring, vehicle tracking, field observation, and inventory monitoring. The goal of precision farming is to analyse the data, generated via sensors, to react accordingly. Precision Farming helps farmers to generate data with the help of sensors and analyse that information to take intelligent and quick decisions.

9 Conclusion

This smart farming will revolutionise the world of farming and it will increase the productivity and improve the quality and can save the lives of farmer.There is an urgent need for a system that makes agriculture process easier and burden free from the farmer's side.With the advancement of technology, it has become necessary to increase the annual crop production of our country India, an entirely agro centric economy. The ability to conserve the natural resources ,as well as living a splendid boost to the production, is one of the main aims of incorporating such technology into agricultural domain of the country.To save farmer's effort, time and water has been the most important consideration.

10 Future Scope

This project has enormous potential and may be used in various other ways, due to its cheap and cost effective design. Remotely perform jobs. Due to extensible feature of sensors, we can add as per our crop specific need. It will help the farmers to do work in any seasonal conditions. It will reduce danger for the farmers from different breathing and physical problems. Moreover, IOT is expected to have dramatic impact in our lives in future.This project can further be implemented by integrating WSNs. One of the limitations of this system is that continuous internet connectivity is required at user end which might prove to be costly for farmer. 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.

11 BIBLIOGRAPHY

https://cloud.ibm.com/login
http://watson-iot-sensor-simulator.mybluemix.net/
https://nodered.org/

APPENDIX

Source Code

```
import time
import sys
import ibmiotf.application # to install pip install ibmiotf
import ibmiotf.device

#Provide your IBM Watson Device Credentials
organization = "9vgw8s" #replace the ORG ID
deviceType = "NodeMCU"#replace the Device type wi
deviceId = "1234" #replace Device ID
authMethod = "use-token-auth"
authToken = "123456789" #Replace the authtoken

def myCommandCallback(cmd): # function for Callback
        print("Command received: %s" % cmd.data)
        if cmd.data['command']=='motoron':
                print("MOTOR ON IS RECEIVED")

        elif cmd.data['command']=='motoroff':
                print("MOTOR OFF IS RECEIVED")

        if cmd.command == "setInterval":

                if 'interval' not in cmd.data:
                        print("Error - command is missing required information: 'interval'")
                else:
                        interval = cmd.data['interval']
        elif cmd.command == "print":
                if 'message' not in cmd.data:
                        print("Error - command is missing required information: 'message'")
                else:
                        output=cmd.data['message']
```

```
                print(output)

try:
                deviceOptions = {"org": organization, "type": deviceType, "id": deviceId,
"auth-method": authMethod, "auth-token": authToken}
                deviceCli = ibmiotf.device.Client(deviceOptions)
                #.....................................

except Exception as e:
                print("Caught exception connecting device: %s" % str(e))
                sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event of
type "greeting" 10 times
deviceCli.connect()

while True:

    deviceCli.commandCallback = myCommandCallback

# Disconnect the device and application from the cloud
deviceCli.disconnect()
```