

PROJECT REPORT

1. INTRODUCTION

1.1 Overview

Agriculture is integral to all of us. The traditional practices involved in agriculture don't give us the best output in terms of productivity. But the technology available today can harness the true potential of any farm-land.

As the population is increasing, the exploitation of resources is increasing and with limited resources, we have to produce the maximum yield. Therefore, it becomes essential that we deploy technology to our help. IOT - Internet Of Things is a technology that can help us. It makes things smart by connecting physical devices to the internet. Smart systems provide accurate and up-to-date information that enables systematic decision making. Today, IOT is used everywhere and its application in agriculture has a great scope.

1.2 Purpose

The purpose of this project is to make a Smart Agriculture Management System for the society with the help of the Internet of Things. It will illustrate how we have made agriculture management systems smart by various sensors, microcontrollers, and various other technologies of IoT.

The goals of this project is to collect all the data such as temperature, humidity, soil moisture, pressure etc. from the sensors and then store it on cloud. The data also needs to be displayed on the web application through which the user can visualize the data. The data should be in easy-to-understand format so that anybody could use it and benefit from it. The user interface plays a important role in any web application. Thus, one of our goals would be to create a user-friendly interface.

When all the data will be available to the user, it would increase transparency and help the user to make his decisions more informed. Agriculture is substantially dependent on weather conditions so if we are able to track the weather patterns

with our data, it can help the farmer to plan which crop to be planted in this season and decrease the chances of crop-failure due to improper weather.

2. LITERATURE SURVEY

2.1 Existing problem

The traditional methods of agriculture have a lot of downfalls and thus, a solution is required. One of the prominent problem we encounter today is of the unpredictable weather patterns. Today, the world is facing problems like global warming, deforestation and natural disasters. All this is due to the exploitation of natural resources by humans. We have not considered that the resources are limited and thus should be judiciously used. This has led to various problems that we face today, be it be pollution or something else.

Global warming makes the glaciers to melt and climate changes abnormally. Weather and climate are closely related to the quality of crop. Some crops need more water and hence, should be planted in a particular season only. While we also have other crops that require less water so, it is totally crop dependent. Therefore, unpredictable weather has made it difficult to decide which crop should be planted. Because, sudden weather change can lead to crop-failure which would waste tons of resources and man-hours.

2.2 Proposed solution

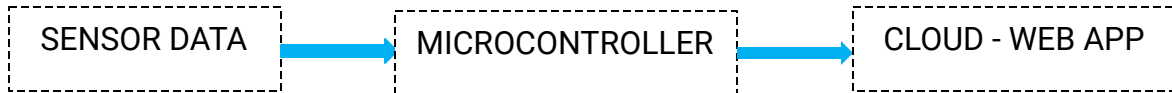
We propose a system to monitor the weather changes in the area of the farmland as every area has slight variations of weather conditions. We will focus on individual farm land's weather and store the data on the cloud.

Some important weather characteristics are temperature, humidity, pressure and soil moisture. We would have sensors to measure these parameters on real-time basis. We would parallelly display the data we have got to the user also through our web application so that he can take his decisions. Our solution would include a smart agriculture system with all the sensors and microcontrollers. We would use cloud for the storage. The web application would provide us the required user engagement.

3. THEORITICAL ANALYSIS

3.1 Block diagram

The data from the sensors would go to the micro-controllers. From the microcontrollers, it would be sent to the cloud from where it would be dispalyed on the web-application for the user to view.

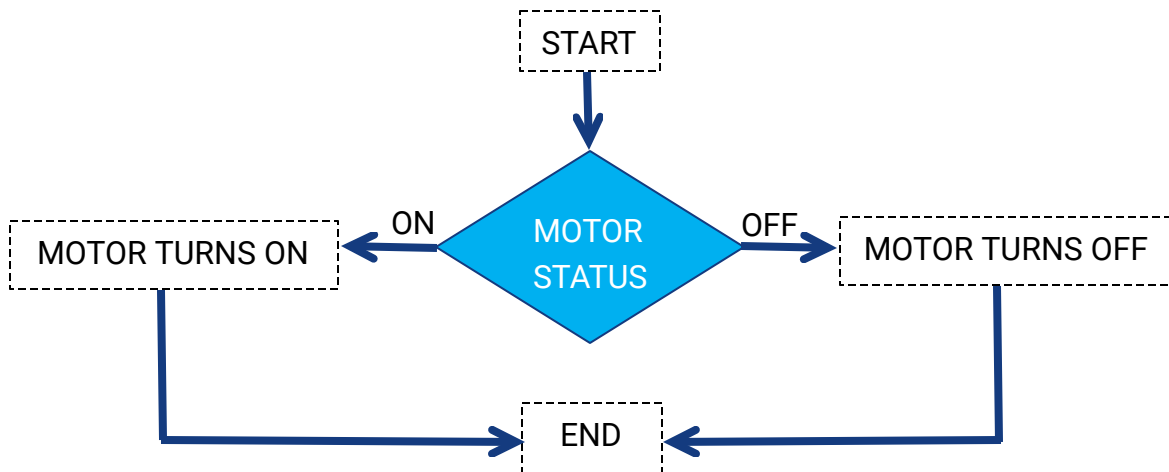


3.2 Hardware / Software designing

For the hardware, we would require sensors to measure temperature, humidity etc. There are sensors available for this in the market. One such sensor is DHTT11 which can provide the temperature and weather readings. All these sensors would be required to connect with a micro-controller. For the microcontroller, there are various options available such as arduino, nodeMCU and raspberry-pi.

For the software part, we would require cloud storage so that we can store our data on the cloud for future analysis. IBM cloud can provide us all the features we require. For sending the data to cloud, we will need a gateway like a router. The data transfer between the microcontrollers can be made using any WiFi module such as ESP8266. We can also implement master-slave concept to channelise the flow of data. It would include making one microcontroller as master to which all other microcontrollers would send their data.

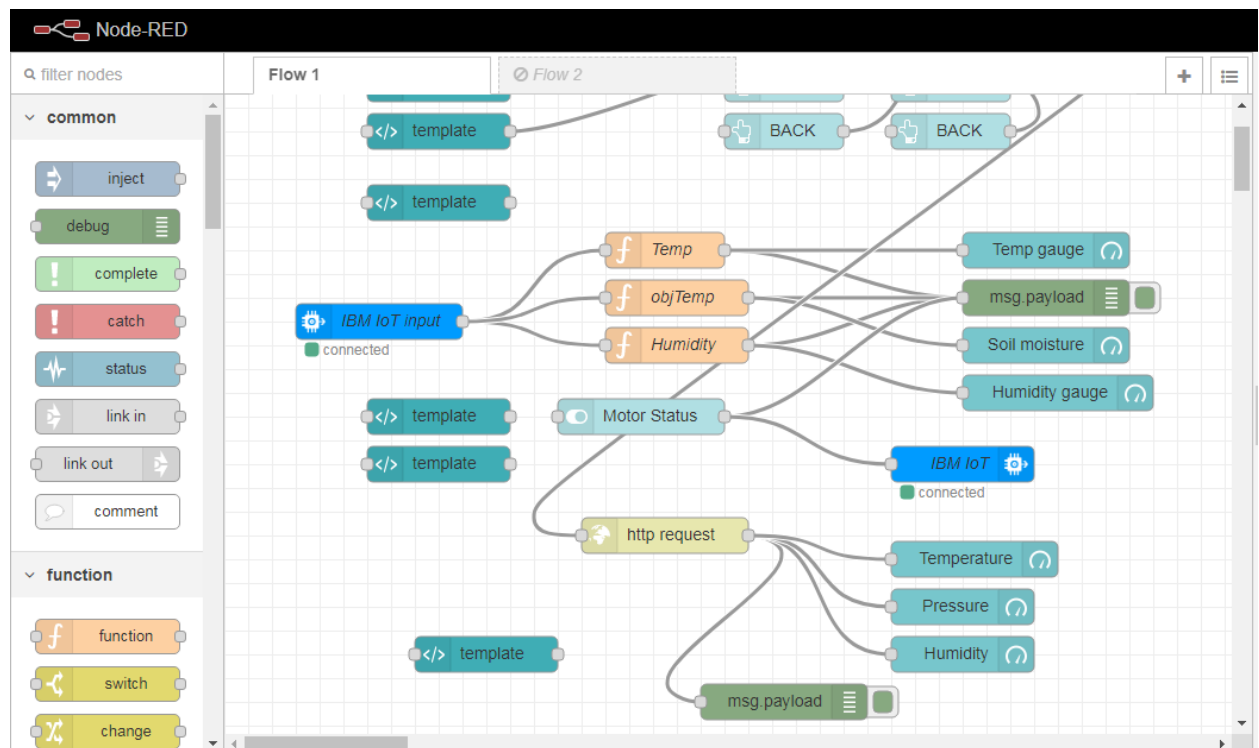
4. FLOWCHART



The motor automation can be done easily. The user will have the provision to turn on and off the motor from the option available in web application.

5. RESULT

The web application has all the features in terms of displaying the data of temperature, pressure and humidity. The motor status function is also working. The command to the motor can be sent through a python script. The IBM cloud provides the functionality we require.



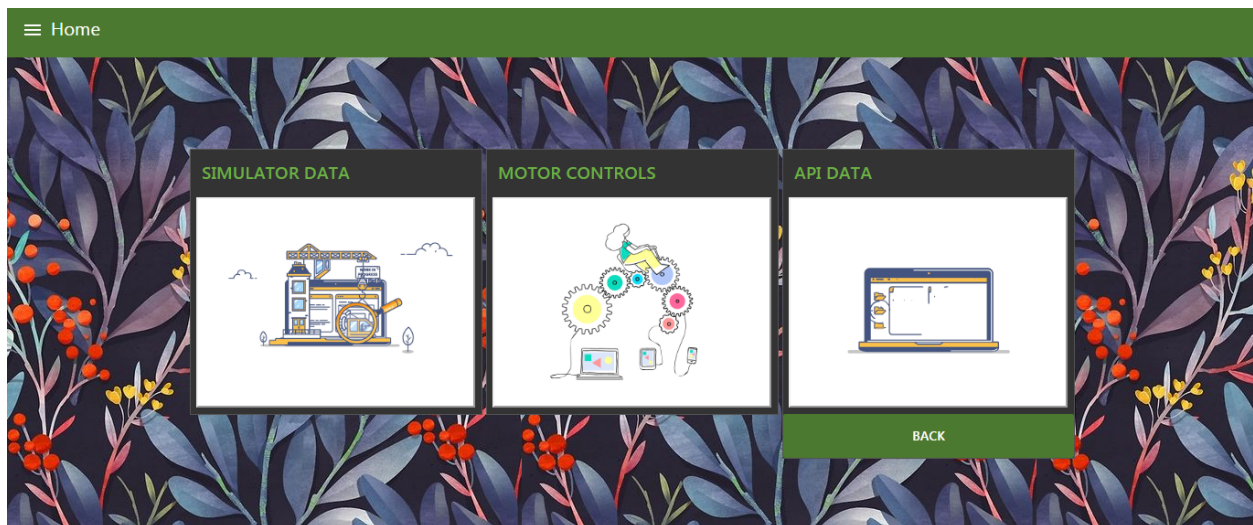
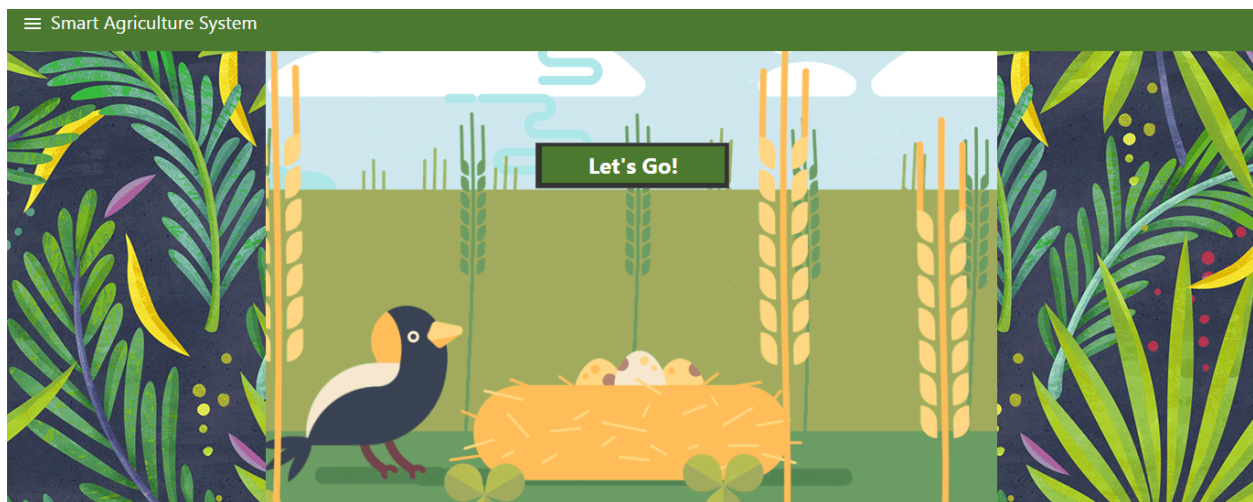
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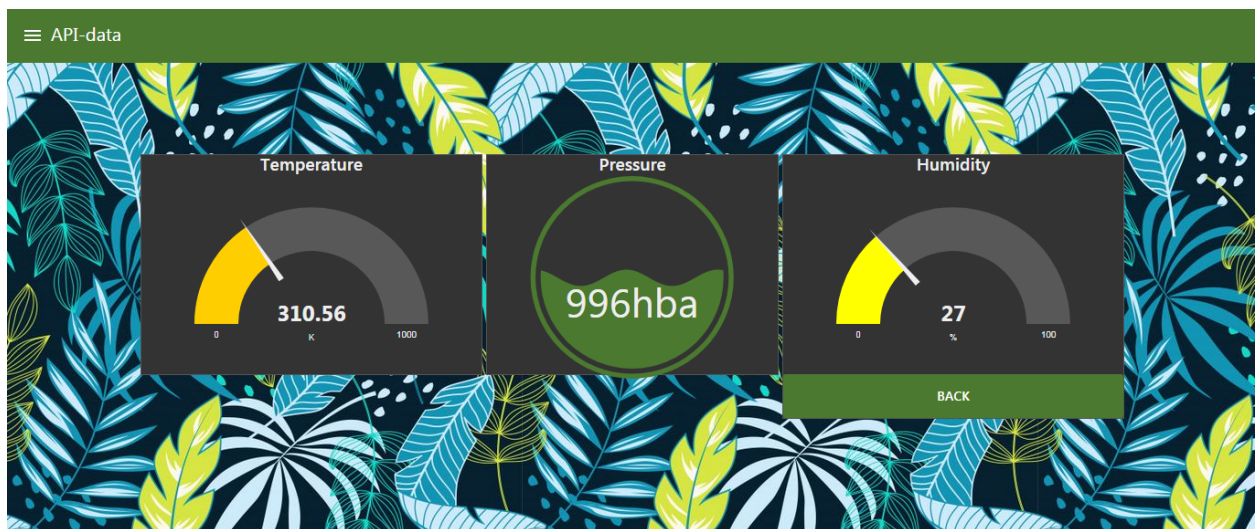
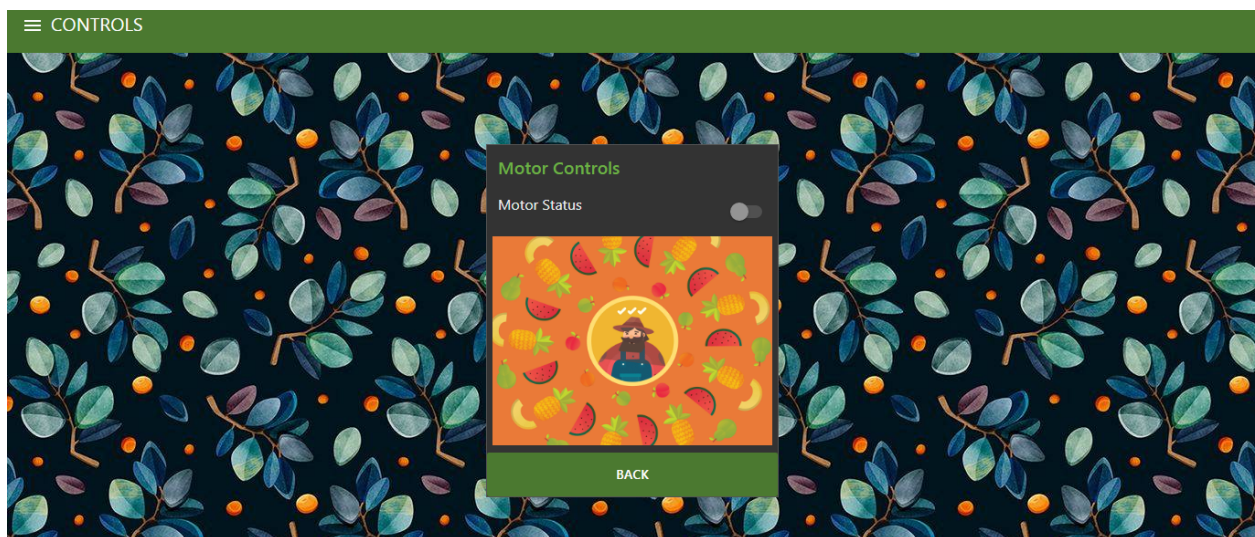
The project will be very advantageous as it would help the farmers to plan their agricultural activities precisely and it would help them increase their productivity. The motor automation would also help them.

The best thing is the visualisation through the web application. The user interface would help the farmers to understand the weather conditions clearly. They can check the motor status also on the web application.

7. APPLICATIONS

The project can be used in agriculture to plan which crops should be planted. The weather study can help not to over-water the crops if rain is suspected. If the conditions indicate sun-heat, extra watering can also be done. It can help to plan all the agricultural activities that happen. This would ultimately help the farmer to increase its productivity.





8. CONCLUSION

We proposed a system where we have used sensors for monitoring the weather conditions and for the automatic working of water motors. We have resolved the problem of planting the wrong crop due to lack of information of current weather patterns by storing data that is transmitted by IoT devices on the cloud which can be easily accessed by end-users at any time.

For visualization and control of our system in real-time, we have designed a web application using node-red that will be beneficial to the users. Every sensor reading is updated on a secure cloud platform in realtime and is also displayed to users in real-time through this application. This whole project can be easily installed in existing infrastructure. Users will not face any difficulty as our system is suitable at existing infrastructures. This project is pocket-friendly as the cost of sensors is very reasonable.

In the end, concluding all the points mentioned above it can be said that this project aims to deliver the best management system for agriculture in a very budget-friendly manner.

9. FUTURE SCOPE

IoT has started to become a part of our lives with the advent of technology in our houses. The smartphone is one of the devices that we can not live without today. And IoT is just not related to sensors and their data, it has a lot more potential. Data is the gold of the future. The data we have can be used in a machine learning model and if we want we can take all this to AI also. "Start small, exponential increase" is the basic idea of developing any new technology or idea. Thus, today the UI we have created can become an integral part of the agriculture system with all the advancements from machine learning to artificial intelligence.

10.BIBILOGRAPHY

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2. <https://cookbook.nodered.org/http/simple-get-request>
3. <https://discourse.nodered.org/t/link-to-another-tab-using-dashboard-button/11211>
4. <https://github.com/rachuriharish23/ibmsubscribe>
5. <https://www.youtube.com/watch?v=cicTw4SEdxk>
6. <https://smartintrnz.com/assets/docs/Sending%20Http%20request%20to%20Open%20weather%20map%20website%20to%20get%20the%20weather%20forecast.pdf>

11.APPENDIX

A. Source code

PYTHON CODE

```
1 import time
2 import sys
3 import ibmiotf.application
4 import ibmiotf.device
5
6 #Provide your IBM Watson Device Credentials
7 organization = "35ypdo" #replace the ORG ID
8 deviceType = "SimpleDevice"#replace the Device type with
9 deviceId = "MotorControl"#replace Device ID
10 authMethod = "token"
11 authToken = "123456789" #Replace the authtoken
12
13 def myCommandCallback(cmd): # function for Callback
14     print("Command received: %s" % cmd.data)
15     if cmd.data['command']=='motoron':
16         print("MOTOR ON IS RECEIVED")
17
18     elif cmd.data['command']=='motoroff':
19         print("MOTOR OFF IS RECEIVED")
20
```



```

21         if cmd.command == "setInterval":
22
23             if 'interval' not in cmd.data:
24                 print("Error - command is missing
required information: 'interval'")
25             else:
26                 interval = cmd.data['interval']
27         elif cmd.command == "print":
28             if 'message' not in cmd.data:
29                 print("Error - command is missing
required information: 'message'")
30             else:
31                 output=cmd.data['message']
32                 print(output)
33
34 try:
35     deviceOptions = {"org": organization, "type": deviceType, "id": deviceId,
"auth-method": authMethod, "auth-token": authToken}
36     deviceCli = ibmiotf.device.Client(deviceOptions)
37     #.....
38
39 except Exception as e:
40     print("Caught exception connecting device: %s" % str(e))
41     sys.exit()
42
43 # Connect and send a datapoint "hello" with value "world"
into the cloud as an event of type "greeting" 10 times
44 deviceCli.connect()
45
46 while True:
47
48     deviceCli.commandCallback = myCommandCallback
49
50 # Disconnect the device and application from the cloud
51 deviceCli.disconnect()
52

```

NODE-RED FLOW

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