PROJECT REPORT

- **INTRODUCTION:**

    - **Project Overview**

• IoT-based agriculture system helps the farmer in monitoring different parameters of his field like soil moisture, temperature, and humidity using some sensors.
• Farmers can monitor all the sensor parameters by using a web or mobile application even if the farmer is not near his field. Watering the crop is one of the important tasks for the farmers.
• They can make the decision whether to water the crop or postpone it by monitoring the sensor parameters and controlling the motor pumps from the mobile application itself.
• In this project explore python client libraries of Watson IoT Platform.Gain knowledge on IBM Cloudant DB.
Configuring APIs using Node-RED for communicating with a mobile application.
Creating a Mobile Application through which the user interacts with the IoT device.

- **LITERATURE SURVEY:**

    - **Existing Problem**

- Agriculture is a field which forms the basis of our economy. Yet it faces a lot of problems in terms of availability of resources, Irrigation, increasing rate of Pesticides, Climatic disasters, Insects which ruin the crops and makes a huge loss this sector.

- In agriculture water is needed for the crops for their growth. If the Soil gets dry itis necessary to supply water. But sometime if the farmer doesn't visit the field it isnot possible to know the condition of soil.
- Sometimes over supply of water or less supply of water affects the growth of crops.
- Sometimes if the weather/temperature changes suddenly it is necessary to takecertain actions.
- Specific crops grow better in specific conditions, they may get damaged due to badweather.

• References

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- Arindom Chakraborty, Monirul Islam, Animesh Dhar, Mohammad. Shahadat Hossain, "IoT Based Greenhouse Environment Monitoringand Smart Irrigation System for Precision Farming Technology", *2022 International Conference on Innovations in Science, Engineering and Technology (ICISET)*, pp.123-128, 2022.
- T Raghul Sudharsan, Gowtham S, S. Revathy, T. Bernatin, L. MaryGladence, V. Maria Anu, "Smart Farming using IoT", *2022 6th International Conference on Computing Methodologies and Communication (ICCMC)*, pp.354-359, 2022.
- Dlnya Abdulahad Aziz, Razieh Asgarnezhad, Sarmad Nozad Mahmood, "The Recent Advances In IoT Based Smart Plant Irrigation

Systems: A Brief Review", *2021 5th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT)*, pp.97- 104, 2021.

• S Ayyasamy, S Eswaran, B Manikandan, S P Mithun Solomon, S Nirmal Kumar, "IoT based Agri Soil Maintenance Through Micro-Nutrients and Protection of Crops from Excess Water", *2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC)*, pp.404-409, 2020

• Madhurima Bhattacharya, Alak Roy, Jayanta Pal, "Smart Irrigation System Using Internet of Things", *Applications of Internet of Things*,vol.137,pp.119,2021

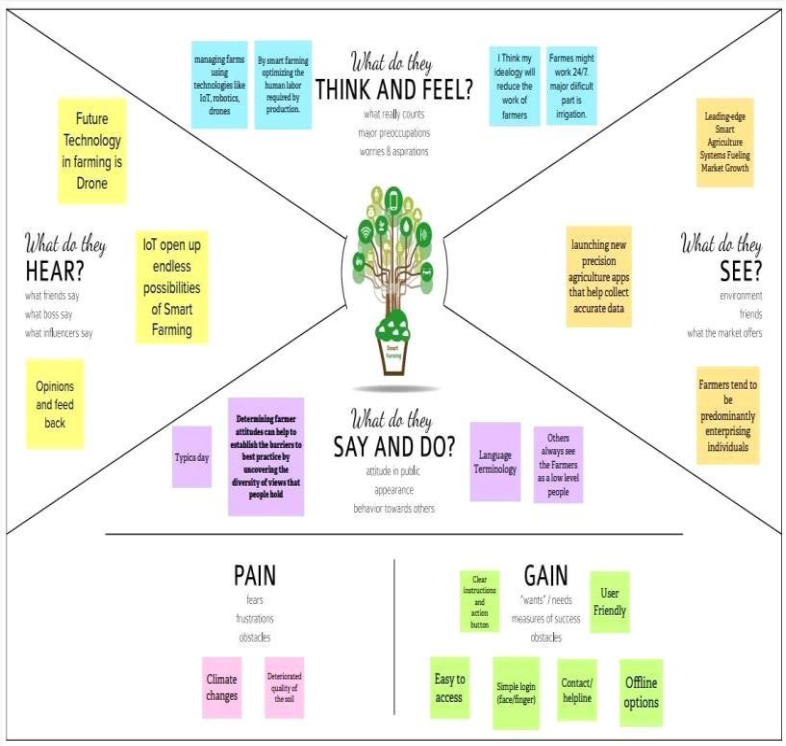
- **Problem Statement Definition**

Farmers are to be present at farm for its maintenance irrespective of the weather conditions. They have to ensure that the crops are well watered and the farm status is monitored by them physically. Farmer have to stay most of the time in field in order to get a good yield. In difficult times like in the presence of pandemic also they have to work hard in their fields risking their lives to provide food for the country.

- **<u>IDEATION & PROPOSED SOLUTION</u>:**

- **Empathy Map Canvas**

SMART FARMER



Brainstorming

2

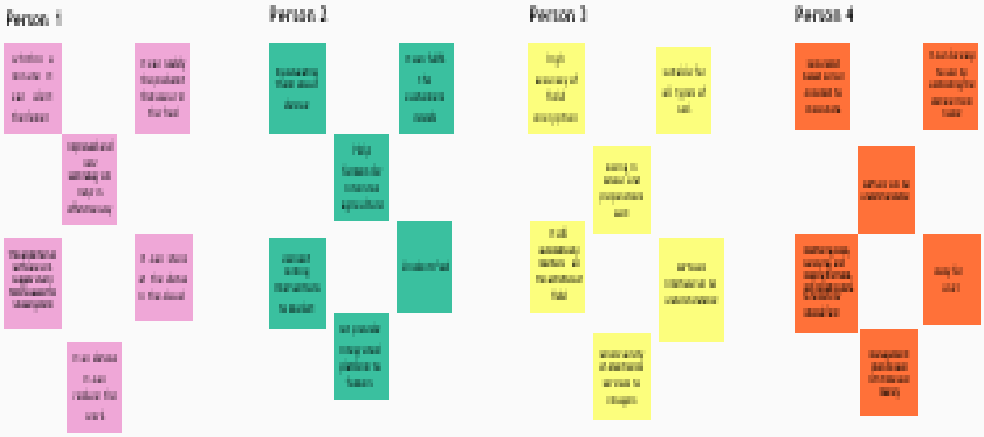
Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil [edit] icon to start drawing!

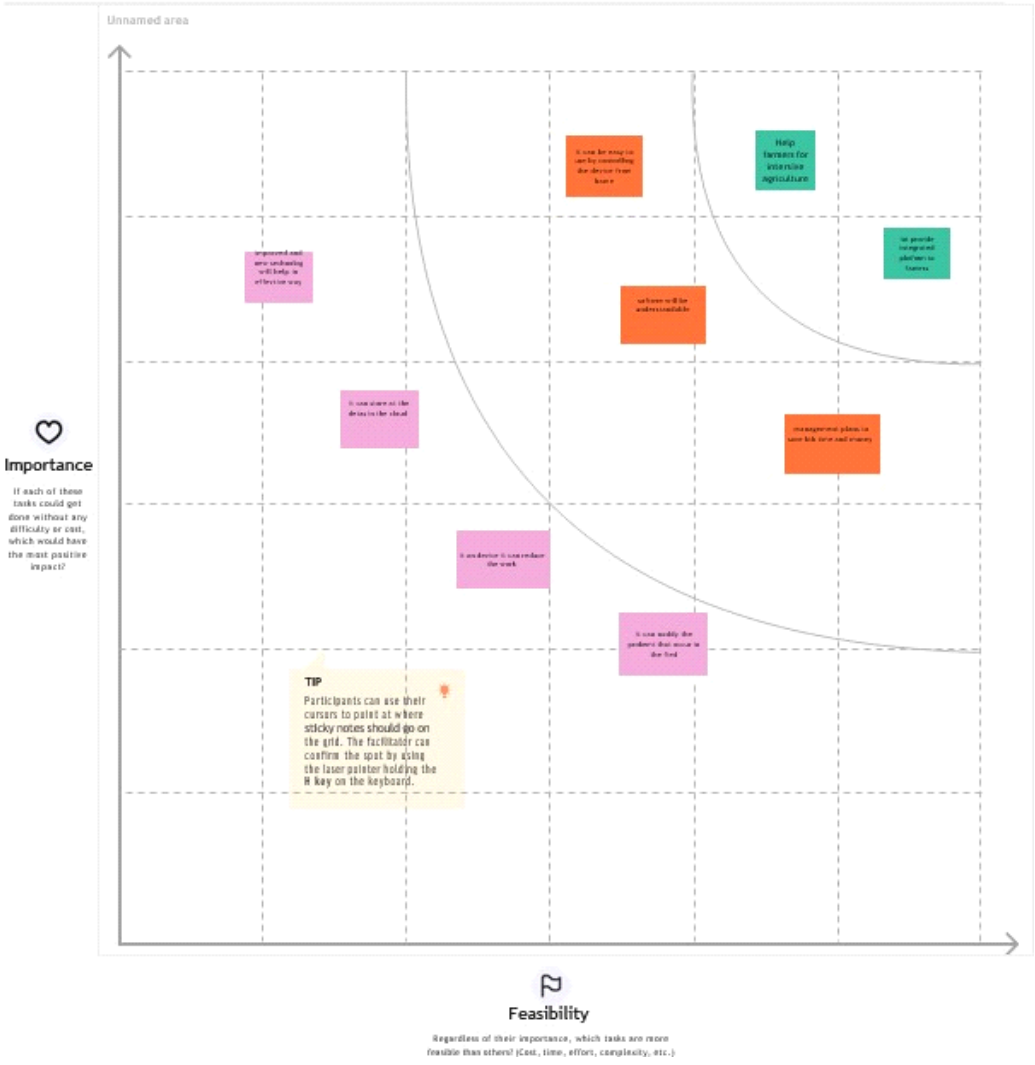


4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

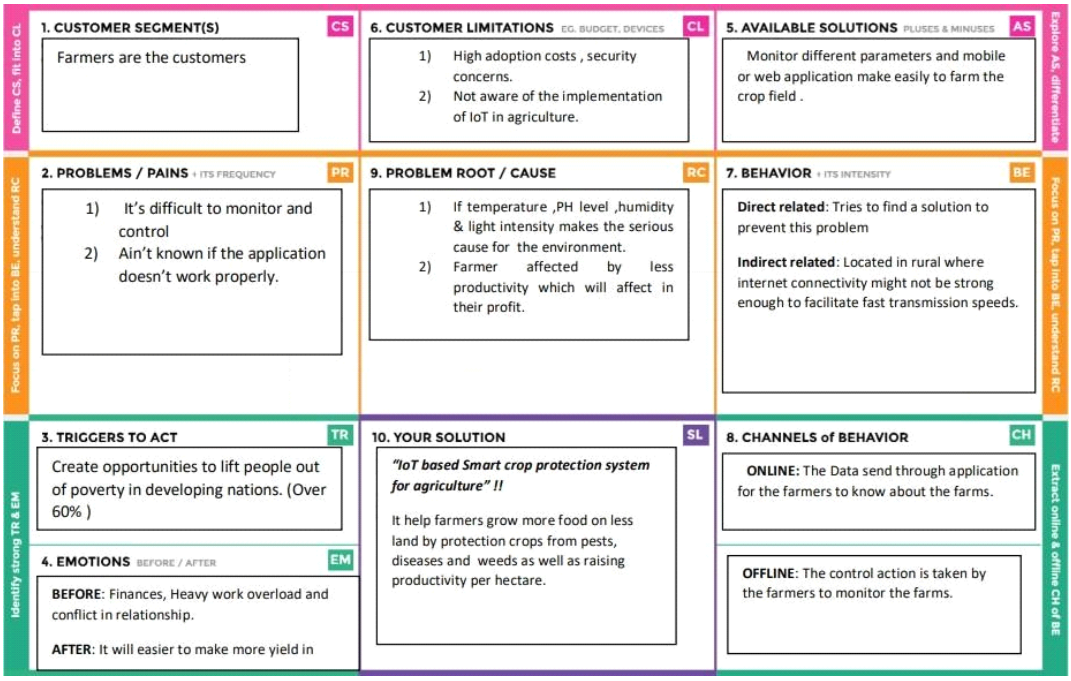
20 minutes



- **Proposed Solution**

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Crops in farms are many times ravaged by local animals like buffaloes, cows, goats, birds, and fire etc. This leads to huge losses for the farmers. It is not possible for farmers to barricade entire fields or stay on field 24 hours and guard it.
2.	Idea / Solution description	Here we propose an automatic crop protection system from animals and fire. This is an arduino Uno based system using microcontroller. This system uses a motion sensor to detect wild animals approaching near the field and smoke sensor to detect the fire.
3.	Novelty / Uniqueness	Fastest alert to the farmers through SMS.
4.	Social Impact / Customer Satisfaction	Real time data and production insight. Remote monitoring.
5.	Business Model (Revenue Model)	Help farmers in protecting their orchards and fields and save them from significant financial losses and will save them from the unproductive efforts that they endure for the protection their fields. This will also help them in achieving better crop yields thus leading to their economic wellbeing.
6.	Scalability of the Solution	Alerts the farmers immediately through an SMS.

- **Problem Solution Fit**



- **<u>REQUIREMENT ANALYSIS</u>**:

• Functional Requirements

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Install the app. Signing up with Gmail or phone numbers. Creating a new profile. Understand the guidelines which we given
FR-2	User Confirmation	Email or phone number verification required via OTP.
FR-3	Accessing datasets	The data like values of temperature, data sensor, humidity, soil moisture are received by alert SMS.
FR-4	Interface sensor	Connect the sensor and the application When animals enter the field, the alarm is generated.
FR-5	User action	The user needs to take action like detecting through crop rotation, fertilizer, strip cropping.

• Non Functional Requirements

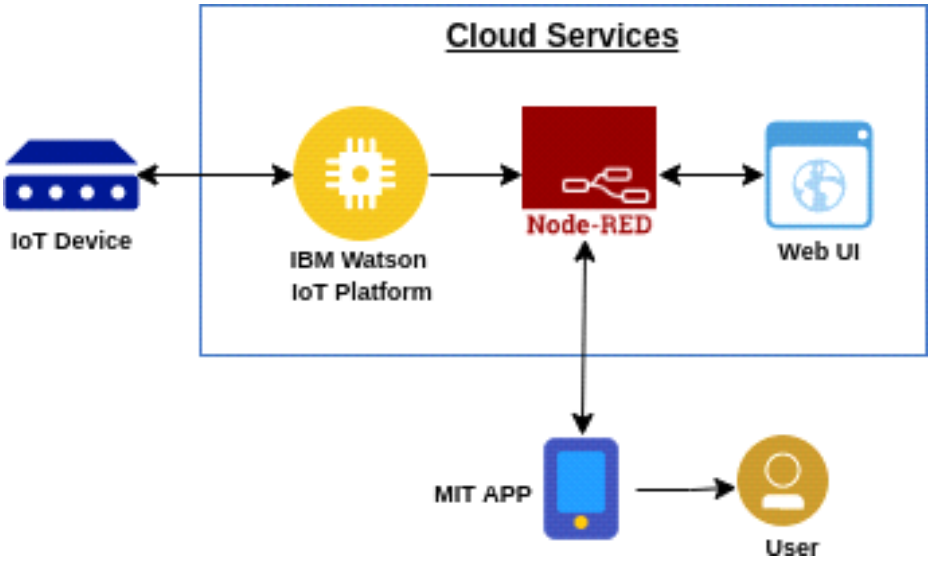
Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	This project's contributors to the farm protection through the smart protection system and use new technologies and also increase the quality of its crop.
NFR-2	**Security**	It was created to protect the crops from animals.
NFR-3	**Reliability**	Farmers are able to safeguard their lands by help of this technology. They get some good benefits from higher crop yields.
NFR-4	**Performance**	When animals attempt to enter the crop field, IOT devices and sensors alert the farmer via message and maintain good yields.
NFR-5	**Availability**	Agriculture fences are quite an effective wild animal protection system.
NFR-6	**Scalability**	The develop system will not harmful and injurious to animals as well as human beings through the system.

- **PROJECT DESIGN**:
  - **Data Flow Diagram**

  - **Solution & Technical Architecture**



  - **User Stories**

User Type	Functional requirement(Epic)	User Story number	User Story/Task	Acceptancecriteria	Priority	Release
Customer (Mobil user)	Registration	USN-1	User can enter into the web application	I can accessmy account /dashboard	High	Sprint 1
		USN-2	User can register their credentials likeemail id and password	I can receive confirmation email & click confirm	High	Sprint 1
	Login	USN-3	User can log into theapplication by entering email & password	I can login tomy account	High	Sprint 1
	Dashboard	USN-4	User can view the temperature	I can view the data given by the device	High	Sprint 2
		USN-5	User can view thelevel of sensor monitoring value	I can view the data given by the device	High	Sprint 2
Customer(Web user)	Usage	USN-1	User can view the web page and get theinformation	I can view the data given by the device	High	Sprint 3
Customer	Working	USN-1	User act according to the alert given by thedevice	I can get thedata work according to it	High	Sprint 3
		USN-2	User turns ON Buzzer/Sound Alarm when the disturbancewill occur on field.	I can get thedata work according toit		Sprint 4
Administration	Administration	USN-1	User store every information	I can store the gained information	High	Sprint 4

6.2 Sprint Delivery Schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	4	High	Krshnapriya
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I have registered for the application	3	High	Krshnapriya
Sprint-1	Login page	USN-3	As a user, enter the username and password which is already existing	3	Medium	Bhavana
Sprint-1	Forecasting the weather	USN-4	As a user, we can monitor he weather conditions like humidity , temperature etc...	12	High	Deepika
Sprint-2	Sensing moisture condition of the soil	USN-5	As a user, we can know about soil moisture condition , controlling the motor pump for water flow by using mobile application.	10	High	Hemapriya
Sprint-3	Detecting the motion in certain range	USN-6	Fencing system are helpful in providing security against animals and birds.	12	High	Hemapriya
Sprint-4	Checking the crops conditions.	USN-7	Here farmer needs to update the condition of crops.	9	HIgh	Bhavana

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	8	6 Days	24 Oct 2022	29 Oct 2022	22	29 Oct 2022
Sprint-2	1	6 Days	31 Oct 2022	05 Nov 2022	10	05 Nov 2022
Sprint-3	2	6 Days	07 Nov 2022	12 Nov 2022	12	12 Nov 2022
Sprint-4	1	6 Days	14 Nov 2022	19 Nov 2022	9	19 Nov 2022

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

$$AV = \frac{sprint\ duration}{velocity}$$

=6/13.25

=0.45

- **CODING & SOLUTIONING**:

```
i
m
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m
p
o
rt
s
y
s
import ibmiotf.application # to install pip install ibmiotf
import ibmiotf.device

#Provide your IBM Watson Device
Credentials organization = "x0cl0i"
#replace the ORG ID deviceType =
"nodemcu"#replace the Device type wi
deviceId = "sensor"#replace Device ID
authMethod = "use-token-auth"
authToken = "6GsCaVQ3-PfYy+J3ts" #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']=='motor
        off':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'")



                                                                try:

    else:


output=cmd.data['message']print(output)

            deviceOptions = {"org": organization, "type":
        deviceType, "id": deviceId,"authmethod": authMethod,
        "auth-token": authToken}
```

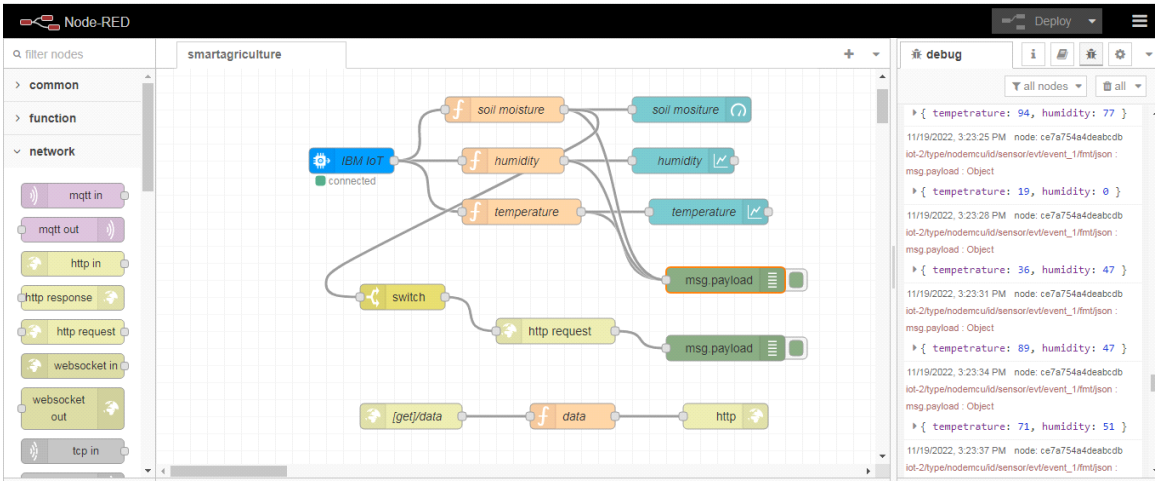
- deviceCl =- ibmiotf.device.Client(deviceOptions)
- i #.....

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

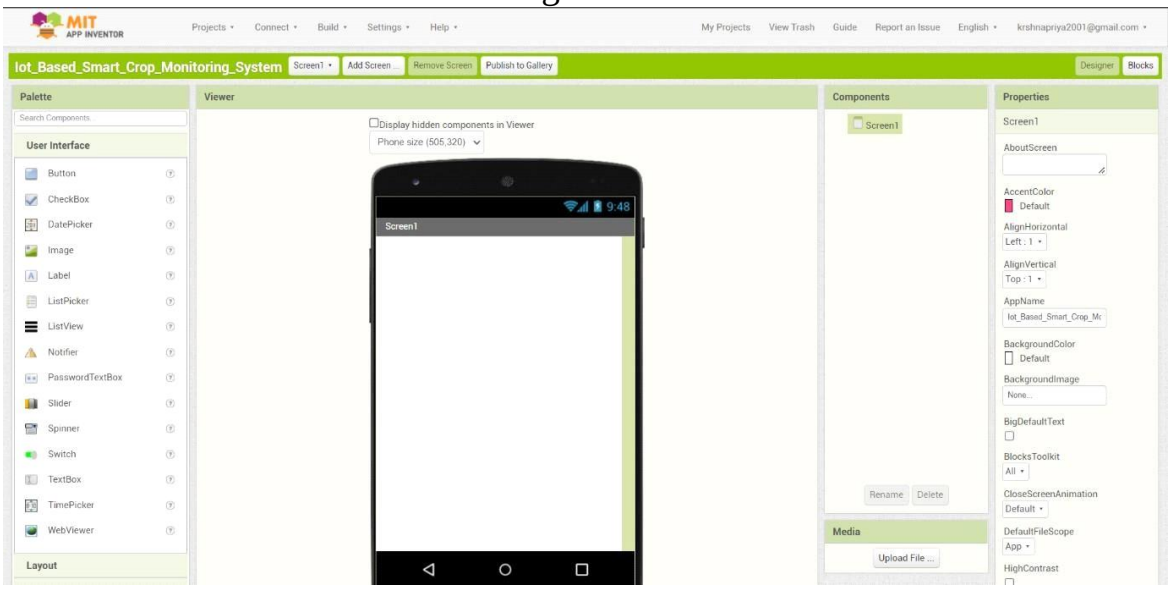
Connect and send a datapoint "hello" with value "world" into the cloud as an event of type"greeting" 10 times

```
deviceCli.connect()
while True:
        deviceCli.commandCallback =
myCommandCallback# Disconnect the
device and application from the cloud
deviceCli.disconnect()
```

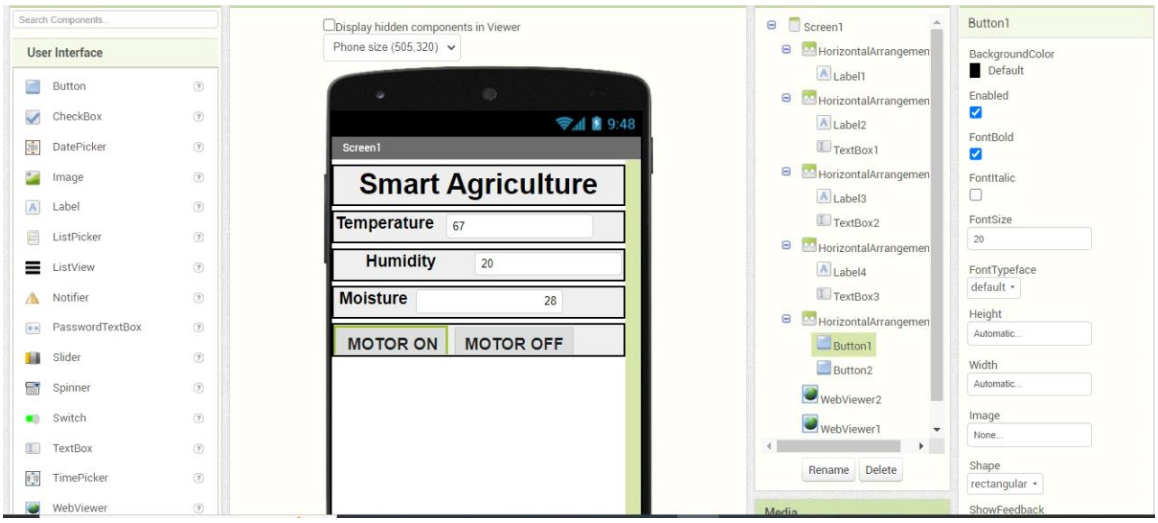
Node Red flow to get simulated data



MIT APP inventor to design the APP



Customize the App interface to Display the Values



- **<u>TESTING</u>**:

Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	11	4	2	2	19
Duplicate	1	1	2	0	4
External	2	3	0	1	6
Fixed	10	2	3	20	35
Not Reproduced	0	0	2	0	2
Skipped	0	0	2	1	3
Won't Fix	0	5	2	1	8
Totals	24	15	13	25	77

Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	5	0	1	4
Client Application	47	0	2	45
Security	3	0	0	3
Outsource Shipping	2	0	0	2
Exception Reporting	11	0	2	9
Final Report Output	5	0	0	5
Version Control	3	0	1	2

- **RESULT:**

We have successfully built an SMART FARMER-IOT BASED FARMING APPLICATION for Agriculture and integrated all the services using Node-RED.

- **ADVANTAGES & DISADVANTAGES:**

Advantages

* Farms can be monitored and controlled remotely.

* Increase in convenience to farmers.

* Less labor cost.

* Better standards of living.

Disadvantages

* Lack of internet/connectivity issues.

* Added cost of internet and internet gateway infrastructure

- **CONCLUSION:**

Thus the objective of the project to implement an IOT system in order to help farmers to control and monitor their farms has been implemented successfully.

- **FUTURE SCOPE**:

In future due to more demand of good and more farming in less time, for betterment of the crops and reducing the usage of extravagant resources like electricity and water IoT can be implemented in most of the places.

DONE BY:

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