PROJECT REPORT

Project Name: SMARTFARMER- IOT ENABLED SMART FARMING APPLICATION **Team ID:** PNT2022TMID34035

Team:

RAMPRIYA.N– TEAM LEAD

MUKELA.M

KALAIVANI.A

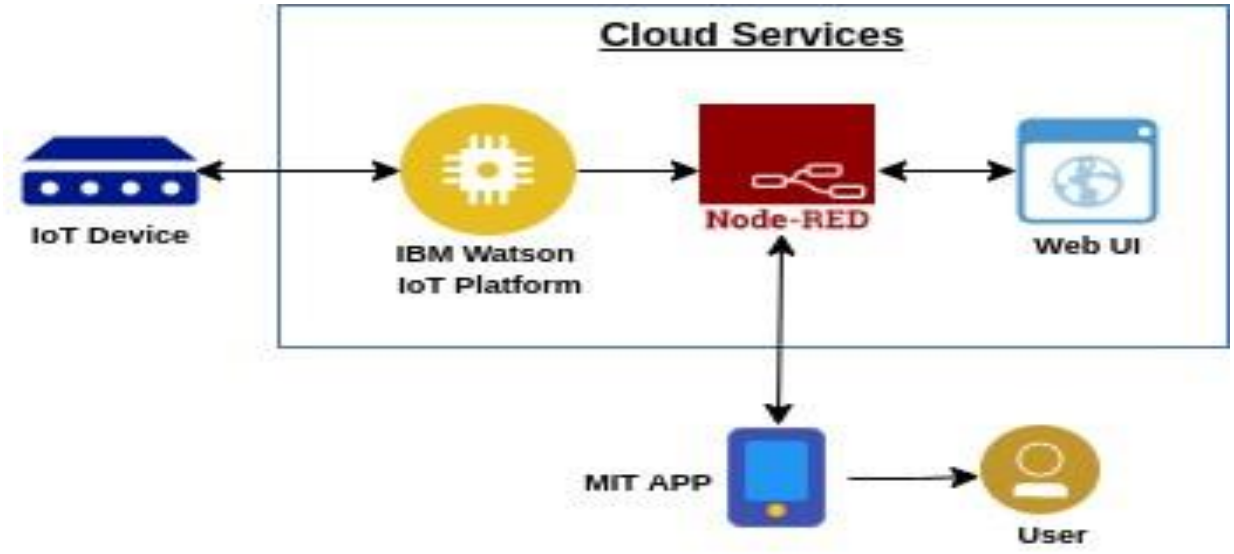
VISHATHINE.A

STELLA RUBY.K

1. INTRODUCTION

1.1 PROJECT OVERVIEW

IoT-based agriculture system helps the farmer in monitoring different parameters of his field like soil moisture, Temperature, 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.



1.2 PURPOSE

Smart farming **reduces the ecological footprint of farming.** Minimizing or site-specific application of inputs, such as fertilizers and pesticides ,in precision agriculture systems will mitigate leaching problem as well as the emission of green house gases.

2.LITERATURE SURVEY

2.2 Existing problem

Internet of Things has a strong backbone of various enabling technologies Wireless Sensor Networks, Cloud Computing, Big Data, Embedded Systems, Security Protocols and Architectures, Protocols enabling communication, web services, Internet and Search Engines. The enabling of Wireless Sensor Network (WSN): It consists of various sensors/nodes which are integrated together to monitor various sorts of data .Cloud Computing: Cloud Computing also known as on-demand computing is a type of Internet based computing which provides shared processing resources and data to computers and other devices on demand. They can be in different forms like IaaS, PaaS ,SaaS, DaaS etc. Big Data Analytics: Big data analytics is the process of examining large datasets containing various forms of data types—i.e. Big Data – to uncover hidden patterns ,unknown correlations, market trends, customer preferences and other useful business information .Communication Protocols: They form the backbone of IoT systems to enable connectivity and coupling to applications and these protocols facilitate exchange of data over the network as these protocols enable data exchange formats, data encoding and addressing. Embedded Systems: It is a sort of computer system which consists of both hardware and software to perform specific tasks. It includes microprocessor/microcontroller, RAM/ROM, networking components, I/O units and storage device

To successfully deploy a smart agriculture system, consider setting up a communications network that can integrate a limited number of sensors across a large area of farmland. This will require third-party network provisioning or setting up a private network consisting of access points and uplinks to a private backhaul network, which channels all the data traffic to centralized monitoring software or an analytics head-end system

- It is not a secure system.
- There is no motion detection for protection of agriculture field.
- Automation is not available.

2.2 References

[1] Pradyumna Gokhale, Omkar Bhat, Sagar Bhat,"Introduction to IOT", International Advanced Research Journal in Science, Engineering and Technology (IARJ SET), Vol. 5, Issue 1, January 2018.

[2] Brian Gilmore,"The Next Step in Internet Evolution: The Internet of Things", Internet of Things, cmswire, Jan 2014.

[3] A.Anusha, A.Guptha, G.Sivanageswar Rao, Ravi Kumar Tenali, "A Model for Smart Agriculture Using IOT", International Journal of Innovative Technology and Exploring Engineering (IJITEE),ISSN: 2278-3075, Volume-8 Issue-6, April 2019.

[4] Muthunoori Naresh, P Munaswamy," Smart Agriculture System using IoT Technology", International Journal of Recent Technology and Engineering (IJRTE), ISSN: 2277-3878, Volume-7 Issue-5, January 2019.

[5] Nikesh Gondchawar, Prof. Dr. R. S. Kawitkar, "IOT based smart agriculture", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 5, Issue 6, June 2016.[6] Anand Nayyar, Er. Vikram Puri," Smart Farming: IoT Based Smart Sensors Agriculture Stick for Live Temperature and Moisture Monitoring using Arduino, Cloud Computing & Solar Technology november 2016.

2.3 Problem Statement Definition

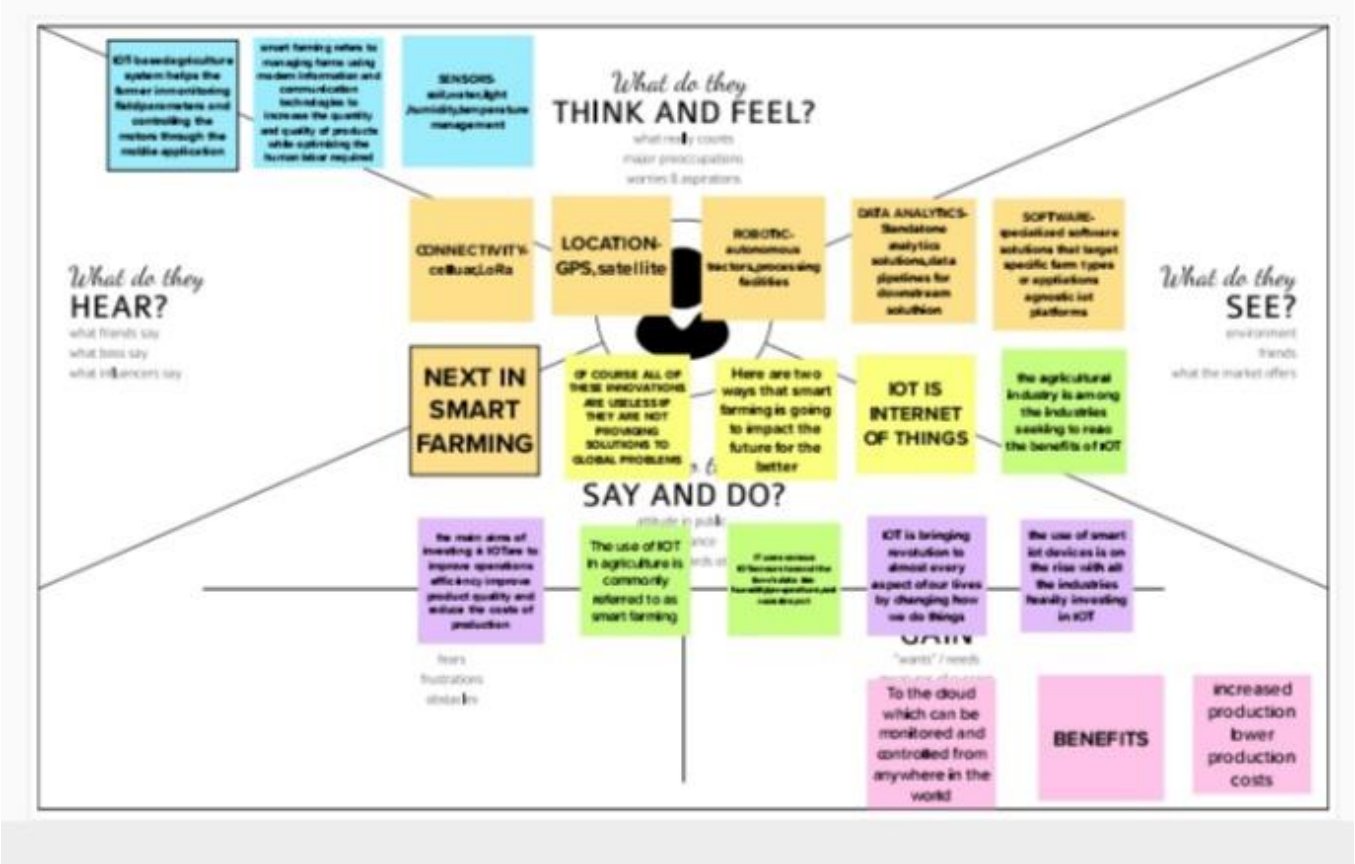
Ideally, each field should get just the right amount of water at just the right time. Under-watering causes crop stress and yield reduction. Overwatering can also cause yield reduction and consumes more water and fuel than necessary and leads to soil erosion and fertilizer, herbicide, and pesticide runoff.

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map canvas serves as a foundation for outstanding user experiences, which focus on providing the experience customers want rather than forcing design teams to rely on guesswork.

Empathy map canvases help identify exactly what it is that users are looking for so brands can deliver. They can be particularly beneficial for getting teams on the same page about who users are and what they want from the brand.



3.2 Ideation and Brainstorming

Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity. Brainstorming is usually conducted by getting a group of people together to come up with either general new ideas or ideas for solving a specific problem or dealing with a specific situation.

For example, a major corporation that recently learned it is the object of a major lawsuit may want to gather together top executives for a brainstorming session on how to publicly respond to the lawsuit being filed.

Participants in a brainstorming session are encouraged to freely toss out whatever ideas may occur to them. The thinking is that by generating a large number of ideas, the brainstorming group is likely to come up with a suitable solution for whatever issue they are addressing.

The lines between ideation and brainstorming have become a bit more blurred with the development of several brainstorming software programs, such as Brightidea and Ideawake. These software programs are designed to encourage employees of companies to generate new ideas for improving the companies' operations and, ultimately, bottom-line profitability.

The programs often combine the processes of ideation and brainstorming in that individual employees can use them, but companies may simulate brainstorming sessions by having several employees all utilize the software to generate new ideas intended to address a specific purpose.

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- **10 minutes** to prepare
- **1 hour** to collaborate
- **2-8 people** recommended

Share template feedback

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A **Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B **Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.

C **Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

1

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

How might we [your problem statement]? Smart farming is about using the new technologies which have arisen at the dawn of the Fourth Industrial Revolution in the areas of agriculture and cattle production to increase production quantity and quality, by making maximum use of resources and minimising the environmental impact.

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Defer judgment.
- Go for volume.
- Encourage wild ideas.
- Listen to others.
- If possible, be visual.

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 (switch to sketch) icon to start drawing!

RAM PRIYA

VISHATHINE

MUKELA

KALAIVANI

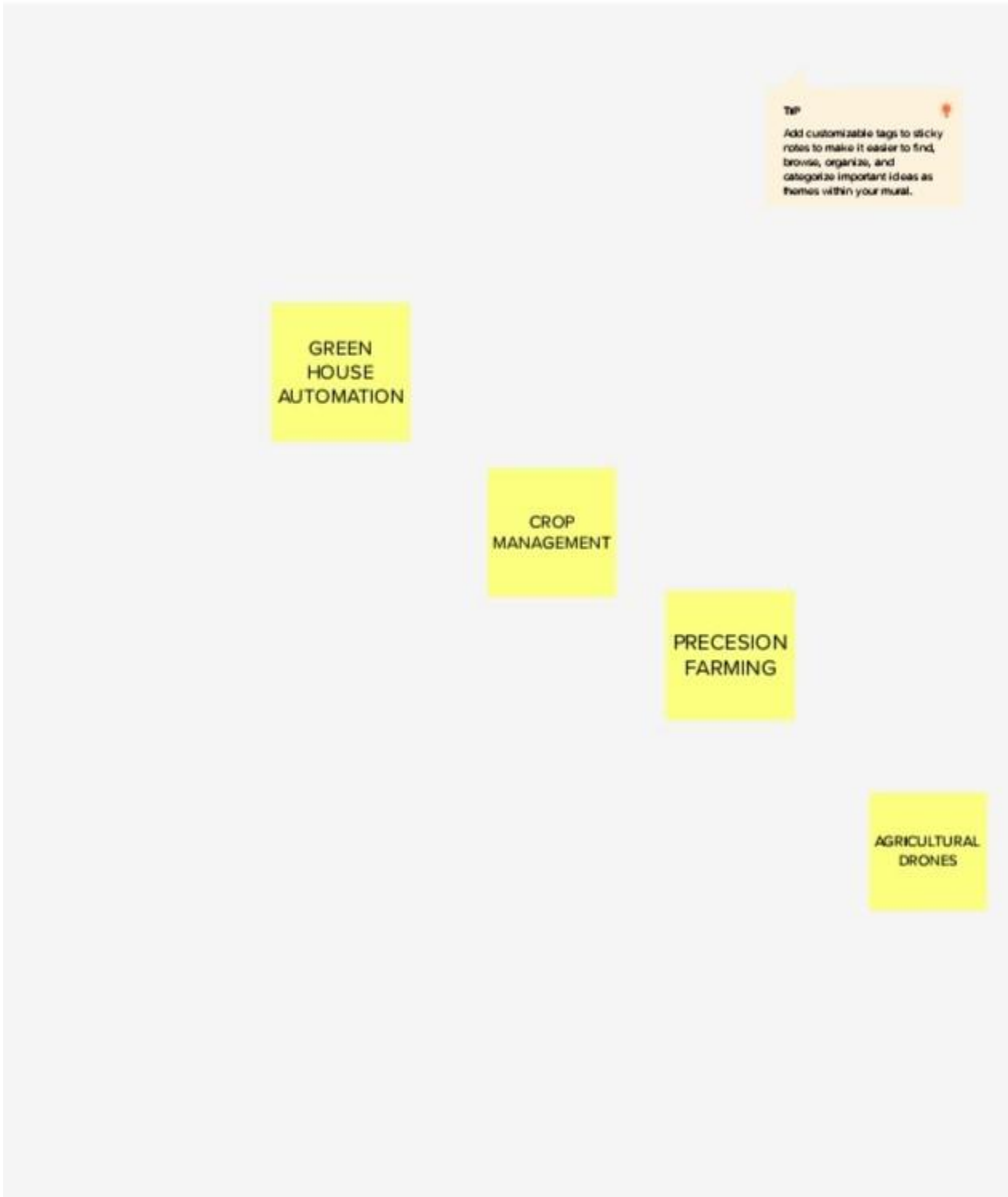
STELLARUBY

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

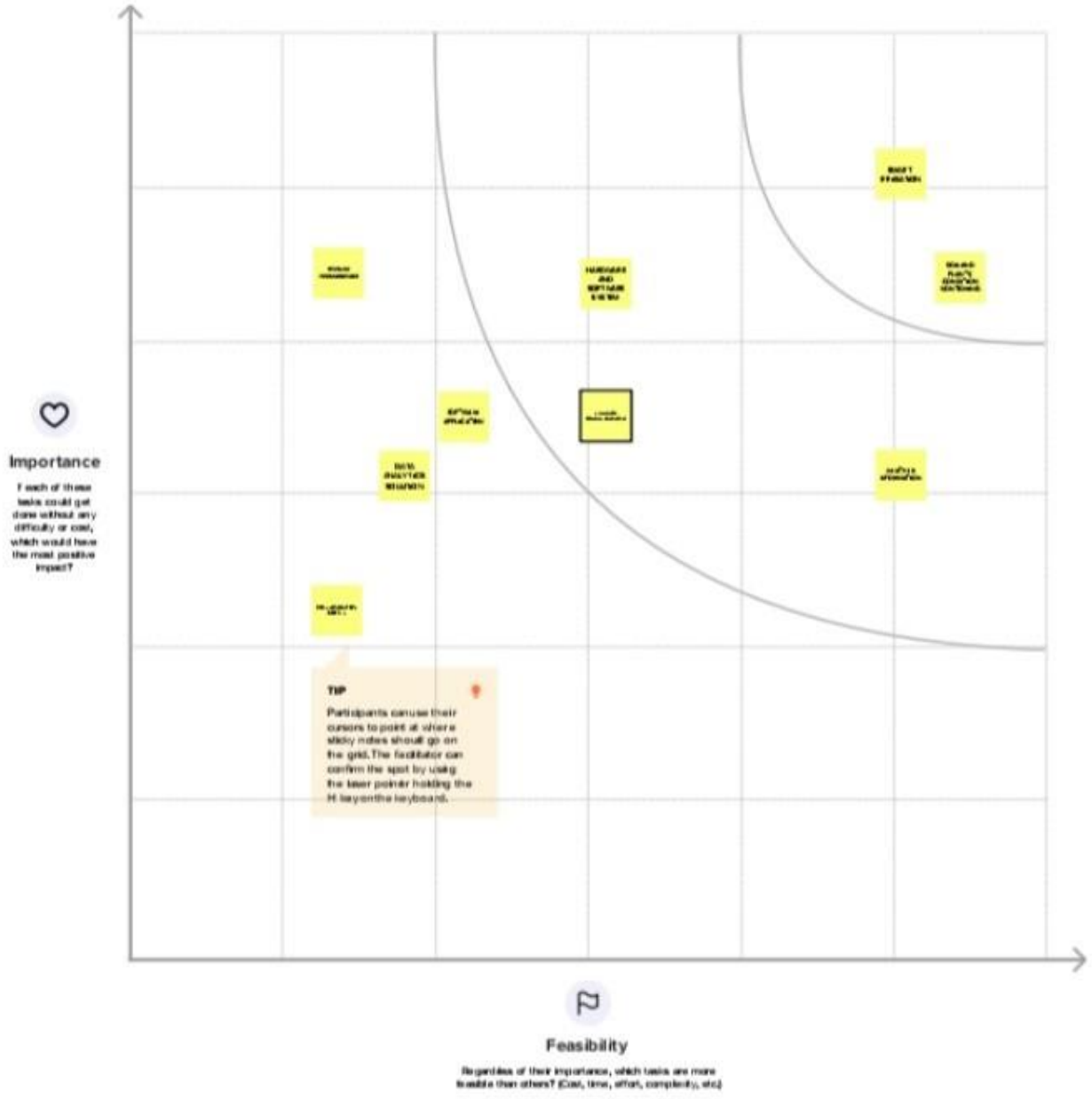


4

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



After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

A **Share the mural**
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

B **Export the mural**
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint
Define the components of a new idea or strategy.

Open the template →

Customer experience journey map
Understand customer needs, motivations, and obstacles for an experience.

Open the template →

Strengths, weaknesses, opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.

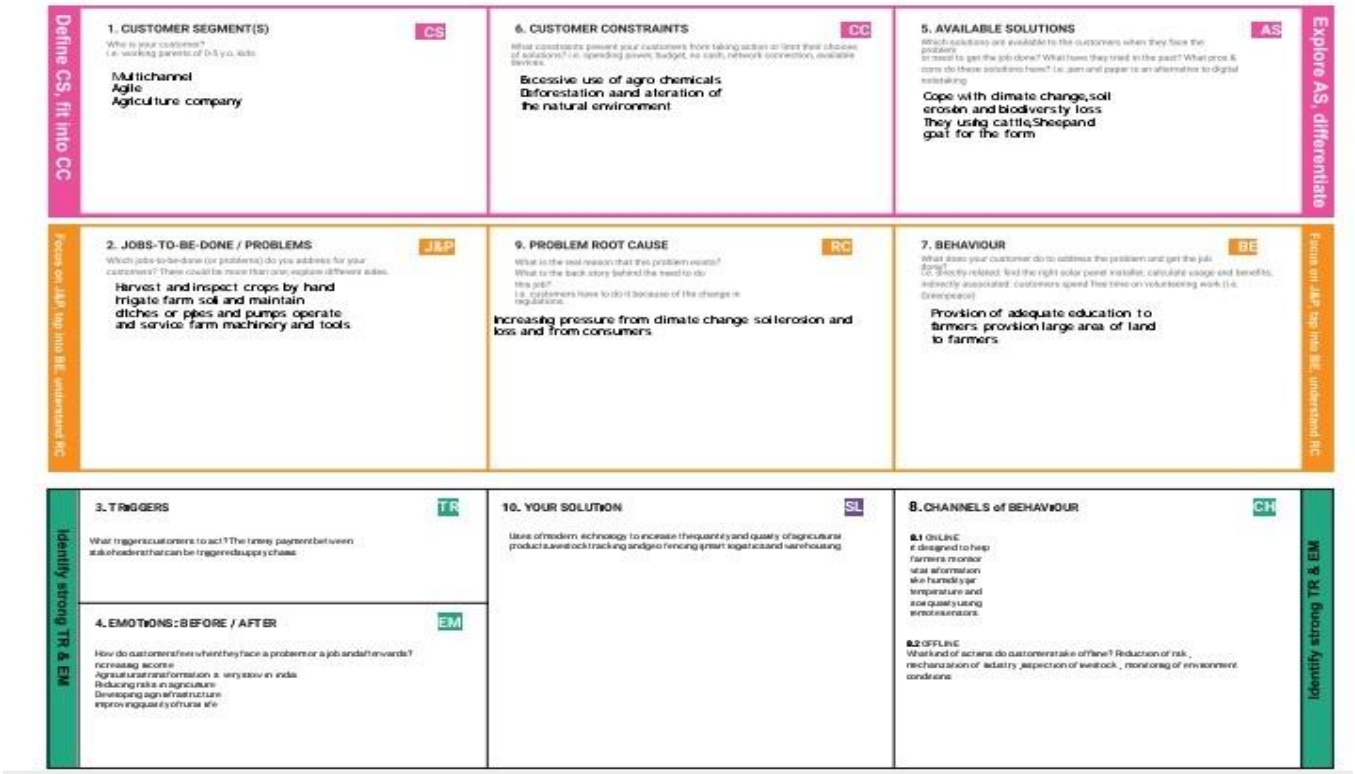
Open the template →

Share template feedback

3.3.PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	A problem statement is a concise description of an issue to be addressed or a condition to be improved upon
2.	Idea / Solution description	If we take tha simplest definition of an idea solution , then it is described as a homogeneous solution where the interaction between molecules of components is exactly the same to the interaction between the molecules
3.	Novelty / Uniqueness	Novelty is a synonyms of uniqueness. As noun the difference between novely and uniqueness is that novelty is the state of being new or novel;newness while uniqueness is the stste or quality of being unique or one-of-a-kind
4.	Social Impact / Customer Satisfaction	The impact of corporate social responsibility on customer loyality. The medisting role of corporate reputation on customer satisfaction and trust
5.	Business Model (Revenue Model)	A business starts with an idea of how to generate value for a customer. So if it's a personal looking for a table , we can produce a table, market it, shipit, receive payment for it and, that's our business model
6.	Scalability of the Solution	Scalability is an aspect or rather a functional quality of a system software or a solution. A system that can accommodate expansion without hampering the existing workflow and ensure an increase in tha output of efficiency of the process, is a scalable system.

3.4 PROBLEM FIT SOLUTION



4.Requirement Analysis

4.1 Functional Requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Monitoring climate change	The system can be implemented directly in felid to altert climate change
FR-2	Green house automation	In order to provide real time monitoring control crop growth
FR-3	Crop management	It sowing of seeds ,continues with crop growth ,crop health and soil health
FR-4	Precision farming	farming management concept based on observing, measuring and responding to inter and intra-field variability in crops
FR-5	Agricultural drones	Agricultural drones provide information on crop growth stages, crop health, and soil variations
FR-6	Automating the irrigation system	the use of a device to operate irrigation structures so the change of flow of water from bays can occur in the absence of the irrigator

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Usable systems are straightforward to use by as many people as possible, whether this is end-users of a website, or administrators and content editors working with a back-end system.
NFR-2	**Security**	Security is a non-functional requirement assuring all data inside the system its part will be protected against malware attacks or unauthorized access.
NFR-3	**Reliability**	Reliability specifies how likely the system its element would run without a failure for a given period of time under predefined conditions.
NFR-4	**Performance**	In other words, a non-functional requirement will describe how a system should behave and what limits there are on its functionality.

5. PRODUCT DESIGN

5.1 DATA FLOW DIAGRAMS

A **data-flow diagram** is a way of representing a flow of data through a process or a system (usually an information system). The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow — there are no decision rules and no loops. Specific operations based on the data can be represented by a flowchart.[1]

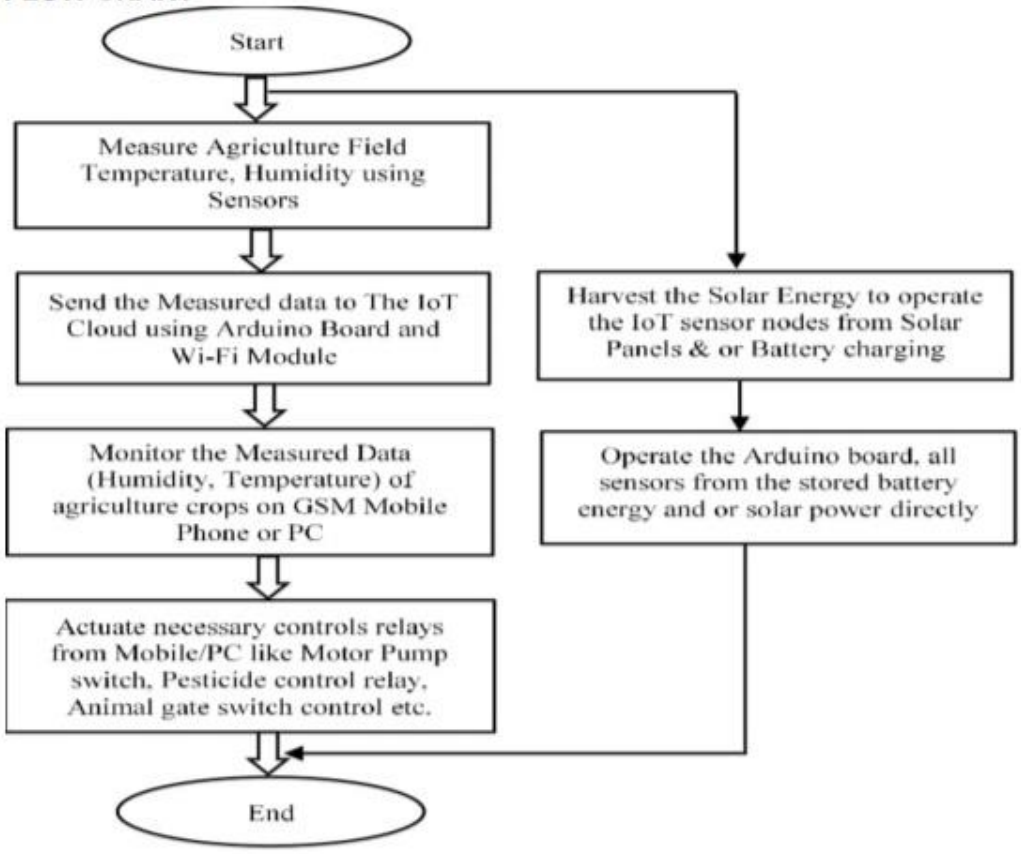
There are several notations for displaying data-flow diagrams. The notation presented above was described in 1979 by Tom DeMarco as part of structured analysis.

For each data flow, at least one of the endpoints (source and / or destination) must exist in a process. The refined representation of a process can be done in another data-flow diagram, which subdivides this process into sub-processes.

The data-flow diagram is a tool that is part of structured analysis and data modeling. When using UML, the activity diagram typically takes over the role of the data-flow diagram. A special form of data-flow plan is a site-oriented data-flow plan.

Data-flow diagrams can be regarded as inverted Petri nets, because places in such networks correspond to the semantics of data memories. Analogously, the semantics of transitions from Petri nets and data flows and functions from data-flow diagrams should be considered equivalent.

FLOW CHART


Start
Measure Agriculture Field Temperature, Humidity using Sensors
Send the Measured data to The IoT Cloud using Arduino Board and Wi-Fi Module
Monitor the Measured Data (Humidity, Temperature) of agriculture crops on GSM Mobile Phone or PC
Actuate necessary controls relays from Mobile/PC like Motor Pump switch, Pesticide control relay, Animal gate switch control etc.
Harvest the Solar Energy to operate the IoT sensor nodes from Solar Panels & or Battery charging
Operate the Arduino board, all sensors from the stored battery energy and or solar power directly
End

5.2 SOLUTION AND TECHNICAL ARCHITECTURE

Our technology environment is evolving quickly while changing business requirements at a dramatic pace. In order to keep up with the digital transformation and align their business strategy with new technology solutions, companies need to rely on specific expertise. That's where IT architects and to some degree also business architects come into play.

But what is the difference between an enterprise architect vs. solution architect?

And why can't an enterprise architect and a technical architect alone guarantee the successful execution of an IT project?

While enterprise architects define strategic directions, solution architects bridge the gap between business requirements and the implementation of technology solutions. Past experiences have shown that link without this, almost half of all IT projects tend to fail.

Solution Architecture:

The main goal of this Smart Farming is to optimize the harvesting land per unit by Using modern methods to achieve best in terms of quality, quantity and financial return. The term Smart farming is also known as Precision Farming which uses a wide range of Technologies, including GPS services, sensors and etc. These technologies are very much Required in agriculture sector Includes with climate forecasting, robotics, science based Solutions, environmental controls and etc.

1. Different agricultural parameters like Temperature, Wind, Humidity, and Moisture can be Controlled and monitored by using sensors.

2.Generates and Schedules a plan for irrigation and fertilization.

3.Data can be obtained through wireless speckles.

4.Provides external memory interface for the purpose of feeding and desertification.

5.Provides awareness to the farmers by alerting while he is away from the field.

6.controls the equipments in the field through sensor devices like mobile phones, Tablets,

Computers etc.

STAKEHOLDERS NETWORK

In view of the technical changes brought forth by Big Data and Smart Farming, We seek to understand the stakeholder network around the farm. The literature suggests Major shifts in roles and power relations among different players in existing agri-food chains. We observed the changing roles of old and new software suppliers in relation to Big Data and Farming and emerging landscape of data-driven initiatives with prominent role of big tech And data companies like Google and IBM.

CHARACTERITICS

1.Passion and Commitment.

2.Sales and Marketing Skills Ingenuity.

3.Creativity and Adaptability.

4.Life-long Learner Skills and Abilities.

FEATURES

1. Livestock tracking and Geo fencing.
2. Smart logistics and warehousing**.**
3. Smart pest management.

SOLUTION AND TECHNICAL ARCHITECTURE DIAGRAM

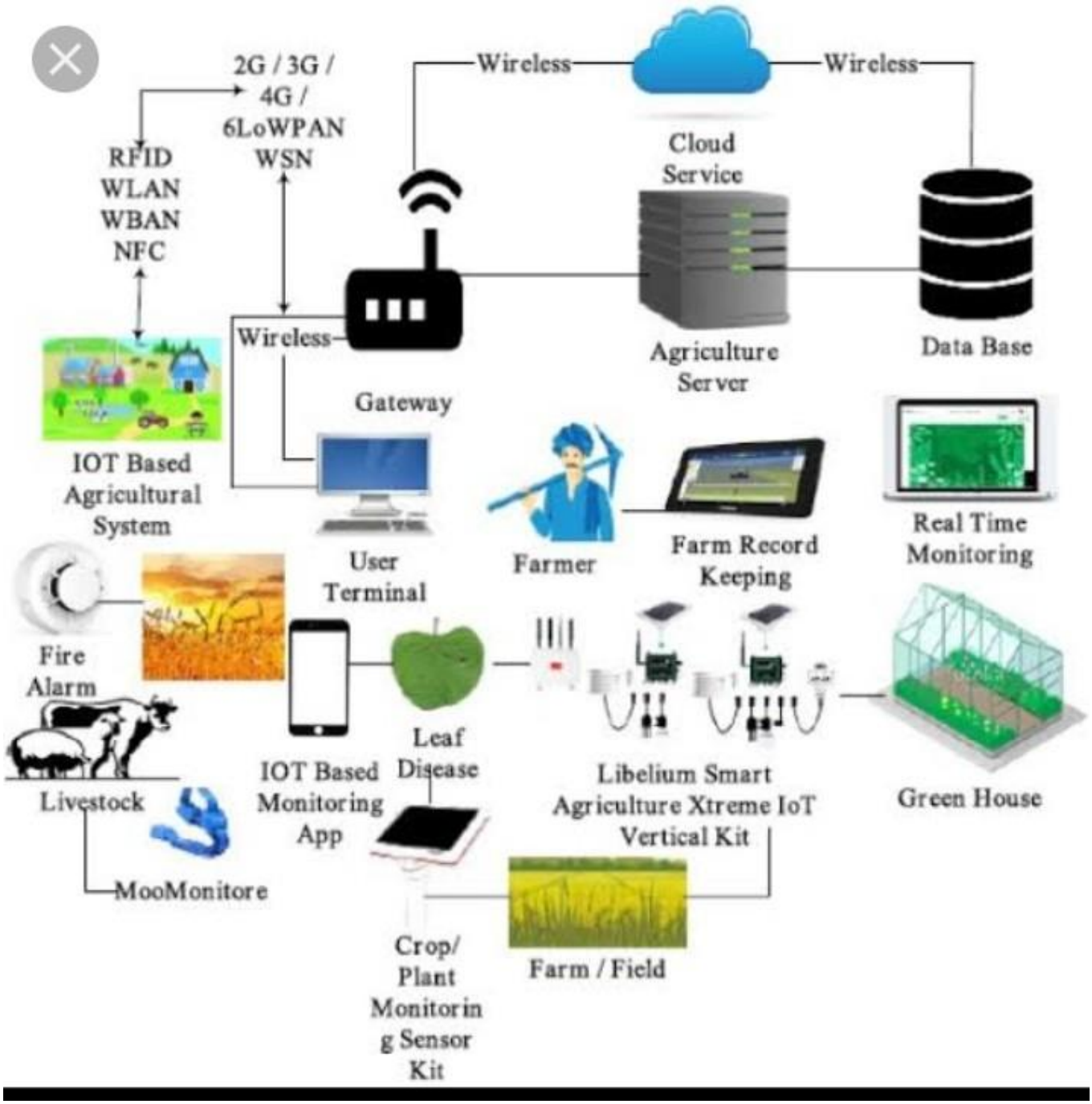

2G / 3G / 4G / 6LoWPAN WSN
RFID WLAN WBAN NFC
Wireless
Wireless
Cloud Service
Wireless
Agriculture Server
Data Base
Gateway
IOT Based Agricultural System
User Terminal
Farmer
Farm Record Keeping
Real Time Monitoring
Fire Alarm
Leaf Disease
IOT Based Monitoring App
Libelium Smart Agriculture Xtreme IoT Vertical Kit
Green House
Livestock
MooMonitore
Crop/ Plant Monitoring Sensor Kit
Farm / Field

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	DATA WRAPPER	offers a genericway to describe characteristics of sensors using sensory meta-data, containing general information about the data stream.A semantic annotation module enables to annotate the parsedsensory data	City Pulse
2.	DEVICE MANAGER	automatically manages IoT devices, removing the need forhuman operators, providing the necessary tools for autonomicmanagement processes to enforce decisions at a later stage.Manages device identity and authorization, considers reliabil-ity of data streams (e.g. real-time checking if values fall intospecific limits) and fault recovery.	FIWARE IoT Back-end
3.	DISCOVERY MODULE	en-sures scalable registration and discovery of IoT devices andservices in real-time, in a plug and play way. These devicescan be either located at the same physical space (e.g. insidethe farm) or remotely, accessed through the internet/web	FIWARE IoT Edge
4.	DATA AGGREGATION	deals with largevolumes of data using time series analysis and data compres-sion techniques to reduce the size of raw sensory observationsdelivered by the data wrappers.	IoT-A

5.	DATA FEDERATION	answers users'queries, e.g. the amount of fertilizer needed to apply over somearea. This component first finds relevant streams according tothe requirements specified in the request. Then, it translatesusers' requests into RDF Stream Processing (RSP) queriesand evaluates the queries to obtain results	City Pulse
6.	EVENT DETECTION	provides tools forprocessing annotated and aggregated data streams to obtainfarm events, such as need for irrigation, sick animals or pestidentification in crops.	City Pulse
7.	REAL TIME ADAPTIVE REASONING	takes into account farmer's preferences and dynamic contex-tual farm-related information	City Pulse
		(represented by real-time events),in order to provide optimal decision support in real-time.	
8.	EXTERNAL AGENT	addresses interoperability, device heterogeneity, datahandling and protocol adaptation. Plays an important role forvirtualising objects, services, methods and processes, consid-ering user's identity and authorization.	Agri-IoT in-house devel-oped
9.	DASH BOARD	providesimmediate and intuitive visual access to the results of process-ing and analysis of data and events.	Thing Speak, freeboard

10.	MOBILE APP	arebuilt on top of the other components, similarly to the dash-board, and use their APIs to offer various services to theirmobile users, either to the farmers for real-time informationand fast decision making, or to the consumers and transportagents at the sales points for more transparency	Map Your Meal, Food Loop.
11.	KNOWLEDGE BASE	provides servicemetadata for sensor/data stream discovery.	Open IoT.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Predictive analytics for crops and livestock	IoT in smart farming is not restricted to a particular section. Smart farming sensors can be placed right in the ground. There, it shall read and analysis the derived data and help improve farming practices.	radio frequency identification (RFID) technology
2.	Remote crop and soil monitoring	With the help of smart farming system, moisture and fertility of soil along with crops growth rate can be monitored remotely through real time animation and graphics via a smartphones	Global navigation satellite system
3.	Remote equipment monitoring	Tractors, pickups and harvesting machines and equipment are IoT enables with sensors. Installing, provisioning and managing IoT endpoints, securely and reliably connecting the same.	Remote monitoring technology

S.No	Characteristics	Description	Technology
		Ingesting, managing, curating and analyzing IoT data can be done remotely.	

4.	Sensor based field and resource mapping	With the help of IoT smart farming systems, one can use sensors to map and keep track of the entire farm. This also includes the stats of the human resources, tools and institutional assets.	Ground based platform
5.	Stats on livestock feeding and produce	Feeding patterns of the cattle often predict if there is any illness round the bend. Quality produce of milk and protein depends on the amount and quality consumption of the cattle.	Life cycle assessment

6.PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

TITLE	DESCRIPTION	DATE
Literature survey & Information Gathering	Literature review on the chose project and information gathering using reference from IEEE papper	27 September 2022
Prepare Empathy map	Get an Empathy map canvas ready to record the user's gain and pain and also prepare list of problem statements	24 September 2022
Brainstorming ideas	List the ideas by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance	7 October 2022
Proposed Solution	Prepare the proposed solution document which include the novelty, workable of idea, business pattern, social clash and so on	7 October 2022
Problem Solution fit	Prepare problem-solution fit document	8 October2022
Solution Architecture	Prepare solution architecture document	9 October 2022
Sprint delivery	Prepare the sprint delivery on number of sprint meetings organized, minutes of meeting recorded	17 November 2022

Customer Journey	Prepare the customer journey maps to understand the user interaction & experience with the application	27 October 2022
Data flow Diagram	Create the data flow diagram, then submit them for evaluation	20 October 2022
Technology Architecture	Prepare the technology by using the architecture diagram	20 October 2022
Prepare Milestone & Activity list	Prepare the milestones & activity list of the project	17 November 2022
Project development – delivery of sprint-1,2,3 &4	Develop & submit the developed code by testing it	17 November 2022

7.CODING AND SOLUTIONING

7.1 FEATURES – DEVELOPMENT OF SPRINT-1

```
import time import os
import datetime import
random myConfig = {
"identity": {
"orgId": "m5ttid",
"typeId": "Devicel",
"deviceId": "12345"
},
"auth": {
"token": "12345678"
} }
client = wiotp.sdk.device.DeviceClient (config=myConfig,
logHandlers=None) client.connect () def
myCommandCallback (cmd) :
print ("Message received from IBM IoT Platform: %s" %
cmd.data['command']) m=cmd.data['command'] if
(m=="motoron"):
print ("Motor is switched on") elif
(m=="motoroff"):
print ("Motor is switched OFF")
print (" ") while
True:
soil=random.ra
ndint (0,100)
temp=random.r
```

andint (-20,

125)

[14:49, 11/19/2022] Pappa B: hum=random.r

andint (0, 100)

myData={'soil

moisture': soil,

'temperature':te

mp,

'humidity':hum

}

client.publishE

vent

(eventId="statu

s",

msgFormat="js

on",

data=myData, qos=0 , onPublish=None) print

("Published data Successfully: %s", myData)

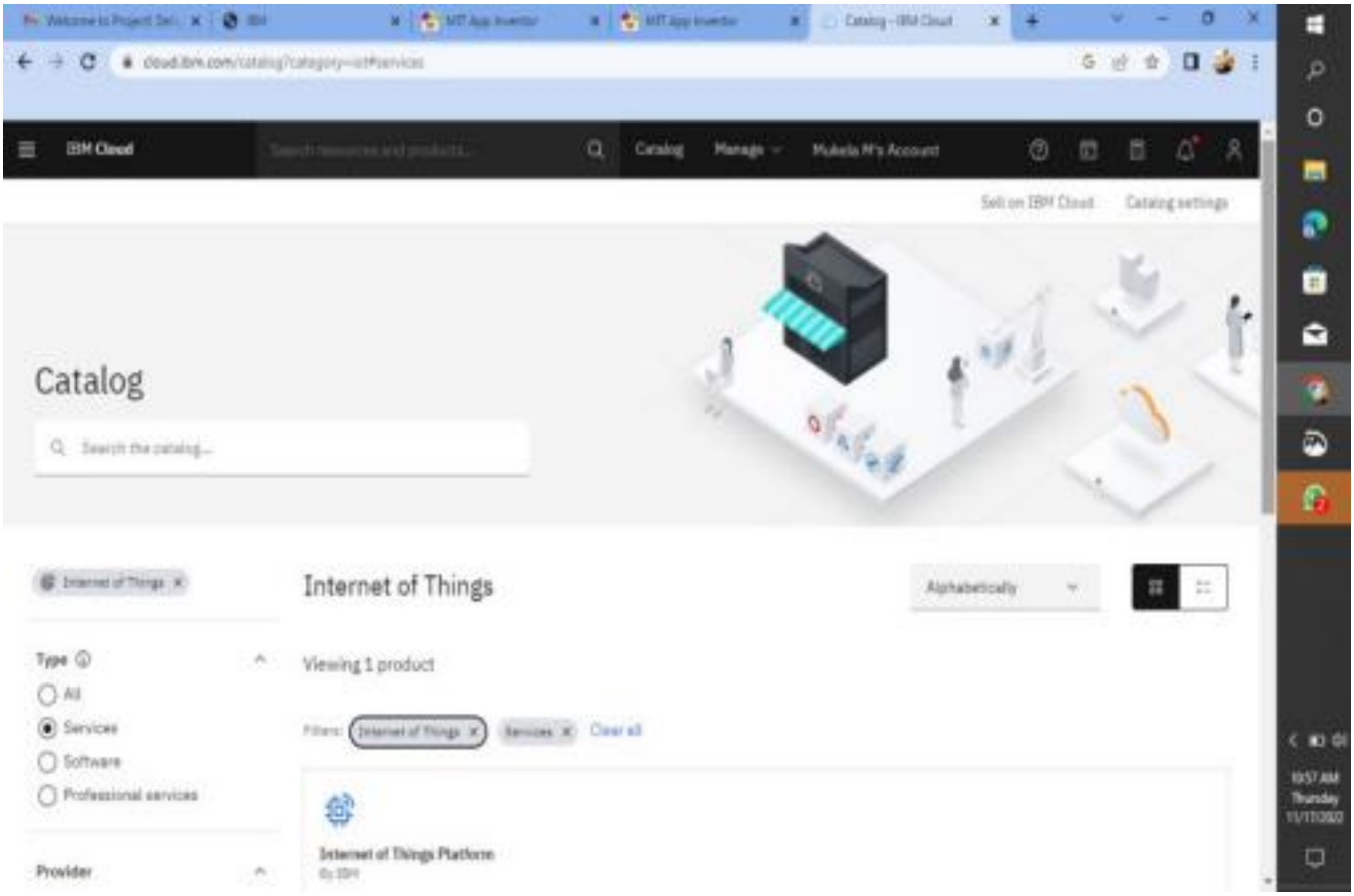
time.sleep (2)

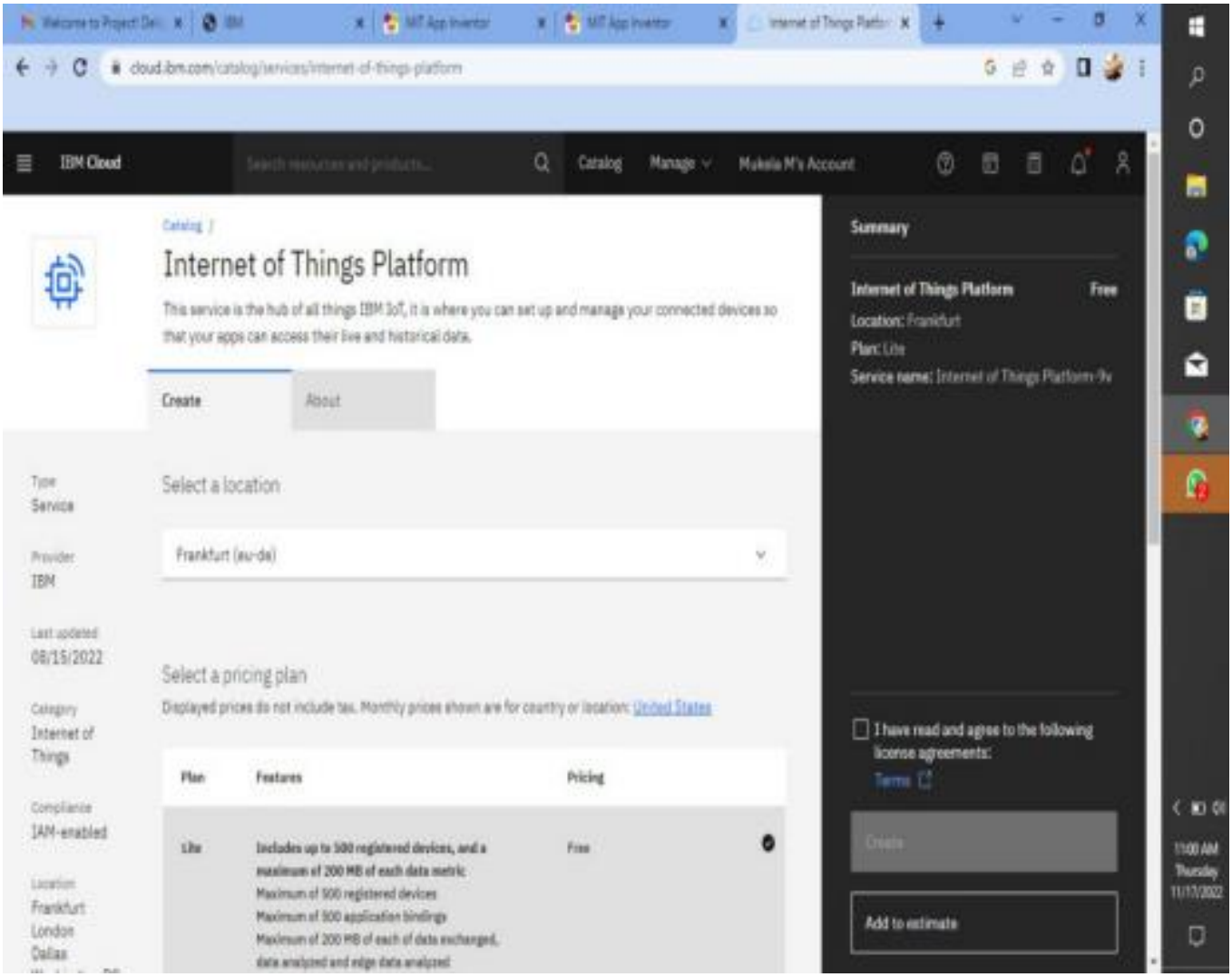
client.commandCallback = myCommandCallback

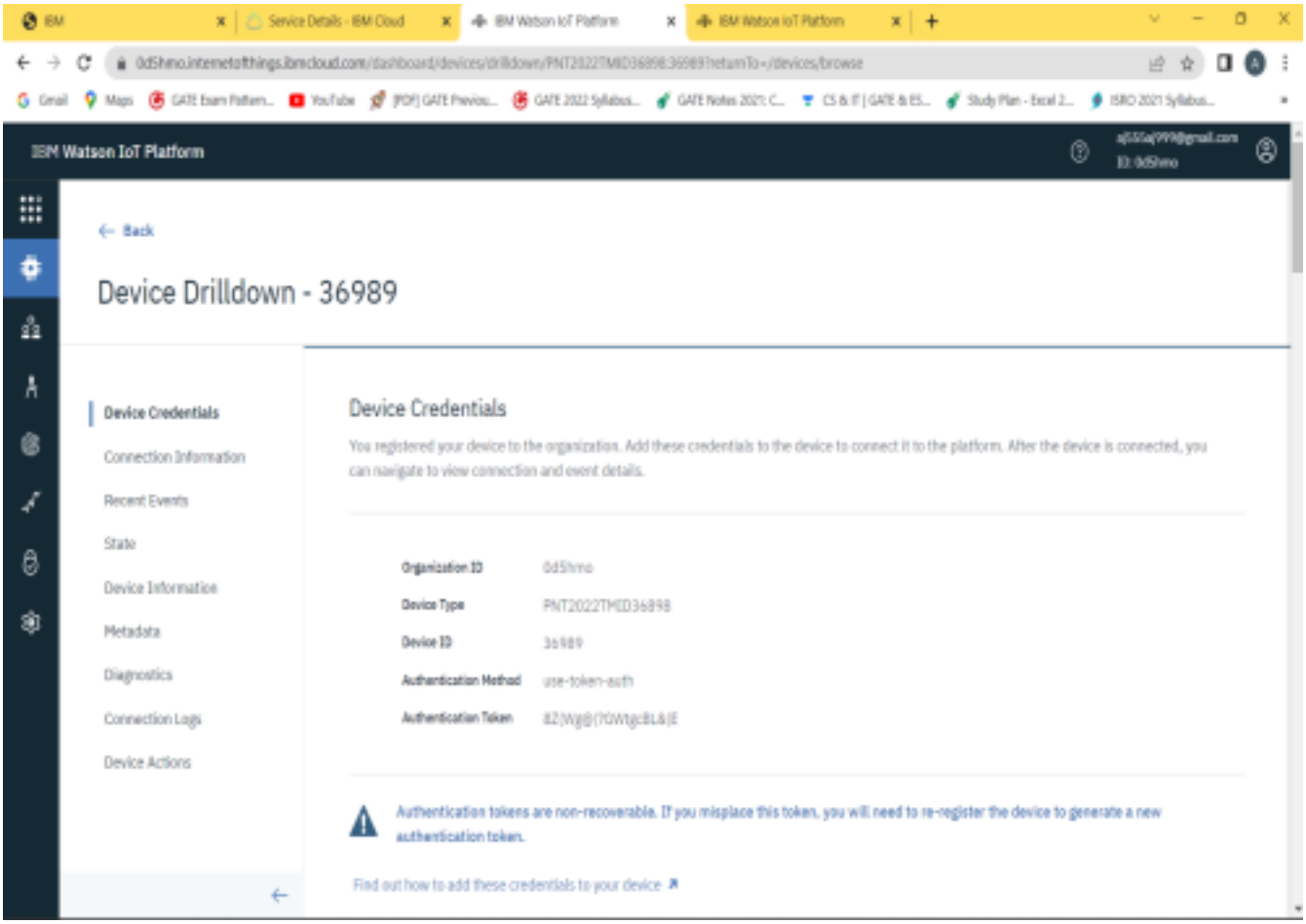
client.disconnect ()

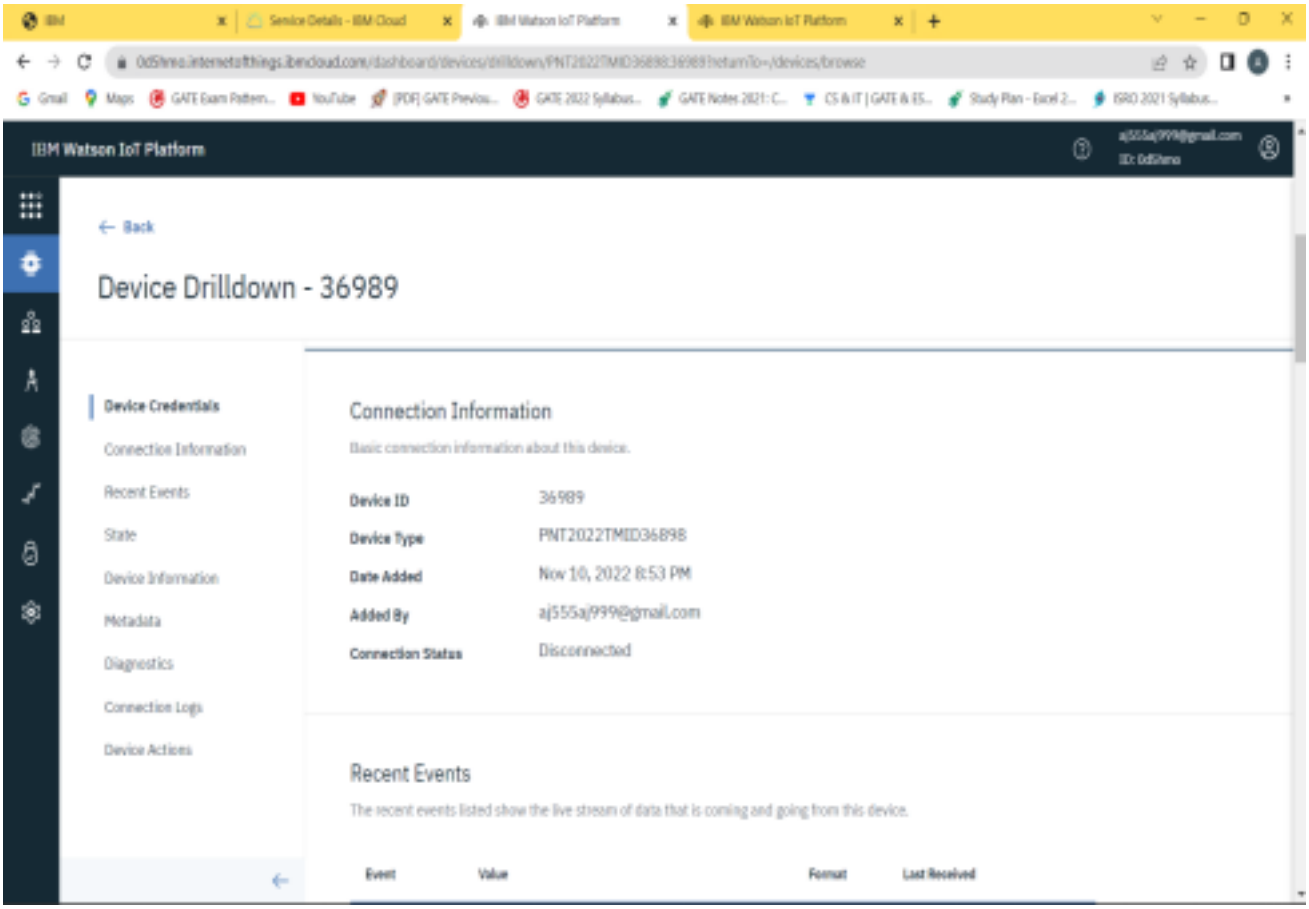

My Home
Temperature
Start
Go!
Step
Level A
Energy Consumption
LED

SPRINT-1


IBM Cloud
Catalog
Manage
Mukela M's Account
Sell on IBM Cloud
Catalog settings
Catalog
Search the catalog...
Internet of Things
Alphabetically
Type
All
Services
Software
Professional services
Viewing 1 product
Filters:
Internet of Things
Services
Clear all
Internet of Things Platform
Provider


cloud.ibm.com/catalog/services/internet-of-things-platform
IBM Cloud
Catalog
Manage
Mukela M's Account
Catalog /
Internet of Things Platform
This service is the hub of all things IBM IoT, it is where you can set up and manage your connected devices so that your apps can access their live and historical data.
Create
About
Type
Service
Provider
IBM
Last updated
08/15/2022
Category
Internet of Things
Compliance
IAM-enabled
Location
Frankfurt
London
Dallas
Select a location
Frankfurt (eu-de)
Select a pricing plan
Displayed prices do not include tax. Monthly prices shown are for country or location: United States
Plan
Features
Pricing
Lite
Includes up to 500 registered devices, and a maximum of 200 MB of each data metric
Maximum of 500 registered devices
Maximum of 500 application bindings
Maximum of 200 MB of each of data exchanged, data analyzed and edge data analyzed
Free
Summary
Internet of Things Platform
Free
Location: Frankfurt
Plan: Lite
Service name: Internet of Things Platform-9v
I have read and agree to the following license agreements:
Terms
Create
Add to estimate
11:00 AM
Thursday
11/17/2022

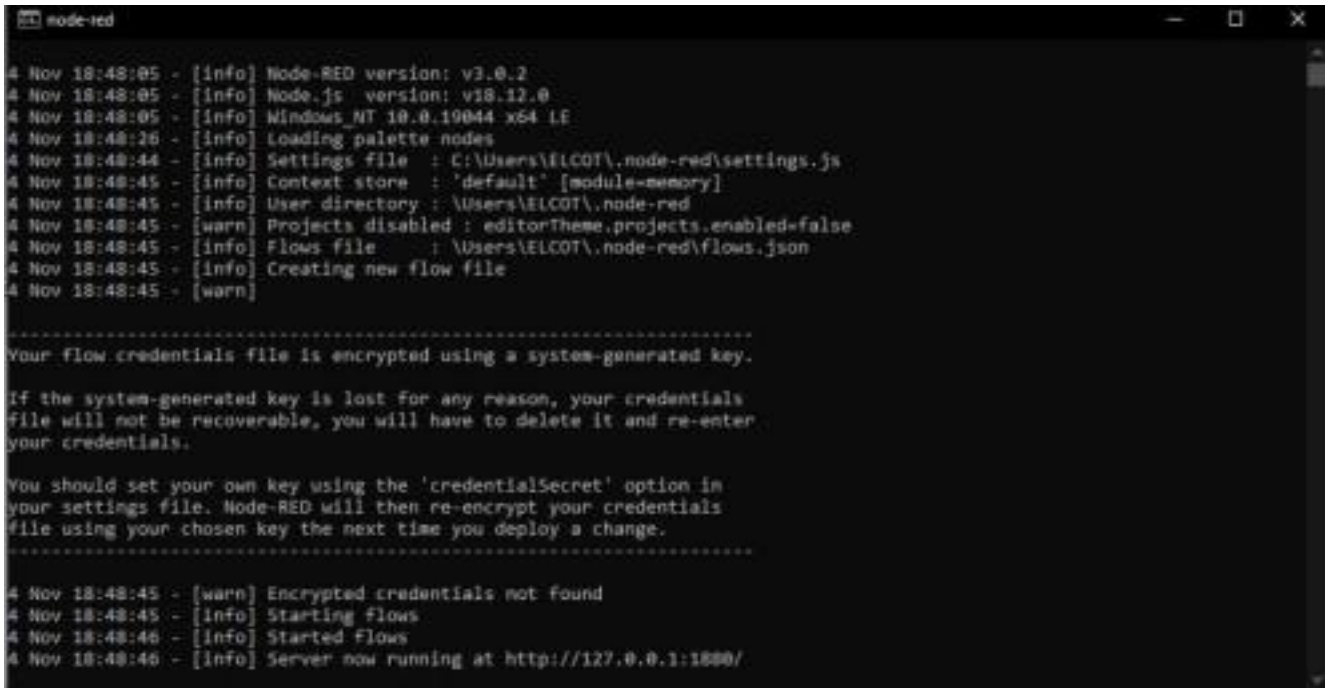

IBM Watson IoT Platform
Back
Device Drilldown - 36989
Device Credentials
Connection Information
Recent Events
State
Device Information
Metadata
Diagnostics
Connection Logs
Device Actions
Device Credentials
You registered your device to the organization. Add these credentials to the device to connect it to the platform. After the device is connected, you can navigate to view connection and event details.
Organization ID
Device Type
Device ID
Authentication Method
Authentication Token
Authentication tokens are non-recoverable. If you misplace this token, you will need to re-register the device to generate a new authentication token.
Find out how to add these credentials to your device


IBM Watson IoT Platform
Back
Device Drilldown - 36989
Device Credentials
Connection Information
Recent Events
State
Device Information
Metadata
Diagnostics
Connection Logs
Device Actions
Connection Information
Basic connection information about this device.
Device ID
36989
Device Type
PNT2022TMID36898
Date Added
Nov 10, 2022 8:53 PM
Added By
aj555aj999@gmail.com
Connection Status
Disconnected
Recent Events
The recent events listed show the live stream of data that is coming and going from this device.
Event
Value
Format
Last Received

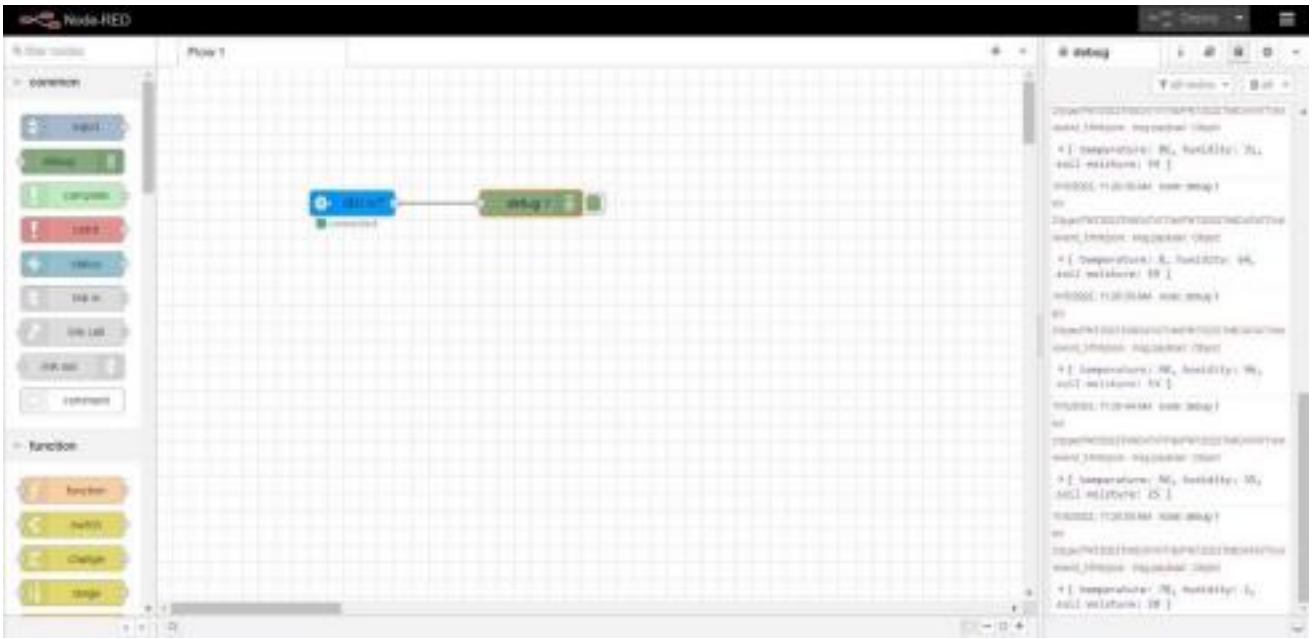
SPRINT-2

STEP1: Download and Install NODE JS.

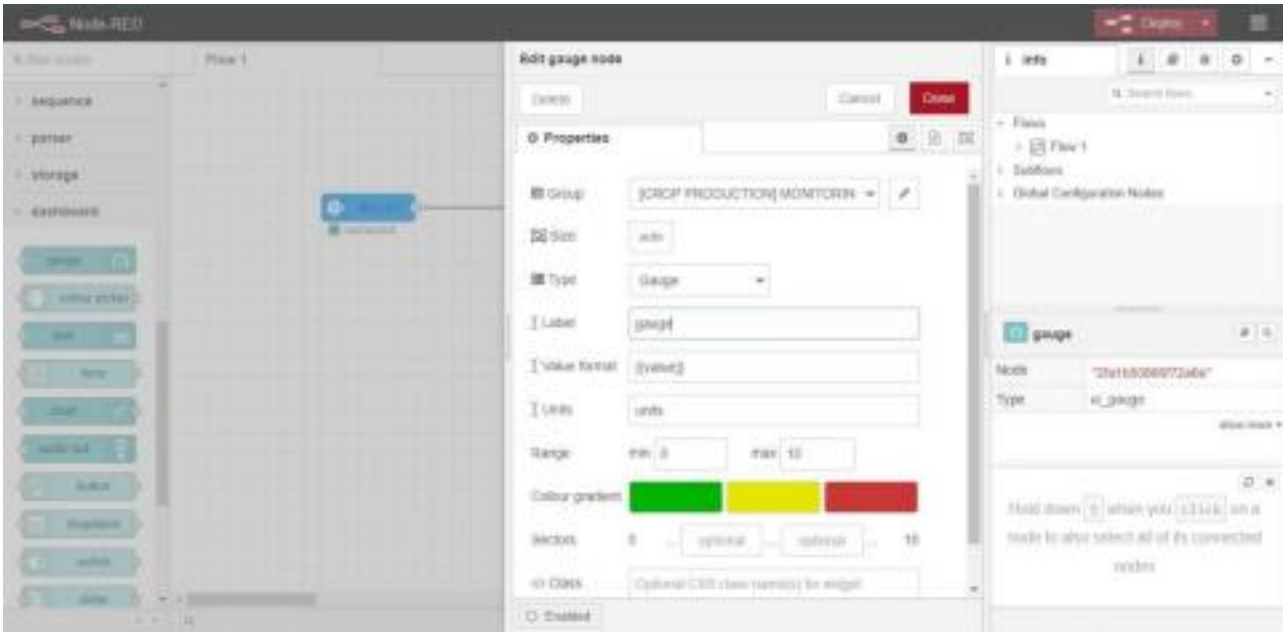
STEP2: Setup node.js and configure command prompt for error check.open node-red from the generated link.



STEP3: Connect IBM IOT in and Debug 1 and Deploy.

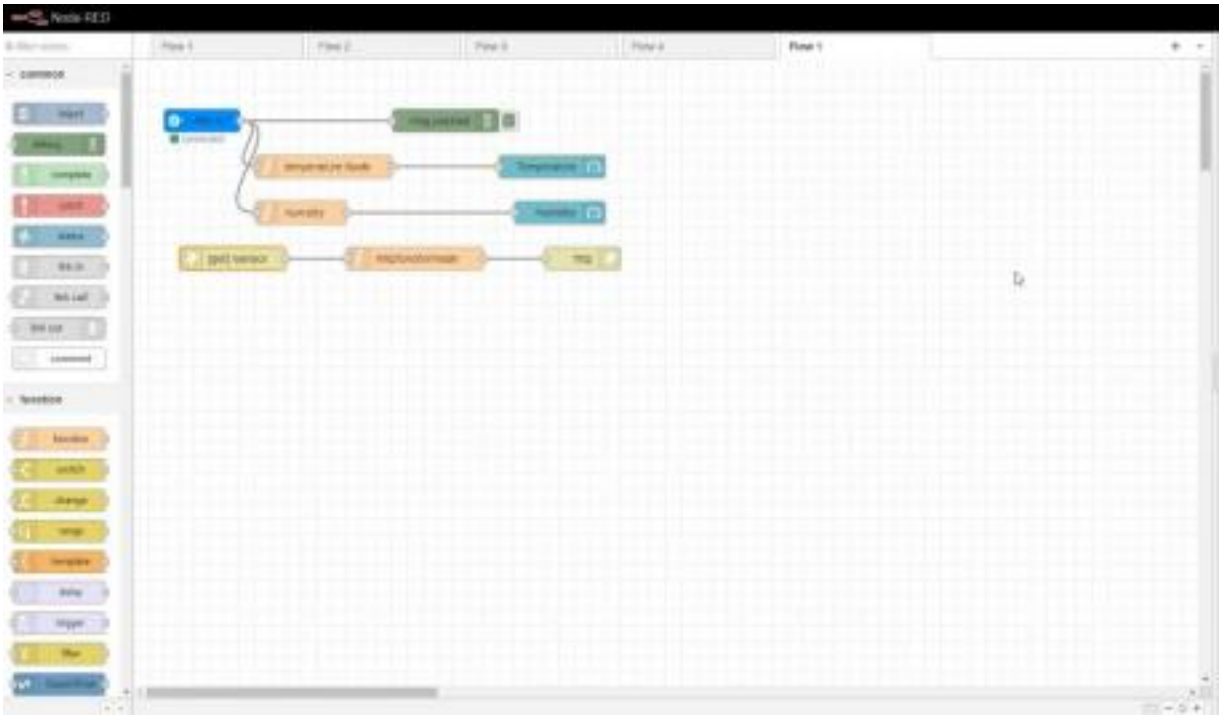


STEP4: Edit gauge node (Here the gauge nodes are named as Temperature, Humidity and Soil moisture).

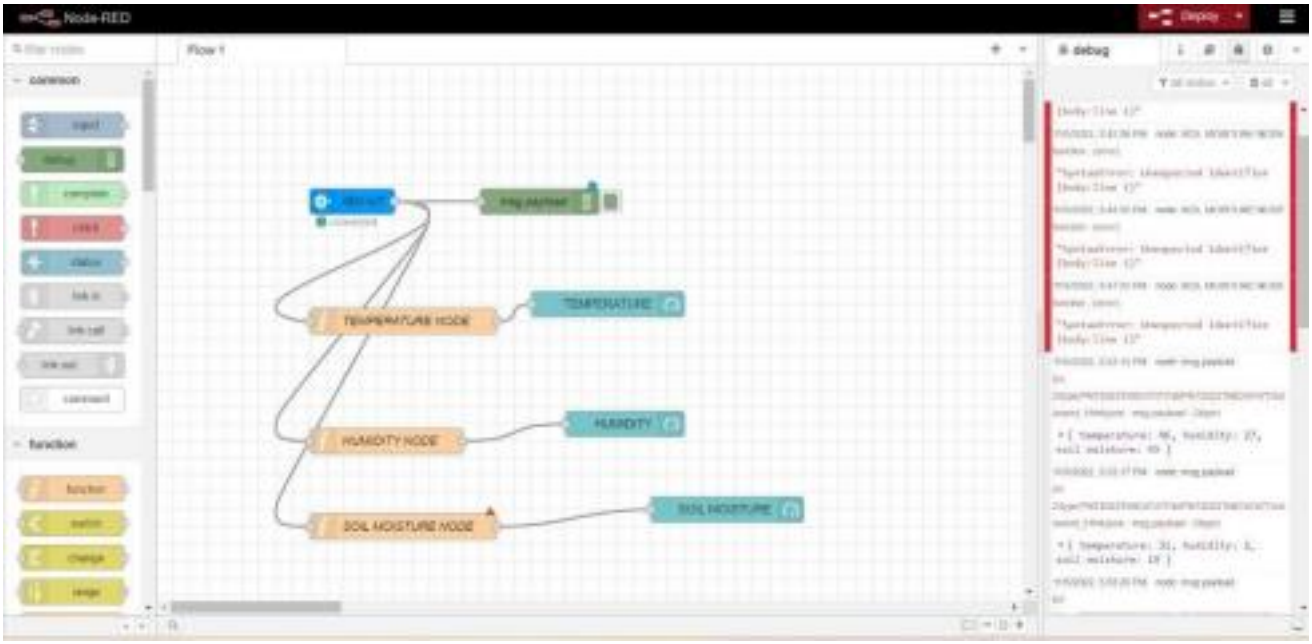


SPRINT-3

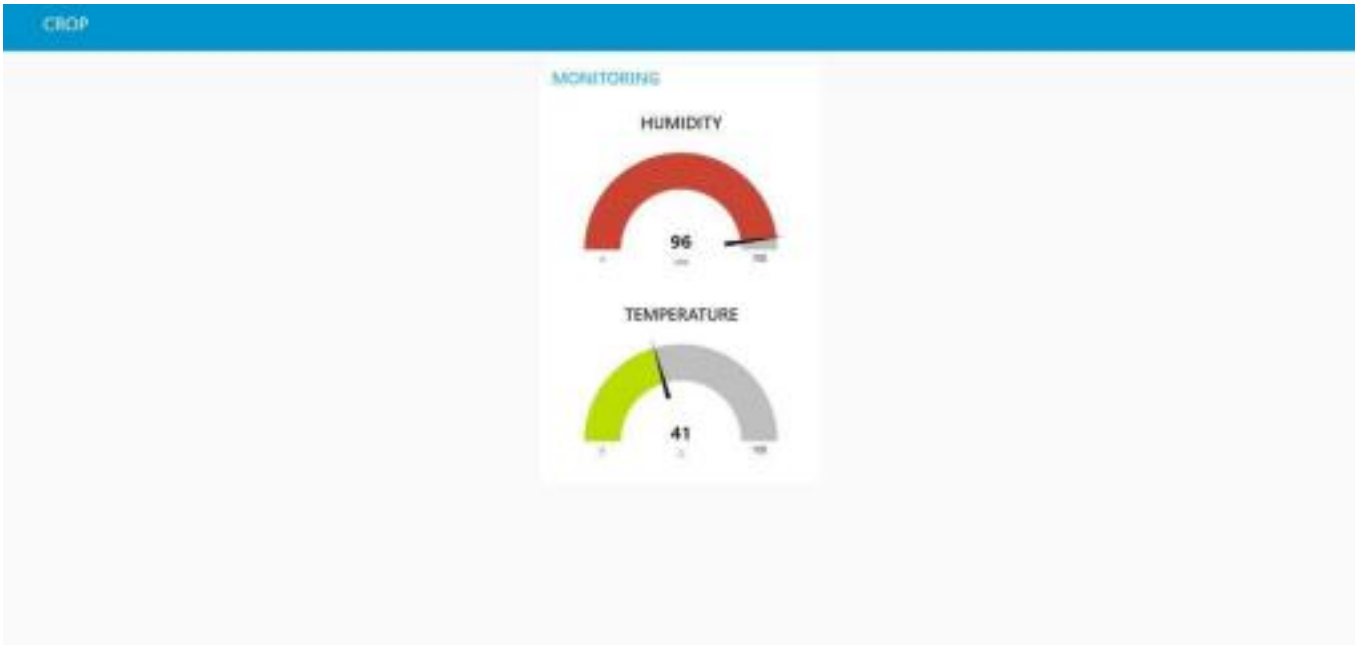
STEP1: Simulated program to get the random values.



STEP2: Generate debug message from IBM Watson IoT Platform and connect the nodes.



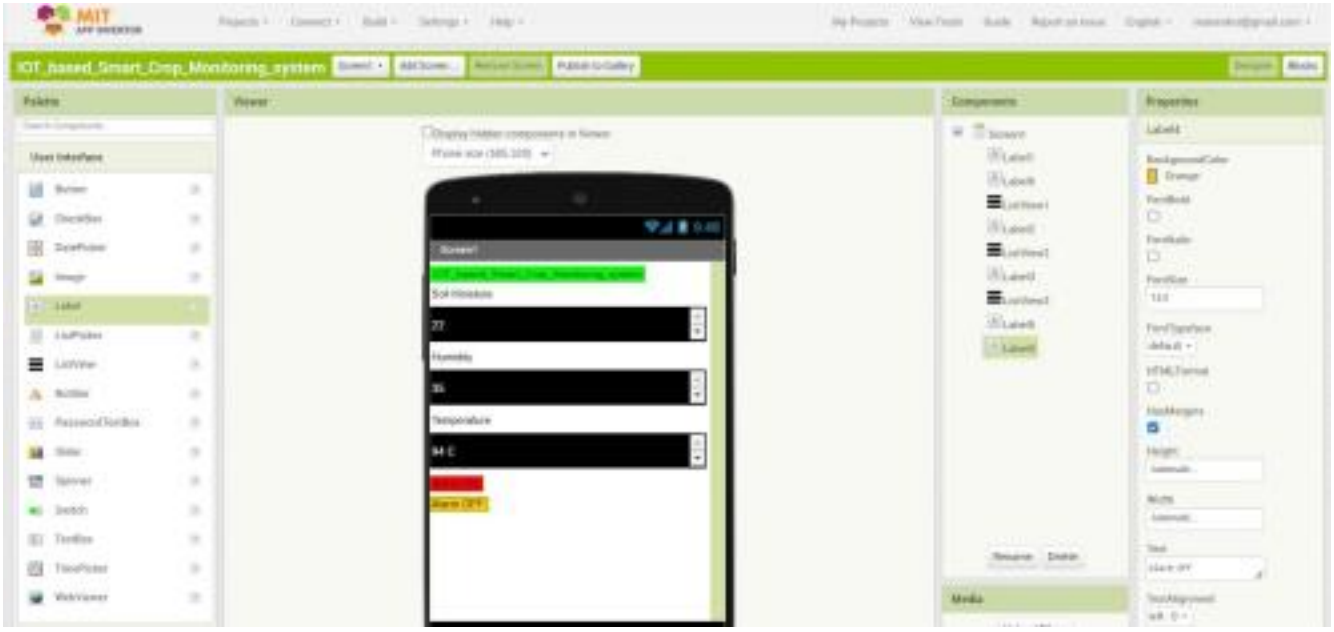
STEP3: Generate the some output from recent events.



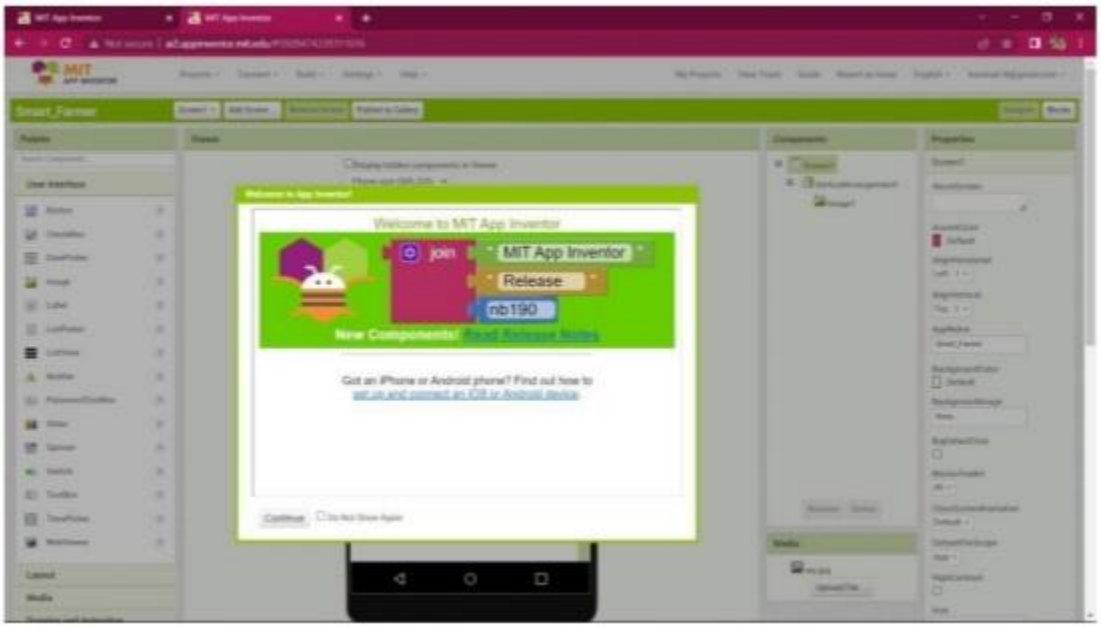
SPRINT-4

STEP 1: MIT APP inventor to design the APP.

STEP 2: Customize the App interface to Display the Values.



Web application using Node Red



8.TESTING

8.1 USING TEST

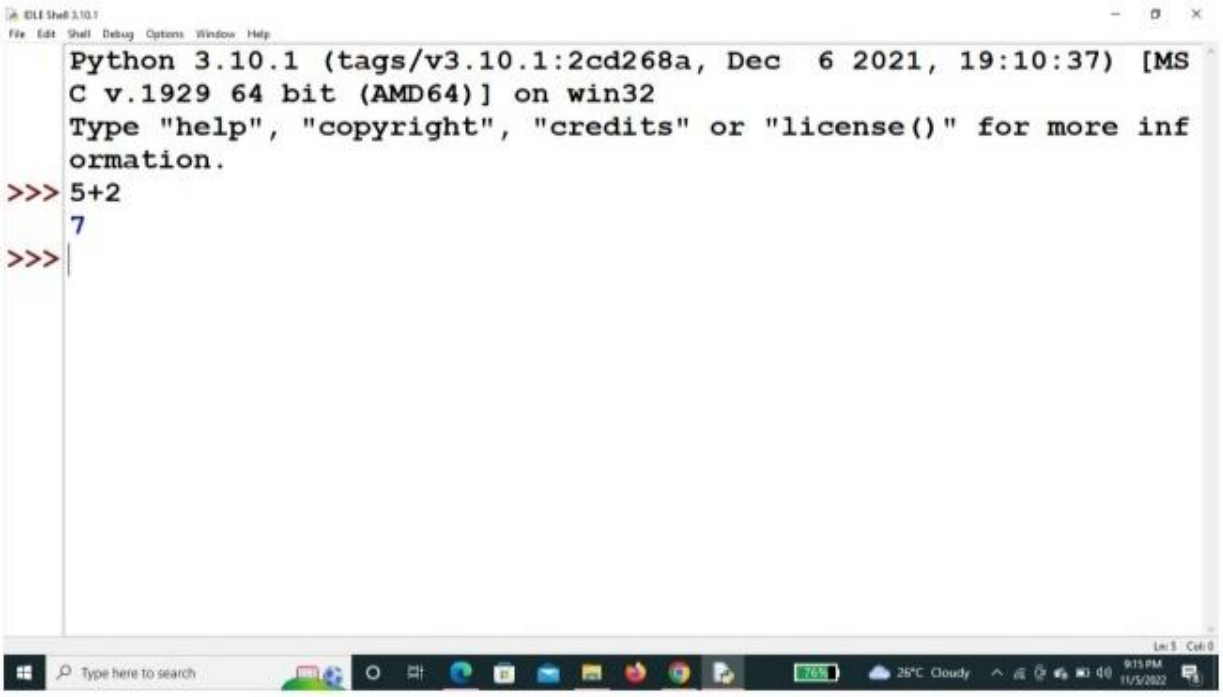
IoT testing involves executing QA tests to check IoT devices' functionality, security, and performance. It is crucial to ensure that your IoT devices can transmit sensitive information wirelessly before going to market because every IoT device sends and receives data over the Internet. Because of this, many IoT businesses rely on IoT automation, penetration, and performance testing tools to detect defects before reaching consumers. IoT testing aims to ensure that IoT devices comply with specified requirements and work as expected.

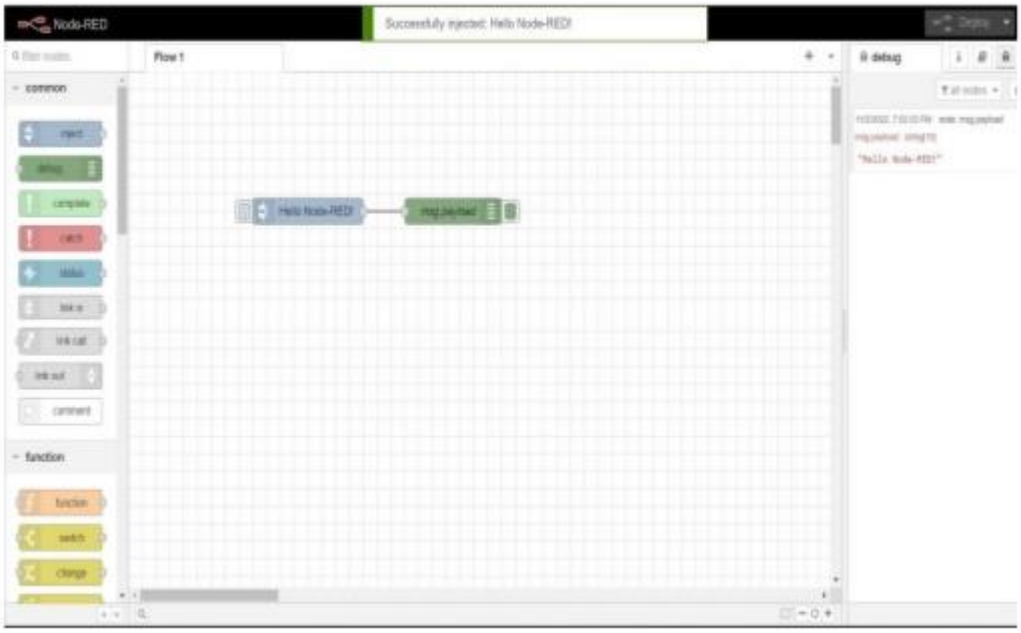
8.2 User Acceptance Testing

Internet of things (IoT) systems are becoming ubiquitous and assuring their quality is fundamental. Unfortunately, a few proposals for testing these complex, and often safety-critical, systems are present in the literature. The authors propose an approach for acceptance testing of IoT systems adopting graphical user interfaces as a principal way of interaction. Acceptance testing is a type of black box testing based on test scenarios, i.e. sequences of steps/actions performed by the user or the system. In their approach, test scenarios are derived from a state machine that expresses the behaviour of the system under test, and test cases are derived from them by specifying

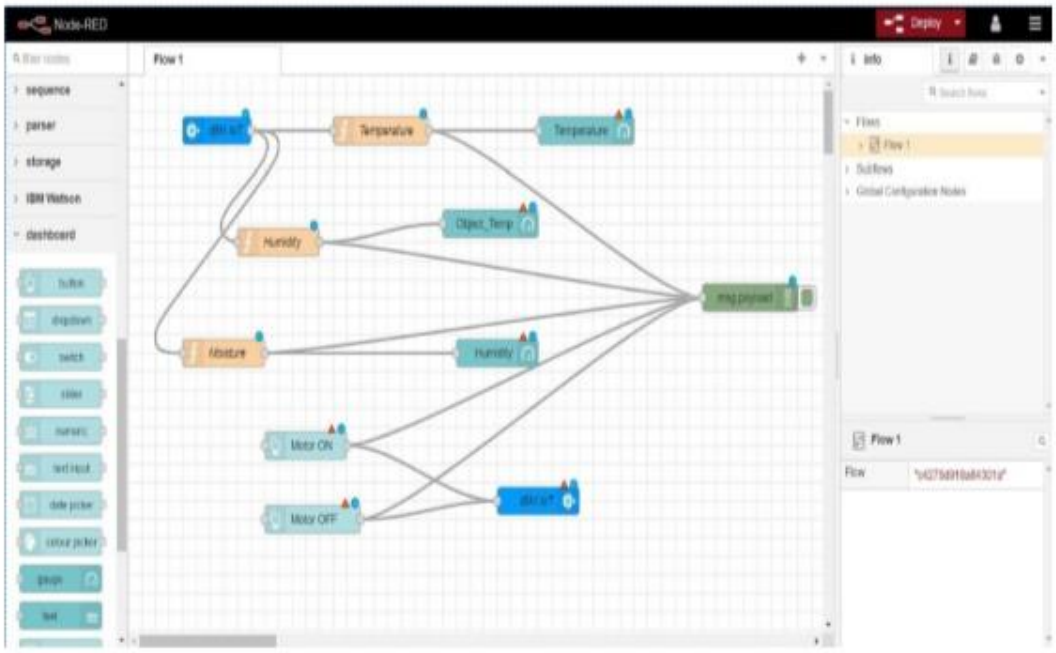
the actual data and assertions and made executable by implementing the corresponding test scripts. As a case study, they selected a mobile health IoT system for diabetes management composed of local sensors/actuators, smartphones, and a remote cloud-based system. The effectiveness of the approach has been evaluated by measuring the capability of two test suites implemented using different localisation strategies (visual and structure-based) in detecting mutants of the original m-health system. Results show the effectiveness of the test suites implemented by following the proposed approach since 93% of the generated mutants have been detected.

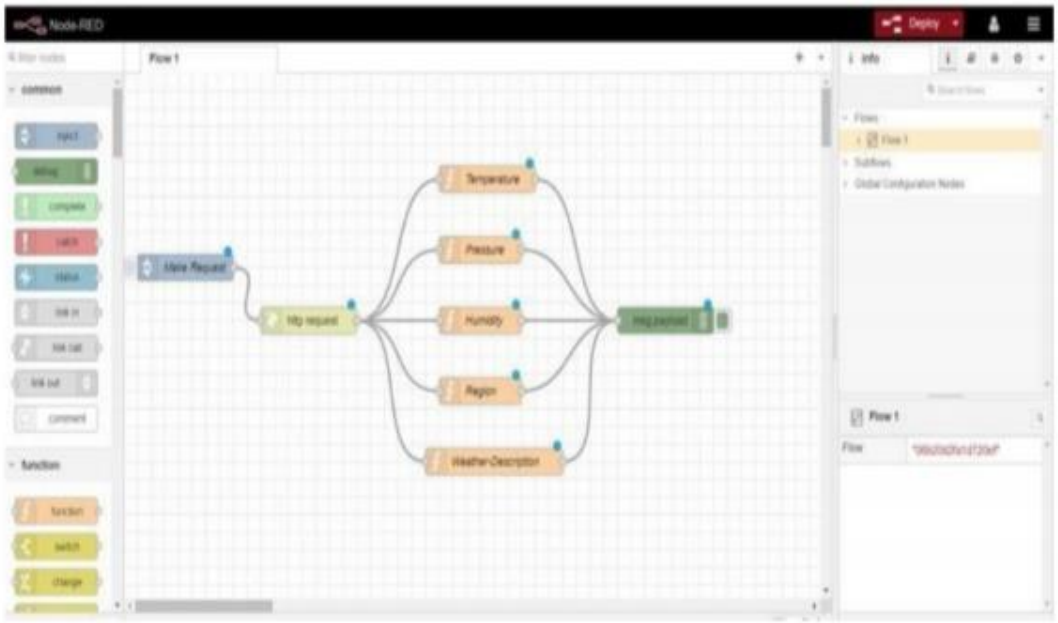
9.RESULT





Web application using Node Red





9.1 Performance Metrics

10.Advantages and disadvantages

Advantages:

- The adaption of forms is supported to a large extent by graphic tools for layout and logic, so that no programming knowledge is necessary (at least 90% of all adjustments). Therefore, power user forms can also make configurations for your business processes with data from an SAP system. Consultants are only required in special cases.
- Displaying table structures (dynamic framing of texts)
- Output of background graphics, for form design in particular the use of templates which were scanned.
- Colored output of texts
- User-friendly and integrated Form Painter for the graphical design of forms
- Graphical Table Painter for drawing tables
- Reusing Font and paragraph formats in forms (Smart Styles)
- Data interface in XML format (XML for Smart Forms, in short XSF)
- Form translation is supported by standard translation tools
- Flexible reuse of text modules
- HTML output of forms (Basis release 6.10)
- Interactive Web forms with input fields, pushbuttons, radio buttons, etc. (Basis-Release 6.10)

Disadvantages:

- Hackers may gain access to the system and steal personal information. Since we add so many devices to the internet, there is a risk that our information as it can be misused.
- They rely heavily on the internet and are unable to function effectively without it.
- With the complexity of systems, there are many ways for them to fail.
- We lose control of our lives—our lives will be fully controlled and reliant on technology.

- Overuse of the Internet and technology makes people unintelligent because they rely on smart devices instead of doing physical work, causing them to become lazy.
- Unskilled workers are at a high risk of losing their jobs, which could lead to unemployment. Smart surveillance cameras, robots, smart ironing systems, smart washing machines, and other facilities are replacing security guards, maids, ironmen, and dry-cleaning services etc.
- It is very difficult to plan, build, manage, and enable a broad technology to IoT framework.
- Deploying IoT devices is very costly and time-consuming.

11.CONCLUSION

Farmers can benefit greatly from an IoT-based smart agriculture system. As a result of the lack of irrigation, agriculture suffers. Climate factors such as humidity, temperature, and moisture can be adjusted dependent on the local environmental variables. This technology also detects animal invasions, which are a major cause of crop loss. This technology aids in the scheduling of irrigation based on present data from the field and records from a climate source. It helps in deciding the farmer to whether to do irrigation or not to do. Continuous internet connectivity is required for continuous monitoring of data from sensors. This also can be overcome by using GSM unit as an alternative of mobile app. By GSM, SMS can be sent to farmers phone.

12.Future scope

In the current project we have implemented the project that can protect and maintain the the crop. In this project the farmer monitor and control the field remotely. In future we can add or update few more things to this project

. • We can create few more models of the same project ,so that the farmer can have information of a entire.

- We can update the this project by using solar power mechanism. So that the power supply from electric poles can be replaced with solar panels. It reduces the power line cost. It will be a one time investment. We can add solar fencing technology to this project.
- We can use GSM technology to this project so that the farmers can get the information directly to his home through SMS. This helps the farmer to get information if there is a internet issues.
- We can add camera feature so that the farmer can monitor his field in real time. This helps in avoiding thefts.

13.Appendix Source

Code

```
import wiotp.sdk.device
import time import os
import datetime import
random myConfig ={
    "identity": {
        "orgId": "0hzydu",
```

```
        "typeId": "NodeMCU",
        "deviceId": "12345"
    },
    "auth": {
        "token": "12345678"
    }
} client =
wiotp.sdk.device.DeviceClient(config=myConfig,logHandlers=None)
client.connect () def myCommandCallback (cmd) :
    print("Message received from IBM IoT Platform: %s" %cmd.data['command'])
m=cmd.data['command']     if (m=="motoron"):
        print("Motor    is    switchedon")
elif (m=="motoroff"):
        print ("Motor is switchedOFF")
print (" ") while True:
    moist =random.randint (0,100)
temp=random.randint (-20, 125)
hum=random.randint (0, 100)
myData={'moisture':moist,'temperat
ure':temp,'humidity':hum}
client.publishEvent
(eventId="status",
msgFormat="json", data=myData,
qos=0 , onPublish=None)     print
("Published data Successfully:
%s",myData)     time.sleep (2)
    client.commandCallback                    =myCommandCallback
client.disconnect ()
```

Reference link: https://github.com/IBM-EPBL/IBM-Project-40617-1660632100