**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**

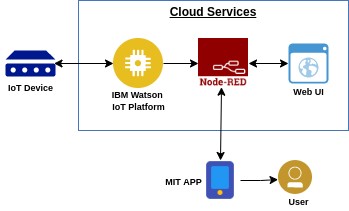
1. **INTRODUCTION** 
   1. Project Overview
   2. Purpose
2. **LITERATURE SURVEY**
   1. Existing problem
   2. References
   3. Problem Statement Definition
3. **IDEATION & PROPOSED SOLUTION**
   1. Empathy Map Canvas
   2. Ideation & Brainstorming
   3. Proposed Solution
   4. Problem Solution fit
4. **REQUIREMENT ANALYSIS**
   1. Functional requirement
5. **PROJECT DESIGN** 
   1. Data Flow Diagrams
   2. Solution & Technical Architecture
6. **PROJECT PLANNING & SCHEDULING** 
   1. Sprint Planning, Schedule & Estimation
7. **CODING & SOLUTIONING (Explain the features added in the project along with code)** 
   1. Feature
8. **TESTING** 
   1. Test Cases
   2. User Acceptance Testing
9. **RESULTS** 
   1. Performance Metrics
10. **ADVANTAGES & DISADVANTAGES**
11. **CONCLUSION**
12. **FUTURE SCOPE**
13. **APPENDIX** Source Code

GitHub & Project Demo Link

# 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 technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks,

Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling

communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network

(WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of

data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based

computing which provides shared processing resources and datato 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

businessinformation.Communication Protocols: They form the backbone of IoT systems toenable

connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as

these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort

of computer system which consists of bothhardware and software to perform specific tasks. It

includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage

devic

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.
  1. **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.
   1. **Problem Statement Definition**

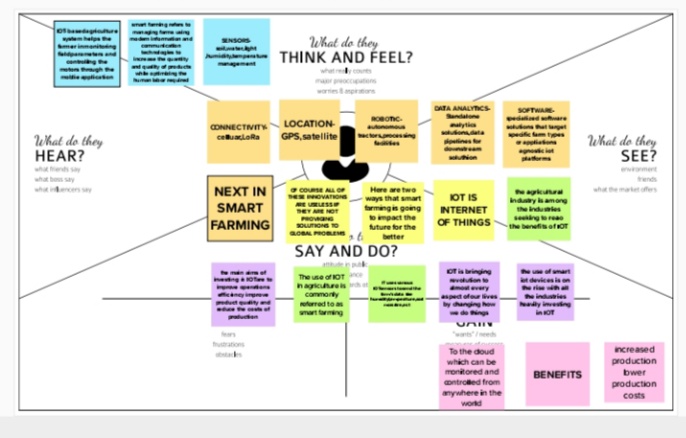
Ideally, each field should get just the right amount of water at just the right time. Under-watering causes crop stress and yield reduction. Overwatering can also cause yield reduction and consumes more water and fuel than necessary and leads to soil erosion and fertilizer, herbicide, and pesticide runoff.

**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**

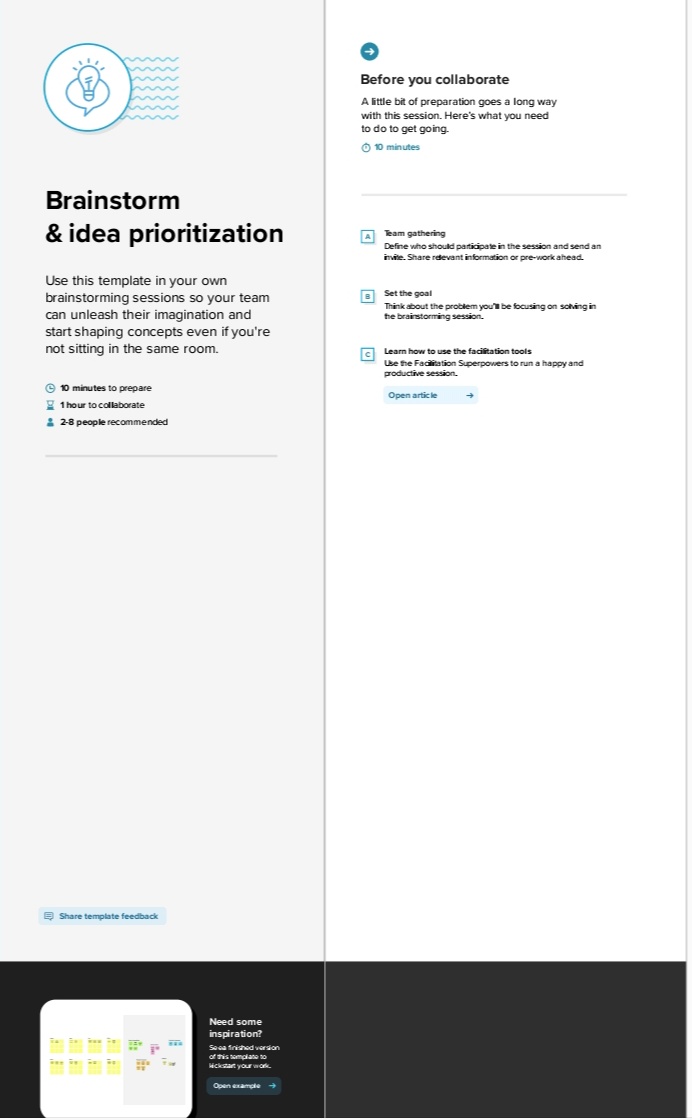
Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always 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.

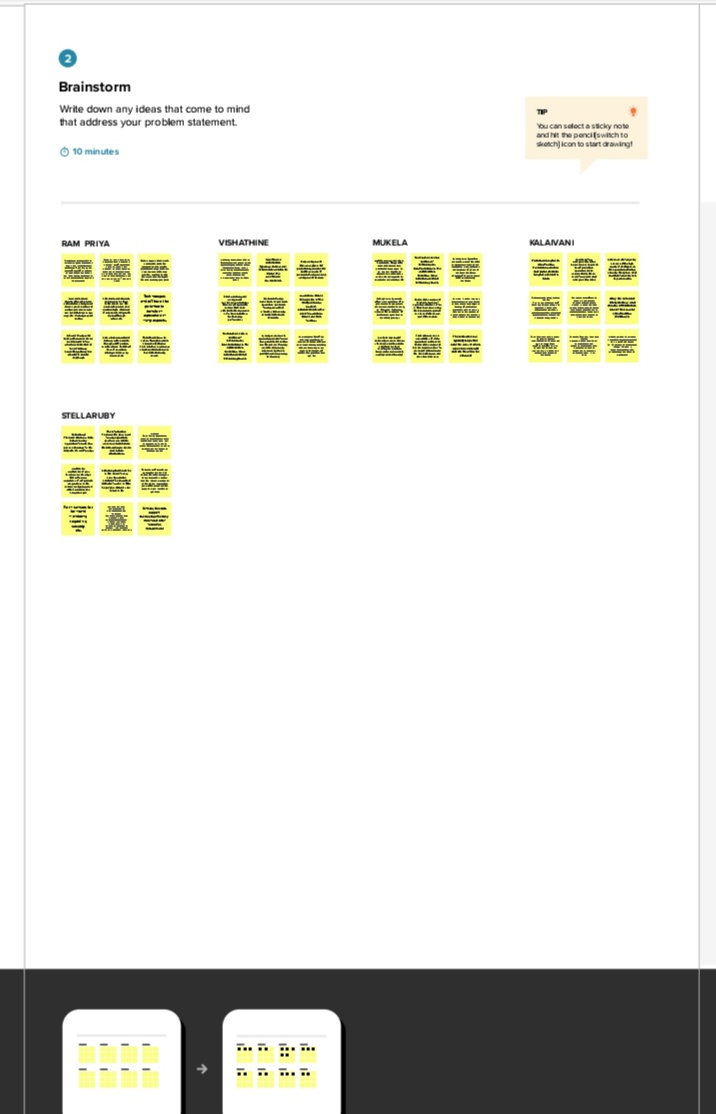
Participants in a brainstorming session are encouraged to freely toss out whatever ideas may occur to them. The thinking is that by generating a large number of ideas, the brainstorming group is likely to come up with a suitable solution for whatever issue they are addressing.

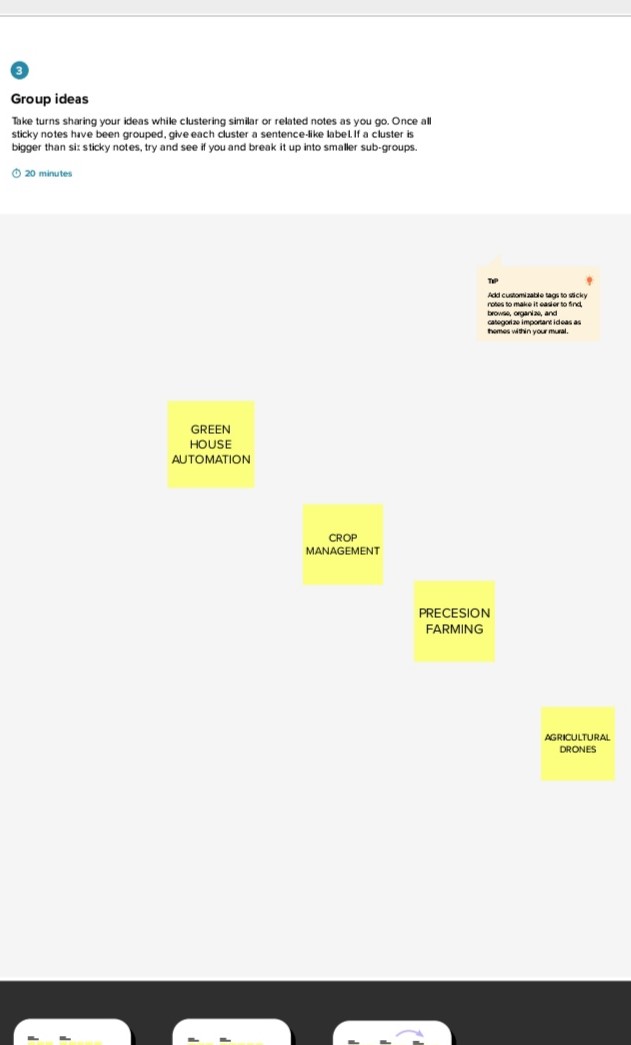
The lines between ideation and brainstorming have become a bit more blurred with the development of several brainstorming software programs, such as Brightidea and Ideawake. These software programs are designed to encourage employees of companies to generate new ideas for improving the companies’ operations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

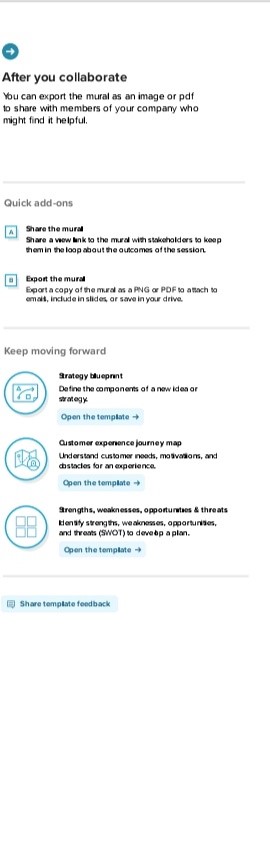








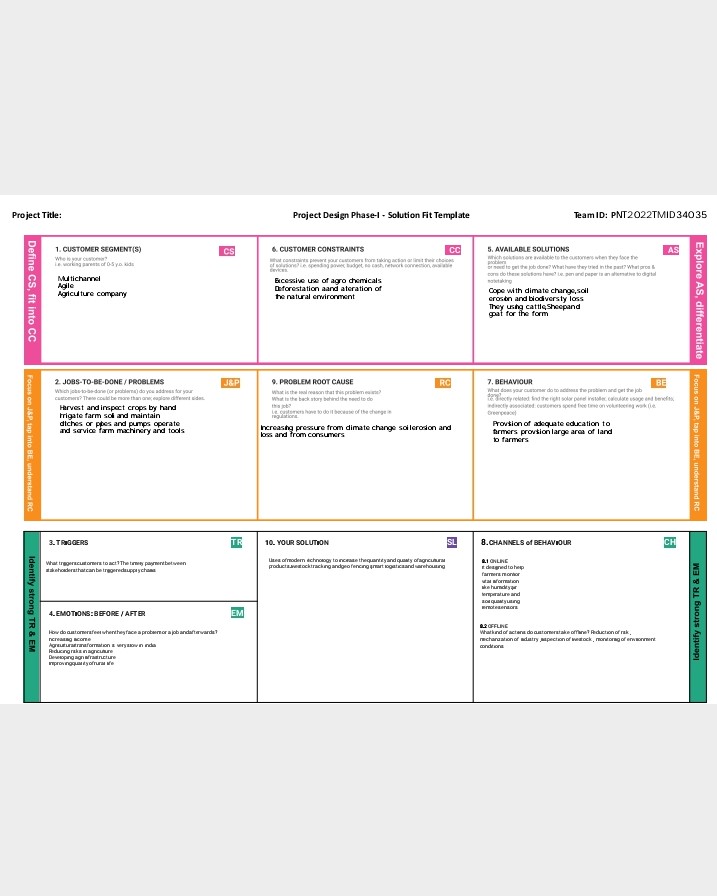




**3.3.PROPOSED SOLUTION**

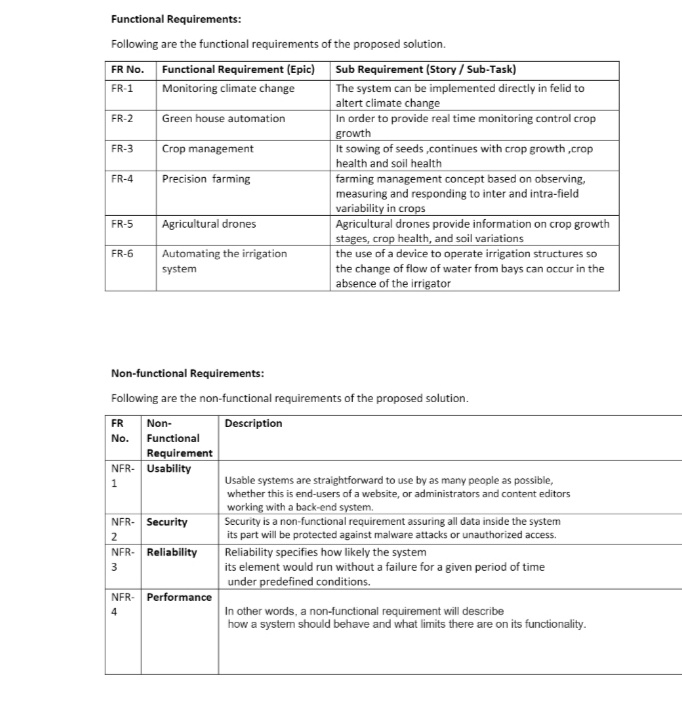
|  |  |  |
| --- | --- | --- |
| **S.No.** | **Parameter** | **Description** |
| 1. | Problem Statement (Problem to be  solved) | A problem statement is a concise description of an issue to be addressed or a condition to be improved upon |
| 2. | Idea / Solution description | If we take tha simplest 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



# 5. PRODUCT DESIGN

## **5.1 DATA FLOW DIAGRAMS**

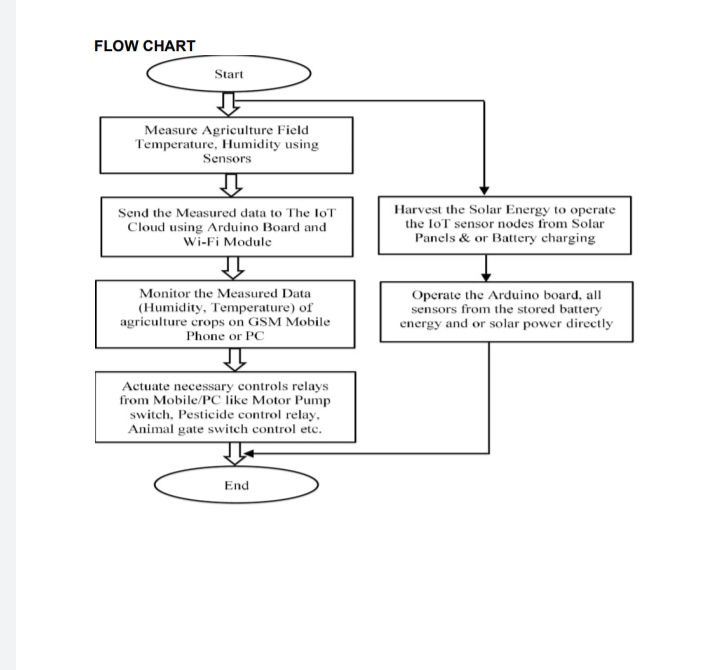
A **data-flow diagram** is a way of representing a flow of data through a [process](https://en.wikipedia.org/wiki/Process) or a system (usually an [information system](https://en.wikipedia.org/wiki/Information_system)). The DFD also provides information about the outputs and inputs of each entity and 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](https://en.wikipedia.org/wiki/Flowchart).[[1]](https://en.wikipedia.org/wiki/Data-flow_diagram#cite_note-:0-1)

There are several notations for displaying data-flow diagrams. The notation presented above was described in 1979 by [Tom DeMarco](https://en.wikipedia.org/wiki/Tom_DeMarco) as part of [structured analysis](https://en.wikipedia.org/wiki/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](https://en.wikipedia.org/wiki/Structured_analysis) and [data modeling](https://en.wikipedia.org/wiki/Data_modeling). When using [UML](https://en.wikipedia.org/wiki/Unified_Modeling_Language), the [activity diagram](https://en.wikipedia.org/wiki/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](https://en.wikipedia.org/wiki/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.



## **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](https://www.leanix.net/en/wiki/ea/digital-transformation-with-enterprise-architecture) and align their business strategy with new technology solutions, companies need to rely on specific expertise. That’s where [IT architects](https://www.leanix.net/en/wiki/ea/it-architects) and to some degree also [business architects](https://www.leanix.net/en/wiki/ea/business-architect) come into play.

**But what is the difference between an**[**enterprise architect**](https://www.leanix.net/en/wiki/ea/enterprise-architect)**vs.**[**solution architect**](https://www.leanix.net/en/wiki/ea/solution-architect)**?**

**And why can’t an enterprise architect and a**[**technical architect**](https://www.leanix.net/en/wiki/ea/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.

## **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 | 9 October 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 | 9 September 2022 |
| Brainstorming ideas | List the ideas by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance | 9 September 2022 |
| Proposed Solution | Prepare the proposed solution document which include the novelty, workable of idea, business pattern, social clash and so on | 9 October 2022 |
| Problem Solution fit | Prepare problem-solution fit document | 9 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 | 4 November 2022 |

|  |  |  |
| --- | --- | --- |
| Customer Journey | Prepare the customer journey maps to understand the user interaction & experience with the application | 20 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 | 4 November 2022 |
| Project development – delivery of sprint-1,2,3 &4 | Develop & submit the developed code by testing it | In progress |
|  |  |  |

### 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

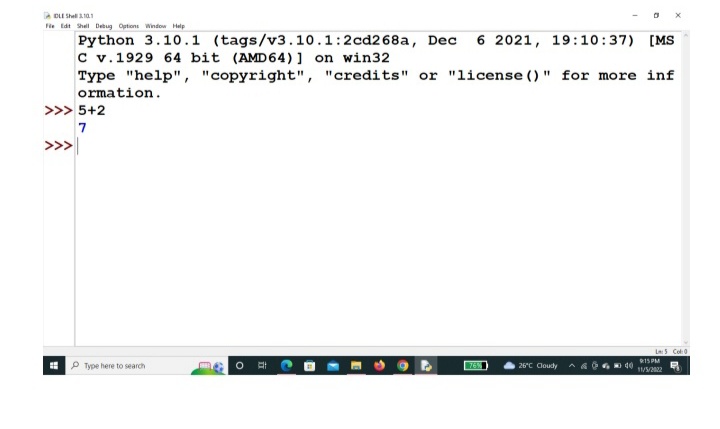
### ("Published data Successfully: %s", myData)

### time.sleep (2)

### client.commandCallback = myCommandCallback

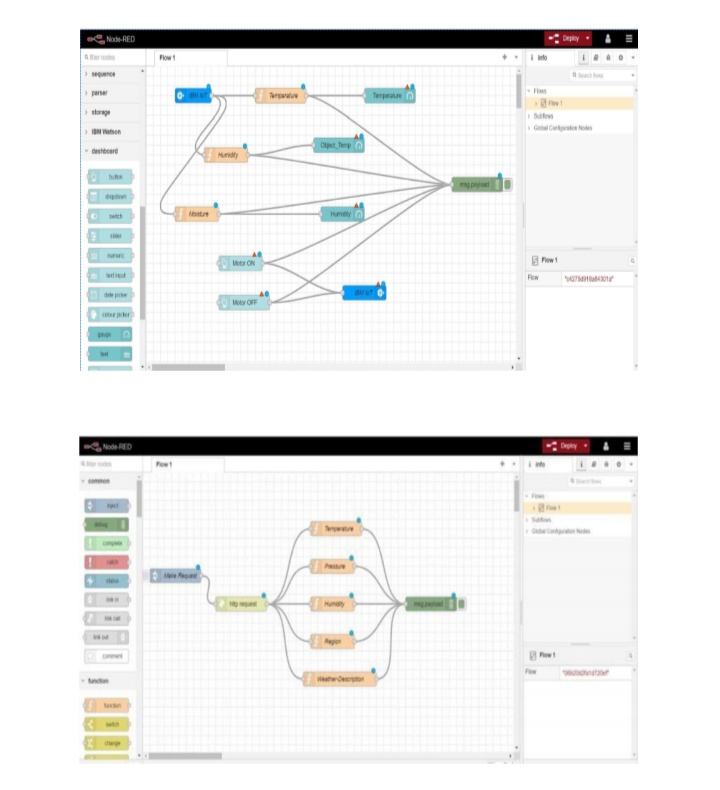
### client.disconnect ()

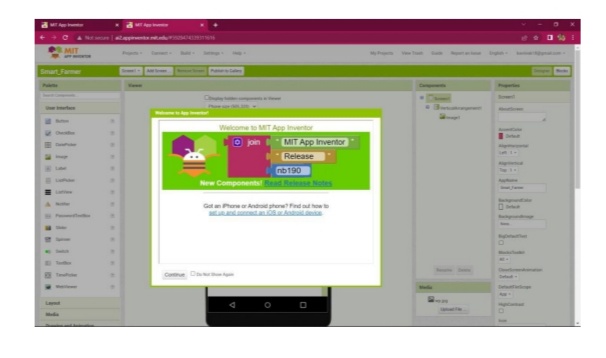
### C:\Users\Dell\Downloads\Screenshot_20221119_193345.JPG

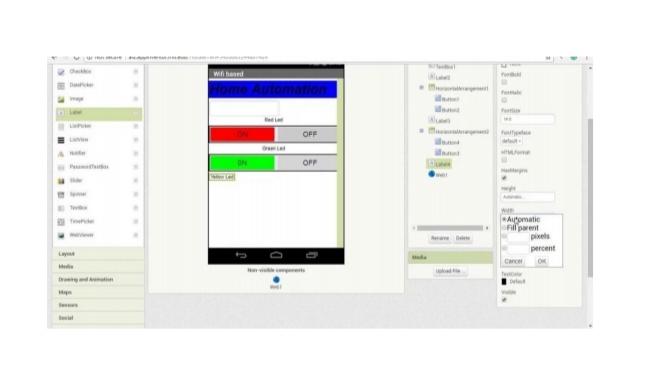
****

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

**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,'temperature':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 ()

**Github link:** [**https://github.com/IBM-EPBL/IBM-Project-19962-1659709867**](https://github.com/IBM-EPBL/IBM-Project-19962-1659709867)

**Project Demo link:**

<https://drive.google.com/file/d/1JrQNUaB8oe5yvimCqPT_rt1WQa1XwOpM/view?usp=drivesdk>