TEAM ID:PNT2022TMID01028

SMART FARMER-IOT ENABLED SMART FARMING APPLICATION SYSTEM

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TEAM MEMBER 2:P.ANANDHI
TEAM MEMBER 3:GAYATHRI PADMA SHREE

CHAPTER 1

INTRODUCTION

INTRODUCTION

The objectives of this report is to proposed IoT based Smart Farming System which will enable farmers to have live data of soil moisture environment temperature at very low cost so that live monitoring can be done. Monitoring systems are used in the field to collect information on farming conditions (e.g., light intensity, humidity, and temperature) with the aim of enhancing crop productivity. Internet of things (IoT) technology is a recent trend in numerous fields, including monitoring systems for agriculture. In conventional farming, farmers need manual labor to handle crops and livestock, often leading to inefficient resource use. This downside can be addressed through the concept of smart farming, whereby farmers receive training in the use of IoT, access to the global positioning system (GPS), and data management capabilities to increase the quantity and quality of their products.

1.1 Project Overview

IoT based SMART FARMING SYSTEM is regarded as IoT gadget focusing on Live Monitoring of Environmental data in terms of Temperature, Moisture and other types depending on the sensors integrated with it. The system provides the concept of “Plug & Sense” in which farmers can directly implement smart farming by as such putting the System on the field and getting Live Data feeds on various devices like Smart Phones, Tablets etc. and the data generated via sensors can be easily shared and viewed by agriculture consultants anywhere remotely via Cloud Computing technology integration. The system also enables analysis of various sorts of data via Big Data Analytics from time to time.

1.2 Purpose

Smart farming is a management concept focused on providing the agricultural industry with the infrastructure to leverage advanced technology – including big data, the cloud and the internet of things (IoT) – for tracking, monitoring, automating and analyzing operations.

CHAPTER 2

LITERATURE SURVEY

2.1 ABSTRACT

One of the important applications of Internet of Things is Smart agriculture. Smart agriculture reduces wastage of water, fertilizers and increases the crop yield. In the current agriculture system the specification such as temperature, moisture, humidity are detected manually which increases the labour cost, time and also monitoring cannot be done continuously. In this paper irrigation process is done automatically using different sensors which reduces the manual labour. Here a system is proposed to monitor crop-field using sensors for soil moisture, humidity and temperature. By monitoring all these parameters the irrigation can be automated.

2.2 ABSTRACT

Internet of Things (IoT), Agriculture, Agriculture Precision, Raspberry Pi, Temperature Sensor, Smart Farming, Soil Moisture Sensor.

2.3 INTRODUCTION

Most important factors for the quality and productivity of plant growth are temperature, humidity and light. Continuous monitoring of these environmental variables provides valuable information to the grower to better understand, how each factor affects growth and how to maximize crop productiveness [1] The optimal greenhouse micro climate adjustment can enable us to improve productivity and to achieve remarkable energy savings especially during the winter in northern countries [2]. WSN composed of hundreds of nodes which have ability of sensing, actuation and communicating, has great advantages in terms of high accuracy, fault tolerance, flexibility, cost, autonomy and robustness compared to wired ones. Moreover, with the onset of IoT and M2M communications, it is poised to become a very significant enabling technology in many sectors, like military, environment, health, home and other commercial areas [3]. IoT is a general term, covering a number of technologies that allows devices to communicate with each other, with or without human intervention. This paper presents a novel approach to implement wireless greenhouse automation and monitoring system which in a timely manner provides a possibility for screen monitoring of detailed data about the conditions of the greenhouse. Furthermore, the suggested setup can be incorporated with other internet and messaging services (i.e. Web, WAP, SMS) to provide communication for farmers. The wireless sensor network (WSN) is one of the most significant technologies in the 21st century and they are very suitable for distributed data collecting and monitoring in tough environments such as greenhouses. The other most significant technologies in the 21st century is the Internet of Things (IoT)which has rapidly developed covering hundreds of applications in the civil, health, military and agriculture areas. In modern greenhouses, several measurement points are required to trace down the local climate parameters in different parts of a large-scale greenhouse in order to ensure proper operation of the greenhouse automation system. Cabling would make the measurement system expensive, vulnerable and also difficult to relocate once installed. This paper presents a WSN prototype consisting of MicaZ nodes which are used to measure greenhouses' temperature, light, pressure and humidity. Measurement data have been shared with the help of IoT. With this system farmers can control their greenhouse from their mobile phones or computers which have internet connection.

2.4 IOT TECHNOLOGY AND AGRICULTURE

2.4.1 Raspberry Pi:

The Raspberry Pi is a credit card sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of stimulating the teaching of basic computer science in schools. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700MHz processor (The firmware includes a number of "Turbo" modes so that the user can try to attempt over clocking, up-to 1GHz, without affecting the warranty), Video Core IV GPU, [5] and 256 megabytes of RAM.

2.4.2 Arduino:

The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board features 14 Digital pins and 6 Analog pins. Soil Moisture Sensor: The Moisture sensor is used to measure the water content (moisture) of soil. When the soil is having water shortage, the module output is at high level else the output is at low level. This sensor reminds the user to water their plants and also monitors the moisture content of soil. It has been widely used in agriculture, land irrigation and botanical gardeningThis DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability.

2.5 LITERATURE SURVEY

In the literature there are numerous examples of versatile IoT application oriented studies. In [4], an example of control networks and information networks integration with IoT technology has been studied based on an actual situation of agricultural production. A remote monitoring system with combining internet and wireless communications is proposed. Furthermore, taking into account the system, an additional information management sub-system is designed. The collected data is provided in a form suitable for agricultural research facilities. In their work Liu Dan et al. [5] take a CC2530 chip as the core and present the design and implementation of an Agriculture Greenhouse Environment monitoring system based on ZigBee connectivity. Additionally, the wireless sensor and control nodes take CC2530F256 as a core to control the environment data. This system comprises front-end data acquisition, data processing, data transmission and data reception. The ambient temperature is real-time processed by the temperature sensor of the terminal node and is send to the intermediate node through a wireless ZigBee based network. Intermediate node aggregates all data, and then sends the data to the PC through a serial port. At the same time, staff may view, and analyse the data, storage of the data on a PC is also provided. The real-time data is used to control the operation of fans and other temperature control equipment and achieve automatic temperature control in the greenhouse. Kun Han et al. [6] proposed the design of an embedded system development platform based on GSM communications. Through its application in hydrology monitoring management, the authors discuss issues related to communication reliability and lightning protection, suggest detailed solutions, and also cover the design and realization of middleware software. Greenhouse technology was started by Dr APJ Abdul Kalam with the help of Swaminathan. It was first started in LehLadakh to grow vegetables for the defence during extreme climatic conditions. A greenhouse (also called a glasshouse) is a structure with walls and roof made chiefly of transparent material, such as glass, in which plants requiring regulated climatic conditions are grown.

2.6 SYSTEM MODULE

Arduino module: It is used to interface with moisture, temperature & humidity sensor. Send these values to the Raspberry pi through the serial port. Raspberry Pi: It receives data from Arduino and takes the decision to start/stop the motor. Sends wireless data to the user. Application server module: Receives data from Raspberry pie and records it into the database. Displays real time graph of the received data Android Module: Displays real time data (temperature, humidity, moisture) on the interface to the user remotely.

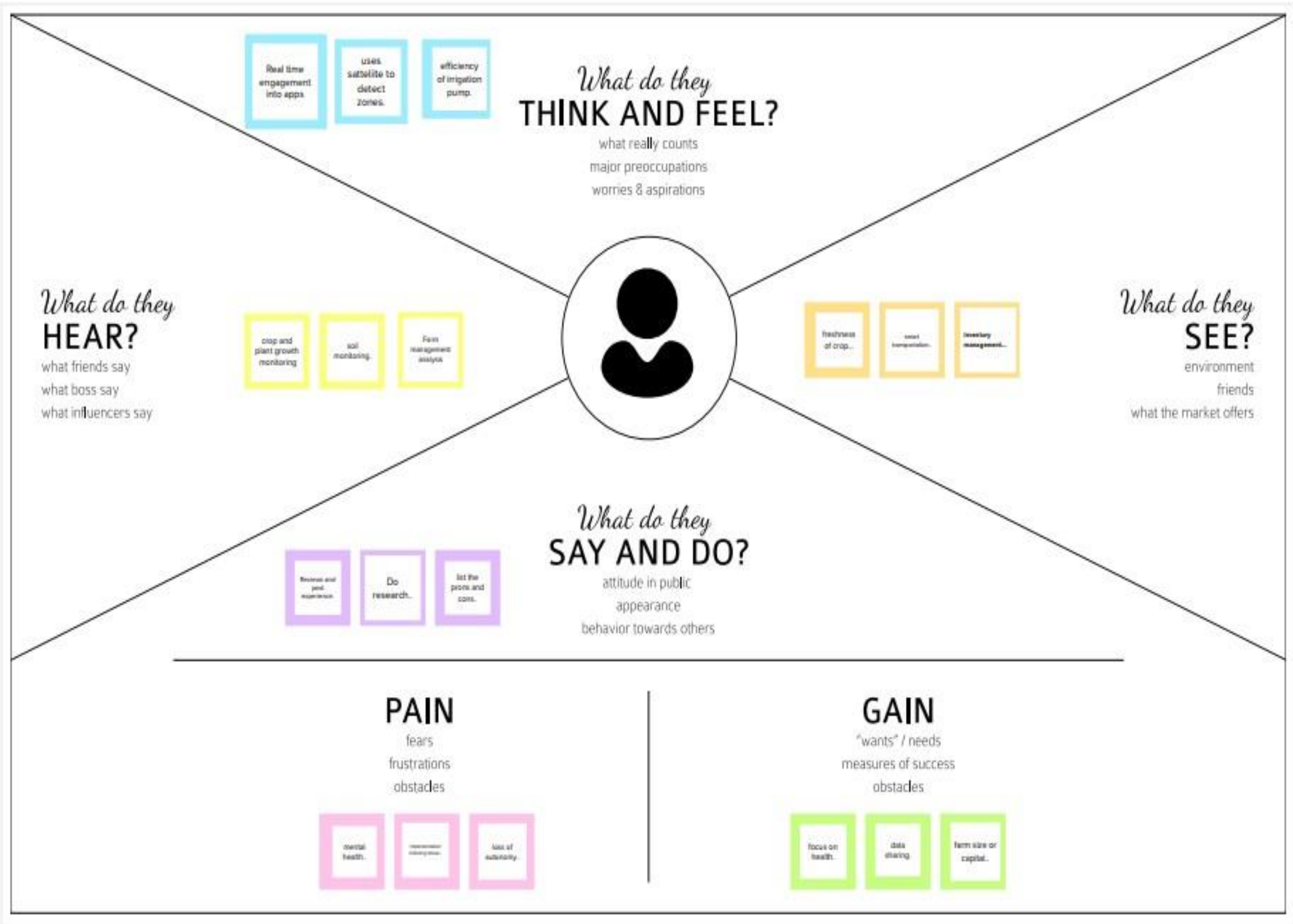
2.7 IMPLEMENTATION

This project can be implemented in a real greenhouse for growing good agricultural produce like ornamental flowers (Gerbera, Carnation, Anthurium etc.), which can be of export quality. The system will take care of automatic irrigation control and various parameters of the greenhouse can be monitored like Temperature, Humidity and Soil Moisture. The Android Application will form the user interface and to record the parameter details we use an application server module. This recorded data can be used for analysis and help in taking decisions. Application Server.

CHAPTER 3

IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

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

PROBLEMS

*T.o. identify the weather
*To identify humidity, temperature
*to identify the production of crops

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- 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!

KALAIKAVIYA V B

- Humidity and Temperature arduino based microcontroller and sensors are used
- IOT enables farmers to reduce water and enhance productivity
- If the soil moisture level decreases the farmers can deploy sensors to start the irrigation
- Livestock tracking and geo fencing,wireless IOT application to collect data regarding the locations

KUMUDHA PRIYA T P

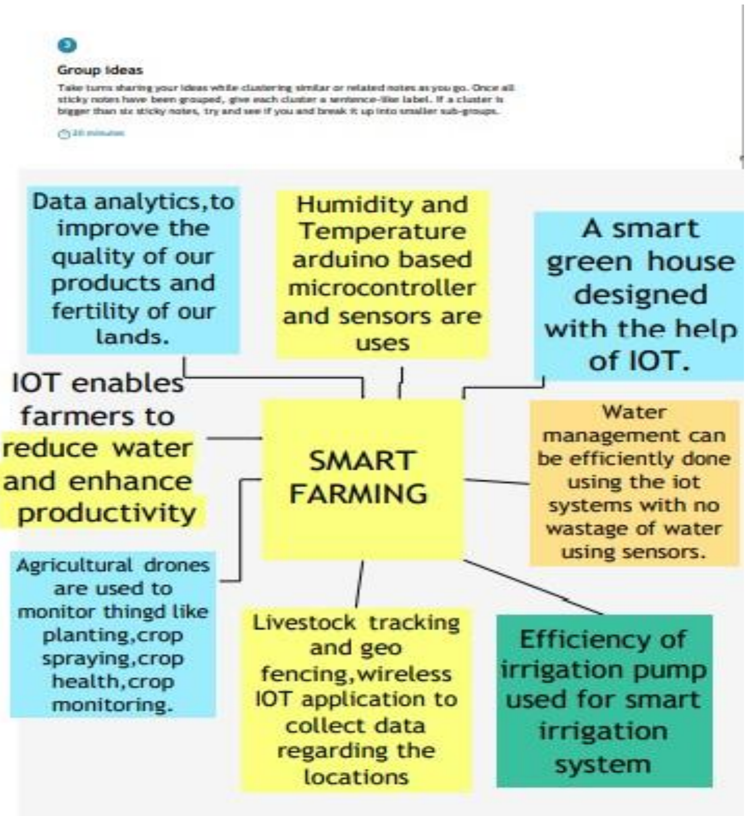
- A smart green house designed with the help of IOT.
- Data analytics,to improve the quality of our products and fertility of our lands.
- Agricultural drones are used to monitor thingd like planting,crop spraying,crop health,crop monitoring.
- Precision farming smart farming option allows us to track vehicles,manage our inventory and monitor our livestock with the touch of a button.

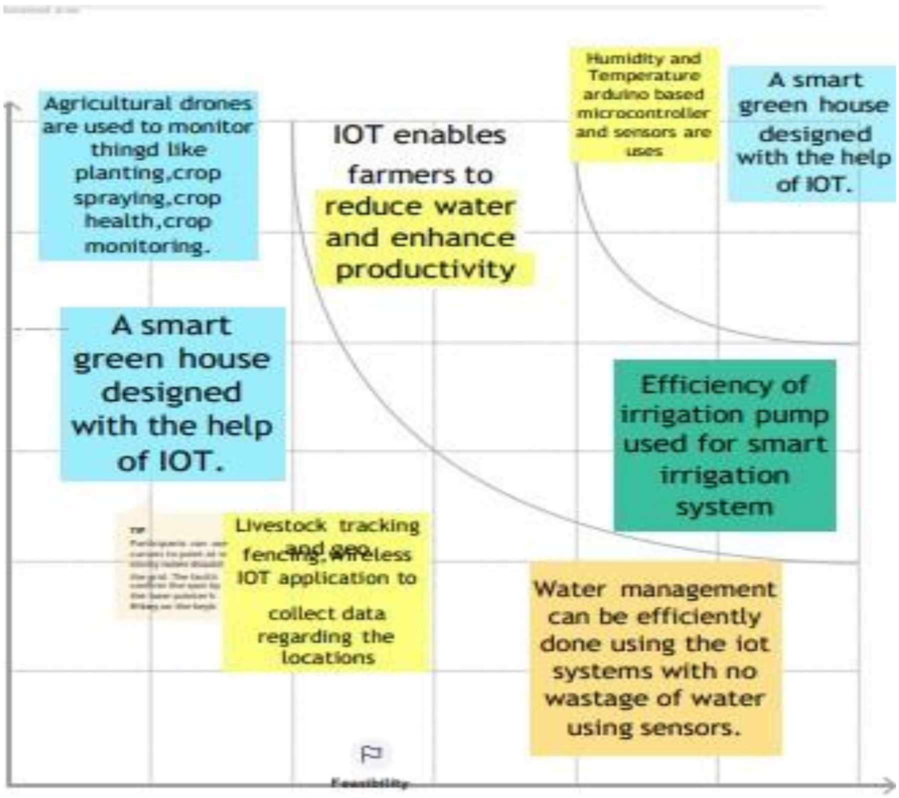
ANANDHI P

- IOT system has made possible the invention of hydroponics and aeroponics
- Better control over the internal processes and,as a result,lower production risks.
- Just like crop monitoring,there are iot agriculture sensors that can be attacked to the animals on a farm to monitor their health and log performance.
- Efficiency of irrigation pump used for smart irrigation system

GAYATRI PADMA SREE

- Water management can be efficiently done using the iot systems with no wastage of water using sensors.
- Uses satellite imagery to detect the different zones in farms.
- The benefits od using drones contain crop health imaging,integrated GIS mapping,ease of use,saves time and potential to increase crop yields.
- Image processing using IOT incorporates comparing images from a database with images of standing crops to determine the size,shape,color,growth.


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.
Data analytics,to improve the quality of our products and fertility of our lands.
Humidity and Temperature arduino based microcontroller and sensors are uses
A smart green house designed with the help of IOT.
IOT enables farmers to reduce water and enhance productivity
SMART FARMING
Water management can be efficiently done using the iot systems with no wastage of water using sensors.
Agricultural drones are used to monitor thingd like planting,crop spraying,crop health,crop monitoring.
Livestock tracking and geo fencing,wireless IOT application to collect data regarding the locations
Efficiency of irrigation pump used for smart irrigation system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Efficiency of irrigation pump used for smart irrigation system
Livestock tracking and geo fencing,wireless IOT application to collect data regarding the locations
Water management can be efficiently done using the iot systems with no wastage of water using sensors.
Feasibility

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

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

Export the mural
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save to 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

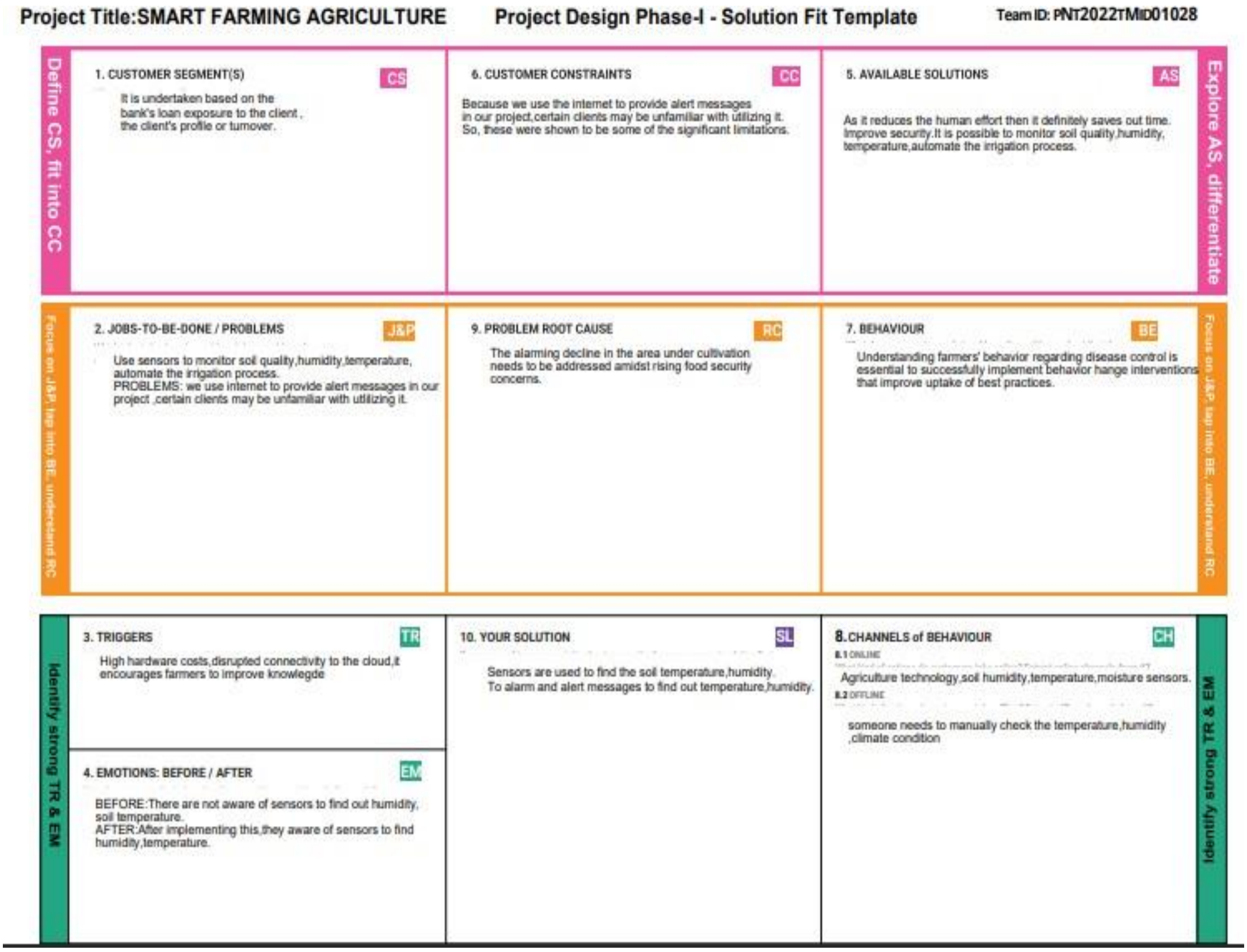
3.3 Proposed Solution

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Iot devices interact with older equipment they have access to the internet connection , there is no guarantee that they would be able to access drone mapping data or sensors readouts by taking benefit of public connection.
2.	Idea / Solution description	Data, tons of data, collected by smart agriculture sensors. Better control over the internal processes and as a result, lower production risks. Cost management and waste reduction to the increased control over the production. Increased business efficiency through process automation.
3.	Novelty / Uniqueness	It is powered by Arduino, it consists of temperature sensor, moisture sensor, water level sensor, DC motor and GPRS module. It checks the water level, moisture level. It sends SMS alert to phone about levels.
4.	Social Impact / Customer Satisfaction	It gains the knowledge about the sensors. Cost management and waste reduction to the increased control over the production.
5.	Business Model (Revenue Model)	To enable producers and farmers to reduce waste and improve productivity by optimizing the usage of fertilizers to boost the efficiency of plants. It gives better control to the farmers for their livestock.
6.	Scalability of the Solution	It is consists of temperature sensor, moisture sensor and check the water level. It sends SMS alert to phone about levels

3.4 Problem Solution fit



Project Title:SMART FARMING AGRICULTURE

Project Design Phase-I - Solution Fit Template

Team ID: PNT2022TMID01028

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

It is undertaken based on the bank's loan exposure to the client , the client's profile or turnover.

6. CUSTOMER CONSTRAINTS CC

Because we use the internet to provide alert messages in our project,certain clients may be unfamiliar with utilizing it. So, these were shown to be some of the significant limitations.

5. AVAILABLE SOLUTIONS AS

As it reduces the human effort then it definitely saves out time. Improve security.It is possible to monitor soil quality,humidity, temperature,automate the irrigation process.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Use sensors to monitor soil quality,humidity,temperature, automate the irrigation process.
PROBLEMS: we use internet to provide alert messages in our project ,certain clients may be unfamiliar with utilizing it.

9. PROBLEM ROOT CAUSE RC

The alarming decline in the area under cultivation needs to be addressed amidst rising food security concerns.

7. BEHAVIOUR BE

Understanding farmers' behavior regarding disease control is essential to successfully implement behavior hange interventions that improve uptake of best practices.

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS TR

High hardware costs,disrupted connectivity to the cloud,it encourages farmers to improve knowlegde

4. EMOTIONS: BEFORE / AFTER EM

BEFORE:There are not aware of sensors to find out humidity, soil temperature.
AFTER:After implementing this,they aware of sensors to find humidity,temperature.

10. YOUR SOLUTION SL

Sensors are used to find the soil temperature,humidity.
To alarm and alert messages to find out temperature,humidity.

8. CHANNELS of BEHAVIOUR CH

8.1 ONLINE

Agriculture technology,soil humidity,temperature,moisture sensors.

8.2 OFFLINE

someone needs to manually check the temperature,humidity ,climate condition

Identify strong TR & EM

CHAPTER – 4

REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Phone number Registration through Gmail
FR-2	User Confirmation	Confirmation via Phone number Confirmation via OTP
FR-3	Observation	Sensors record observational data from the, soil, temperature, humidity and atmosphere.
FR-4	Diagnosis	The sensor values are fed to a cloud-hosted IoT platform that ascertain the condition of the examined object and identify the needs.
FR-5	Action	Shows the real time data and when the soil moisture content is reduced the water pump irrigate the field until the required moisture is achieved.
FR-6	Monitor	User can monitor the data online from anywhere.

4.2 Non-Functional requirements

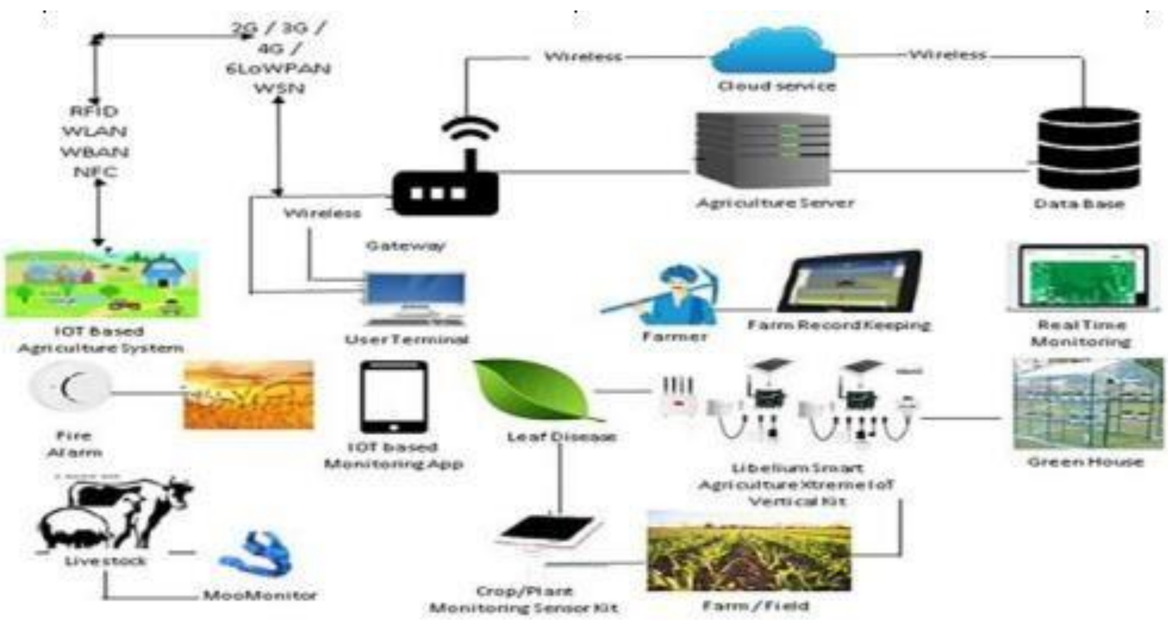
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Usability includes easy understanding and efficiency in use. With real-time monitoring and analytics systems, data collected by smart sensors allows farmers to better control processes.
NFR-2	**Security**	Device and data security includes authentication of devices and confidentiality.
NFR-3	**Reliability**	Smart farming platforms require reliable and robust technologies such as the physical safety of IOT devices for precision agricultural systems should be ensured in different environmental conditions to avoid communication failures.
NFR-4	**Performance**	High performance which includes the recurrent tasks on the field can be replaced by automatized modes of monitoring.
NFR-5	**Availability**	Automatic adjustment of farming equipment made possible by linking information like weather
NFR-6	**Scalability**	Automatic real time decision-making system is feasible in an environment composed of sensors continuously transmitting the real time data efficiently

CHAPTER – 5

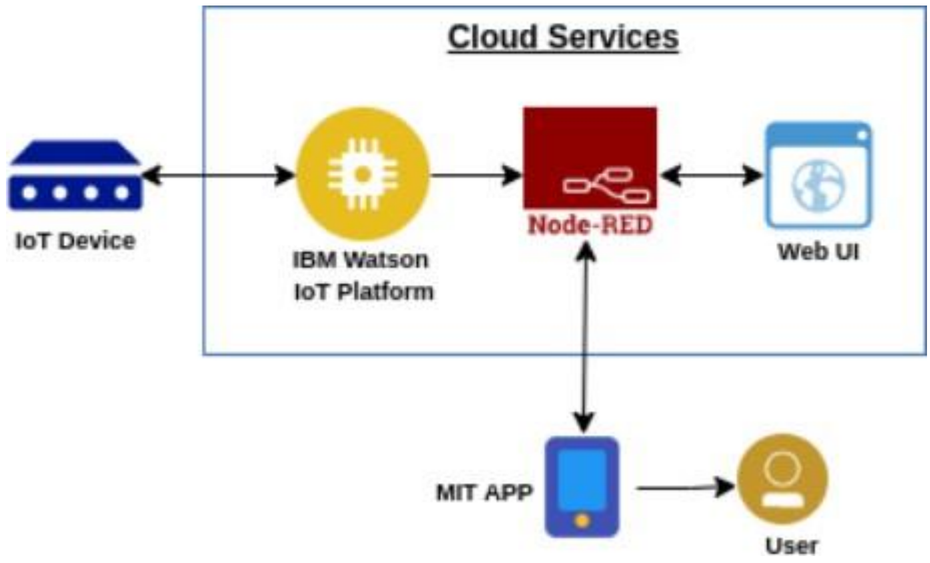
PROJECT DESIGN

5.1 Data Flow Diagrams

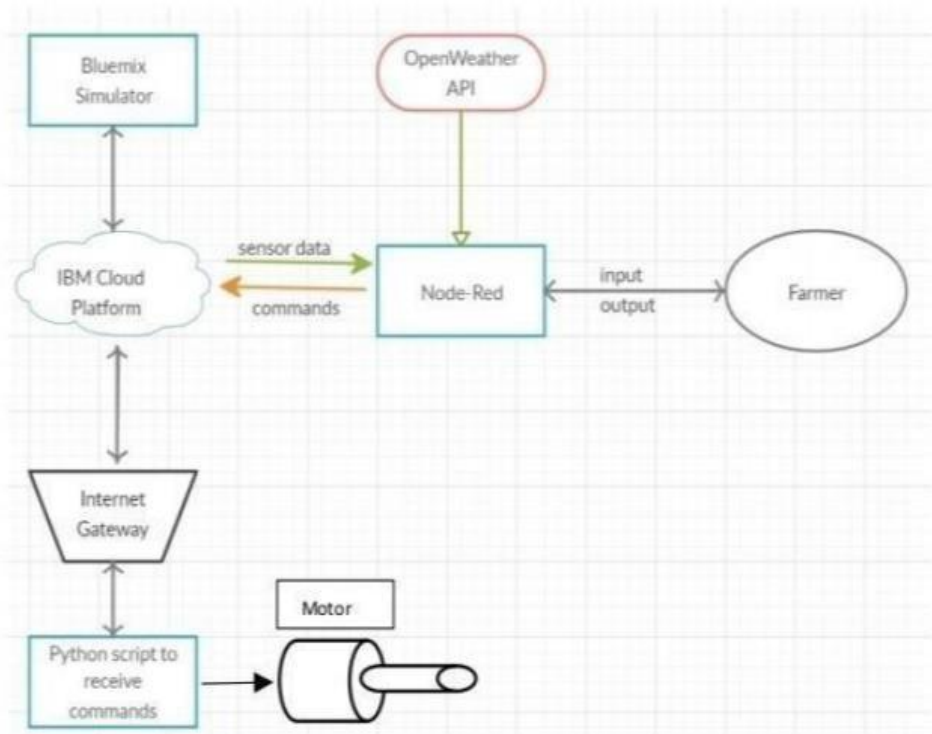


5.2 Solution & Technical Architecture

5.2.1 Solution Architecture



5.2.2 Technical Architecture



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with Gmail Login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can access dashboard with email login	High	Sprint-1
	Dashboard	USN-6	As a user I can enter into dashboard by using navigation panel	I can access the dashboard by using navigation panel	High	Sprint-1
Customer (Web user)	Registration	USN-1	As a user, I can register for the web application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the web application	I can receive confirmation email & click confirm	High	Sprint-1
	Login	USN-3	As a user, I can log into the web application by entering email & password	I can access dashboard with email login	High	Sprint-1
	Dashboard	USN-4	As a user I can enter into web dashboard by using navigation panel	I can access into dashboard by using navigation panel	High	Sprint-1
Customer Care Executive	Registration	USN-1	As a user I can contact the customer care service through phone or mail medium	I can receive confirmation SMS or email	High	Sprint-1
		USN-2	As a user I want customer care to answer the questions related to product and services	I can get the problem solved within a day	High	Sprint-1
		USN-3	As a user I want customer care to register my complaints	I can receive a confirmation message stating my complaint is registered	High	Sprint-1
		USN-4	As a user I want customer care to collect and analyse consumer feedback	I can get the status of my feedback	High	Sprint-1
		USN-5	As a user I want customer care to troubleshoot technical problems	I can get the problem solved within a day	High	Sprint-1
Administrator		USN-1	As a user I want the administrator to use good working hardware	I can get a guarantee and warranty card	High	Sprint-1
		USN-2	As a user I want the administrator to sell the product in a reasonable rate	I can get the cost of bill of materials	High	Sprint-1
		USN-3	As a user I want the administrator to refund my amount if I am not satisfied with the product	I can get an assurance stating I will get my amount back	High	Sprint-1

CHAPTER-6

SPRINT DELIVERY PLAN

Product Backlog, Sprint Schedule, and Estimation

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.	2	High	KALAI KAVIYA.V.B
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	KALAI KAVIYA.V.B
Sprint-1		USN-3	As a user, I can register for the application through Facebook	2	Low	KALAIKAVIYA .V.B
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	KUMUDHA PRIYA.T.P
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	KUMUDHA PRIYA.T.P
Sprint-1	Dashboard	USN-6	As a user, I can log into the application by entering email & password and access all the resources and services available	2	High	KUMUDHA PRIYA.T.P
Sprint-2	Login	USN-1	As a weather data controller, I log into my profile and start monitoring the weather updates	3	High	KALAI KAVIYA.V.B
Sprint-2	Dashboard	USN-2	I receive all the information about weather from web from weather API. Whenever there is change in weather, corresponding updates are made on sign boards.	2	Medium	KUMUDHA PRIYA.T.P
Sprint-3	Login	USN-1	As a image controller, I keep note of all the images received from various areas and detect traffic in that particular area.	3	High	KALAI KAVIYA.V.B
Sprint-3	Dashboard	USN-2	With the traffic, updates I change the status of sign board as “take diversion”.	2	Medium	KUMUDHA PRIYA.T.P
Sprint-4	Login	USN-1	As a zonal officer, I ensure that boards near school display “slow down” and near hospitals display “no horn”.	3	High	KALAI KAVIYA V.B
Sprint-4	Login	USN-1	As an administrator, I ensure that all departments work co-ordinated and ensure the accuracy and efficiency.	2	Medium	KALAI KAVIYA.V.B

Project Tracker, Velocity & Burndown Chart:

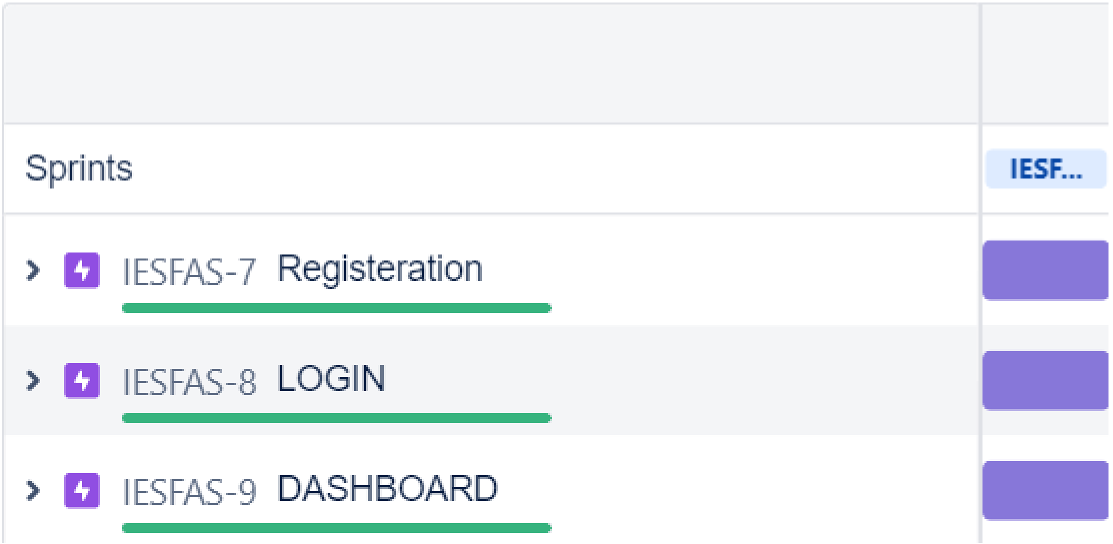
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022		
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022		
Sprint-4	20	6 Days	14 Nov 2022	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)

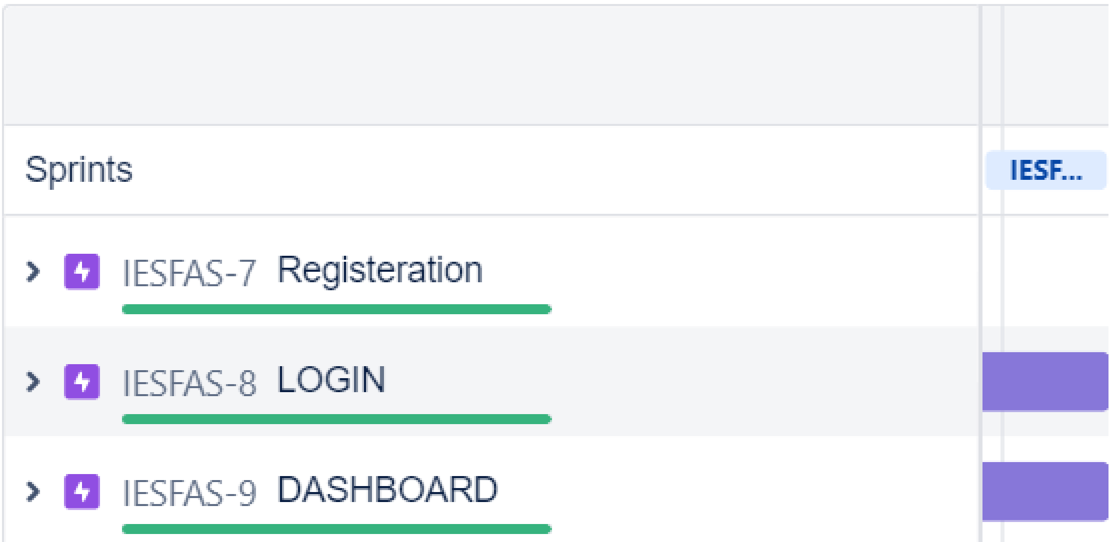
$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

JIRA REPORT

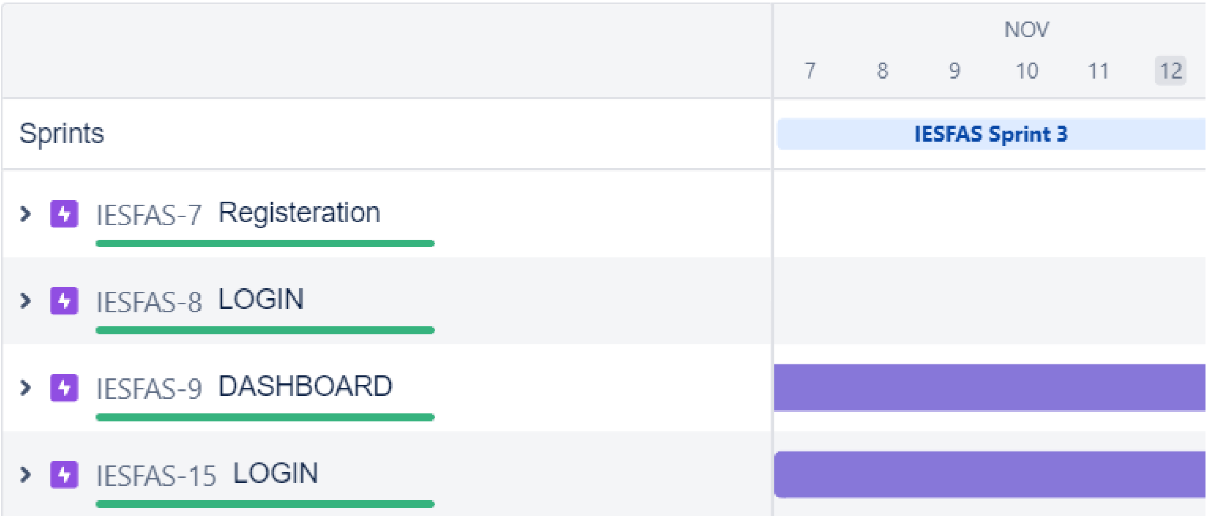
SPRINT 1:



SPRINT 2:



SPRINT 3:


NOV
7
8
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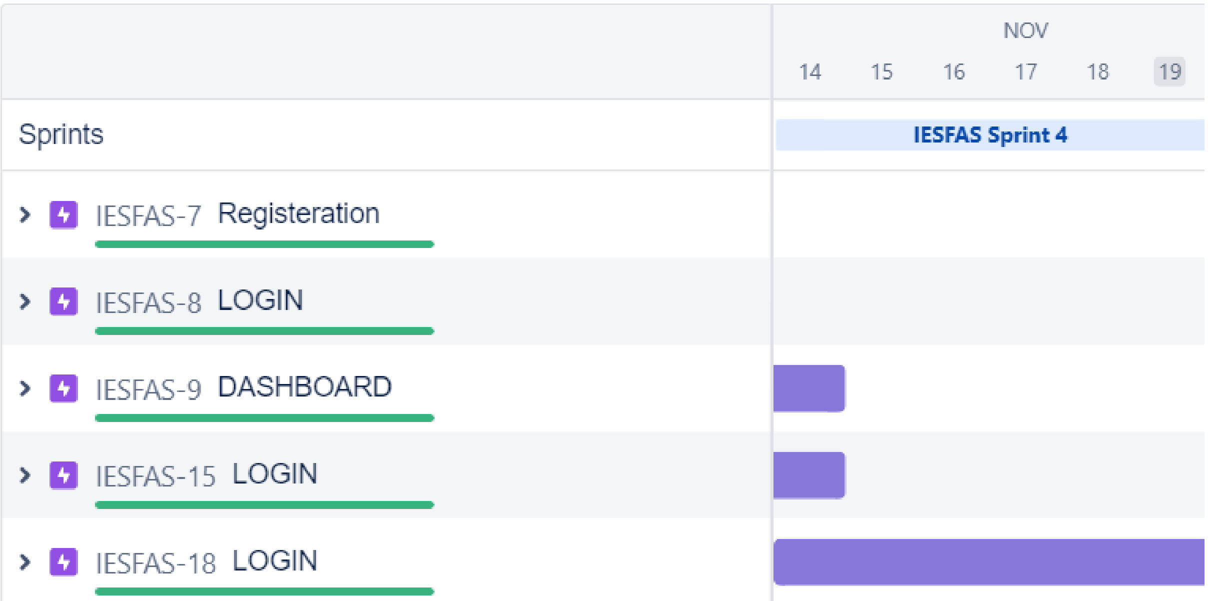
Sprints
IESFAS Sprint 3
IESFAS-7 Registeration
IESFAS-8 LOGIN
IESFAS-9 DASHBOARD
IESFAS-15 LOGIN

SPRINT 4: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Sprints
IESFAS Sprint 4
IESFAS-7 Registeration
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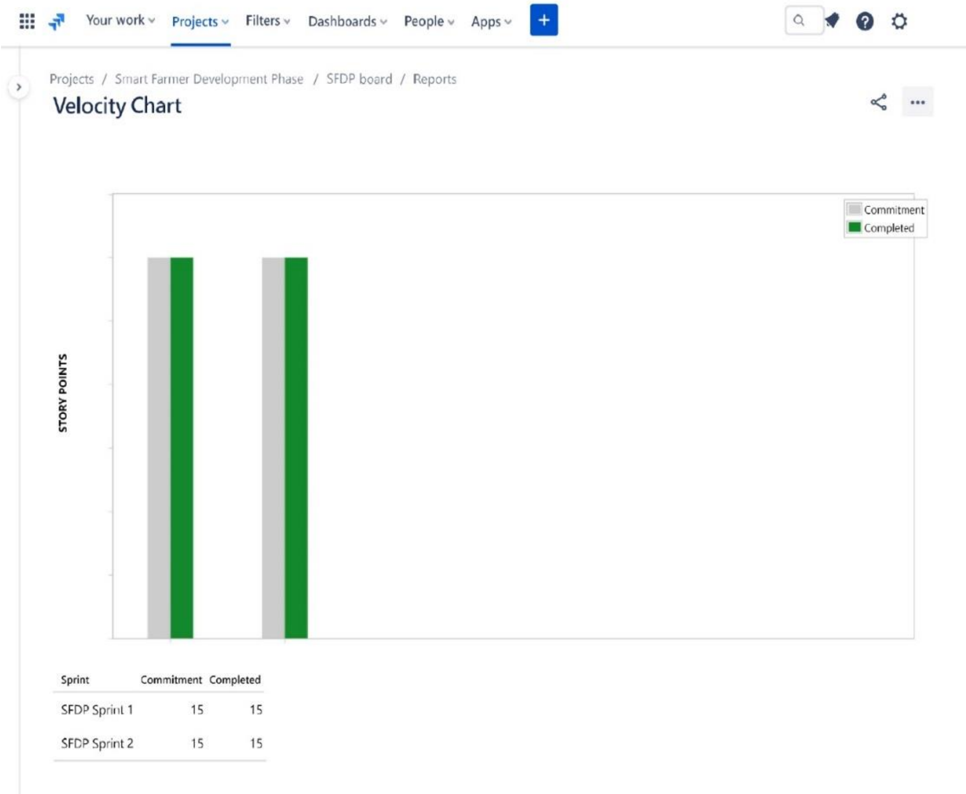
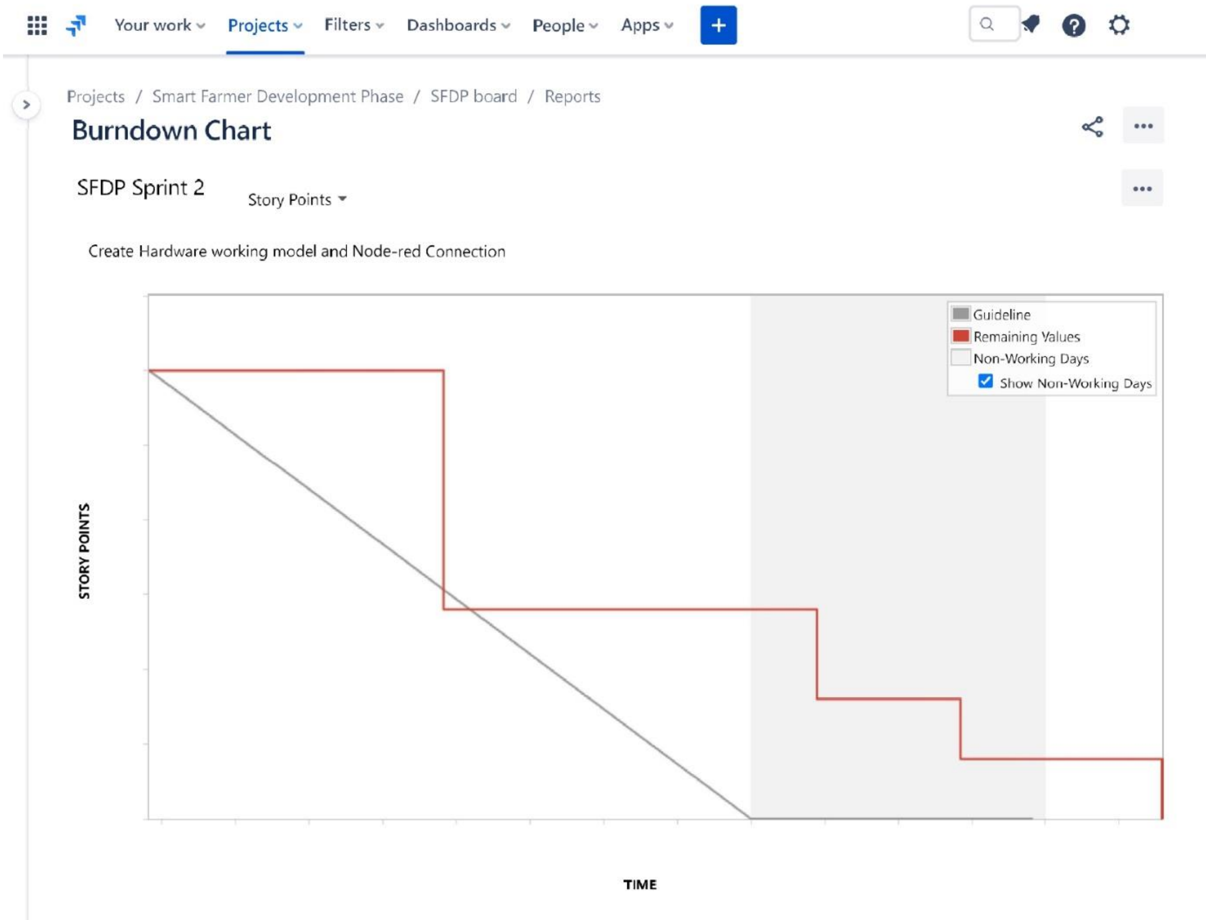
IESFAS-9 DASHBOARD
IESFAS-15 LOGIN
IESFAS-18 LOGIN

VELOCITY:



BURDOWN CHART:


Your work
Projects
Filters
Dashboards
People
Apps
Projects / Smart Farmer Development Phase / SFDP board / Reports
Burndown Chart
SFDP Sprint 2
Story Points
Create Hardware working model and Node-red Connection
Guideline
Remaining Values
Non-Working Days
Show Non-Working Days
STORY POINTS
TIME

CHAPTER-7
CODING & SOLUTIONING

CODING & SOLUTIONING

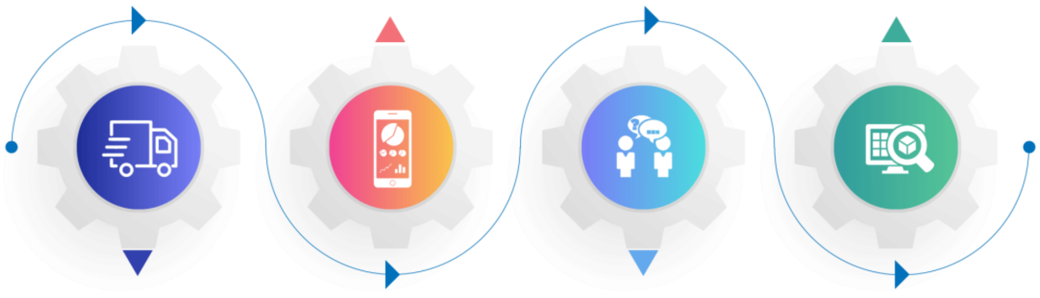
```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random


#Provide your IBM Watson Device Credentials
organization = "kv09p4"
deviceType = "Groot"
deviceId = "13"
authMethod = "token"
authToken = "12345678"
global y
# Initialize GPIO

def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if status=="motoron":
        print ("motor is on")
    if status=="motoroff" :
        print ("motor is off")
    if status=="manual" :
        print ("Motor Control is in Manual Mode")
    if status=="automatic" :
        print ("Motor control is in Automatic Mode")
        if soilmoisture > 600:
            print ("motor is on")

    #print(cmd)
```

```
try:
 deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-token": authToken}
 deviceCli = ibmiotf.device.Client(deviceOptions)
 #..............................................
except Exception as e:
 print("Caught exception connecting device: %s" % str(e))
 sys.exit()

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

while True:
        #Get Sensor Data from DHT11
        temp=random.randint(0,100)
        Humid=random.randint(0,100)
        soilmoisture=random.randint(0,1023)
        Phlevel=random.randint(0,14)
        y=soilmoisture

        data = { 'temp' : temp, 'Humid': Humid,'soilmoisture' : soilmoisture ,'Phlevel' : Phlevel }
        #print data
        def myOnPublishCallback():
            print ("Published Temperature = %s C" % temp, "Humidity = %s %%" % Humid,"Soil Moisture is %s %%" % soilmoisture,"PH level is
%s" %Phlevel ,"to IBM Watson")

        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(10)

        deviceCli.commandCallback = myCommandCallback

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

FEATURES:

- Scheduled automatic off times – diesel and electric pumps
- Rain gauge triggered automatic shutdowns
- Soil moisture level threshold automatic shutdowns
- “All Off” pump command feature
- based on standing water levels

Field operator specific automation scheduling access rights



Climate monitoring and forecasting

- Nature is a fickle friend of the farmers. Climate change, weather forecasts are now key features in in precision farming. They alert the farmer of the impending changes and help ensure preventive measures. With sensors in place to predict and analyze the weather, crops can be saves from being destroyed.

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. Primarily, the leaf to soil ratio and soil humidity help increase quantity and quality of the produce. Wearables for cattle are the best bet against poaching and cattle napping.

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. This helps the farmer make environmental variables and informed decisions for the farm.

Automated Sprinkler System

The weather, humidity in the air, analysis of the soil goes a long way in determining if there is a need for water dispersion. Precise and controlled water dispersion through IoT enabled water meter sensors helps in ensuring that there is no risk of damaging crops due to over watering.

Weather forecast:

Weather forecast is very crucial to agriculture activities and is a very important feature that farmers look for in the farming mobile app. The accuracy of this data can help farmers be prepared for anything unforeseen.

CHAPTER-8

ADVANTAGES AND DISADVANTGES

Advantages:

• Increased production and its quality.
• Water is used effectively.
• Remote monitoring.
• Automatic controlling of irrigation.
• Cost Effective.
• IOT technologies enables growers and farmers to reduce waste and enhance productivity

Disadvantages:

Lack of Infrastructure: Even if the farmers adopt IoT technology they won't be able to take benefit of this technology due to poor communication infrastructure. Farms are located in remote areas and are far from access to the internet. A farmer needs to have access to crop data reliably at any time from any location, so connection issues would cause an advanced monitoring system to be useless.

High Cost: Equipment needed to implement IoT in agriculture is expensive. However sensors are the least expensive component, yet outfitting all of the farmers' fields to be with them would cost more than a thousand dollars. Automated machinery cost more than manually operated machinery as they include cost for farm management software and cloud access to record data. To earn higher profits, it is significant for farmers to invest in these technologies however it would be difficult for them to make the initial investment to set up IoT technology at their farms.

Lack of Security: Since IoT devices interact with older equipment they have access to the internet connection, there is no guarantee that they would be able to access drone mapping data or sensor readouts by taking benefit of public connection. An enormous amount of data is collected by IoT agricultural systems which is difficult to protect. Someone can have unauthorized access IoT providers database and could steal and manipulate the data.

CHAPTER-9

CONCLUSION

IoT based SMART FARMING SYSTEM for Live Monitoring of Temperature and Soil Moisture has been proposed using Arduino and Cloud Computing .

The System has high efficiency and accuracy in fetching the live data of temperature and soil moisture.

The IoT based smart farming System being proposed via this report will assist farmers in increasing the agriculture yield and take efficient care of food production as the System will always provide helping hand to farmers for getting accurate live feed of environmental temperature and soil moisture with more than 99% accurate results.

the IoT agricultural applications are making it possible for ranchers and farmers to collect meaningful data.

Large landowners and small farmers must understand the potential of IoT market for agriculture by installing smart technologies to increase competitiveness and sustainability in their productions.

With the population growing rapidly, the demand can be successfully met if the ranchers, as well as small farmers, implement agricultural IoT solutions in a prosperous manner.

Thus the smart agriculture using IoT will revolutionized the world of farming and it will increase the productivity as well as improve the quality and can save lives of farmer. There is an urgent need for a system that makes the agricultural process easier and burden free from the farmer's side.

With the recent advancement of technology it has become necessary to increase the annual crop production output of our country India, an entirely agro centric economy. The ability to conserve the natural resources as well as giving a splendid boost to the production of the crops is one of the main aims of incorporating such technology into the agricultural domain of the country.

To save farmer's effort, water and time has been the most important consideration.

CHAPTER- 10

FUTURE SCOPE

Data collected by smart agriculture sensors, **in this approach of farm management, a key component are sensors, control systems, robotics, autonomous vehicles, automated hardware, variable rate technology, motion detectors, button camera, and wearable devices. This data can be used to track the state of the business in general as well as staff performance, equipment efficiency. The ability to foresee the output of production allows to plan for better product distribution.**
Agricultural Drones Ground-based and aerial-based drones are being used in agriculture in order to enhance various agricultural practices: crop health assessment, irrigation, crop monitoring, crop spraying, planting, and soil and field analysis.

Livestock tracking and geofencing Farm owners can utilize wireless IoT applications to collect data regarding the location, well-being, and health of their cattle. This information helps to prevent the spread of disease and also lowers labor costs.

Smart Greenhouses A smart greenhouse designed with the help of IoT intelligently monitors as well as controls the climate, eliminating the need for manual intervention.

Predictive analytics for smart farming Crop predication plays a key role, it helps the farmer to decide future plan regarding the production of the crop, its storage, marketing techniques and risk management. To predict production rate of the crop artificial network use information collected by sensors from the farm. This information includes parameters such as soil, temperature, pressure, rainfall, and humidity. The farmers can get an accurate soil data either by the dashboard or a customized mobile application.

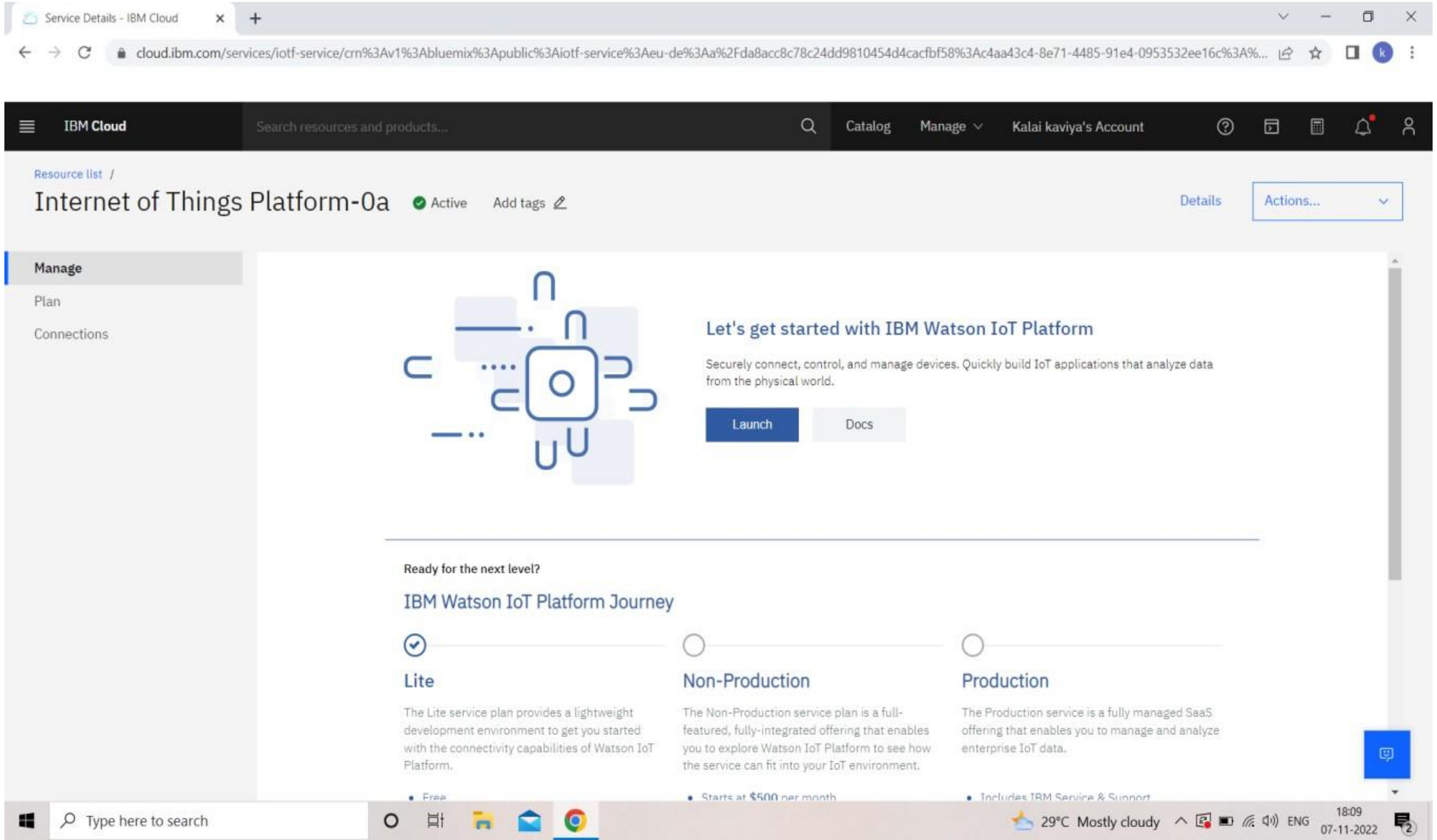
Future work would be focused more on increasing sensors on this system to fetch more data especially with regard to Pest Control and by also integrating GPS module in this system to enhance this Agriculture IoT Technology to full-fledged Agriculture Precision ready product.

CHAPTER-11

APPENDIX

CREATION OF IBM CLOUD SERVICES:

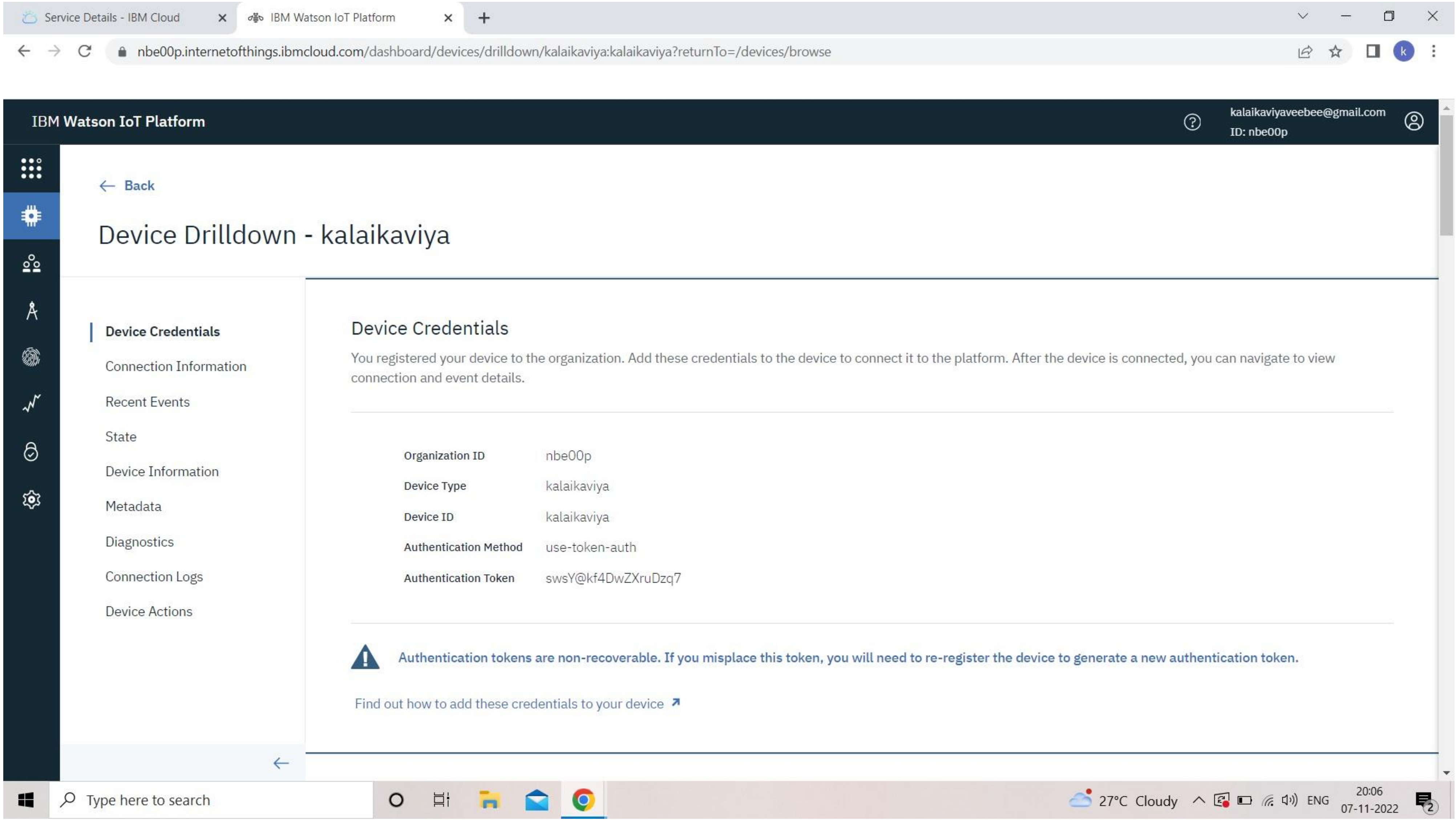
SCREENSHOT OF CLOUD ACCOUNT CREATION:

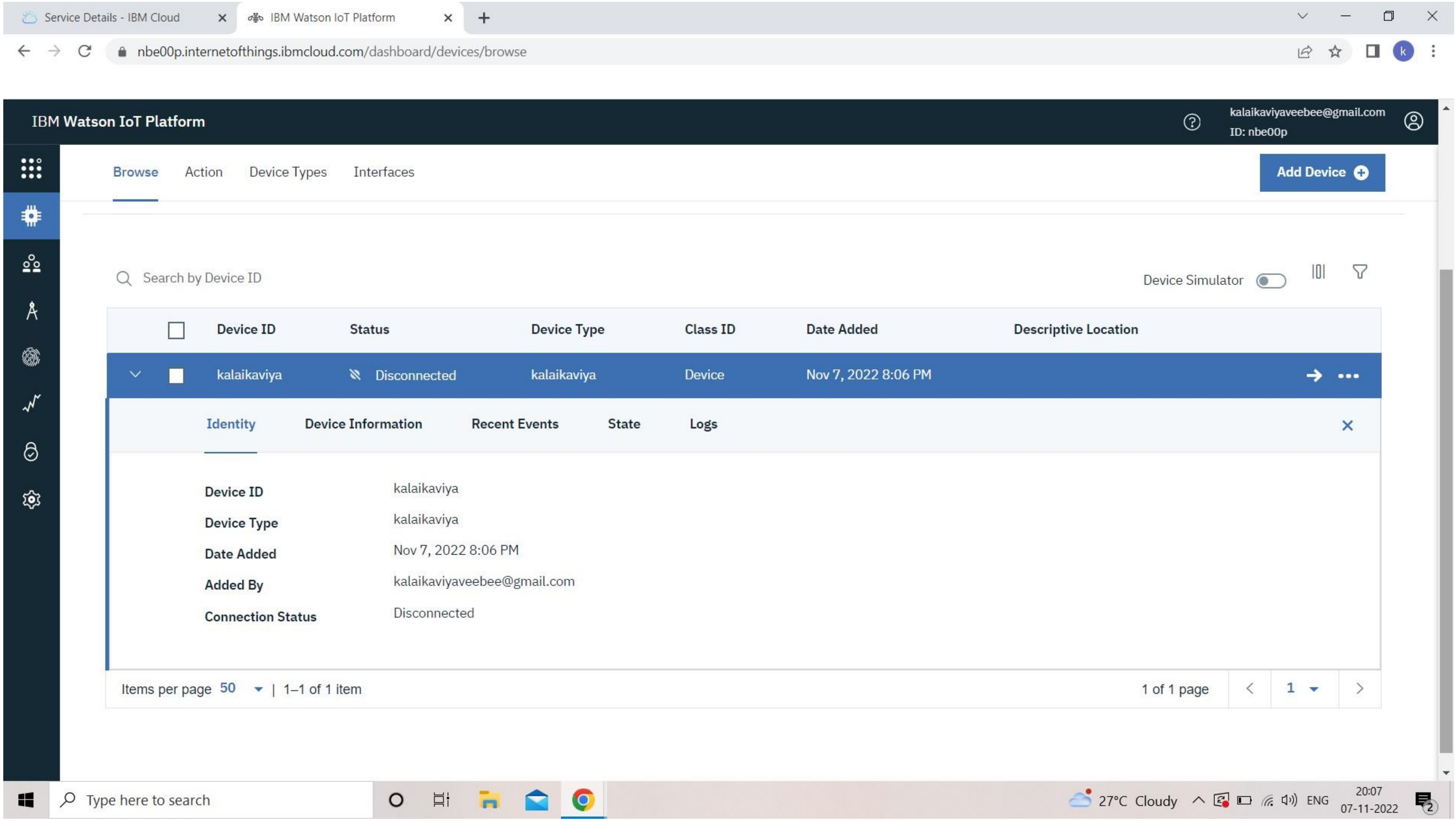


Create a IBM Watson IOT platform and device

Step 1: login into IBM CLOUD account
Step2: click on catalog and search for IOT platform
Step 3: Then search for IOT Watson platform then click on create
Step 4: Then click on add device and give the device type and necessary details then click finishStep 5: Finally, IOT Watson platform is successfully created

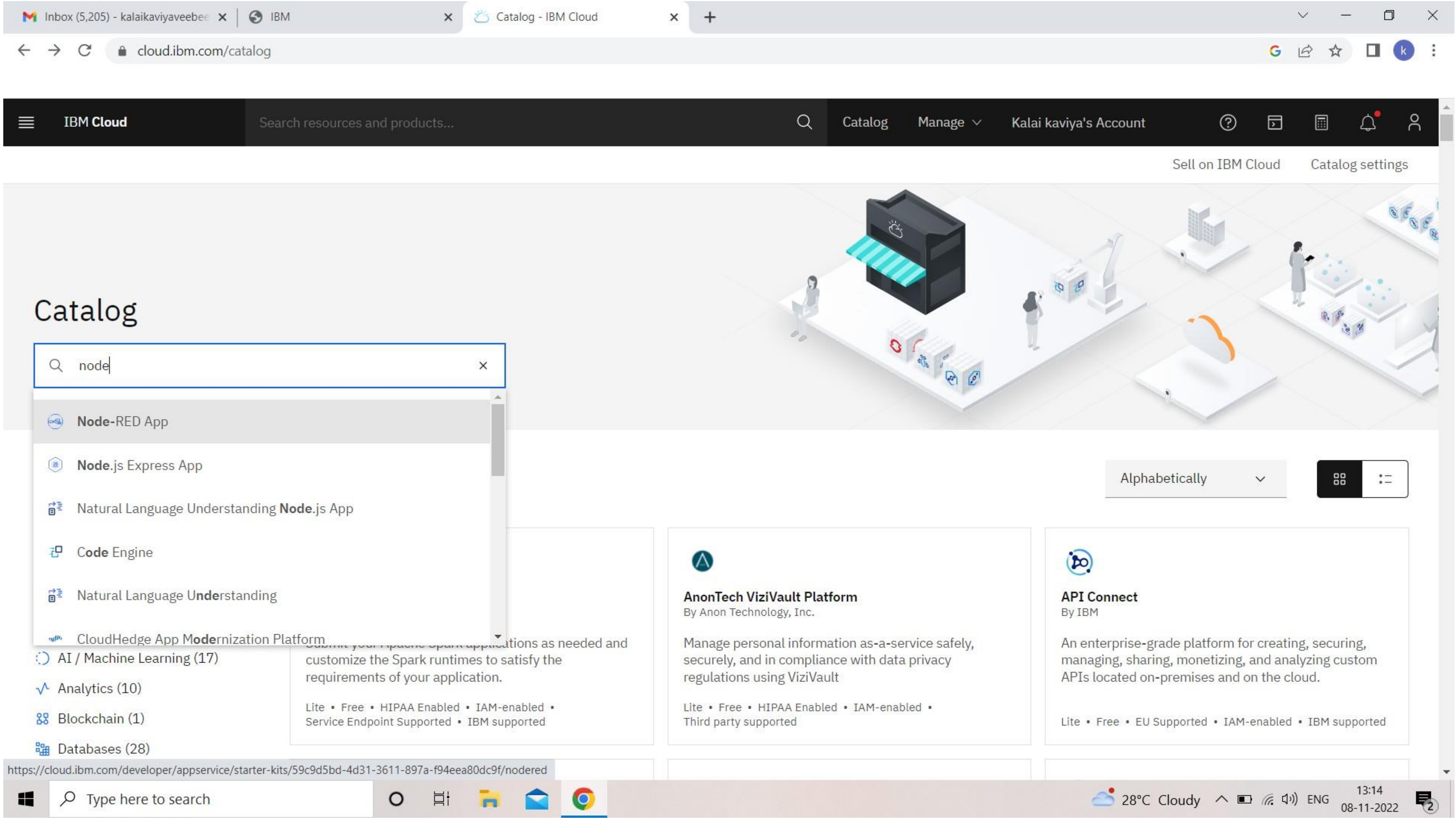
Screenshots of IBM Watson IOT platform and device:


Service Details - IBM Cloud
IBM Watson IoT Platform
nbe00p.internetofthings.ibmcloud.com/dashboard/devices/drilldown/kalaikaviya:kalaikaviya?returnTo=/devices/browse
IBM Watson IoT Platform
kalaikaviyaveebee@gmail.com
ID: nbe00p
Back
Device Drilldown - kalaikaviya
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 nbe00p
Device Type kalaikaviya
Device ID kalaikaviya
Authentication Method use-token-auth
Authentication Token swsY@kf4DwZXruDzq7
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
Type here to search
27°C Cloudy
ENG
20:06
07-11-2022


Service Details - IBM Cloud
IBM Watson IoT Platform
nbe00p.internetofthings.ibmcloud.com/dashboard/devices/browse
IBM Watson IoT Platform
kalaikaviyaveebee@gmail.com
ID: nbe00p
Browse
Action
Device Types
Interfaces
Add Device
Search by Device ID
Device Simulator
Device ID
Status
Device Type
Class ID
Date Added
Descriptive Location
kalaikaviya
Disconnected
kalaikaviya
Device
Nov 7, 2022 8:06 PM
Identity
Device Information
Recent Events
State
Logs
Device ID
kalaikaviya
Device Type
kalaikaviya
Date Added
Nov 7, 2022 8:06 PM
Added By
kalaikaviyaveebee@gmail.com
Connection Status
Disconnected
Items per page 50
1–1 of 1 item
1 of 1 page
1
Type here to search
27°C Cloudy
ENG
20:07
07-11-2022

Step 1: Login into IBM CLOUD account

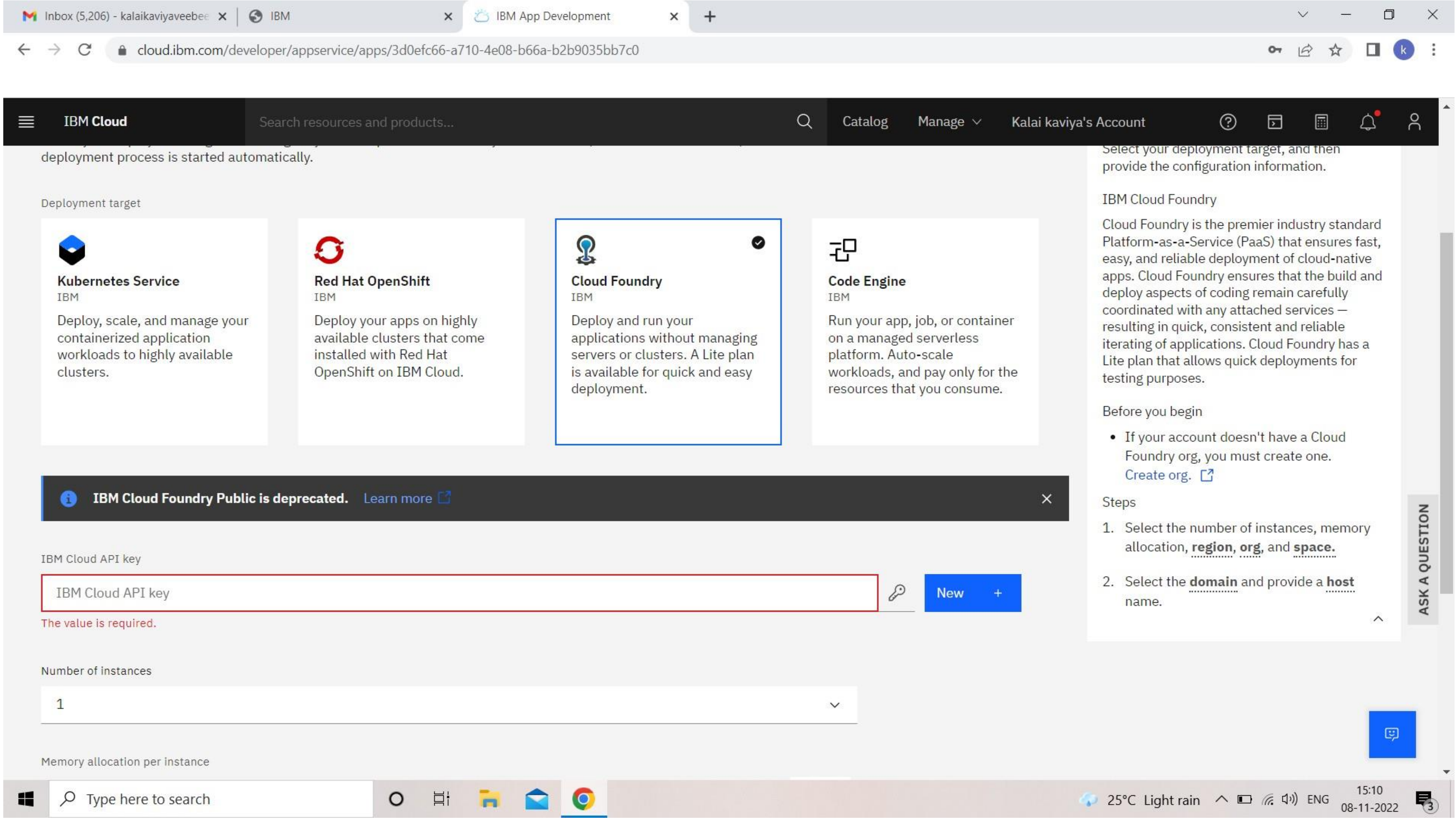
Step2: In catalog, search for node red application



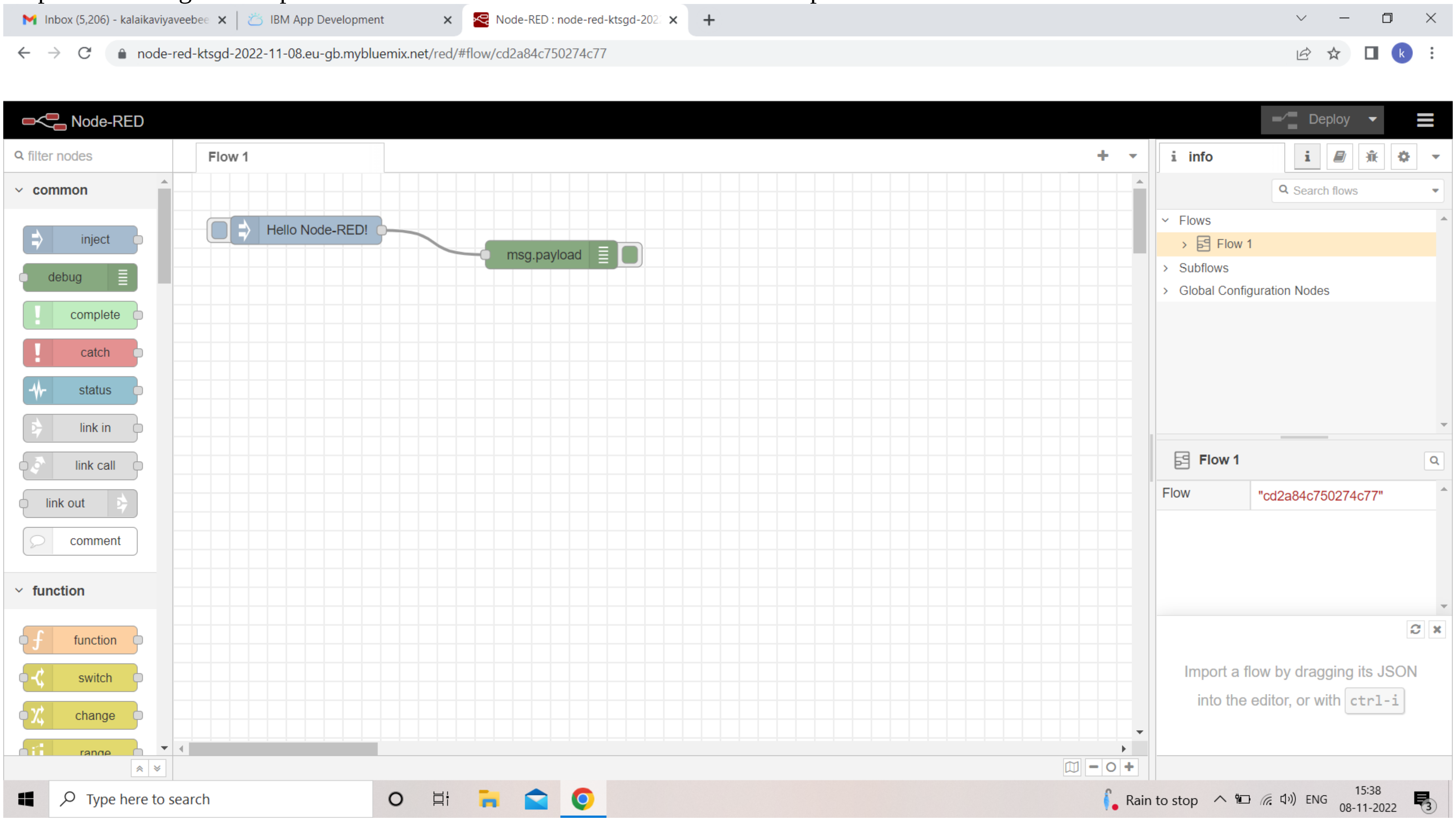
Step 3: Enter the project details and click on create

Step 4: click on deploy option and deploy

Step 5: Set up the environment for deploying and click on create



Step 6: Now drag and drop the nodes and connect nodes with IOT Watson platform

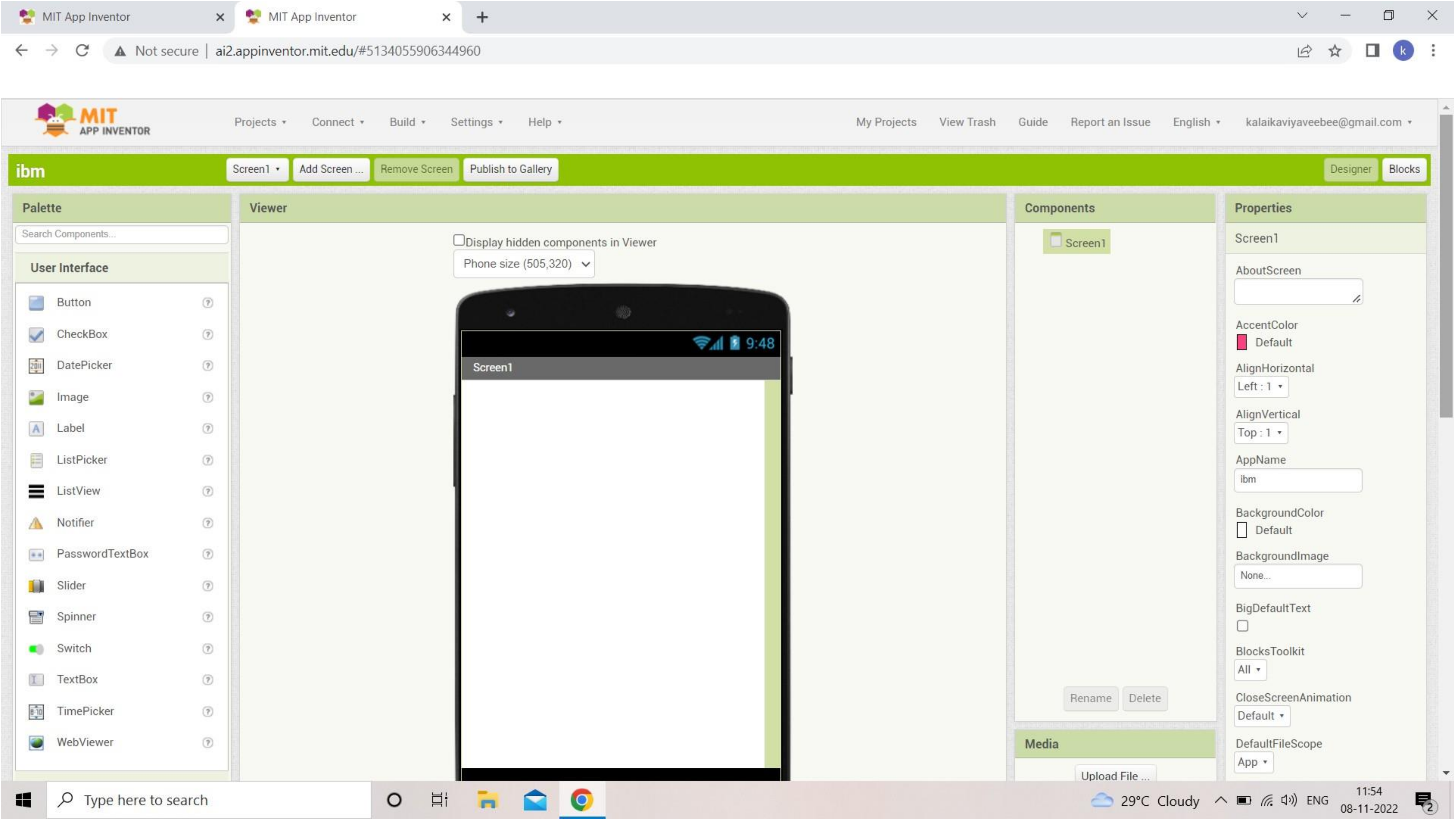


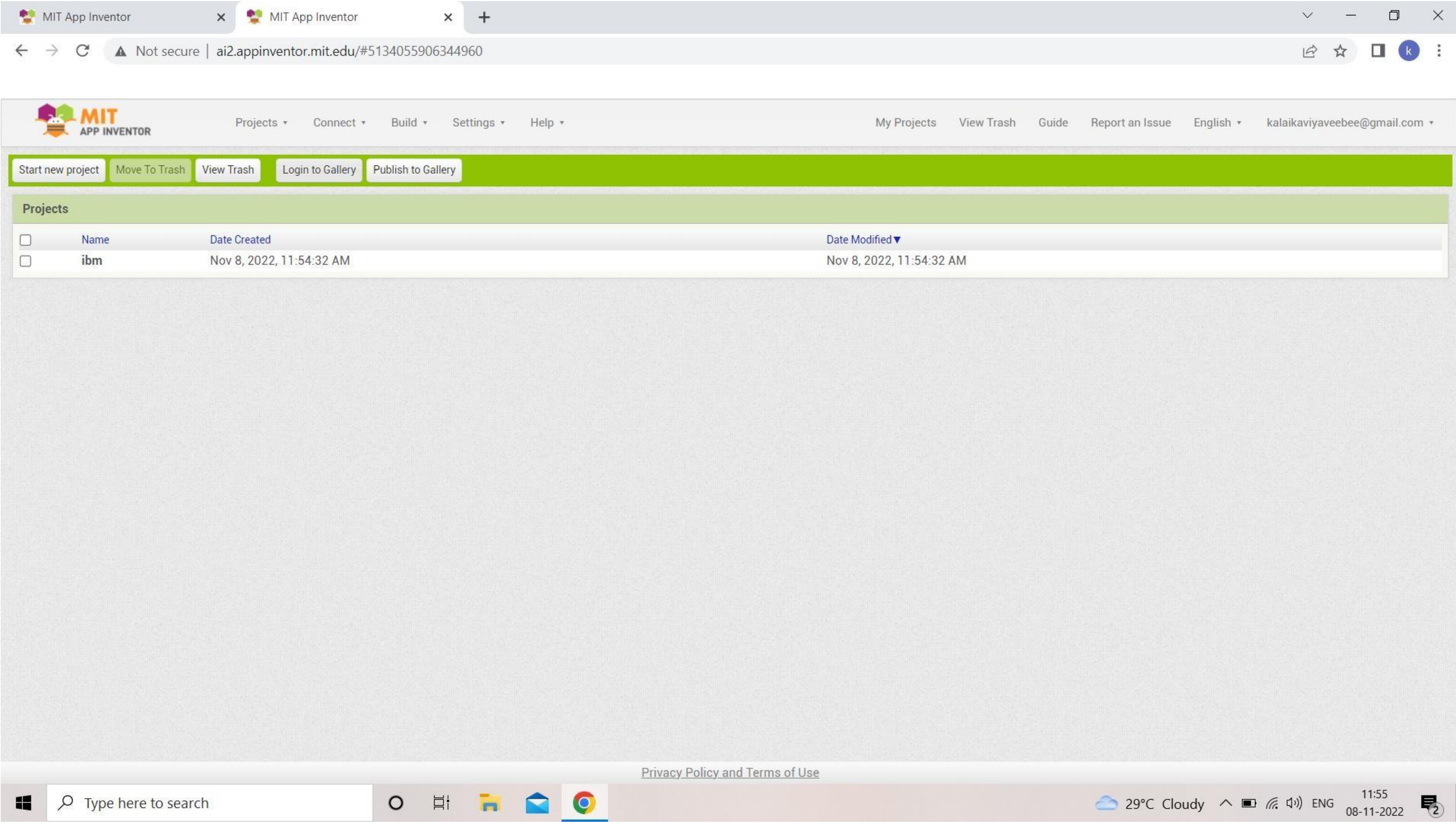
Step 7: setup the settings that connects node red service with Watson IOTStep 8:

Finally, output can be seen in node red service

Create a MIT APP INVENTOR

Screenshots of MIT APP INVENTOR:

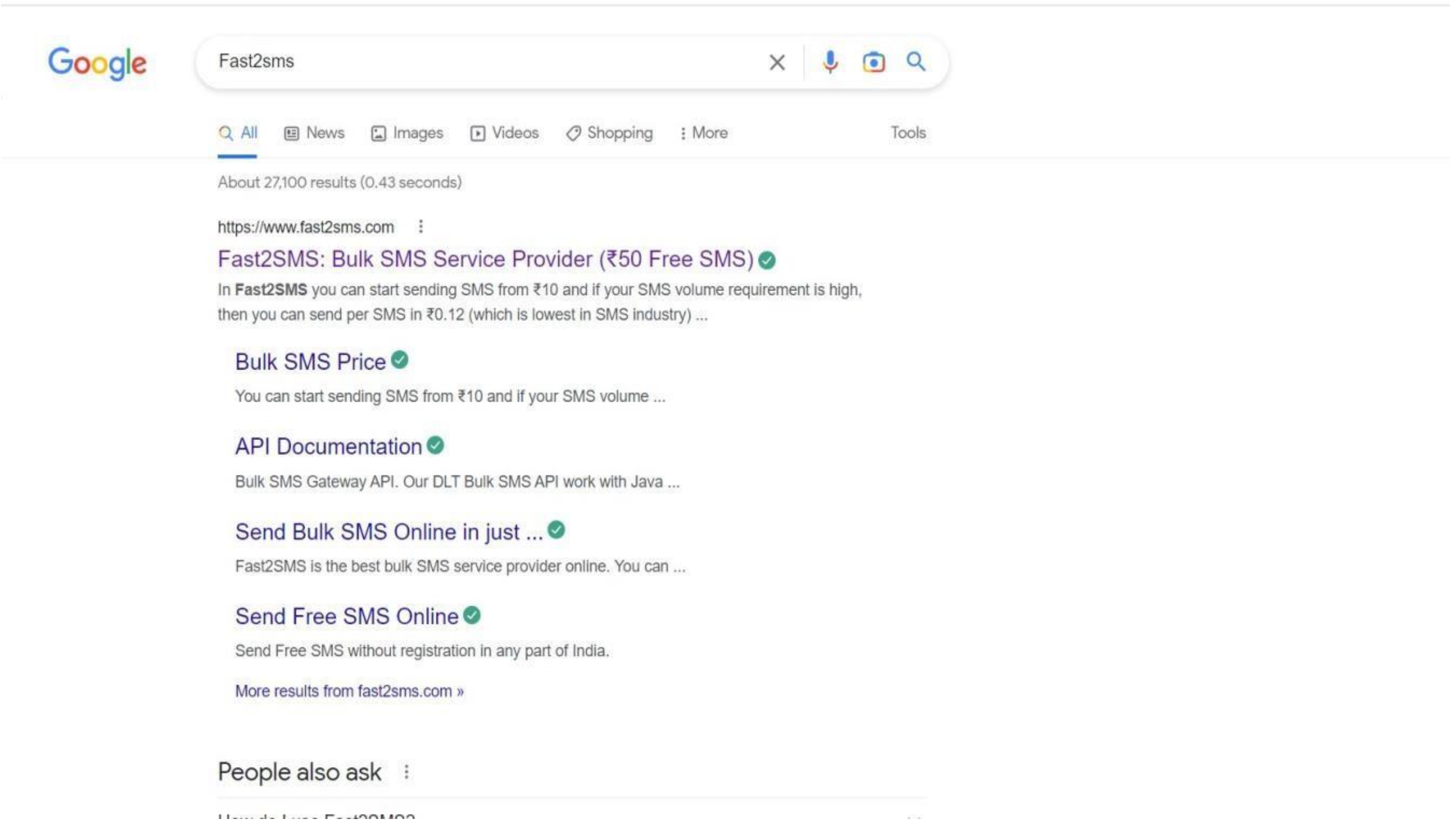

MIT App Inventor
MIT App Inventor
Not secure | ai2.appinventor.mit.edu/#5134055906344960
MIT APP INVENTOR
Projects
Connect
Build
Settings
Help
My Projects
View Trash
Guide
Report an Issue
English
kalaikaviyaveebee@gmail.com
ibm
Screen1
Add Screen ...
Remove Screen
Publish to Gallery
Designer
Blocks
Palette
Search Components...
User Interface
Button
CheckBox
DatePicker
Image
Label
ListPicker
ListView
Notifier
PasswordTextBox
Slider
Spinner
Switch
TextBox
TimePicker
WebViewer
Viewer
Display hidden components in Viewer
Phone size (505,320)
9:48
Screen1
Components
Screen1
Rename
Delete
Media
Upload File ...
Properties
Screen1
AboutScreen
AccentColor
Default
AlignHorizontal
Left : 1
AlignVertical
Top : 1
AppName
ibm
BackgroundColor
Default
BackgroundImage
None...
BigDefaultText
BlocksToolkit
All
CloseScreenAnimation
Default
DefaultFileScope
App
Type here to search
29°C Cloudy
ENG
11:54
08-11-2022


MIT App Inventor
MIT App Inventor
Not secure | ai2.appinventor.mit.edu/#5134055906344960
MIT APP INVENTOR
Projects
Connect
Build
Settings
Help
My Projects
View Trash
Guide
Report an Issue
English
kalaikaviyaveebee@gmail.com
Start new project
Move To Trash
View Trash
Login to Gallery
Publish to Gallery
Projects
Name
Date Created
Date Modified
ibm
Nov 8, 2022, 11:54:32 AM
Nov 8, 2022, 11:54:32 AM
Privacy Policy and Terms of Use
Type here to search
29°C Cloudy
ENG
11:55
08-11-2022

CREATE AN ACCOUNT IN FAST2SMS

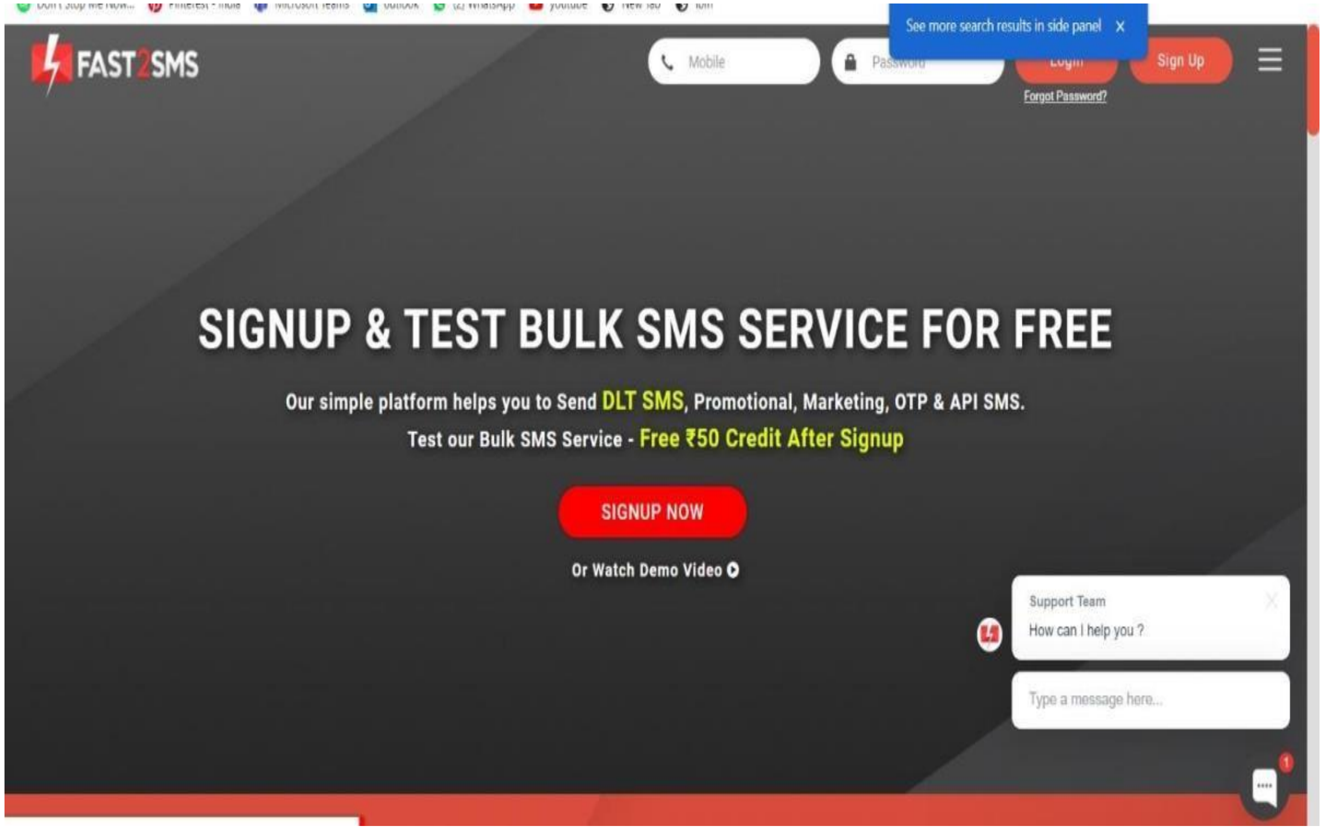
Step 1:

Type fast2sms in google and click on the fist link



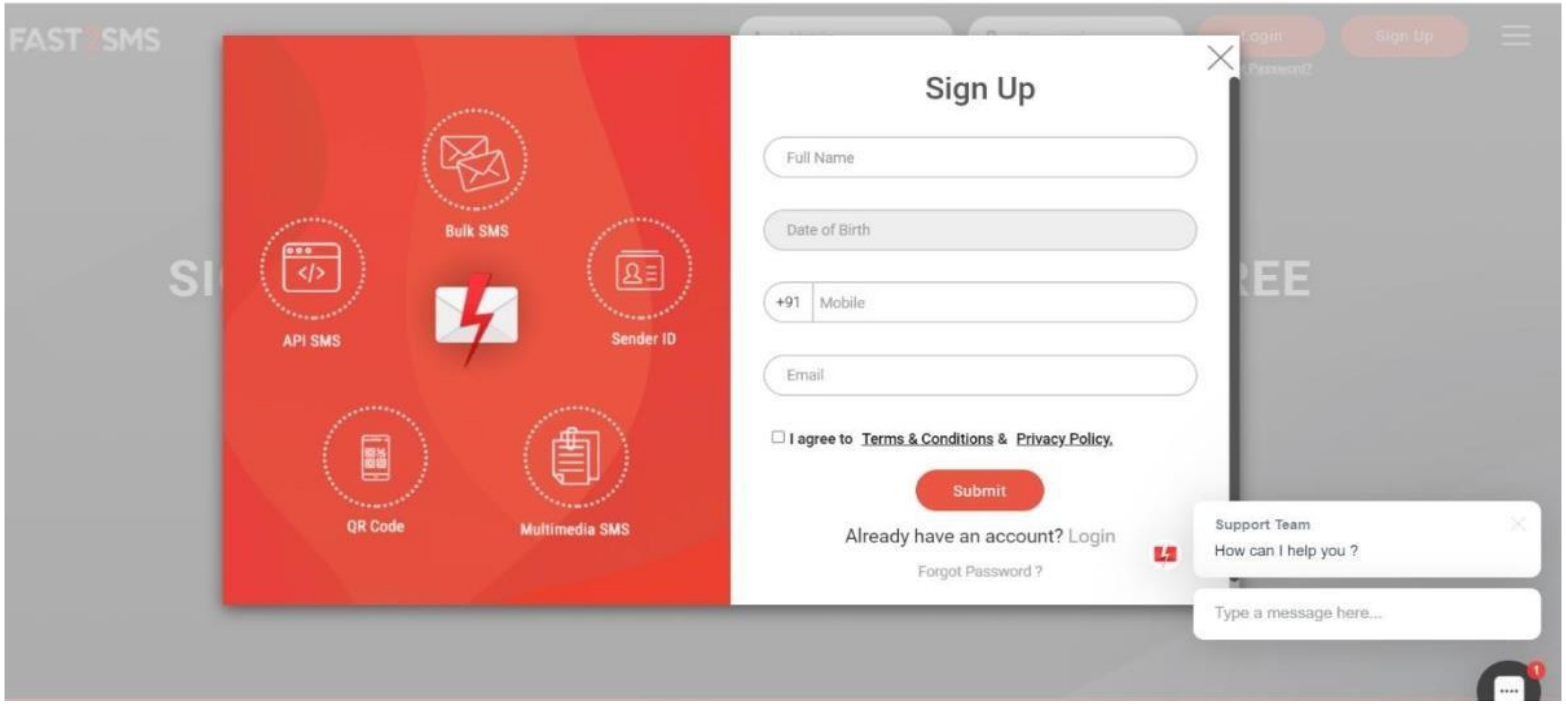
Step 2:

click on sign up now



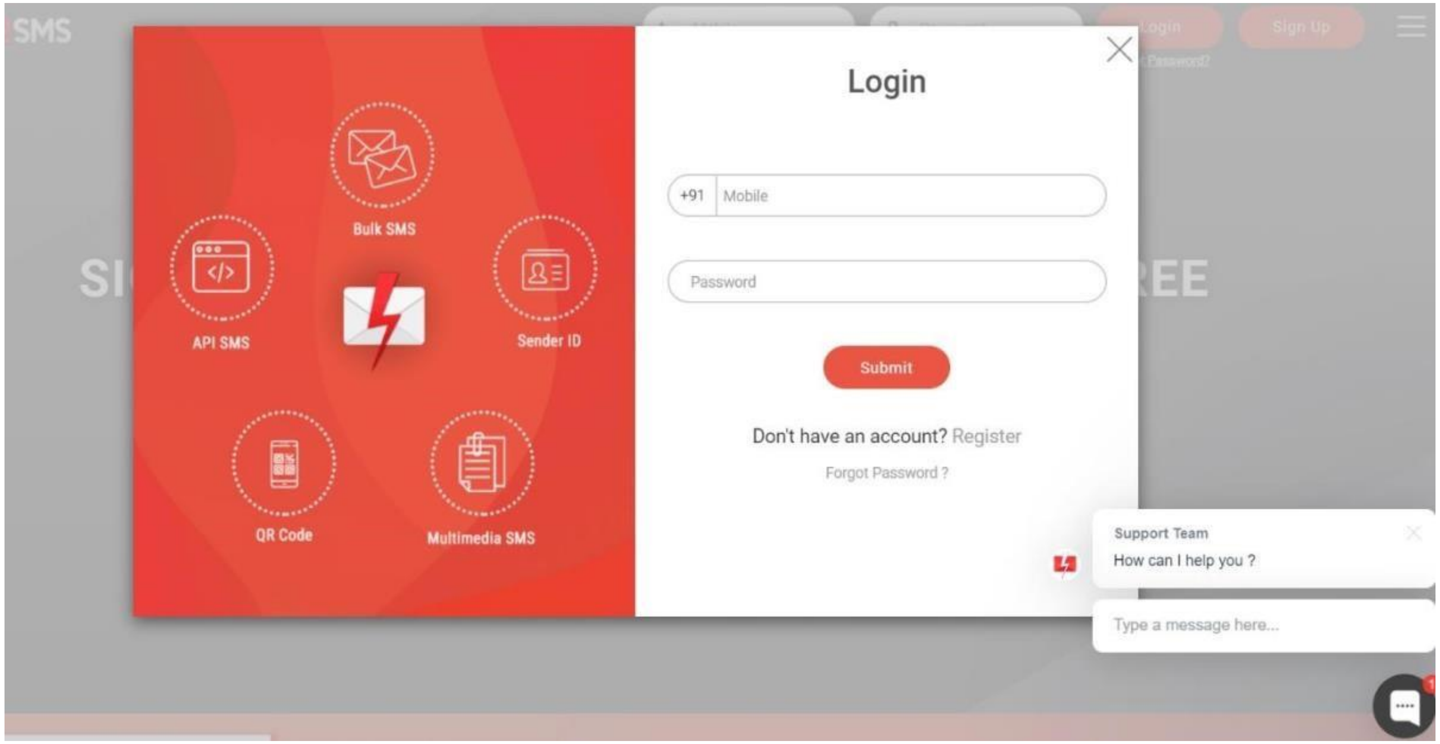
Step 3:

Give your details and click on the check box, then click the submit button.



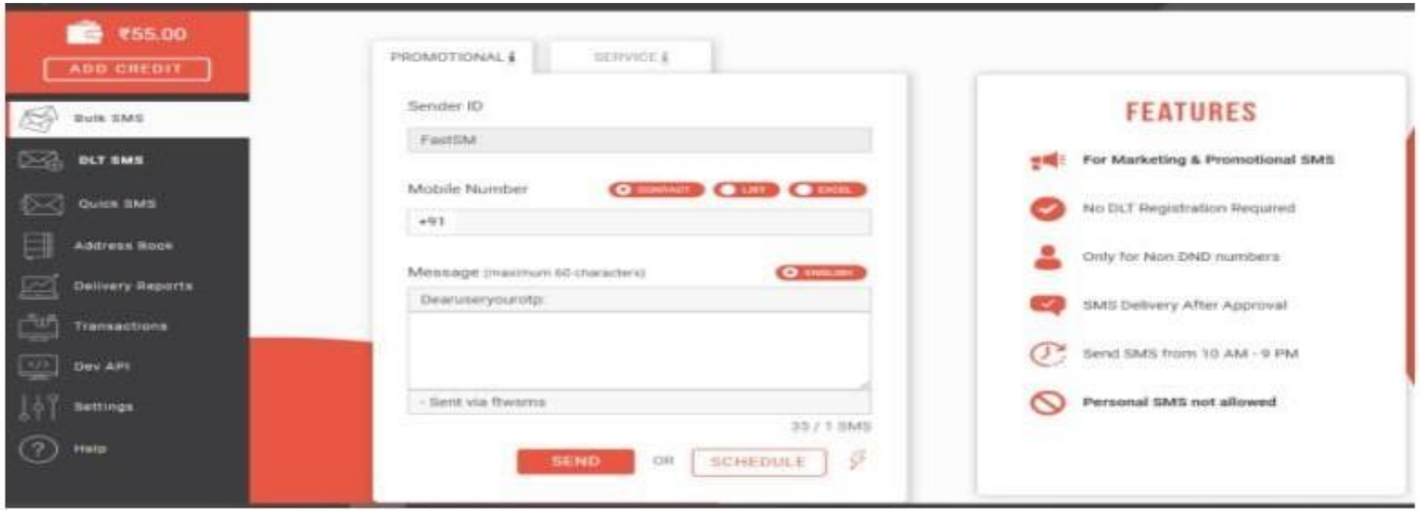
Step 4:

You will get the SMS with your password. Type your mobile number andthe password then click on the submit button.



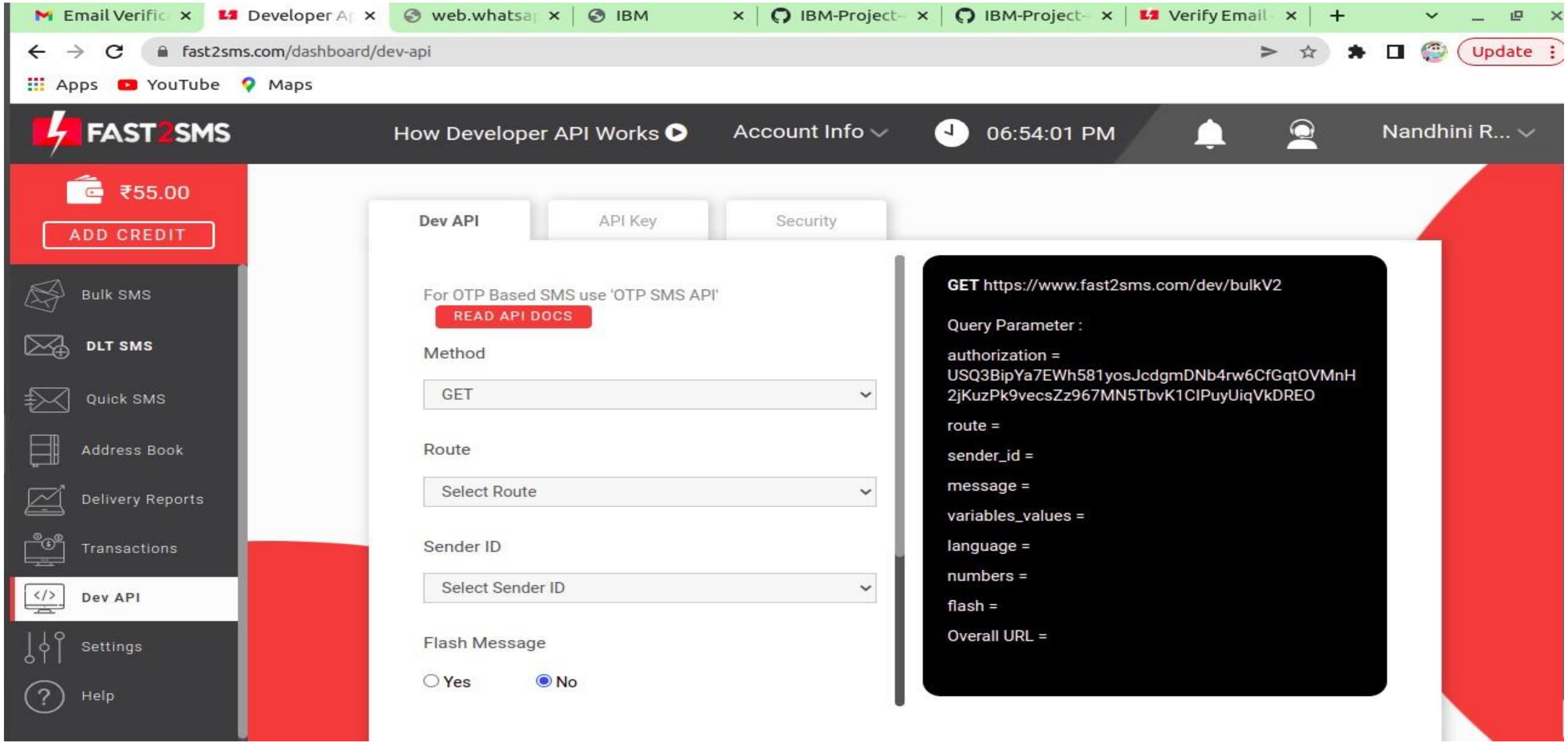
Step 5:

Click on the Dev API



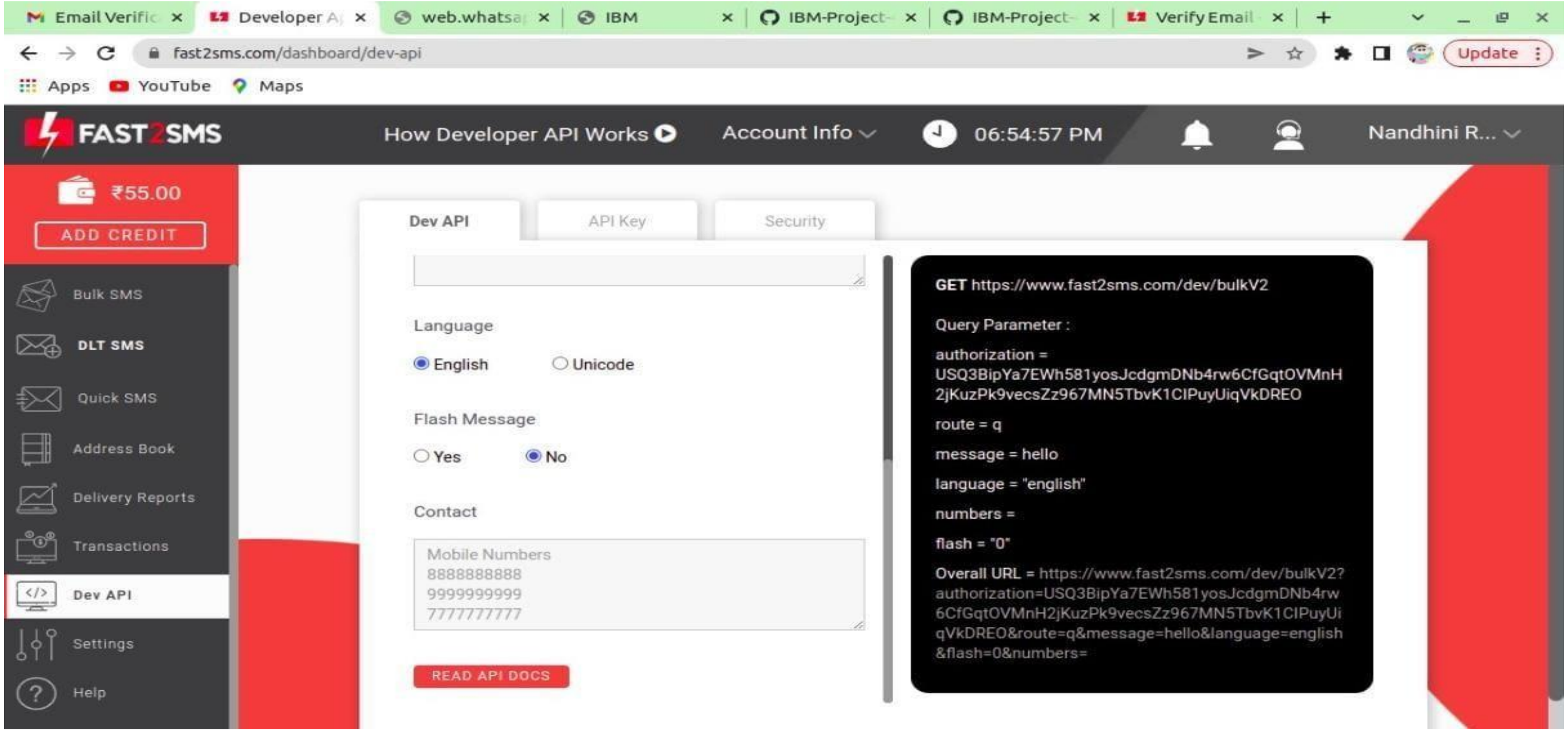
Step 6:

Select the Route as Quick SMS and type the message in Messagebox.



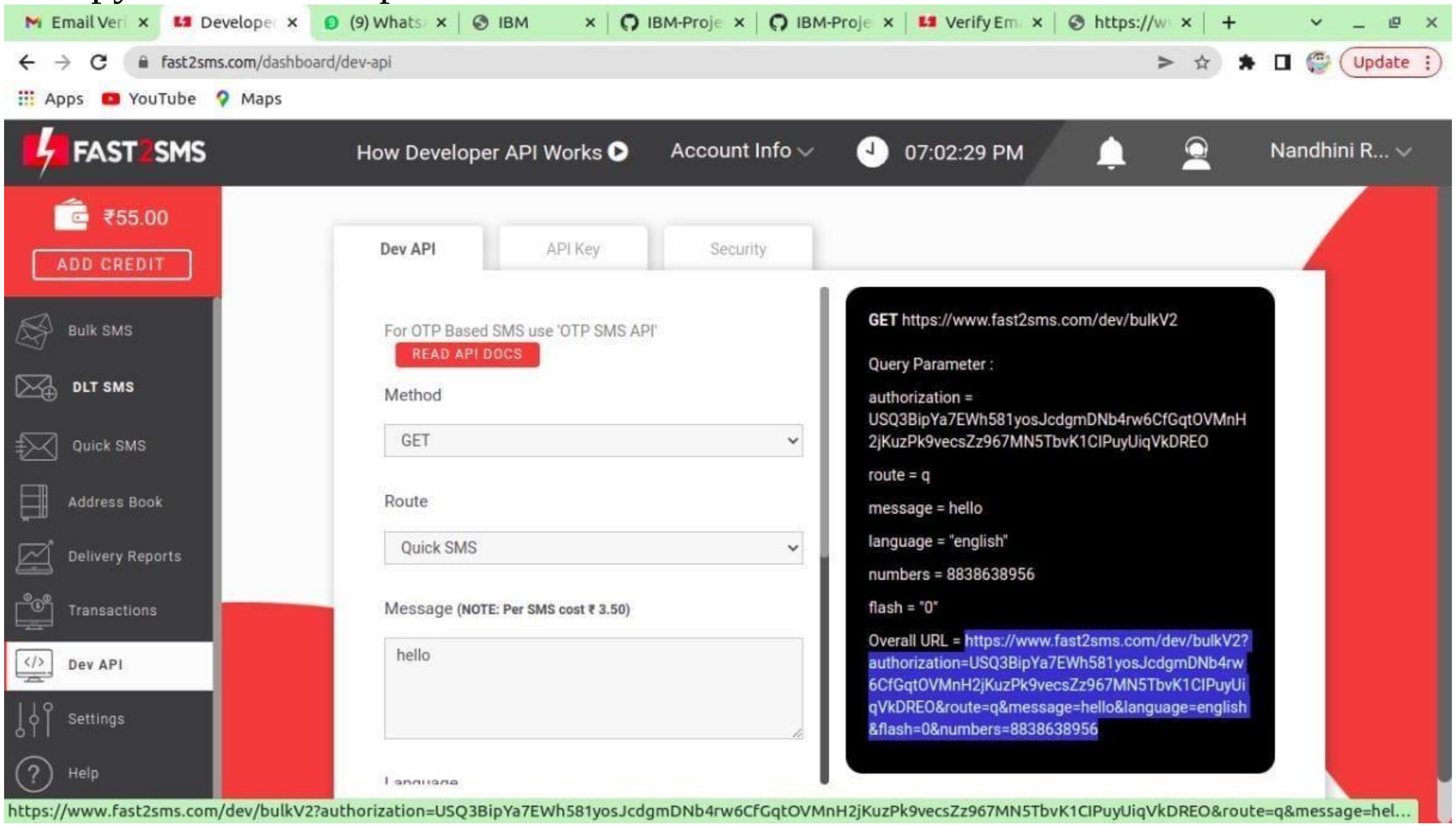
Step 7:

Select your language and type your Mobile number in contact


fast2sms.com/dashboard/dev-api
FAST2SMS
How Developer API Works
Account Info
06:54:57 PM
Nandhini R...
₹55.00
ADD CREDIT
Bulk SMS
DLT SMS
Quick SMS
Address Book
Delivery Reports
Transactions
Dev API
Settings
Help
Dev API
API Key
Security
Language
English
Unicode
Flash Message
Yes
No
Contact
Mobile Numbers
8888888888
9999999999
7777777777
READ API DOCS
GET https://www.fast2sms.com/dev/bulkV2
Query Parameter :
authorization =
USQ3BipYa7EWh581yosJcdgmDNb4rw6CfGqtOVMnH
2jKuzPk9vecsZz967MN5TbvK1CIPuyUiqVkDREO
route = q
message = hello
language = "english"
numbers =
flash = "0"
Overall URL = https://www.fast2sms.com/dev/bulkV2?
authorization=USQ3BipYa7EWh581yosJcdgmDNb4rw
6CfGqtOVMnH2jKuzPk9vecsZz967MN5TbvK1CIPuyUi
qVkDREO&route=q&message=hello&language=english
&flash=0&numbers=

Step 8:

Copy the URL and paste it in the new tab



Step 9:

You will get the SMS in the new tab

DEMO LINK:

https://drive.google.com/file/d/1cD4m15a5otkmYqfPysPvB3zhK3S_YTzz/view?usp=drivesdk

GITHUB LINK: https://github.com/IBM-EPBL/IBM-Project-3260-1658509509