UNIVERSITY COLLEGE OF ENGINEERING ,NAGERCOIL

(A CONSTITUENT COLLEGE OF ANNA UNIVERSITY,CHENNAI)

PROFESSIONAL READINESS FOR INNOVATION , EMPLOYABILITY AND ENTREPRENEURSHIP

IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE

PROJECT REPORT

Submitted by

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1.INTRODUCTION

1.1.Project Overview:

Agriculture is the main backbone of India's economic growth. To boost productivity and minimize the barriers in agriculture field, there is need to use innovative technology and techniques called Internet of things. Due to enormous growth in technologies, farming has become more popular and significant. Different tools and techniques are available for development of farming. Internet of Things (IoT) can play big role in increasing productivity, obtaining huge global market and to obtain idea about recent trends of high yielding and high income. Even if the farmers increased productivity of crops, crops may be destroyed due to animals, floods and other natural disasters. Hence our project deals with a smart crop protection system to safeguard the crops and to increase the productivity. The crops are damaged mainly due to entry of intruders and animals. It cause huge loss for the farmers financially and economically. Without timely supply of water, the crops withers away .To overcome these problem, we develop this project.

1.2.Purpose:

The purpose of this project is to protect the crops from animals entry without fencing field and to detect the moisture level from the soil .The moisture sensor is used to produce a wealthy field and to save water. Even if the farmers increased productivity of crops, crops may be destroyed due to animals, floods and other natural disasters. Hence our project deals with a smart crop protection system to safeguard the crops and to increase the productivity.The crops are damaged mainly due to entry of intruders and animals. It cause huge loss for the farmers financially and economically. Without timely supply of water, the crops withers away .To overcome these problem, we develop this project,Drought problem will overcome by monitoring the moisture level in the soil .it help to increase the yield by proper irrigation.

2.Literature survey:

2.1.Existing Problem:

This project is developed for overcoming the problem when the soil become moisture less ,drought problem will arise ,so the yield of the crops will degrade .The other problem exists whenever the animals entry in the field ,it will destroy the crops .so it also decrease the yield of the crops. Moisture sensor is used to check the moisture content present in the soil.The annual income of farmers is largely dependent upon the yield of crops that they produce, which is continuously decreasing due to a number of factors and one such factor that we are focusing on is the damage caused by animals.

2.2.References:

1.MICHAEL ASTERA :Important minerals and grow the healthiestpossible food for people and animals. Completely revised and expanded fromthe 2010 edition. The secrets of soil mineral balance that create ideal soil,plant, and animal health are revealed here for the first time. The amazing results that can be achieved by balancing the major minerals Calcium,Magnesium,Potassium and Sodium in the soil according to the teachings of DrWilliam Albrecht and Dr Carey Reams have changed the world of agriculture.This knowledge has taken the focus away from merely trying to achieve highvolume yields to achieving the highest yield.

2. MICHAEL E. ESSINGTON :In this book, it covers topics includingsoil chemical environment, soil minerals, soil organic matter, cationsexchange,oxidation-reduction, mineral weathering and solubility, surface chemistry andadsorption reactions, acidity and salinity in soil materials, and chemicalthermodynamics applied to soil systems .Extensive section that details thesources, speciation, and the general behaviour of elements in soils Expanded section on crystal structure, updated phyllosilicates classifications scheme,Discussion of surface runoff losses of phosphorus from soil and description ofthe inductively coupled argon plasma-mass spectroscopy (ICP-MS) analyticaltechnique for determining elemental elements concentrations in soil solution.

3. KEITH REID :Valuable advice from an expert in soil science.Intended for both small and medium-size gardens, Improving Your Soil revealsthe steps to take to achieve the perfectsoil base in which to grow plants. Withdirections on amending poor soil, modifying mediocre earth, aeratingcompacted topsoil and substrates, and testing pH levels, this book enables gardeners to nurture their plants and promote more abundant growth. Thefeatures of good soil include proper structure and nutrients that encouragehealthy plant growth.Soil in "good tilth" is loamy, nutrient-rich and friable because it has an optimal mixture of sand, clay and organic matter that prevents severe compaction. Your Soil shows gardeners how to improve the soil in their garden to encourage good seed bedding and a strong root system for proper nutrient disbursement throughout various soil depths.

4. BRITTANY M. RAUZAN : Sustainable agriculture is an area of globaland critical importance for consumers, farmers, and the agrochemical industry in order to address the increasing global demand on the food supply. This volume highlights innovations in discovering and developing crop protection products with a focus on environmental impact and sustainability. Chapters focus on design of small molecules, development of biological , and environmental characterization of agrochemicals. Researchers in agrochemical as well as those in small molecule discovery and delivery will find this work useful.

5. SARRA ABRAMOVNA BEKUZAROVA, NINA ANATOLIEVNA BOME,ANATOLY IVANOVICH OPALKO, LARISSA I. WEISFELD|MA: on the ecologicalaspects of crops growing under stress This new collection covers a wide varietyof research conditions due to atmospheric changes and pollution and the impact on both plant and human health. The book

provides research that will help to find ways to overcome adverse abiotic environmental factors and unfavorable anthropogenic pressures on crop plants, which also eventually impact human health. Divided into six parts, leading authors from many institutes provide and share new knowledge gained from studies on ecological and genetic controls of plant resistance to various adverse environmental factors. Geneticists and breeders are creating new cultivars and hybrids of crops, which greatly expand the range of source material. The book includes a range of material on the biology, genetics, and breeding of crops, taking into account ecological and climatic conditions, with emphasis on the impact on humans. The main agricultural crops are studied: cereals, fodder crops, and horticultural plants.

6. DAMINI KALRA; PRAVEEN KUMAR; K SINGH; APURVA SONI:Agriculture assumes a significant job for advancement in nourishment creationand crop protection in India. Here, agriculture relies upon disproportionate rainwhich thereby affects India's agriculture. There arises a need for effectiveirrigation for agricultural production. The control over how much water is to be supplied and when it is to be applied determines the uniformity which is key to maximizing their irrigation efforts. The proper irrigation management takescareful consideration and vigilant observations. It has many benefits. Keen water irrigation and protection system framework is in this way accepted to be a significant arrangement. The paper along these lines presents an effective water system framework that advances the accessible water in the water supply and in this manner giving an effective and powerful mechanism for the irrigation purpose.

2.3.Problem Statement solution:

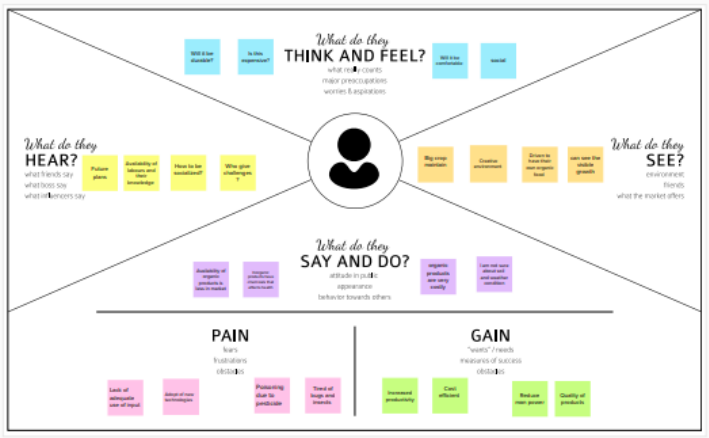
Protecting the fnal products from animals allowing only authorised person, avoiding drought by proper watering, maintaing idle temperature and humidity for plant growth.With the help of remote sensing technologies developed crop protection solution from animals attacks.Provide alerts when any crops get damage in case of animals attack.Drought problem will overcome by monitoring the moisture level inthe soil hence it helps to increase the crop yield by proper irrigation. also helps to save water and we can provide correct amount of watering to plants.

3.IDEATION & PROPOSED SOLUTION

3.1.Empathy Map Canvas:

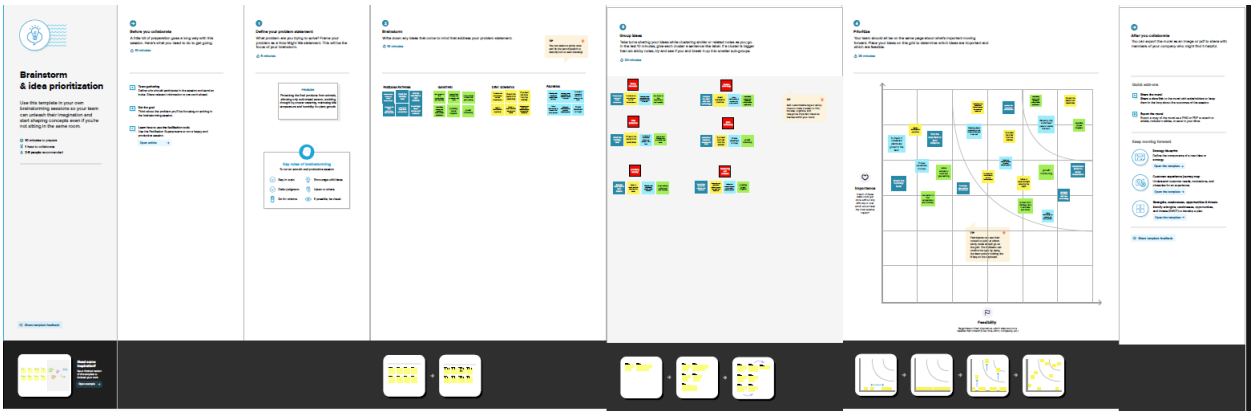
Empathy Map Canvas

Build empathy and keep your focus on the user by putting yourself in their shoes.



Share your feedback

3.2.Ideation & Brainstorming:



3.3.Proposed Solution:

SI.NO	PARAMETER	DESCRIPTION
1.	Problem Statement (Problem to be solved)	To boost the productivity and minimize the barriers in agriculture field, there is need to use innovative technology and techniques called Internet of things. Even if the farmers increased productivity of crops, crops may be destroyed due to animals, floods and other natural disasters. Hence our project deals with a smart crop protection system to safeguard the crops and to increase the productivity. The crops are damaged mainly due to entry of intruders and animals. It cause huge loss for the farmers financially and economically. Without timely supply of water, the crops withers away .
2.	Idea / Solution description	Surveillance helps us to monitor a certain area and prevent theft and also provides proof of evidence. Various methods aim only at surveillance which is mainly for human intruders, but we tend to forget that the main enemies of such farmers are the animals which destroy the crops.This leads to poor yield of crops and significant financial loss to the owners of the farmland.This system helps us to keep away wild animals from the farmlands as well as provides surveillance functionality.
		If the soil in our field is dry then automatic irrigation

3.	Novelty / Uniqueness	is done with the help of moisture sensor and DC motor. Entry of animals inside the field can be known to the owner directly.
4.	Social Impact / Customer Satisfaction	Better Quality: With an effective IoT solution it is possible to have increased control over production process as well as maintain high standards of growth capacity and crop quality via automation. This way, farmers can expect higher revenues eventually. Control: Integrating IoT technology allows to maintain control over internal processes and this way production risks can be decreased. Reliability: In the field of agriculture, IoT devices are deployed in an open environment due to which harsh environmental conditions may cause communication failure and the humiliation of deployed sensors.
5.	Business Model (revenue model)	The benefits of optimizing irrigation scheduling with soil moisture sensors includes increasing crop yields, saving water, saving on energy costs and increasing the farmer profitability. Reduced Operation Costs: The utility of IoT in agriculture generates more profits since it leads to less manual intervention due to automated processes. Better Food Quality: Farmers can create the conditions necessary to improve the quality of the crops.
6.	Scalability of the Solution	This solution is scalable enough.The cost and use of this project is affordable hence it is very useful for farmers. Agriculture sensors such as air temperature and humidity, soil moisture, soil pH, light intensity, and carbon dioxide are often used to collect data in all aspects of crop growth such as nursery, growth, and harvest. The soil moisture sensor is an important sensor and it determines the water supply status of crops. Too high or too low soil moisture will affect the normal growth of crops above the ground.

3.4.Problem Solution Fit:

Project Title: IoT Based Smart Crop Protection System for Agriculture **Project Design Phase-I - Solution Fit Template** **Team ID:** PNT2022TMID34905

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Who is your customer?
i.e. working parents of 0-5 y.o. kids

Small scale farmers

6. CUSTOMER CONSTRAINTS CC

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

Spending power, memory, network connection, available devices

5. AVAILABLE SOLUTIONS AS

Which solutions are available to the customers when they face the problem

or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an

Scarecrow is used to chase the birds that helps us to protect the vegetables, fruits and crops.

Explore AS, differentiate

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

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

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different

1) Too much of birds, spoiling the ripened fruit.
2) When soil is moisture less then drought problem will arise.
3) Unauthorized person enter in to the farm and damage the crops.so it leads to economical loss or the farmers.

9. PROBLEM ROOT CAUSE RC

What is the real reason that this problem exists? What is the back story behind the need to do this job?

The field is open so too much of birds enter into the field and damage the crops.
Drought is due to lack of rainfall, so soil become moisture less.

7. BEHAVIOUR BE

What does your customer do to address the problem and get
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering

Irrigation is not maintained properly. Protect the fruits from the birds is very difficult task. Work is done by using smart technology and manpower is thus reduced.

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

Identify strong TR & EM

3. TRIGGERS TR

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

Using new technology can improve the crop productivity by overcoming the problems and this helps the farmers.

4. EMOTIONS: BEFORE / AFTER EM

How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

Before:
1) usually man power is large while farming.
2) Frequent monitoring of the farm is needed in person .
After:
1) Now man power is reduced so less number of labour is enough hence we can save the money.
2) Now there is no need of direct monitoring

10. YOUR SOLUTION SL

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

Birds can be chased away using ultrasound sensors.
Animals are restricted using fencing and door protected by RFID.
Drought can be overcome by providing proper irrigation using DC motor.
Soil humidity and moisture are detected using moisture sensor.
Information can be sent to the farmers using mobile app.

8. CHANNELS of BEHAVIOUR CH

8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

Online:
1) Control of motor using mobile app.
2) Getting alert message, when unauthorized person enter into the field and humidity detection.
Offline:
1) Automatic ON/OFF of door when authorized people enter while the farm is fenced. Ultrasound sensor is used to chase the birds away.
2)In case of no fencing, IR sensor is used to detect the animal enter into the farm.

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	User Registration	Registration through phone call. Registration through Gmail. Registration through WhatsApp.
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Payment	Payment through Google pay, net banking, paytm.
FR-4	User complaints	Complaints can be filled through Email and customer care number would be shared to the user during the delivery of the product.

4.2.Non-Functional requirements:

Non-functional Requirements:

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

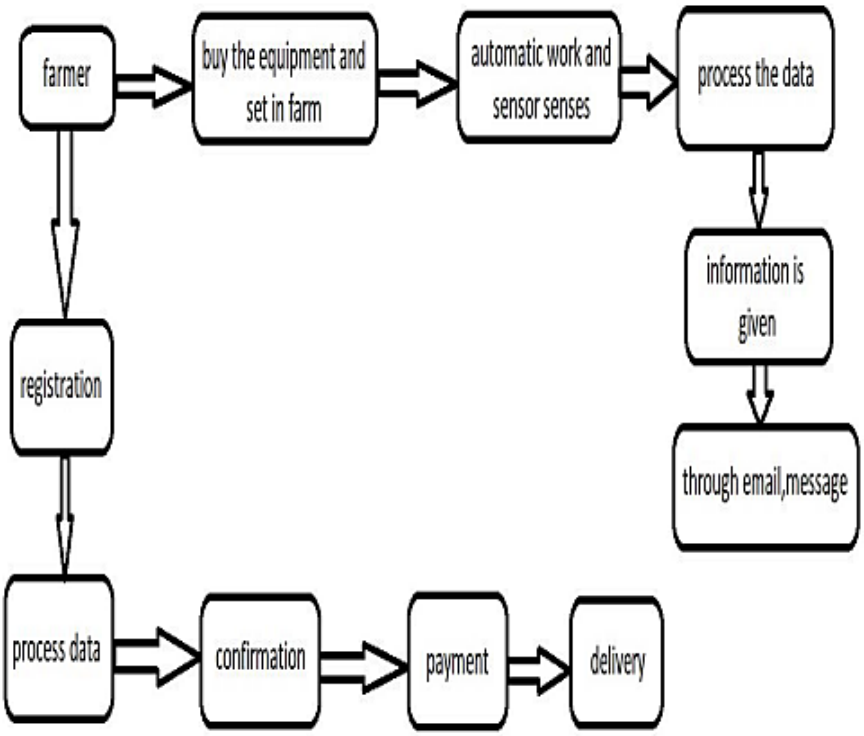
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	User friendly and simple. We can learn to use this device within a week.
NFR-2	**Security**	Highly secure because the data would be shared only to the users mobile phone. No other person except the owner can get access to the data.
NFR-3	**Reliability**	Only if there is any network issue then it would take time to send information to the user, or else it would perform properly. Stability of the entire device is good. Reliability is reduced only if the network is not proper.
NFR-4	**Performance**	It works 24*7. Updating of change in data is very fast. The data that is sent to the user cannot be manipulated. The sensor devices are precise and accurate. Overall performance of the device is good.
NFR-5	**Availability**	The device if properly maintained then the availability can be extended. The minimum lifetime of the device is 2 years.
NFR-6	**Scalability**	This solution is scalable enough to fit the IOT Based Smart crop protection system for agriculture by using the sensors. The cost and use of this project is affordable hence it is very useful for farmers

5.PROJECT DESIGN

5.1. Data flow diagram:

Data Flow Diagram:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



5.2.Solution & Technical Architecture:

Table-1: Components & Technologies:

S.No	Component	Description	Technology
1.	Arduino	Arduino is an open-source electronic device based on easy-to-use hardware and software	Python
2.	Servo motor	It is an electronic device and rotary or linear actuators that rotate and push part of a machine with precision	Python
3.	Moisture sensor	Moisture sensor senses measure the volumetric water content in the soil.	Python
4.	IR Sensor	It is a radiation-sensitive electronic component and it is widely used in motion detectors.	Python
5.	Ultrasonic sensor	Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing.	Python
6.	User Interface	Mobile phone and Email	HTML
7.	Data storage	Easy to store and view the data.	IBM Cloud

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	physical objects with sensors, processing ability, software, and other technologies that connect and exchange data with other devices and systems over the Internet	IoT, Arduino, IBM cloud, Python
2.	Security Implementations	Highly secure because the data would be shared only with the user's mobile phone. No other person except the owner can get access to the data	Authentication, authorization, accessibility
3.	Scalable Architecture	This solution is scalable enough to fit the IOT Based Smart crop protection system for agriculture by using the sensors. The cost and use of this project is affordable hence it is very useful for farmers	Internet of Things
4.	Availability	If the device is properly maintained then the availability can be extended. The minimum lifetime of the device is 2 years.	Based on the hardware device
5.	Performance	It works 24*7. Updating of changes in data is very fast. The data that is sent to the user cannot be manipulated. The sensor devices are precise andaccurate. The overall performance of the device is good.	Python

5.3.User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Farmer (online)	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	One month
		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	Two weeks
		USN-3	As a user, I can register for the application through WhatsApp	I can register and confirm it	Medium	Two weeks
		USN-4	As a user, I can register for the application through Gmail	I can register and confirm it	Medium	Two weeks
	Login	USN-5	As a user, I can log into the application by entering email & password		High	All time
	Dashboard	USN-6	You can see your order details and equipment details		High	All time
Farmer (through phone call)	Order	USN-7	As a user I can book my order through phone call	Call should be attend and user details should be added to database	High	Working hours
Help desk	Queries	USN-8	As a user ,for any complaint we can reach out to the particular team	Accept the complaint and feedback then modifications are done	High	All time

6.PROJECT PLANNING AND SCHEDULING

6.1.Sprint planning & Estimation:

Sprint	Functional Requirement	User Story number	User Stories/task	Story points	Priority	Team member
Sprint 4	Registration	USN 1	As a user I can register to the reguired data set by entering username and password	6	High	Devi Sowmiya S, Gayathri R A
	login	USN 2	As a user I can login to the data set	4	High	Devi Sowmiya S, Gayathri R A
Sprint 3	Dashboard	USN 3	As a user ,I can see datas in the dashboard		Medium	A.farzana Fathima, Faumina Zafirah feroz
Sprint 2	Integrating	USN 4	To find and use appropriate compiler to run andtest the data so that we can implement our program		Medium	Devi sowmiya S, Faumina Zafirah Feroz
Sprint 2		USN 5	To integrate the available dataset and keep improving accuracy of crop yield		Medium	A.Farzana Fathima, Devi Sowmiya S
Sprint 1	Coding	USN 5	To modify the code accordingto our program and improvethe efficiency of that code	10	High	Faumina Zafirah Feroz, Gayathri R A

6.2.Sprint Delivery schedule:

Project Tracker, Velocity & Burn down Chart: (4 Marks

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	10	5 Days	22 Oct 2022	26 Oct 2022	10	22 Oct 2022
Sprint-2	10	5 Days	27 Oct 2022	31 Oct 2022	10	29 Oct 2022
Sprint-3	10	5 Days	1 Nov 2022	5 Nov 2022	10	3 Nov 2022
Sprint-4	10	6 Days	7 Nov 2022	12 Nov 2022	10	10 Nov 2022

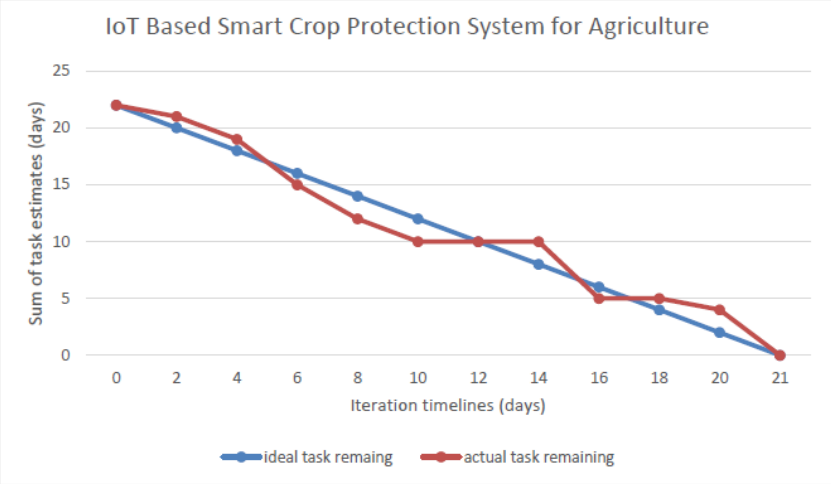
Velocity:

We have a 21-day sprint duration, and the velocity of the team is 10 (points per sprint).
To Find: Calculate the team's average velocity (AV) per iteration unit (story points per day)

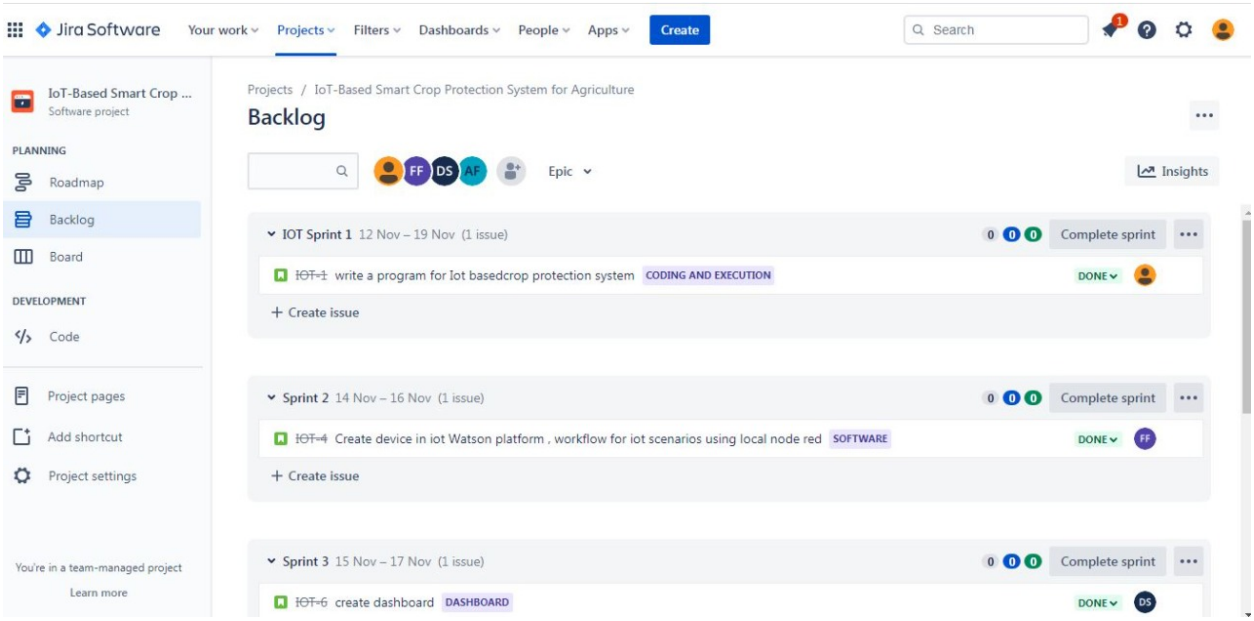
$$\text{Velocity} = \frac{\text{sprint duration}}{\text{Velocity}} = \frac{21}{10} = 2.1$$

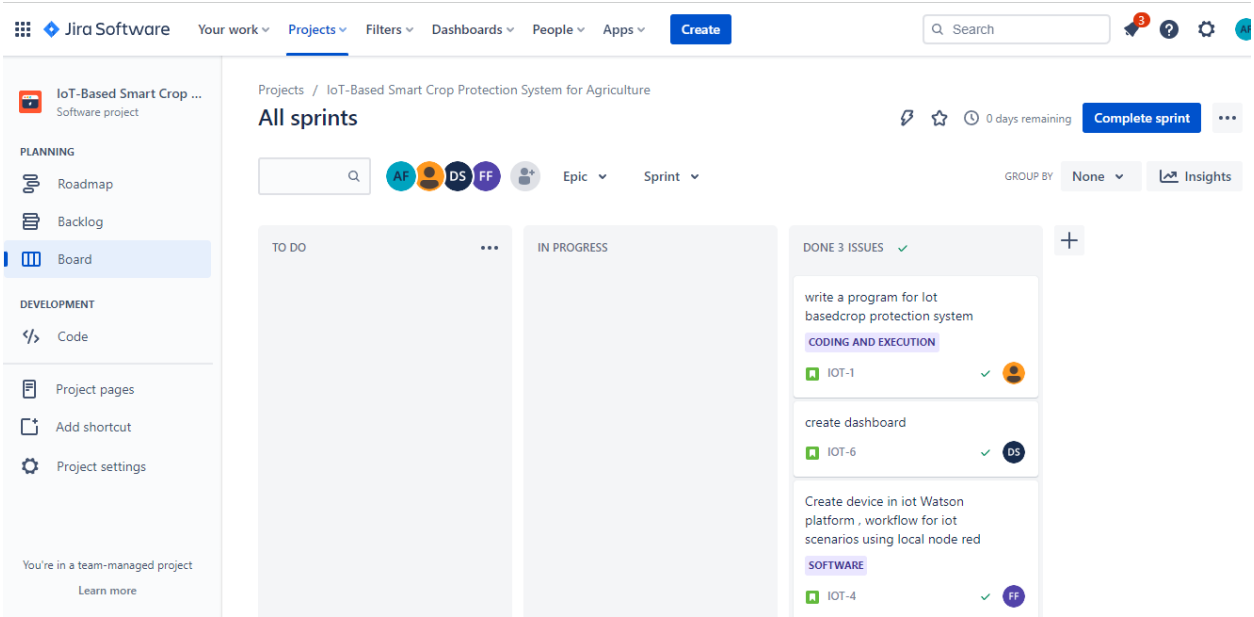
Burn down Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

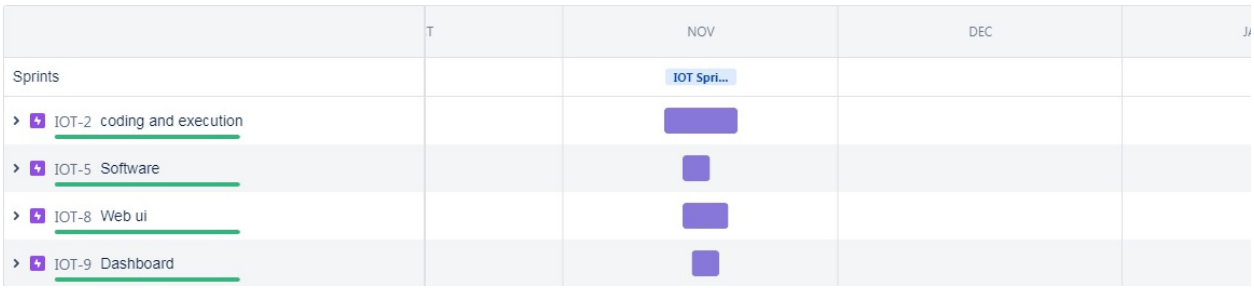


6.3.Reports from JIRA:



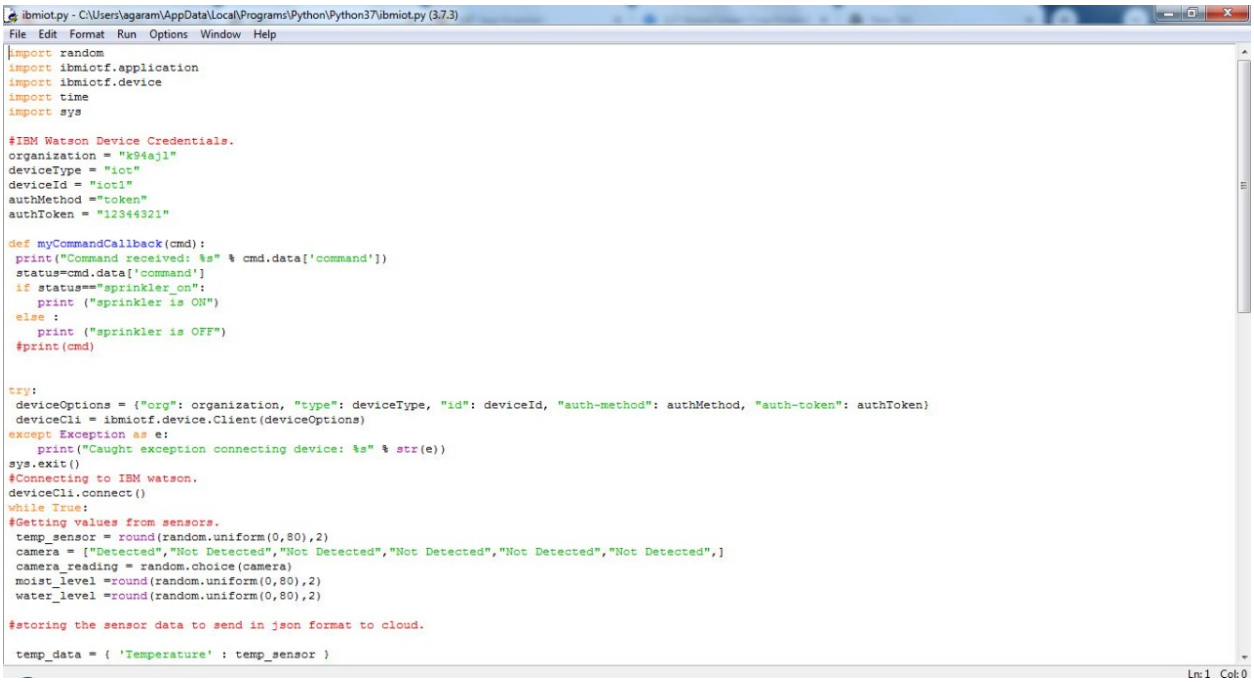


ROADMAP:



7. CODING & SOLUTIONING (Explain

7.1.Feature 1:



ibmiot.py - C:\Users\agaram\AppData\Local\Programs\Python\Python37\ibmiot.py (3.7.3)

File Edit Format Run Options Window Help

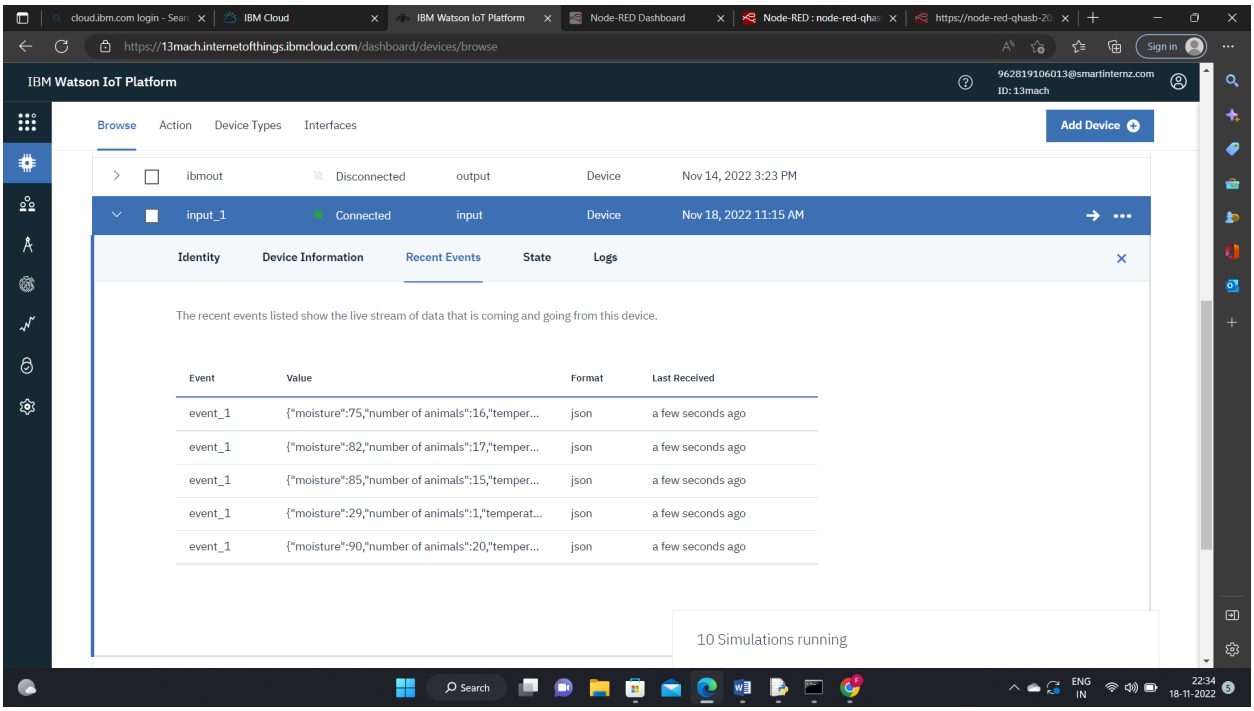
```
 temp_data = { 'Temperature' : temp_sensor }
 camera_data = { 'Animal attack' : camera_reading}
 moist_data = { 'Moisture Level' : moist_level}
 water_data = { 'Water Level' : water_level}


# publishing Sensor data to IBM Watson for every 5-10 seconds.

 success = deviceCli.publishEvent("Temperature sensor", "json", temp_data, qos=0)
 sleep(1)
 if success:
   print("...............................publish ok.................................")
   print("Published Temperature = %s C"% temp_sensor,"to IBM Watson")

 success = deviceCli.publishEvent("camera", "json", camera_data, qos=0)
 sleep(1)
 if success:
   print("Published Animal attack is %s "%camera_reading ,"to IBM Watson")

 success = deviceCli.publishEvent("Moisture sensor", "json", moist_data,qos=0)
 sleep(1)
 if success:
   print("Published Moisture level is %s "% moist_level ,"to IBM Watson")

 success = deviceCli.publishEvent("water sensor", "json", water_data, qos=0)
 sleep(1)
 if success:
   print("Published Water level is %s "% water_level,"to IBM Watson")


 #To send alert message to farmer that animal attack on crops.

if (camera_reading == "Detected"):
 success = deviceCli.publishEvent("Alert3", "json", { 'alert3' : "Animal attack on crops detected" }, qos=0)
sleep(1)
if success:
    print('Published alert3 : ' , "Animal attack on crops detected","to IBM Watson","to IBM Watson")
print("")
 #To send alert message if Moisture level is LOW and to Turn ON Motor-1 for irrigation.
if (moist_level < 20):
```

ibmiot.py - C:\Users\agaram\AppData\Local\Programs\Python\Python37\ibmiot.py (3.7.3)

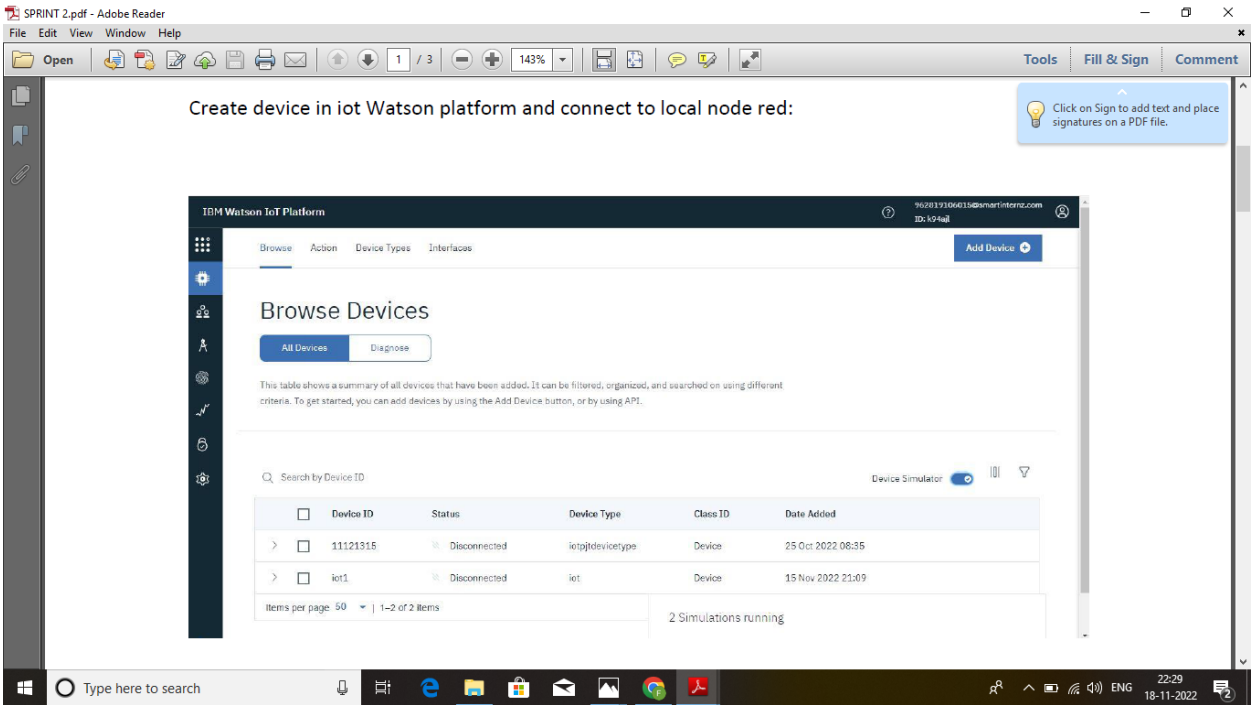
File Edit Format Run Options Window Help

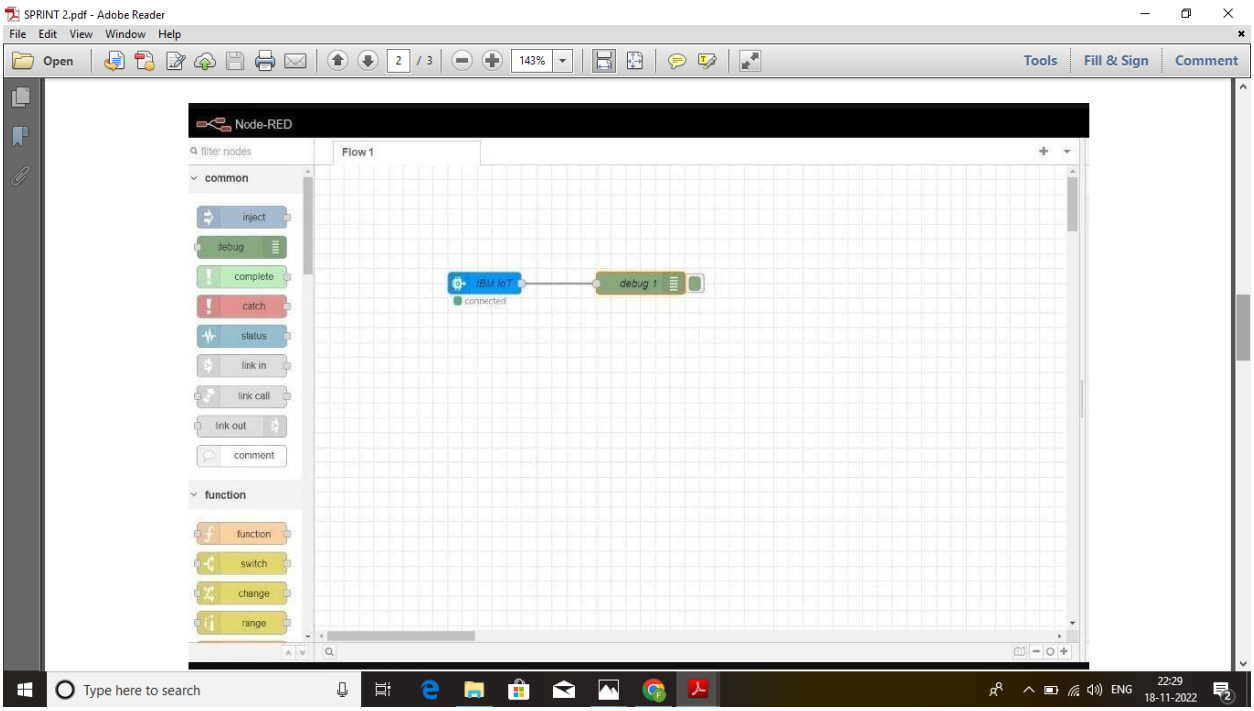
```
 success = deviceCli.publishEvent("Moisture sensor", "json", moist_data,qos=0)
 sleep(1)
 if success:
   print("Published Moisture level is %s "% moist_level ,"to IBM Watson")

 success = deviceCli.publishEvent("water sensor", "json", water_data, qos=0)
 sleep(1)
 if success:
   print("Published Water level is %s "% water_level,"to IBM Watson")


 #To send alert message to farmer that animal attack on crops.

if (camera_reading == "Detected"):
 success = deviceCli.publishEvent("Alert3", "json", { 'alert3' : "Animal attack on crops detected" }, qos=0)
sleep(1)
if success:
    print('Published alert3 : ' , "Animal attack on crops detected","to IBM Watson","to IBM Watson")
print("")
 #To send alert message if Moisture level is LOW and to Turn ON Motor-1 for irrigation.
if (moist_level < 20):
    print("Motor-1 is ON")
success = deviceCli.publishEvent("Alert5", "json", { 'alert5' : "Moisture level(%s) is low, Irrigation started" %moist_level }, qos=0)
sleep(1)
if success:
    print('Published alert5 : ' , "Moisture level(%s) is low, Irrigation started" %moist_level,"to IBM Watson" )
print("")
 #To send alert message if Water level is HIGH and to Turn ON Motor-2 to take water out.
if (water_level > 20):
    print("Motor-2 is ON")
success = deviceCli.publishEvent("Alert6", "json", { 'alert6' : "Water level(%s) is high, so motor is ON to take water out " %water_level }, qos=0, on_publish=myOnPubl
sleep(1)
if success:
    print('Published alert6 : ' , "water level(%s) is high, so motor is ON to take water out " %water_level,"to IBM Watson" )
print("")
 #command recived by farmer
deviceCli.commandCallback = myCommandCallback
# Disconnect the device and application from the cloud
deviceCli.disconnect()
```

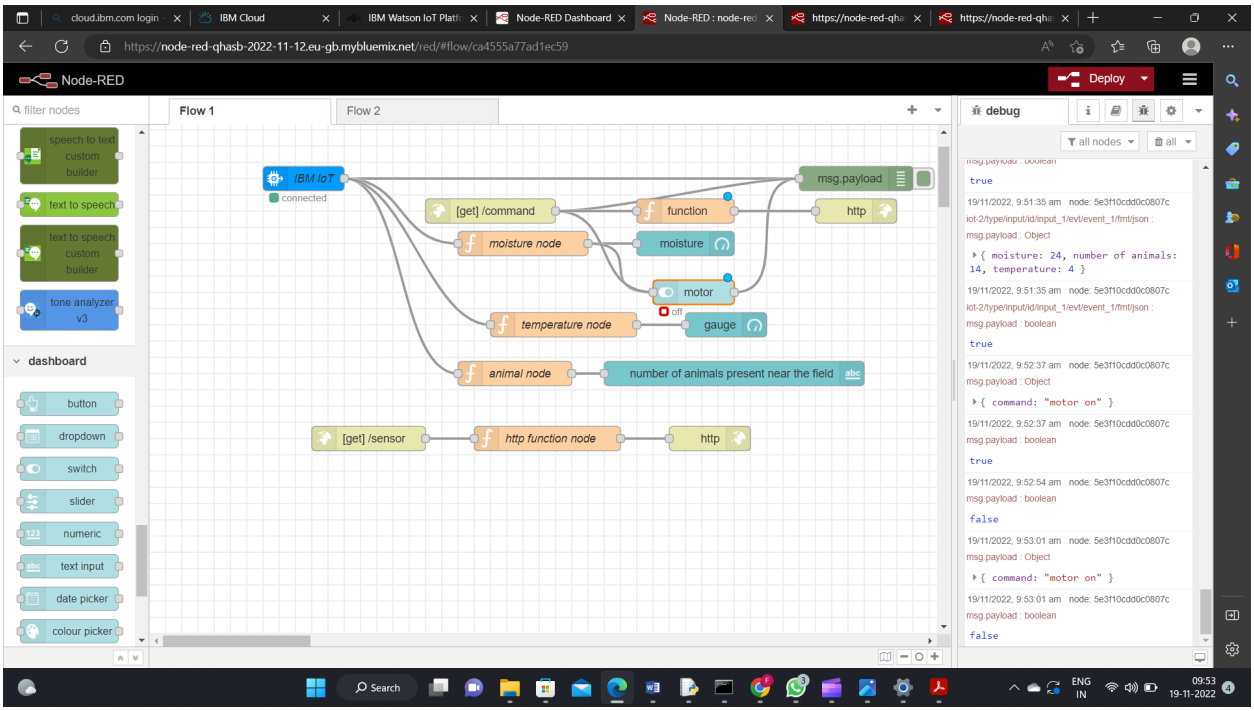
Ln: 1 Col:

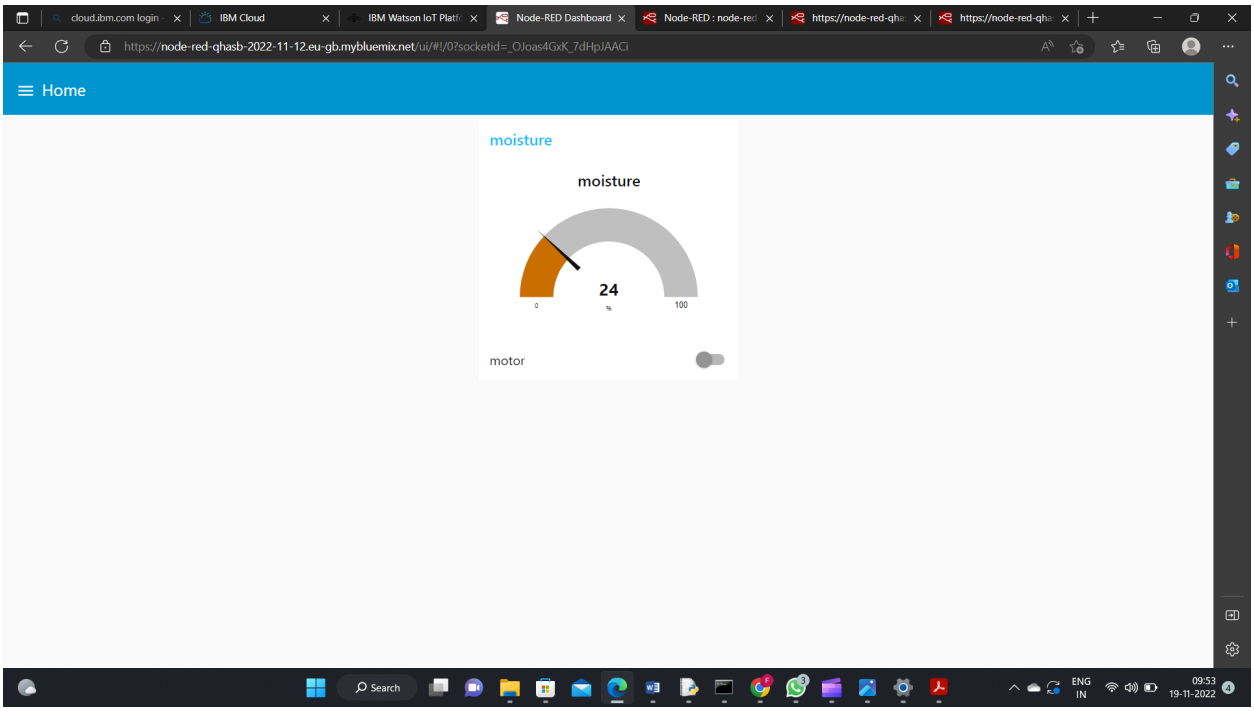

IBM Watson IoT Platform
Browse
Action
Device Types
Interfaces
Add Device
ibmout
Disconnected
output
Device
Nov 14, 2022 3:23 PM
input_1
Connected
input
Device
Nov 18, 2022 11:15 AM
Identity
Device Information
Recent Events
State
Logs
The recent events listed show the live stream of data that is coming and going from this device.
Event
Value
Format
Last Received
event_1
{"moisture":75,"number of animals":16,"temper...
json
a few seconds ago
event_1
{"moisture":82,"number of animals":17,"temper...
json
a few seconds ago
event_1
{"moisture":85,"number of animals":15,"temper...
json
a few seconds ago
event_1
{"moisture":29,"number of animals":1,"temperat...
json
a few seconds ago
event_1
{"moisture":90,"number of animals":20,"temper...
json
a few seconds ago
10 Simulations running

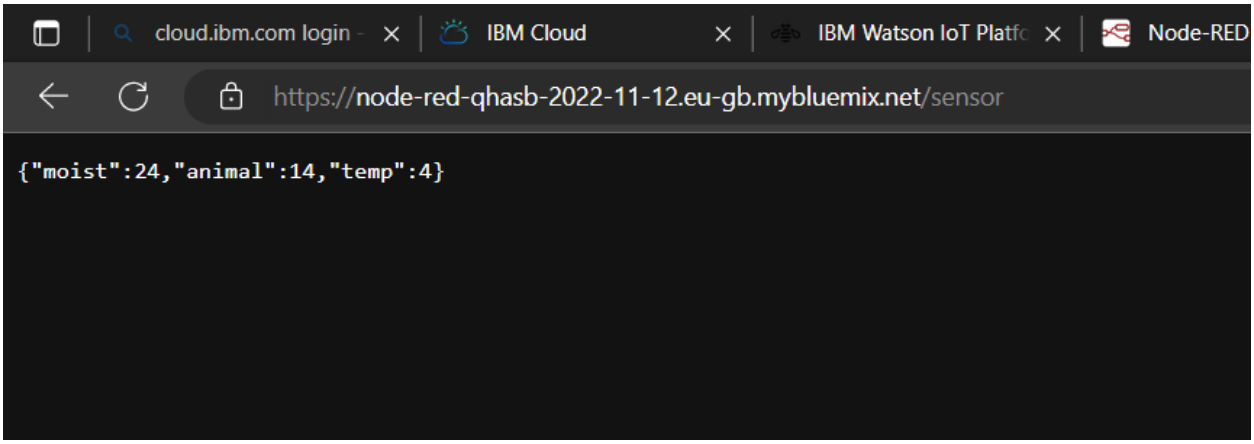
7.2.FEATURE 2:

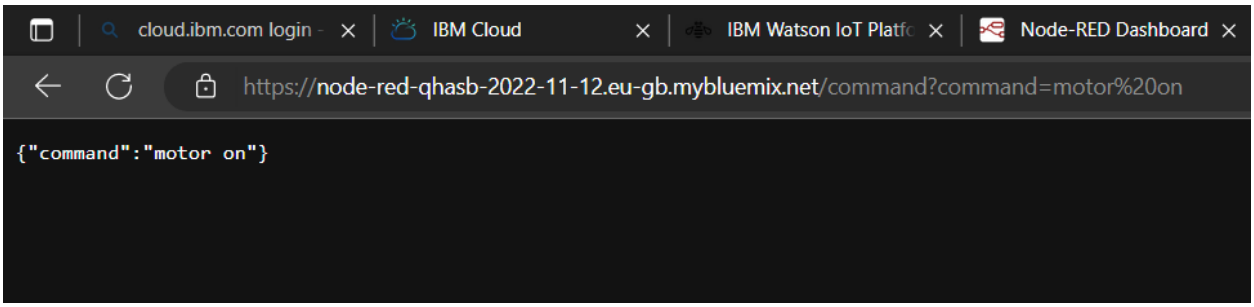

SPRINT 2.pdf - Adobe Reader
Create device in iot Watson platform and connect to local node red:
IBM Watson IoT Platform
Browse
Action
Device Types
Interfaces
Add Device
Browse Devices
All Devices
Diagnose
Device ID
Status
Device Type
Class ID
Date Added
11121315
Disconnected
iotpjtdevicetype
Device
25 Oct 2022 08:35
iot1
Disconnected
iot
Device
15 Nov 2022 21:09
2 Simulations running

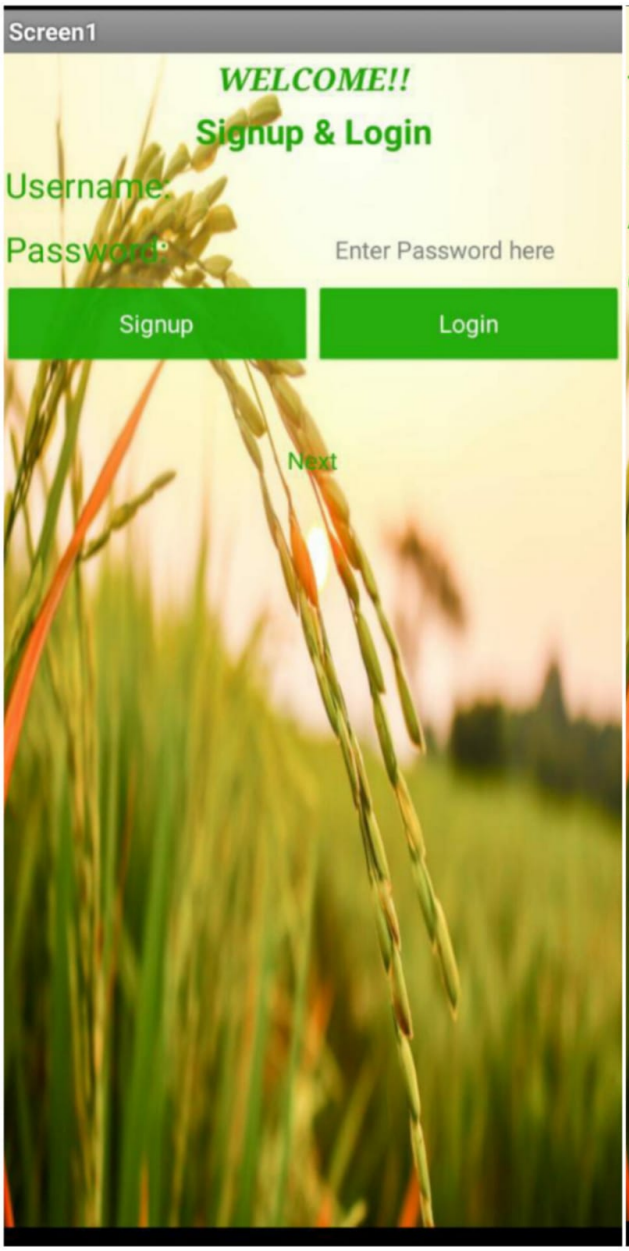

SPRINT 2.pdf - Adobe Reader
File Edit View Window Help
Open
Tools
Fill & Sign
Comment
Node-RED
Flow 1
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
function
switch
change
range
IBM IoT
connected
debug 1
Type here to search
ENG
22:29
18-11-2022

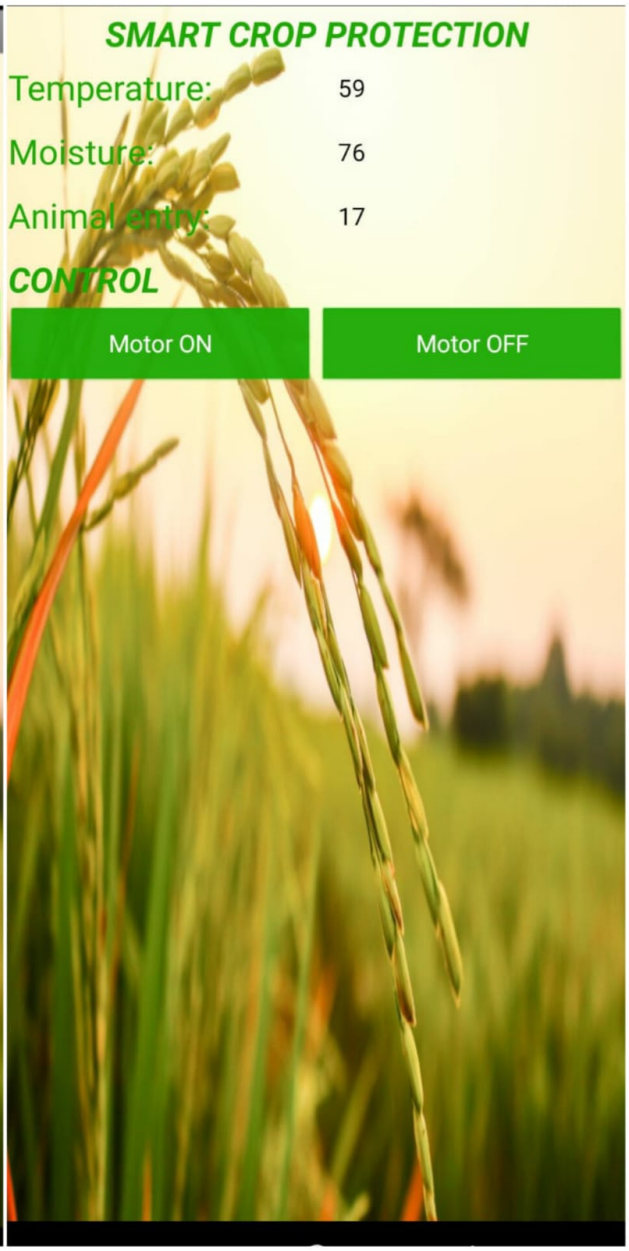

https://node-red-qhasb-2022-11-12.eu-gb.mybluemix.net/red/#flow/ca4555a77ad1ec59
Node-RED
Deploy
Flow 1
Flow 2
speech to text custom builder
text to speech
text to speech custom builder
tone analyzer v3
dashboard
button
dropdown
switch
slider
numeric
text input
date picker
colour picker
IBM IoT
connected
[get] /command
function
msg.payload
http
moisture node
moisture
motor
off
temperature node
gauge
animal node
number of animals present near the field
[get] /sensor
http function node
http
debug
all nodes
true
{ moisture: 24, number of animals: 14, temperature: 4 }
{ command: "motor on" }
false
Search
ENG
IN
09:53
19-11-2022


Home
moisture
moisture
24
0
%
100
motor


cloud.ibm.com login -
IBM Cloud
IBM Watson IoT Platfc
Node-RED
https://node-red-qhasb-2022-11-12.eu-gb.mybluemix.net/sensor
{"moist":24,"animal":14,"temp":4}


cloud.ibm.com login -
IBM Cloud
IBM Watson IoT Platfc
Node-RED Dashboard
https://node-red-qhasb-2022-11-12.eu-gb.mybluemix.net/command?command=motor%20on
{"command":"motor on"}


Screen1
WELCOME!!
Signup & Login
Username:
Password:
Enter Password here
Signup
Login
Next


SMART CROP PROTECTION
Temperature:
59
Moisture:
76
Animal entry:
17
CONTROL
Motor ON
Motor OFF

8.TESTING

Acceptance Testing

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [Product Name] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

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

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

3. Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	1	6
Client Application	51	0	2	49
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	2	7
Final Report Output	4	0	1	3
Version Control	2	0	0	2

9.RESULTS

9.1.Performance Metrics:

Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Voluem Changes	Risk Score	Justification
IoT based smart crop protection	New	Low	No Changes	Moderate		>5 to 10%	ORANGE	As we have seen the changes
	sensing							As we have seen the changes
	displaying	customizable						As we have seen the changes
	registration							As we have seen the changes
	availability						red	As we have seen the changes

NFT - Detailed Test Plan			
S.No	Project Overview	NFT Test approach	Assumptions/Dependencies/Risks
1	IoT based smart crop protection	testing	Assumptions

End Of Test Report						
Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Recommendations	Identified Defects (Detected/Closed/Open)	Approvals/SignOff
IoT based crop protection	testing	sensing-met	dashboard	go decision		network issuews	
		registration-met	mail	go decision		connection failure	
		display-met	application/link	go decision			

10.ADVANATAGES & DISADVANTAGES

ADVANTAGES:

1.The benefits of optimizing irrigation scheduling with soil moisture sensors includes increasing crop yields, saving water, protecting local water resources from runoff, saving on energy costs, saving on fertilizer costs and increasing the farmer profitability.

2. Less Consumption of Water and Energy: Sensors across the fields help the farmers determine the appropriate resources required.

3. Reduced Operation Costs: The utility of IoT in agriculture generates more profits since it leads to less manual intervention due to automated processes.

4. Better Food Quality: Through the processes mentioned above, farmers can create the conditions necessary to improve the quality of the crops.

5. Low Usage of Chemicals: IoT-based systems help farmers switch to cost-effective and eco-friendly farming methods through much-reduced consumption of harmful pesticides and fertilize

DISADVANTAGES:

1. If there are faulty data processing equipment or sensors then it will lead to the situation where the wrong decision are taken.

2.Connectivity:Connected devices that provide useful front and information are extremely valuable. But poor connectivity becomes a challenge where IoT sensors are required to monitor process data and supply information.

3.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.

11.CONCLUSION:

Farmers encounter severe threats in rural parts of India. Hence,to overcome this issue we have designed this system. Therefore the designed system is affordable and useful to the farmers. The designed system won't be harmful to animals and person ,and it protects the farm areas.IoT can positively impact a lot of areas and industries. This also makes IoT solutions very effective in helping the environment and improving sustainability. IoT's nature of data collecting, optimizing, and automating, impacts the environment positively and it is expected that it will be even better in the future.These Iot based systems help companies speed up work, cut down costs, and identify growth opportunities.

12.FUTURE SCOPE:

IoT is bound to be an effective technology in the future, and IoT enabled devices are likely to be all-pervasive, from industry to households. The future scope of IoT is bright and varied.In this project ,we included the RFID based technology.RFID is used to allow the authorized persons only inside the field.
To prevent the human intruders into our field the agricultural land is protected by fencing and a door with smart lock system based on RFID.The annual income of farmers is largely dependent upon the yield of crops that they produce, which is continuously decreasing due to a number of factors and one such factor that we are focusing on is the damage caused by birds. By taking into consideration the statistical survey of farmers on the percentage damage of crops due to birds, we would like to propose the model and prototype of an automated bird detection and repeller system using IoT devices. This model consists of two main functionality one is the motion detection using PIR(Passive Infrared) based motion detectors and the other part that is repeller that will generate sounds of the predator which will drift the birds away from the field. To prevent too much of birds from spoiling the ripened fruits, birds are expelled from the field by playing the buzzer.

13. APPENDIX

13.1 SOURCE CODE

user interface: https://node-red-qhasb-2022-11-12.eu-gb.mybluemix.net/ui/#!/0?socketid=-b7QvlNYF1mJxnQ8AACu

sensor:https://node-red-qhasb-2022-11-12.eu-gb.mybluemix.net/sensor

output:https://node-red-qhasb-2022-11-12.eu-gb.mybluemix.net/command?command=motor%20on

Nodered:https://node-red-qhasb-2022-11-12.eu-gb.mybluemix.net/red/#flow/ca4555a77ad1ec59

13.2. GITHUB & PROJECT DEMO LINK:

Github: https://github.com/IBM-EPBL/IBM-Project-38261-1660375905

Demolink: