A PROJECT REPORT

CONTENTS

IoT Based Smart Crop Protection System ForAgriculture

TEAM ID	PNT2022TMID44579
PROJECT NAME	Project-IoT BasedSmart Crop Protection System For Agriculture
TEAM MEMBERS	A. ARUNACHALAM D. MONISH P. PAVITHRA D. VINITHA C. GEETHANJALI

1. INTRODUCTION

1.1 Project overview

- The device will detect the animals and birdsusing the Clarifaiservice.
- If any animal or bird is detected the image will be captured and stored in the IBM Cloudobject storage.
- It also generates an alarm and avoid animalsfrom destroying the crop .
- The image URL will bestored in the IBM CloudantDB service.
- The device will also monitor the soil moisture levels, temperature, and humidity values and send them to the IBM IoT Platform.
- The image will be retrievedfrom Object storage and displayed in the web application.
- A web application is developed to visualize the soil moisture, temperature, and humidity values .
- Users can also control the motors through web application.

1.2. PURPOSE

An intelligent crop protection system helps the farmers in protecting the crop from the animals and birds which destroy the crop. This system also helps farmers to monitor the soil moisture levels in the field and also the temperature and humidity values near the field. The motorsand sprinklers in the field can be controlled using the mobile application.

2. LITERATURE SURVEY

2.1. Existing Problem

Most of the farmers are facing many problems nowadays due to many reasons. Our problem to solve is the invasion of various species such as birds and animals that harm thecrops that are being cultivated. Various types of species such as birds and animals come to thecultivation field according to the crop that is being cultivated and also according to the season of cultivation. Some wild animals enter the fieldduring night times when the field is near a forest region or when the farm cultivates some fruits and other crops that attractanimals.

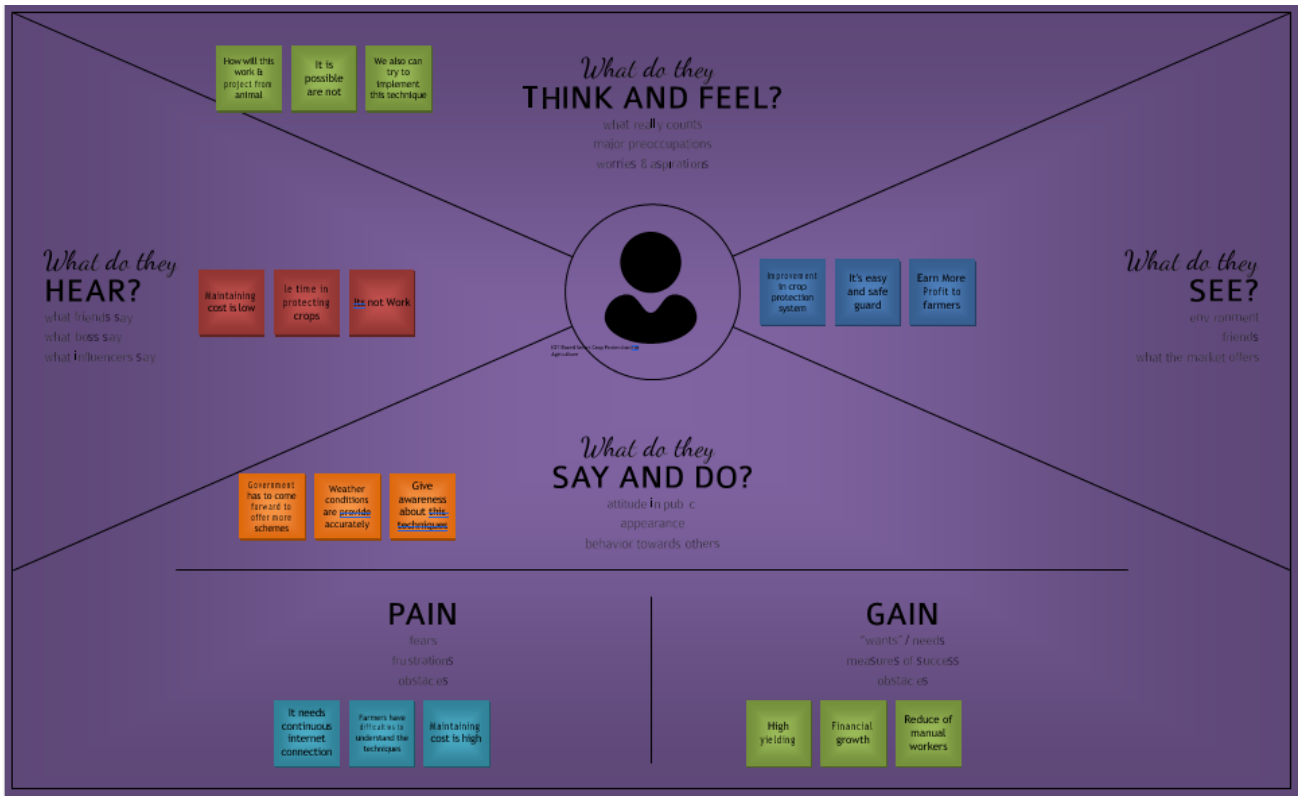
Some animals cross the field in search of food and water and also the birds enter the field for food and they damage all the crops. When the animals enter the field they not only eat food butthey also damage the entire field by walking upon the crops and also by spoiling the food crops.The birds, byentering the field they come to eat seeds of the crops and also they tend todrag the crops and ruin the entirefield. Some birds enter the field to eat the insects and pestsinthe field.

2.2. Problem Statement Definition

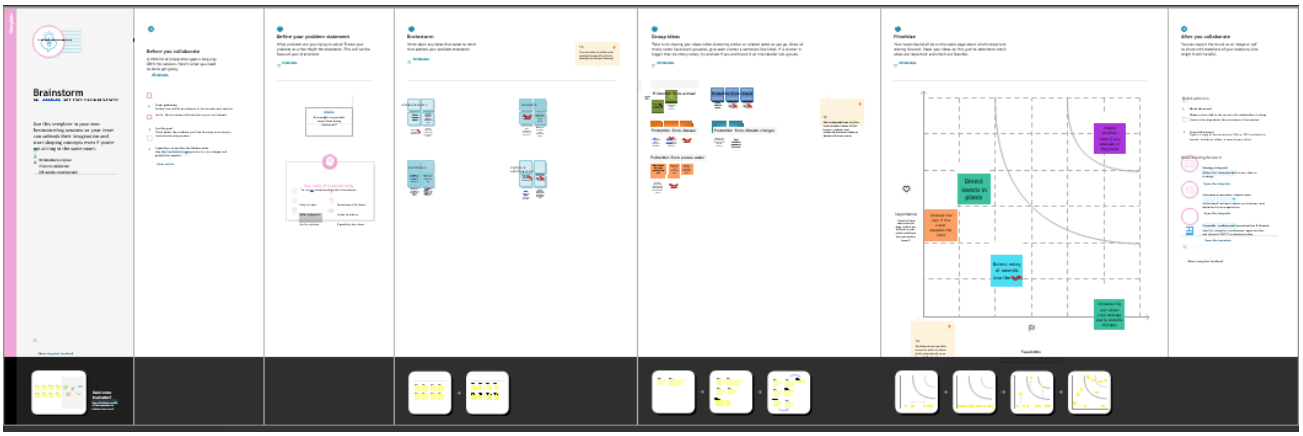
Most of the farmers are facing many problems nowadays due to many reasons. Our problem to solve is the invasion of various species such as birds and animals that harm the crops thatare being cultivated. Various types of species such as birds and animals come to the cultivation field according to the crop that is being cultivated and also according to the season of cultivation. Some wild animals enter the fieldduring night times when the field is near a forest region or when the farmcultivates some fruits and other crops that attractanimals.

3. IDEATION & POPOSEDSOLUTION

3.1. Empathy Map Canvas



3.2. Ideation and Brainstorming

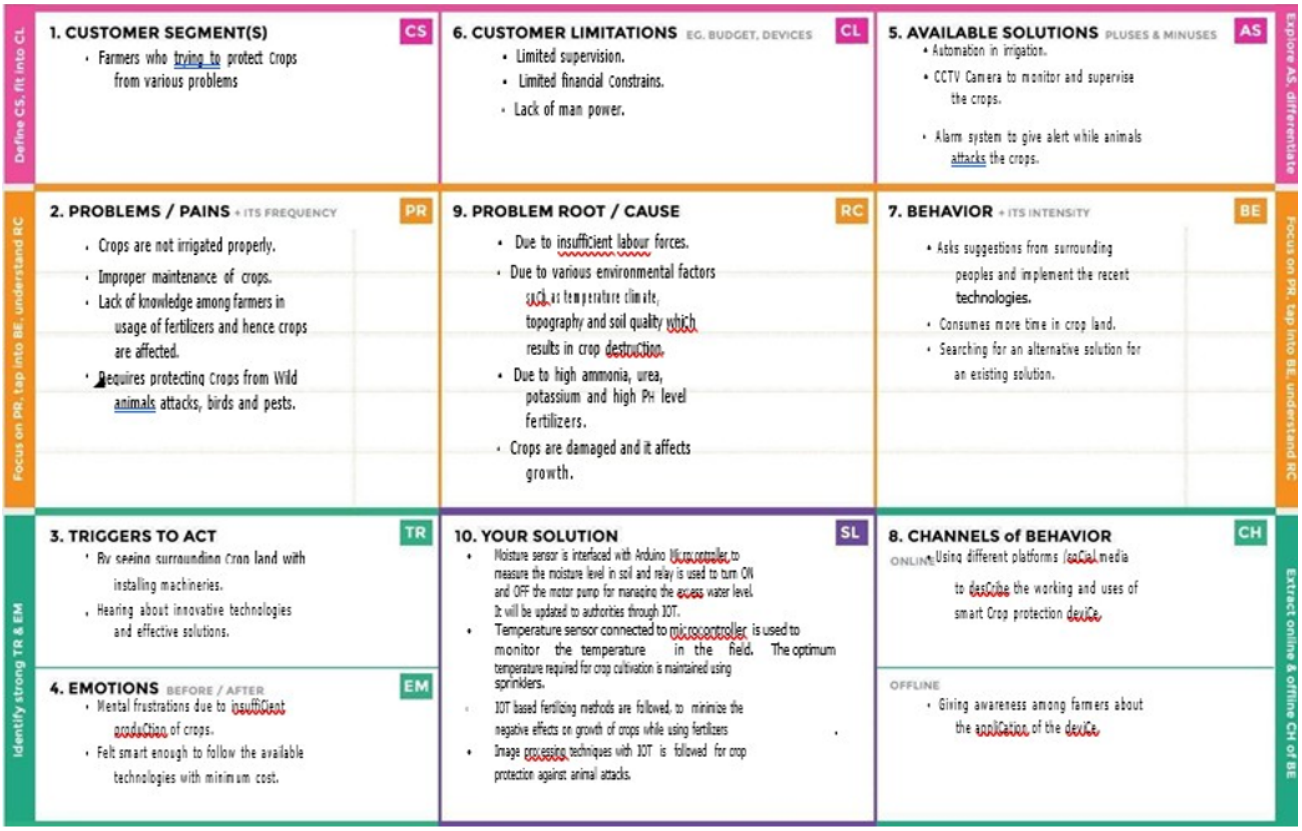


3.3. Proposed Solution

S.No.	Parameter	Description
1.	ProblemStatement(Problemto besolved)	Create an effective system and application that can watch over and notify users (farmers)
2.	Idea/Solution description	Farmers may now increase production and decrease waste thanks to sensors for light, humidity, temperature, soil moisture, etc. Furthermore, farmers may check on the state of their fields from anywhere with the aid of these sensors.
3.	Novelty/Uniqueness	Using sensors and automating irrigation systems, IOT smart agricultural solutions are intended to monitor crop areas. As a consequence, farmers and affiliated brands can conveniently and hassle-free monitor field conditions from anywhere.
4.	Social Impact/Customer Satisfaction	conservation of water. greatly reduces time. a rise in production quality. Production intelligence and real-time data. remote observation.
5.	Business Model(Revenue Model)	Since everyone can understand how to utilise the product, it is simple for them to do so for their safest organisation. The product is heavily promoted across all mediums. Due of its affordability, it even protects small

		farms from natural calamities.
6.	Scalability of the Solution	Even when there is greater disruption, the device detects the precise place and successfully warns the farmers.

3.4. Proposed Solution Fit



4. REQUIREMENT ANALYSIS

4.1. Functional Requirement

Following are the functional requirements of the proposed solution.

- FR-1 User Registration ,Registration through Form Registration through Gmail Registrationthrough LinkedIN
- FR-2 User Confirmation ,Confirmation via Email Confirmation via OTP
- FR-3 Tracking ExpenseHelpful insights about money management
- FR-4 Alert MessageGive alert mail if the amount exceedsthe budget limit
- FR-5 Category This application shall allow users to add categories of their expenses

4.2. Non Functional requirement

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

- NFR-1 UsabilityYou will able to allocatemoney to different priorities and also helpyou to cut down on unnecessary spending
- NFR-2 Security More security of the customerdata and bank account details.
- NFR-3 Reliability Used to manage his/her expense so that the user is the path of financialstability. It is categorized by week, month,and year and also helps to see more expenses made. Helps to definetheir own categories.
- NFR-4 Performance The types of expense are categories alongwith an option.Throughput of the system isincreased due to light weight databasesupport.
- NFR-5 Availability Able to track business expense and monitor important for maintaining healthy cash flow. NFR-6 Scalability The ability to appropriately handle increasing demands.

5. PROJECT DESIGN

5.1. Data Flow Diagrams

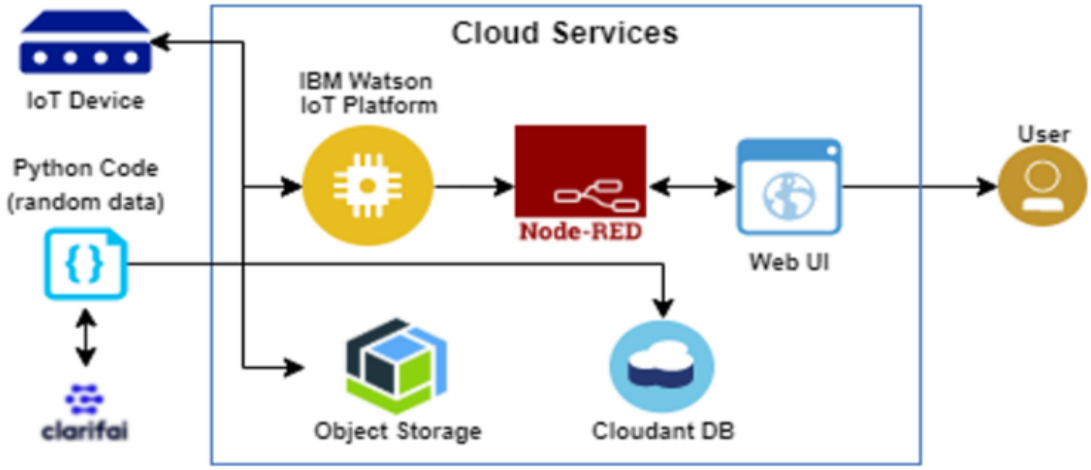
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, whatchanges the information, and where data is store.

5.2. Solution Architecture:

Solution architecture is a complexprocess – with many sub-processes – that bridgesthe gapbetween business problems and technology solutions. Its goals are to:

- Find the best tech solutionto solve existingbusiness problems.
- Describe the structure, characteristics, behavior, and other aspects of thesoftware to project stakeholders.
- Define features, development phases, and solutionrequirements.
- Provide specifications according to which the solution is defined, managed,anddelivered.

Technical Architecture:



6. PROJECT PLANNING &SCHEDULING

6.1. Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story/ Task	Story Points	Priority	Team Members
Sprint- 1	SensorData(python script)	USN-1	The Data of sensor which are feed to the Raspberrypi.Here we areusingpython scriptto generatea random sensor data.	3	High	A.ARUNACHALAM (Teamleader)
Sprint- 1	Automation(python script)	USN-2	Some activities are made to automation to overcome insufficient of labourforce in the field.Hence that also included in python scriptto implement automationin the.	5	High	A.ARUNACHALAM (Teamleader)
Sprint- 2	IBM IOTplatform	USN-3	To sendtheraspberrypi datato IOT platform, we create an IBM IOT platform and connect the raspberry pi tothe device created in IBM IOT.	5	High	P.PAVITHRA (Team Member-2)

Sprint- 3	Node RED service	USN-4	To accessthe IBM IOT platform from external applicationor from externalUINode red serviceis established.	5	High	D.MONISH (Team Member-2)
Sprint- 3	API Key	USN-5	Toprotect the IBM IOTplatform creating an API		High	VINITHA.D(Team Member-3)
			Key.			
Sprint-4	User Application	USN-6	Tomonitor and control thefield sensors the Useris provided with an User application created by MIT app inventor	8	High	D.MONISH (TeamMember-1), P.PAVITHRA (Team Member-2)

6.2. Sprint Delivery Schedule

Sprint	**Total Story Points**	**Duration**	**Sprint Start Date**	**Sprint End Date(Planned)**	**Story Points Completed (as on PlannedEnd Date)**	**Sprint Release Date(Actual)**
Sprint-1	8	6Days	24 Oct2022	29 Oct 2022	8	29 Oct 2022
Sprint-2	5	6Days	31 Oct 2022	05Nov 2022	5	05 Nov 2022
Sprint-3	8	6Days	07 Nov	12 Nov	8	12 Nov 2022

			2022	2022		
Sprint-4	8	6 Days	14 Nov2022	19Nov2022	8	19Nov2022

7. Coding And Solutioning:

7.1 Features

Feature 1: Detect the Temperature
Feature 2: Detect the Humidity Feature

7.2. Codes:

PYTHON CODE TO IBM:

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

#Provide your IBM Watson Device
Credentialsorganization = "60hw5g"
deviceType =
"IOT" deviceId
= "ultrasonic"
authMethod =
"token"
authToken=
"73171920500
1"
```

```
# Initialize GPIO
def myCommandCallback(cmd):
    print("Command received: %s" %
    cmd.data['command'])
    status=cmd.data['command']
    if
        status==
        "lighton
        ":print
        ("led is
        on")
    elif status ==
        "lightoff":
        print ("led
        is off")
    else :
        print("please send propercommand")



try:
deviceOptions = {"org": organization, "type": deviceType, "id":
deviceId,"auth-method": authMethod, "auth-token": authToken}
deviceCli =
ibmiotf.device.Client(deviceOptions)
#.....

except Exceptionas e:
print("Caught exceptionconnecting device: %s"%
str(e))sys.exit()
```

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

while True:
        #Get Sensor Data from DHT11

        temp=random.randint(90,110)
        Humid=random.randint(60,100)
         data = { 'temp' : temp, 'Humid': Humid}
        #print data
        def myOnPublishCallback():
            print ("Published Temperature = %s C" % temp, "Humidity = %s %%"
% Humid, "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 clouddeviceCli.disconnect()
```

NODE RED CODE:

TEMPERATURE:

msg.payload=msg.payload.”temp”return msg;

HUMIDITY:

msg.payload=msg.payload.

”Humid”return msg;

8. TESTING:

- PYTHON CODE TO IBM
- IoT SENSOR OUTPUT
- IBM CLOUD TO NODE RED OUTPUT

8.1. User Acceptance Testing:

8.1.1. Purpose of Document

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

8.1.2. Defect Analysis

This report shows the number of resolved or closed bugs at each severitylevel, and howthey were resolved

Resolution	Severity1	Severity2	Severity3	Severity4	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

NotReproduced	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

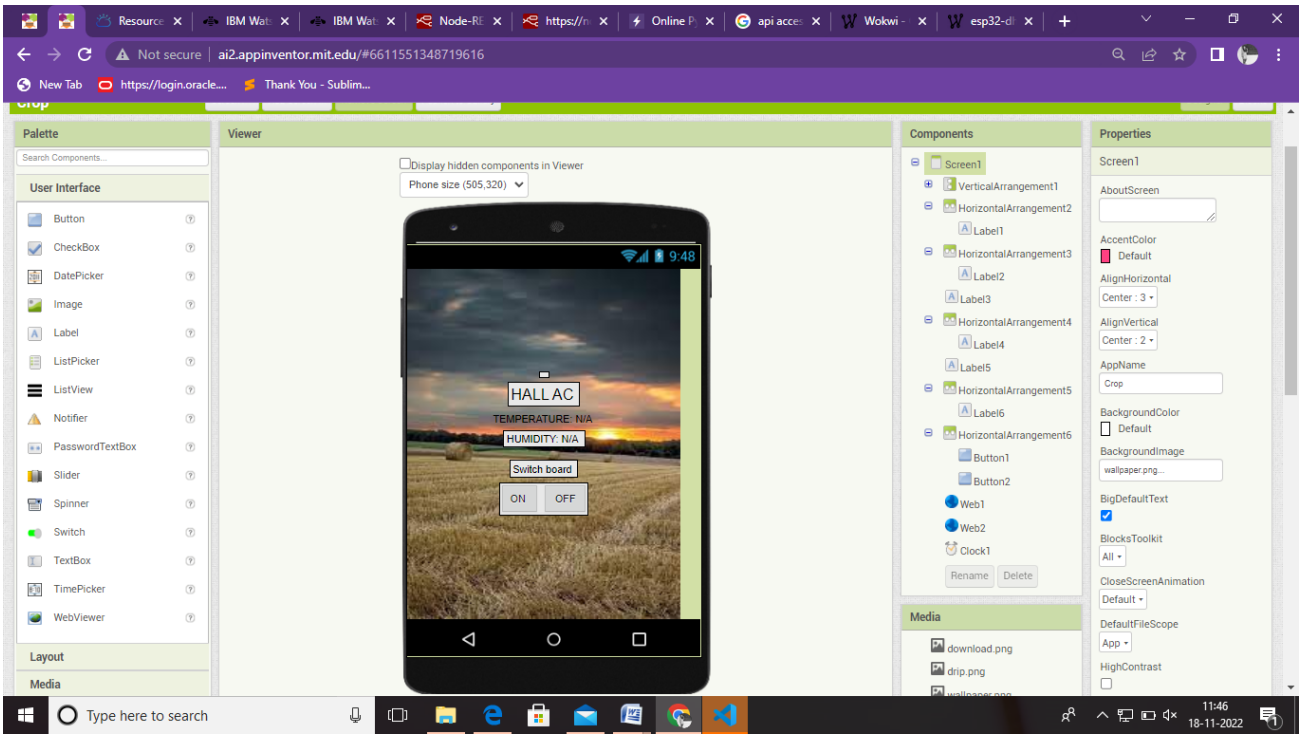
8.1.3. Test Case Analysis

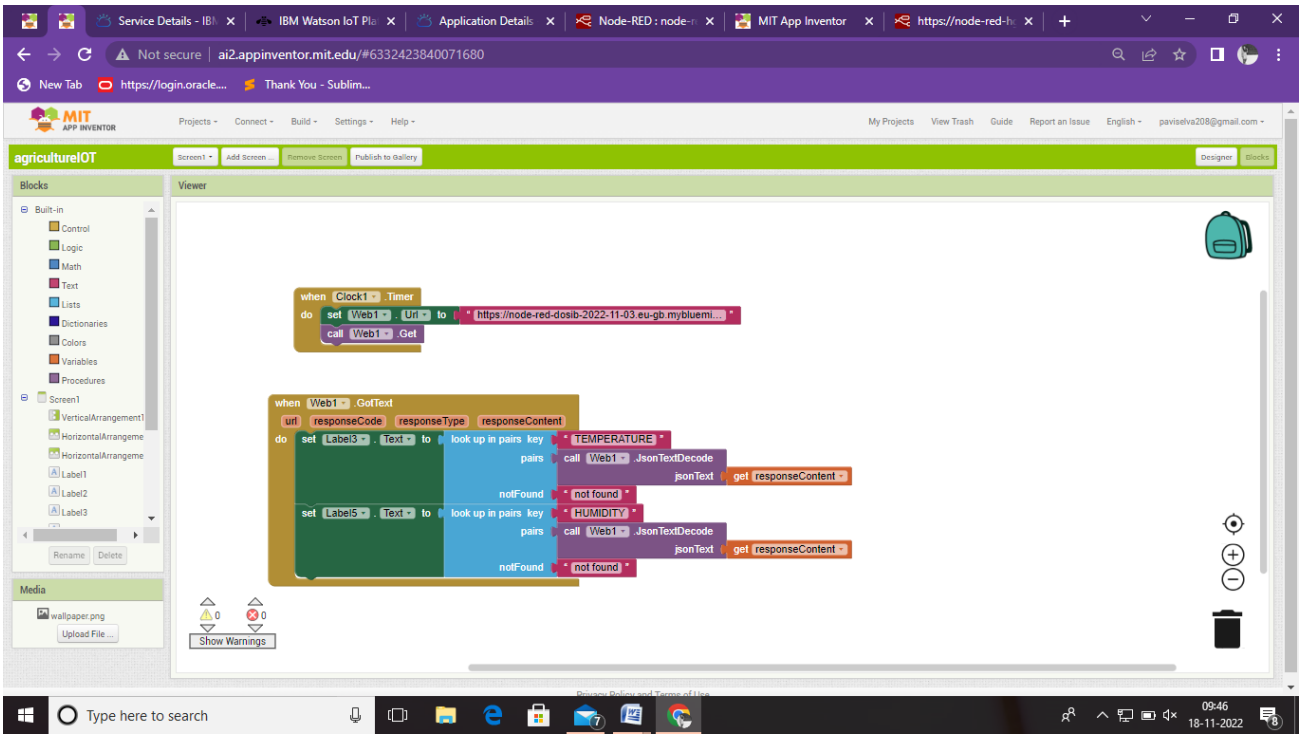
This report shows the number of test cases that have passed, failed, anduntested

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

9. RESULT

MIT APP INVENTOR-TO DESIGN THE APP




Service Details - IBM
IBM Watson IoT Pla
Application Details
Node-RED : node-r
MIT App Inventor
https://node-red-ha
Not secure
ai2.appinventor.mit.edu/#6332423840071680
New Tab
https://login.oracle....
Thank You - Sublim...
MIT APP INVENTOR
Projects
Connect
Build
Settings
Help
My Projects
View Trash
Guide
Report an Issue
English
paviselva208@gmail.com
agricultureIOT
Screen1
Add Screen ...
Remove Screen
Publish to Gallery
Designer
Blocks
Blocks
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen1
VerticalArrangement1
HorizontalArrangeme
HorizontalArrangeme
Label1
Label2
Label3
Rename
Delete
Media
wallpaper.png
Upload File ...
Viewer
when Clock1 .Timer
do set Web1 . Url to https://node-red-dosib-2022-11-03.eu-gb.mybluemi...
call Web1 .Get
when Web1 .GotText
url responseCode responseType responseContent
do set Label3 . Text to look up in pairs key TEMPERATURE
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound not found
set Label5 . Text to look up in pairs key HUMIDITY
pairs call Web1 .JsonTextDecode
jsonText get responseContent
notFound not found
0
0
Show Warnings
Type here to search
09:46
18-11-2022

10. ADVANTAGES :

- Farmers can monitor the health of farm animals closely, even if they are

physicallydistant.

- Smart farming systems reducewaste, improve productivity and enable managementof a greater number ofresources through remote sensing.
- High reliance.
- Enhanced Security.

DISADVANTAGES:

- 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, soconnection issues would cause an advanced monitoring system to be useless.
- High Cost
- Equipment neededto implement IoT in agriculture is expensive.

APPLICATIONS:

- Monitoring the crop field with the help of sensors (light, humidity, temperature, soilmoisture, etc.)
- Automating the irrigation system
-
- Soil Moisture Monitoring (including conductivity)

11. CONCLUSION:

The problem of crop vandalization by wild animals and fire has become a major social problem in current time. It requires urgent attention as no effective solution exists tilldate for this problem. Thus, this project carries a great social relevance as it aims to addressthis problem. This project will help farmers in protecting their orchards and fields and save them from significant financial losses and will save them from the unproductive efforts thatthey endure for the protection their fields. This will also help them in achieving better crop yields thus leading to their economicwell being.

12. FUTURE SCOPE:

Study and analysis of the developed Crop protection systems for its cost effectiveness with the development of Arduino based variable frequency Ultrasonic birddeterrent circuit. outline of the crop damage caused by a particular Wild animal if the behavioral features of the With the reduced cost in the smart phones.

13. APPENDIX

GitHub Link:https://github.com/IBM-EPBL/IBM-Project-36470-1660295246

projrct demo link: https://www.youtube.com/embed/6vzEzHNQFI0