IoT Based Smart Crop Protection System for Agriculture

M.E.T ENGINEERING COLLEGE

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IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE

13 APPENDIX

1.INTRODUCTION

1.1 PROJECT OVERVIEW

IoT tendencies are often utilized in smart farming to boost the standard of agriculture . But our productivity remains enormously diminutive as associated to world standards . Societies after pastoral areas drift to a municipal extent for her lucrative commerce besides they can't deliberate on crofting. In detail, moderate smart irrigation systems are utilized to afford the solution for dissimilar variety of plants in spite of getting the solution for moisture related issues Weather conditions like temperature, humidity and moisture are difficult to check manually frequently overcome all these a new system is proposed constructed on cloud of Effects.Wildlife requisite overlaps personage laypeople, creating fee to inhabitants and cultivated field. Wild animals regularly ruin eminence of crops.The low productiveness is mainly due to the reasons, the crop ruined by means of untamed animals and yield ruined by way of nature object.Cultivators are experiencing numerous challenges for attaining more production due to unexpected encounters of animals, slight sorts of species, beetles, some hazardous snakes and weather circumstances. Within the existing system, electrical protection is used to give up untamed animal assaults on vegetation which leads to the death of animals.The surveillance and monitor of the tiny species, bugs and snakes are tough because of their aspect and flora of effort. A well-known wild animal safety observation that may final for a lot of Fencing is years. However, utilizing fences as a train is often. Therefore, earlier than deciding on an acceptable fence, it is vital to examine native law regulations . The high quality of fencing depends upon the material and structure. Counting on how it’s made and what it’s made from, some everlasting fences can last as long as 30 years. Previously buying electrical fences, it is very meaningful to be certain that they're allowed to be used in the precise area, and for defense towards endangered animal species. Further more, it is steered that electrical fences are marked with a warning signal to stop any doable human contact. Climatic conditions be keen on temperature, humidity and moisture are troublesome.

1.2 PURPOSE

The purpose is to grant monitoring device for crop safety to animal outbreaks and environment circumstances . This supports to preserve stretch and cash by dipping the physical exertion, else obligatory if the cultivators themselves have to afford guard for their crops with their endless physical administration . Wildlife regularly wreck eminence crops, because of which annual manufacturing of vegetation reduces inflicting monetary victims to cultivators . Agriculturalist suicide is huge bother due to less harvest . This low harvest is duet the circumstance of two most significant purposes i.e. Crop wrecked via untamed animals and Crop wrecked by meteorological conditions . The ranchers will treasure these SMS containing location. The prime thing of this task is to furnish a great reply to this distress . Each time either the wild animal or species are identified through PIR sensor which stimulates the web camera and gives rise to alert the buzzer in the locality, associates to the farmer direct to the cloud . When the moisture content is inferior to a terrifying level the sensor planted makes the water pumps to turn on . This ensures the complete safety of crops from animals also as from the weather conditions thus prevent the farmers .

2.LITERATURE SURVEY

2.1 EXISTING PROBLEM

IOT tendencies are often utilized in smart farming to boost the standard of agriculture . Farming the pillar of supports our country to the general commercial development. But our productivity is extremely low as associated to world standards. People from rural areas drift to an urban area for other worthwhile trades and they can't concentrate on agriculture . There are many disadvantages of the current traditional agricultural methods namely costlier and manual monitoring of the agriculture field. Specifically, small-scale smart irrigation systems are utilized to provide the solution for dissimilar variety of plants in spite of getting the solution for moisture related issues Weather conditions like temperature, humidity and moisture are difficult to check manually frequently. Farmer suicide is turning into big problem due to low productiveness amongst farms . This low productiveness is due to the fact of two main reasons, Crop ruined by means of untamed weather conditions untamed animal attacks, small types of species, insects, some hazardous snakes and weather circumstances.

2.2 REFERENCES

1 Krunal Mahajan1, Riya Parate2, Ekta Zade3, Shubham Khante4, Shishir Bagal5," REVIEW PAPER ON SMART CROP PROTECTION SYSTEM", International Research Journal of Engineering and Technology (IRJET), Volume: 08, issue 02 Feb 2021.

2 Dr.M. Chandra, Mohan Reddy, Keerthi Raju KamakshiKodi, BabithaAnapalliMounikaPulla, "SMART CROP PROTECTION SYSTEM FROM LIVING OBJECTS AND FIRE USING ARDUINO", Science, Technology and Development, Volume IX Issue IX, pg.no 261- 265, Sept 2020.

3 Anjana, Sowmya, Charan Kumar, Monisha, Sahana, "Review on IoT in Agricultural Crop Protection and Power Generation", International Research Journal of Engineering and Technology (IRJET) , Volume 06, Issue 11 ,Nov 2019.

4 G. NaveenBalaji, V. Nandhini, S. Mithra, N. Priya, R. Naveena, "IOT based smart crop monitoring in farmland", Imperial Journal of Interdisciplinary Research (IJIR), Volume 04, Issue 01, Nov 2018.

5 P.Rekha, T.Saranya, P.Preethi, L.Saraswathi, G.Shobana, "Smart AGRO Using ARDUINO and GSM", International Journal of Emerging Technologies in Engineering Research (IJETER) Volume 5, Issue 3, March 2017

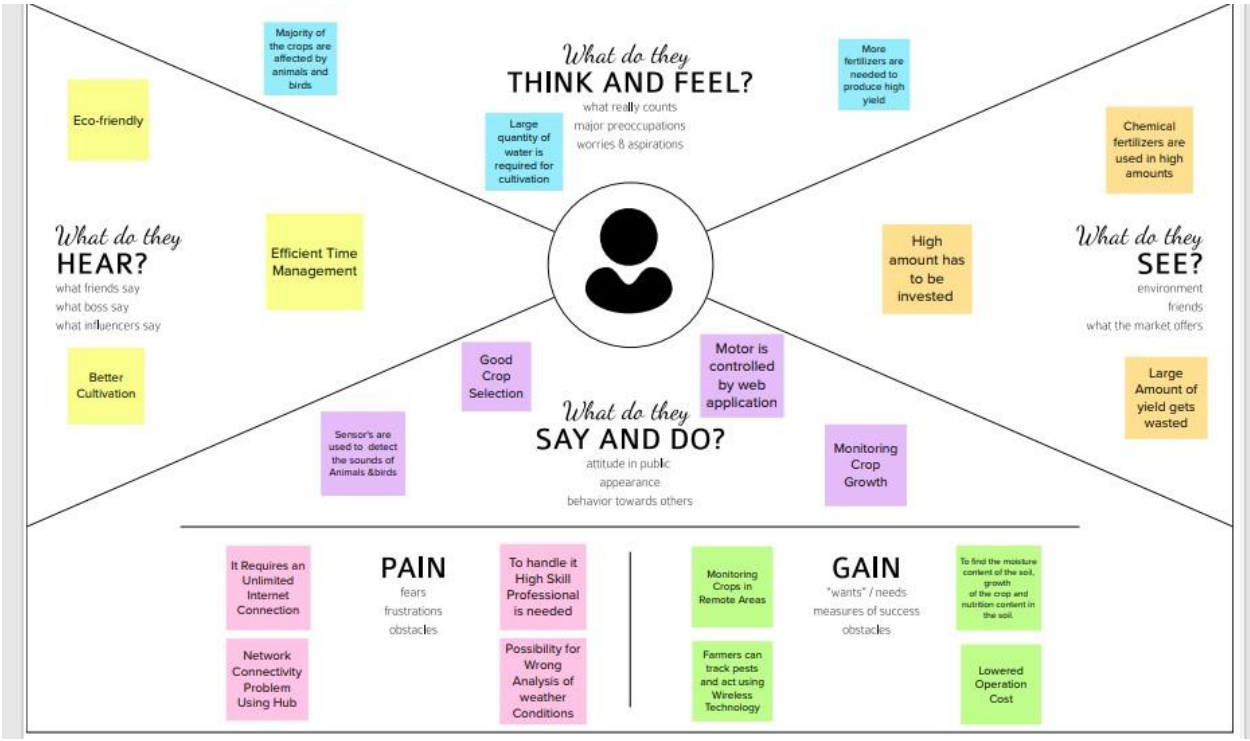
2.3 PROBLEM STATEMENT DEFINITION

Within the existing system, electrical fencing is used to give up untamed animal assaults on agricultural vegetation which leads to the death of animals . The fundamental objective is to provide a fantastic answer to this problem, so that losses incurred will be minimized and farmers will have an accurate crop yield . This low productivity is because of the fact of two most important motives i.e. Crop destroyed via untamed animals and Crop damaged by using nature object.The main objective of this assignment is to furnish a

fantastic answer to this trouble, as a result with the purpose of the economic losses incurred through the support of our farmers are minimized to get truthful crop yield .This ensures complete security of vegetation from animals and defending the farmers loss. In the proposed system Raspberry Pi, PIR sensor, web camera, ultrasonic sensor, LDR sensor, temperature sensor, humidity sensor, moisture sensor, buzzer and monitor are used . This field of this effort remains towards withdraw to monitor the system for crop security conflicting to subconscious occurrences and meteorological conditions When the moisture content is below a critical level which is determined by the sensor planted in the fields, as the system is automated the water pumps are switched on . This ensures complete safety of crops from animals also as from the weather conditions thus prevent the farmers loss.

3.IDEATION & PROPOSED SOLUTION

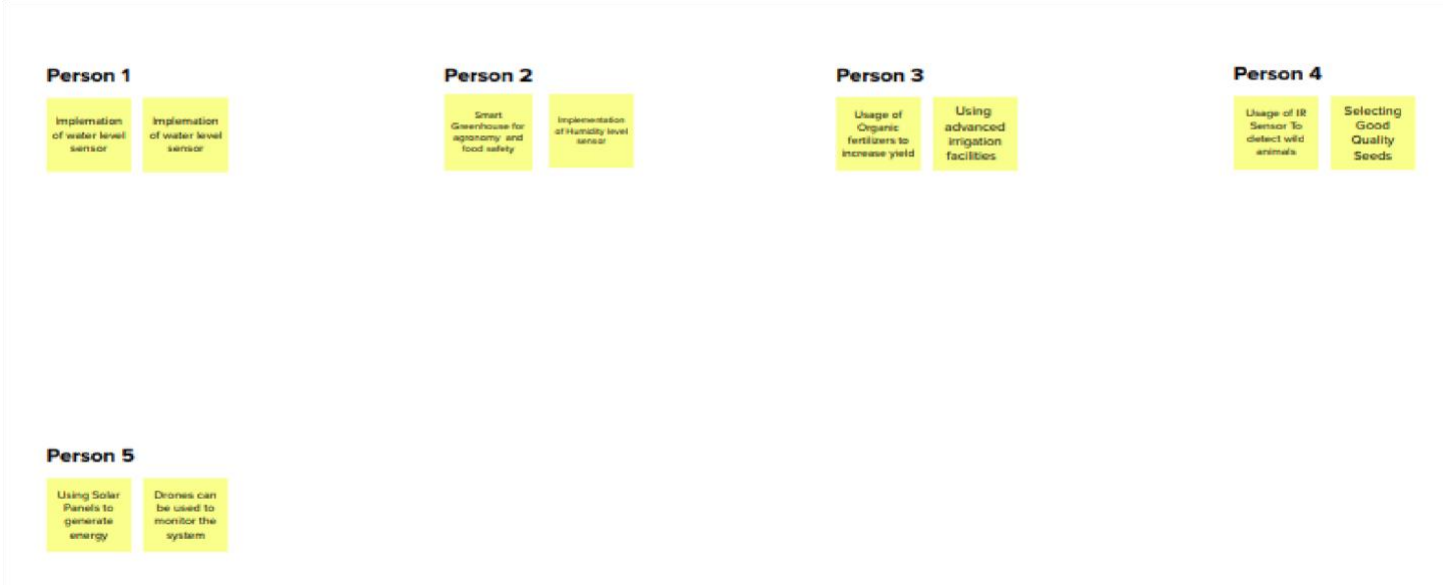
3.1 EMPATHY MAP CANVAS



Agriculture is the backbone of our country that contributes to 45% of the GDP that is responsible for the enhancement of country's economy. This IOT based Crop Protec on System aims on building an integrated module for improving the efficiency of the present agricultural modules. A smart way of automa ng farming process can be called as Smart Agriculture. Precision agriculture is one of the most famous applica ons of IoT in the agricultural sector and numerous organiza ons are leveraging this technique around the world. By implying an automated system, it possible to eliminate threats to the crops by reducing the human interven on. The major emphasize will be on providing favourable atmosphere for plants. These agricultural automated systems will help in managing and maintain safe environment especially the agricultural areas. Environment real me. Monitoring is an important factor in smart farming. Graphical User Interface based so ware will be provided to control the hardware system and the system will be en rely isolated environment, equipped with sensors like temperature sensor, humidity sensor. The I controllers will be managed by a master sta on which will communicate with the human interac ve so ware. This IOT based system will provide smart interface to the farmers and can increase the level of produc on than the current scenario.

3.2 IDEATION & BRAINSTORMING

- Implementation of water level sensor
- Using Solar panels to generate energy

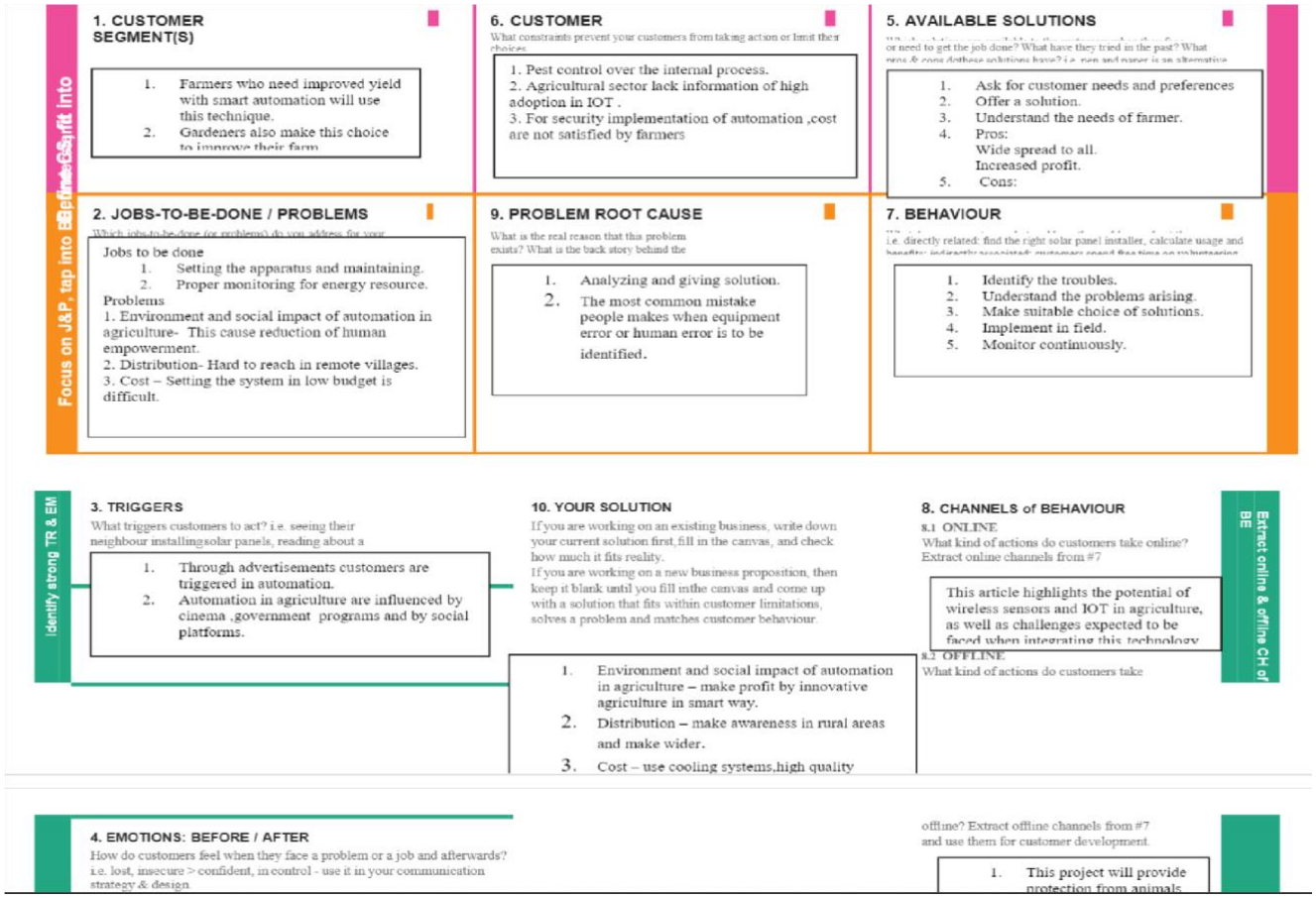


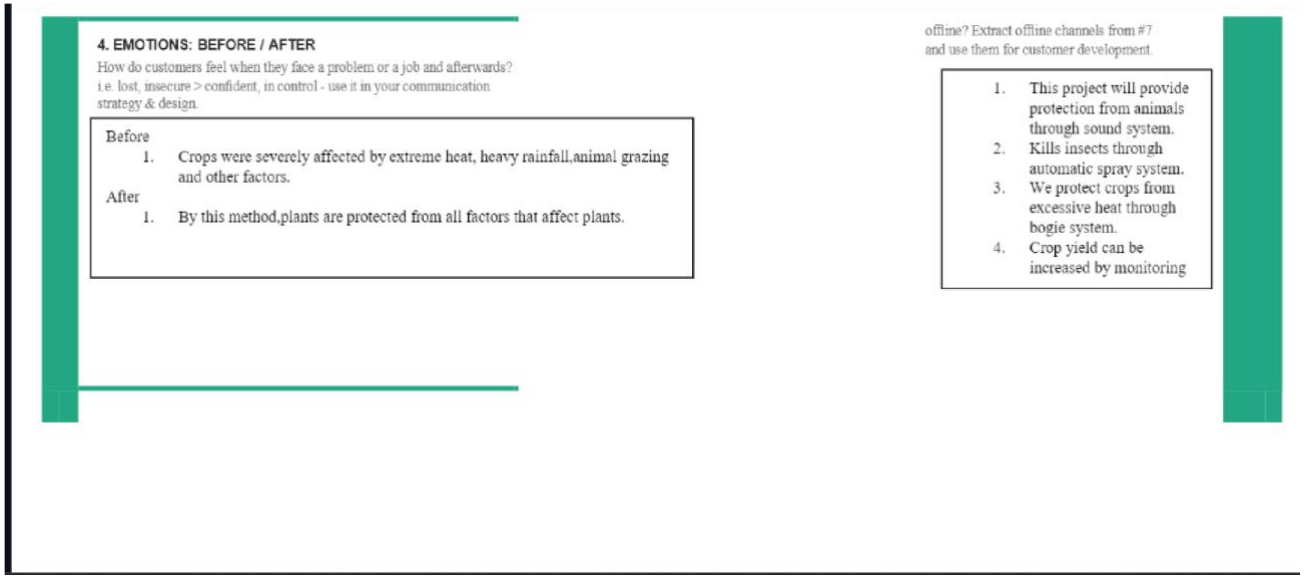
- Usage of organic fertilizers to increase yield
- Usage of IR sensors to detect wild animals
- Selecting good quality seeds

3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Protecting crops from insects , animals and other factors using pest sprayer , sound system and automatic drip irrigation.
2.	Idea / Solution description	Using moisture meter ,automatic sprayer of pesticide ,automatic DC motor and sensors are placed for protect crops.
3.	Novelty / Uniqueness	Water stagnation and scarcity is maintained every movement in field and growth of plants are monitored with mobile phone.
4.	Social Impact / Customer Satisfaction	Improved and high yield crops are obtained . Farmers work is reduced with automation.
5.	Business Model (Revenue Model)	This makes agriculture easier and profit is attained more by using this technique.
6.	Scalability of the Solution	This solution will gives high performance for proper maintenance.

3.4 PROBLEM SOLUTION FIT


1. CUSTOMER SEGMENT(S)
1. Farmers who need improved yield with smart automation will use this technique.
2. Gardeners also make this choice to improve their farm
6. CUSTOMER
What constraints prevent your customers from taking action or limit their choices
1. Pest control over the internal process.
2. Agricultural sector lack information of high adoption in IOT .
3. For security implementation of automation ,cost are not satisfied by farmers
5. AVAILABLE SOLUTIONS
1. Ask for customer needs and preferences
2. Offer a solution.
3. Understand the needs of farmer.
4. Pros:
Wide spread to all.
Increased profit.
5. Cons:
Focus on J&P, tap into
2. JOBS-TO-BE-DONE / PROBLEMS
Jobs to be done
1. Setting the apparatus and maintaining.
2. Proper monitoring for energy resource.
Problems
1. Environment and social impact of automation in agriculture- This cause reduction of human empowerment.
2. Distribution- Hard to reach in remote villages.
3. Cost – Setting the system in low budget is difficult.
9. PROBLEM ROOT CAUSE
What is the real reason that this problem exists? What is the back story behind the
1. Analyzing and giving solution.
2. The most common mistake people makes when equipment error or human error is to be identified.
7. BEHAVIOUR
1. Identify the troubles.
2. Understand the problems arising.
3. Make suitable choice of solutions.
4. Implement in field.
5. Monitor continuously.
Identify strong TR & EM
3. TRIGGERS
What triggers customers to act? i.e. seeing their neighbour installingsolar panels, reading about a
1. Through advertisements customers are triggered in automation.
2. Automation in agriculture are influenced by cinema ,government programs and by social platforms.
10. YOUR SOLUTION
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 inthe canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.
1. Environment and social impact of automation in agriculture – make profit by innovative agriculture in smart way.
2. Distribution – make awareness in rural areas and make wider.
3. Cost – use cooling systems,high quality
8. CHANNELS of BEHAVIOUR
8.1 ONLINE
What kind of actions do customers take online?
Extract online channels from #7
This article highlights the potential of wireless sensors and IOT in agriculture, as well as challenges expected to be faced when integrating this technology
8.2 OFFLINE
What kind of actions do customers take
Extract online & offline CH of BE
4. EMOTIONS: BEFORE / AFTER
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
offline? Extract offline channels from #7
and use them for customer development.
1. This project will provide protection from animals



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

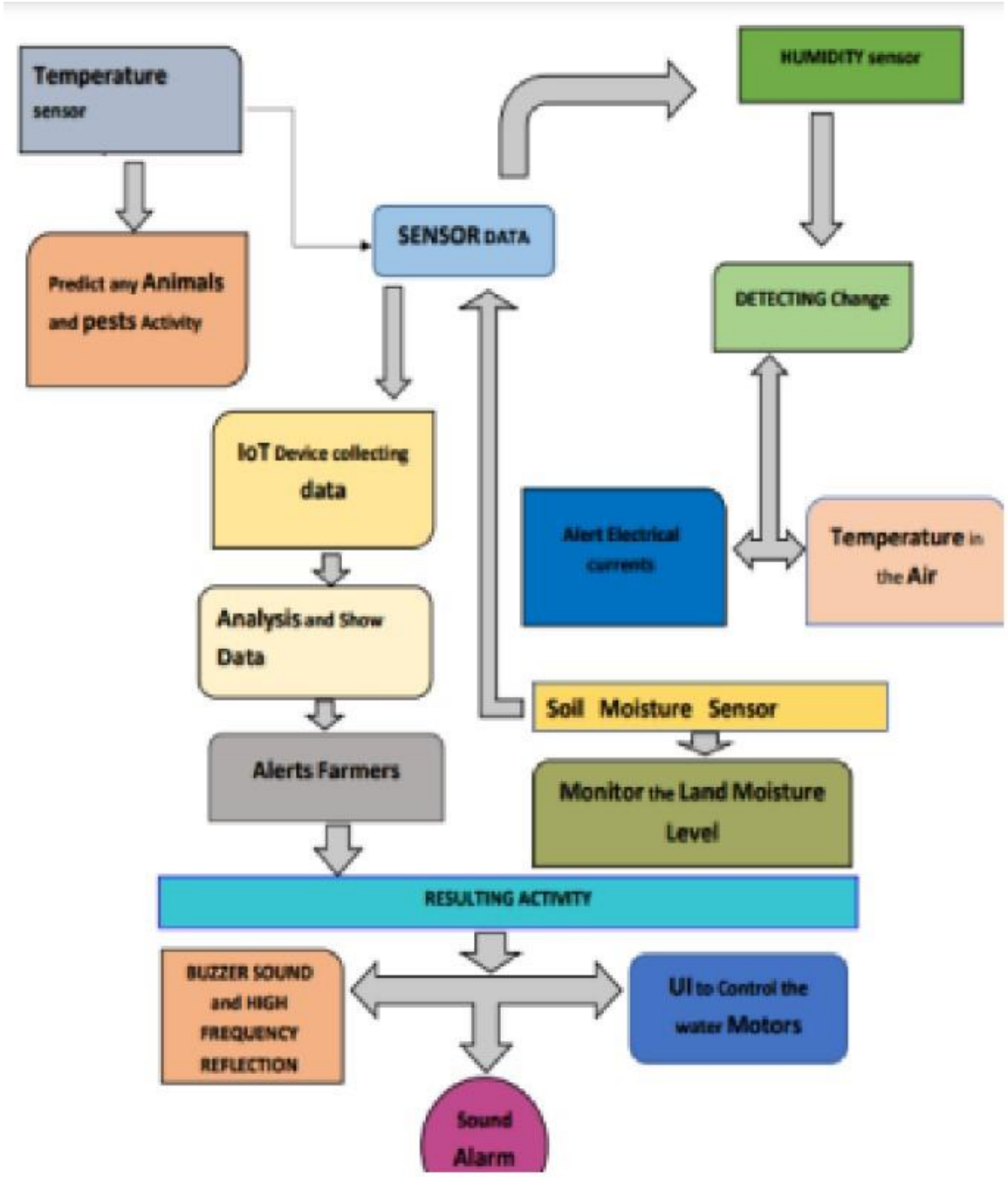
FR-NO	FUNCTIONAL REQUIREMENTS	SUB-REQUIREMENTS
FR-1	Fertilizing frame service	Documentation requirements and assisting information
FR-2	Economical service	Assisting information
FR-3	Technology assessment service	Selecting fertilizing features
FR-4	Feature assessment service	Updated technical information and machinery selection
FR-5	Information acquisition service	Assisting information about fertilizing rules
FR-6	Farm and field customizing service	Potential data acquisition service
FR-7	Field inspection	Spatial field information
FR-8	Field observation service	Analysed risks
FR-9	Assisting remote controlling	Inspecting and controlling fertilizing task
FR-10	Assisting "operational performance service"	Economical analysis of current technology

4.2 NON-FUNCTIONAL REQUIREMENT

NRF.NO	NON FUNCTIONAL REQUIREMENTS	DESCRIPTION
NRF-1	Usability	To use new technologies and increase the quantity and quality
NRF-2	Security	Protect the field from animals.
NRF-3	Reliability	Increasing the demand for food with minimum resources
NRF-4	Performance	Maintain good yield and provide sustainable quantity
NRF-5	Availability	Agricultural fences are quite an effective wild animal protection
NRF-6	Scalability	The develop system will not harmful and injurious to animals as well as human beings.

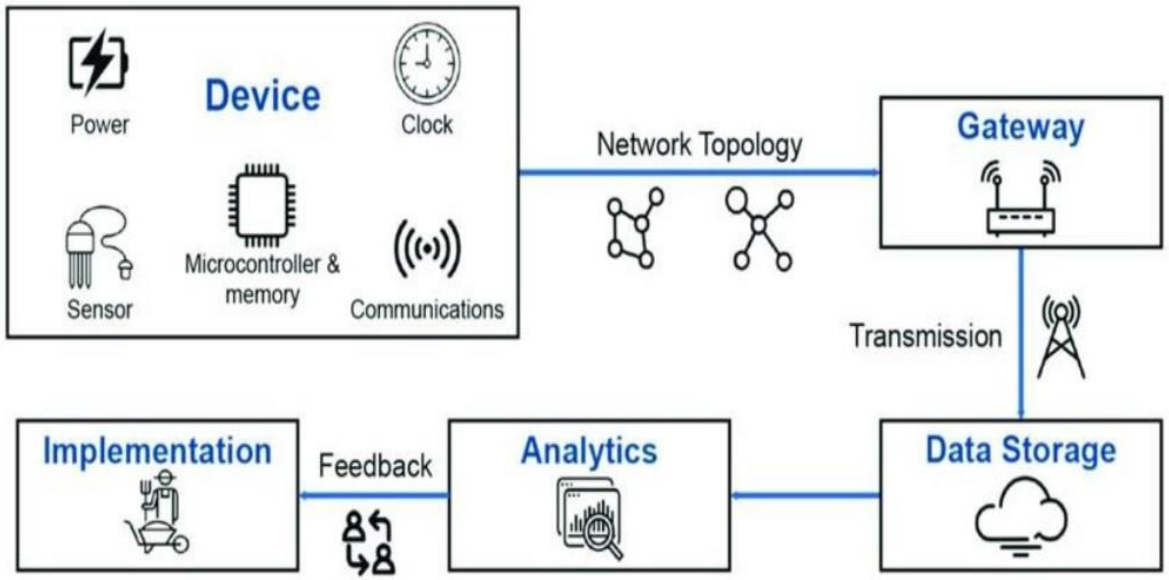
5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS


Temperature sensor
HUMIDITY sensor
Predict any Animals and pests Activity
SENSOR DATA
DETECTING Change
IoT Device collecting data
Alert Electrical currents
Temperature in the Air
Analysis and Show Data
Soil Moisture Sensor
Alerts Farmers
Monitor the Land Moisture Level
RESULTING ACTIVITY
BUZZER SOUND and HIGH FREQUENCY REFLECTION
UI to Control the water Motors
Sound Alarm

5.2 SOLUTIONS & TECHNICAL ARCHITECTURE


SENSORS DATA
IOT
GATEWAY/
PROCESSOR
CLOUD
MOBILE APP
OUTPUT DEVICES



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5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Farmer)	Maintaining Fields	USN-1	As a user, I can monitor the growth of crops and protect the crops against animals	I can maintain the fields with less labor	High	Sprint-1
	Analyzing Problems	USN-2	As a user, I collect the required information about the problems on agriculture fields	I can ask my field owner directly.	Low	Sprint-2
		USN-3	As a user, I can monitor the moisture level in soil and solve the problems by using Smart IOT System	I can take remedial action immediately	High	Sprint-1
Project Designers	Identifying the problem and provide solutions	USN-4	As a user, I can sense the water level and flame in the field using sensor and monitor using IOT	I can perform this actions via IoT.	Medium	Sprint-1
		USN-5	As a user, I can make services for Irrigation, pesticides, Fertilization, and Soil preparation	I can solve this problem using IOT	High	Sprint-1
			As a user, I can monitor the field against animal attacks using a camera interface module and appropriate actions can be taken	I can monitor the field continuously.	Medium	Sprint-2
Customer (Field Maintainer)	Problem solutions	USN-6	As a user, areas can be monitored from a remote place	Checking Process	Medium	Sprint-3
	Application	USN-7	As a user, I can respond to the problems in the fields immediately	Continuous monitoring and remedial actions.	Medium	Sprint-3
	Final Process	USN-8	This proposed smart IOT-based crop protection device is found to be cost-effective and efficient	I can take necessary action if required.	Medium	Sprint-4

6.PROJECT PLANNING & SCHEDULING

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	Athisaya Selva Prakash A. Iswariya B. Indhumathi S. Vinthiya P.
Sprint-1	Login	USN-2	As a user can login using the email and password.	2	High	Athisaya Selva Prakash A Iswariya B. Indhumathi S. Vinthiya P.
Sprint-1		USN-3	Create the IBM Cloud services which are being used in this project.	6	High	Athisaya Selva Prakash A Iswariya B. Indhumathi S. Vinthiya P.
Sprint-1		USN-4	Configure the IBM Cloud services which are being used in completing this project.	4	Medium	Athisaya Selva Prakash A Iswariya B. Indhumathi S. Vinthiya P.

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2		USN-5	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the IBM Watson IoT platform.	5	High	Athisaya Selva Prakash A. Iswariya B. Indhumathi S. Vinthiya P.
Sprint-2		USN-6	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	4	Medium	Athisaya Selva Prakash A. Iswariya B. Indhumathi S. Vinthiya P.
Sprint-2		USN-7	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT Platform.	10	High	Athisaya Selva Prakash A. Iswariya B. Indhumathi S. Vinthiya P.
Sprint-3		USN-8	To create a web application create a Node-RED service.	10	High	Athisaya Selva Prakash A. Iswariya B. Indhumathi S. Vinthiya P.
Sprint-3		USN-9	Launch the cloudant DB and create a database to store the image URL	4	Medium	Athisaya Selva Prakash A. Iswariya B. Indhumathi S. Vinthiya P.

Sprint-4		USN-10	Create a cloud object storage service, create a bucket to store the images, and configure the bucket settings.	5	Medium	Athisaya Selva Prakash A. Iswariya B. Indhumathi S. Vinthiya P.
Sprint-4		USN-11	Develop a python script.	6	Medium	

PROJECT TRACKER, VELOCITY & BURNDOWN 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	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

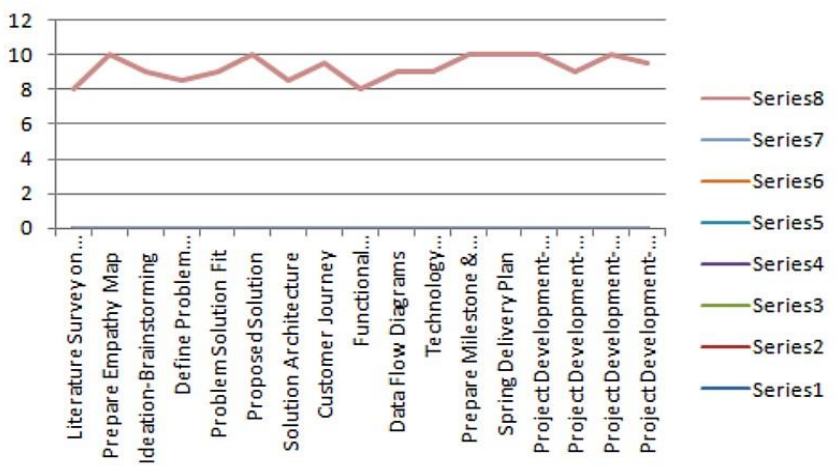
VELOCITY:

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

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

BURNDOWN CHART:

A burndown 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, burndown charts can be applied to any project containing measurable progress overtime



7.CODING & SOLUTIONING (EXPLAIN THE FEATURES ADDED IN THE PROJECT ALONG WITH THE CODE):

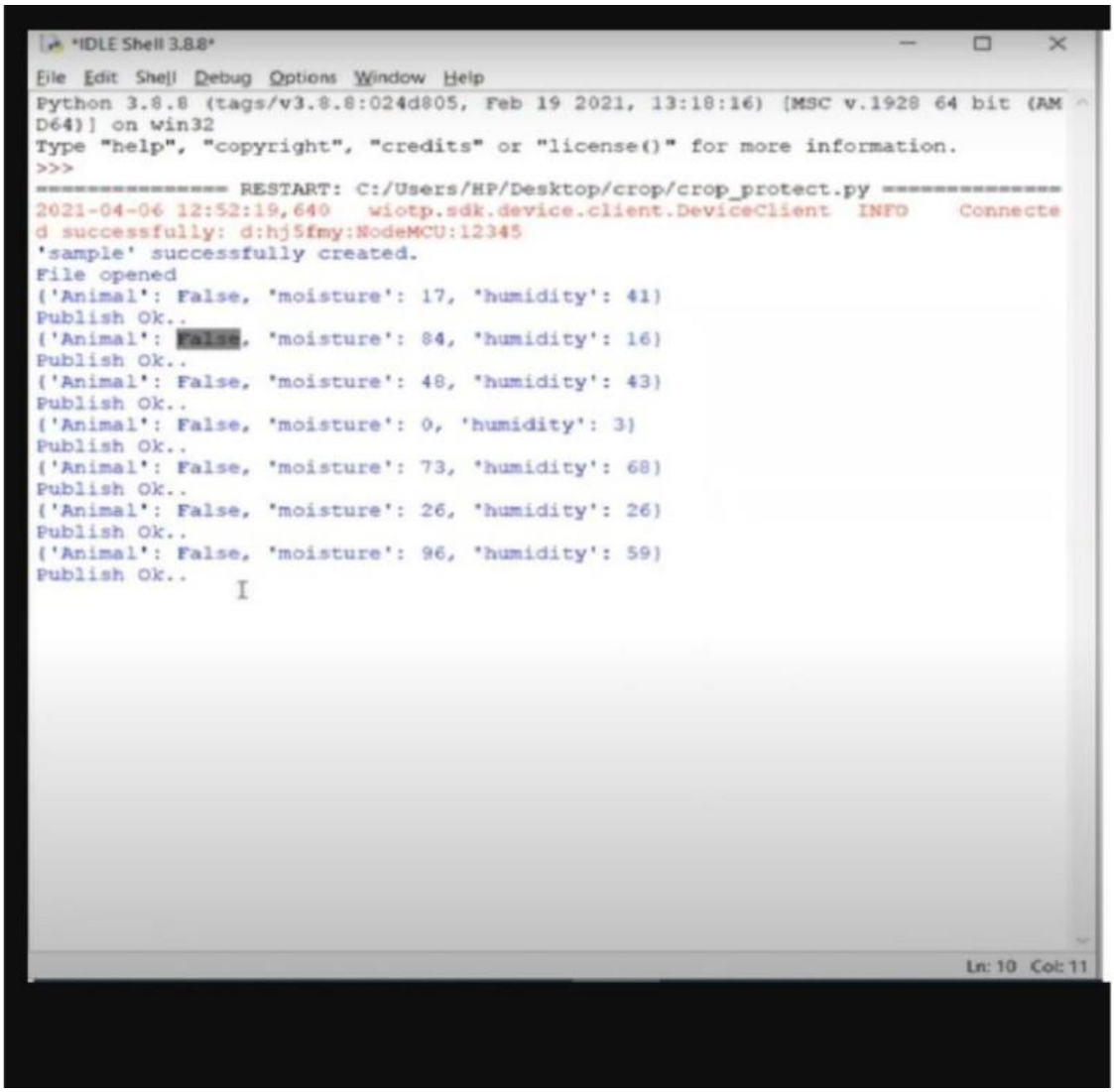
7.1 FEATURE 1

```
Python 3.10.7 (tags/v3.10.7:6cc6b13, Sep  5 2022, 14:08:36) [MSC v.1933 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
import cv2
import numpy as np
import wiot.sdk.device
import playsound
import random
import time
import datetime
import ibm_boto3
from ibm_botocore.client import Config, ClientError

#CloudantDB
from cloudant.client import Cloudant
from cloudant.error import CloudantException
from cloudant.result import Result, ResultByKey
from clarifai_grpc.channel.clarifai_channel import ClarifaiChannel
from clarifai_grpc.grpc.api import service_pb2_grpc
stub = service_pb2_grpc.V2Stub(clarifaiChannel.get.grpc_channel())
from clarifai_grpc.grpc.api import service_pb2, resource_pb2
from clarifai_grpc.grpc.api.status import status_code_pb2

#This is how you authenticate
metadata = (('authorization', 'key 0620e202302b4508b90eab7efe7475e4'),)
COS_ENDPOINT = "https://s3.jp-tok.cloud-object-storage.appdomain.cloud"
COS_API_KEY_ID = "g5d4qO8EIgv4TWUCJj4hfEzgalqEjrObE82AJDWlAOHo"
COS_AUTH_ENDPOINT = "https://iam.cloud.ibm.com/identity/token"
COS_RESOURCE_CRN = "crn:v1:bluemix:public:cloud-object-storage:global:a/c2fa2836eaf3434bbc8b5b58feffff3f0:62e450fd-4c82-4153-ba41-ccb53adb8111::"
clientdb = cloudant("apikey-W2njldnwtjO16V53lAVUCqPwc2aHTlmljlxXvtdGKJBn", "88cc5f47c1a28afbfb8ad16161583f5a", url="https://d6c89f97-cf91-48b7-b14b-c99b2fe27c2f-bluemix.clouda
clientdb.connect()

#Create resource
cos = ibm_boto3.resource("s3",
                         ibm_api_key_id=COS_API_KEY_ID,
```

```
                        config=Config(signature_version='oauth'),
                        endpoint_url=COS_ENDPOINT
                        )
def = multi_part_upload(bucket_name, item_name, file_path):
    try:
        print("Starting file transfer for {0} to bucket: {1}\n".format(item_name, bucket_name))
        #set 5 MB chunks
        part_size = 1024 * 1024 * 5
        #set threadhold to 15 MB
        file_threshold = 1024 * 1024 * 15
        #set the transfer threshold and chunk size
        transfer_config = ibm_boto3.s3.transfer.TransferConfig(
            multipart_threshold=file_threshold,
            multipart_chunksize=part_size
            )
        #the upload_fileobj method will automatically execute a multi-part upload
        #in 5 MB chunks size
        with open(file_path, "rb") as file_data:
            cos.Object(bucket_name, item_name).upload_fileobj(
                Fileobj=file_data,
                Config=transfer_config
                )
        print("Transfer for {0} Complete!\n".format(item_name))
    except ClientError as be:
        print("CLIENT ERROR: {0}\n".format(be))
    except Exception as e:
        print("Unable to complete multi-part upload: {0}".format(e))

def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data)
    command=cmd.data['command']
    print(command)
    if(commamd=="lighton"):
        print('lighton')
    elif(command=="lightoff"):
        print('lightoff')
    elif(command=="motoron"):
        print('motoron')
```

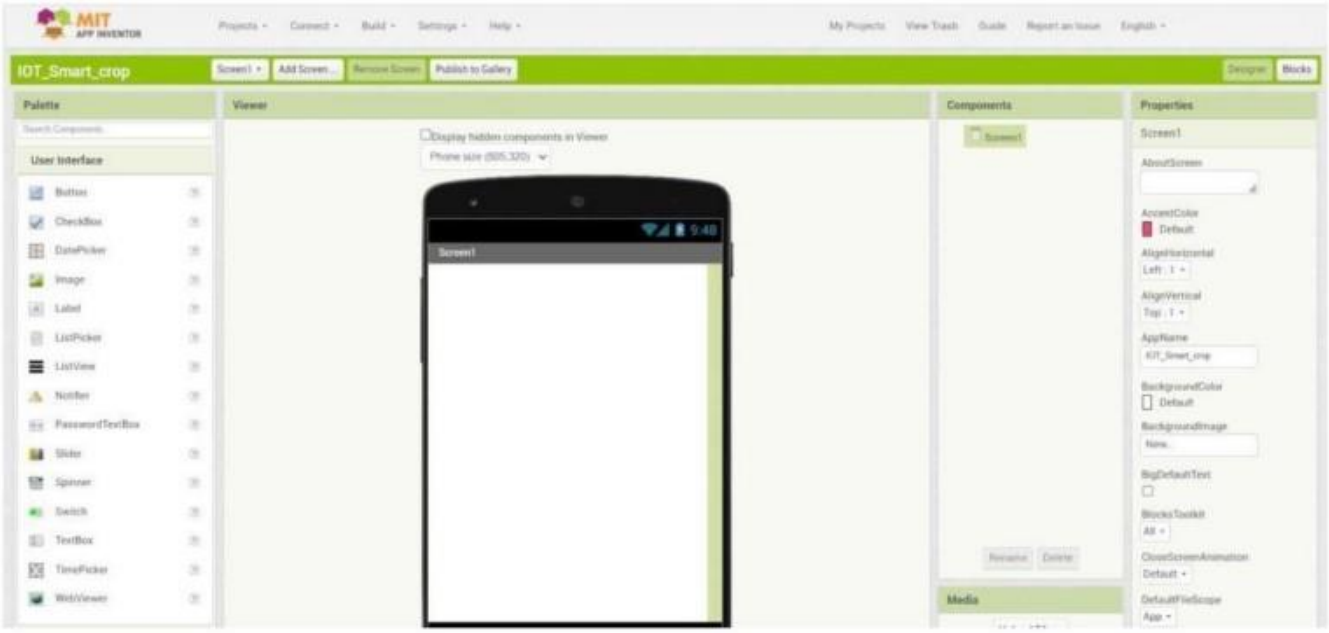
```
        print('motoron')
    elif(command=="motoroff"):
        print('motoroff')
myConfig = {
    "identity": {
        "orgId": "chytun",
        "typeId": "NodeMCU",
        "deviceId": "12345"
        },
    "auth": {
        "token": "12345678"
        }
    }
client = wiot.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

database_name = "sample"
my_database = clientdb.create_database(database_name)
if my_dtabase.exists():
    print(f"'(database_name)' successfully created.")
cap=cv2.VideoCapture("garden.mp4")
if(cap.isOpened()==True):
    print('File opened')
else:
    print('File not found')

while(cap.isOpened()):
    ret, frame = cap.read()
    gray = cv3.cvtColor(frame, cv2.COLOR_BGR@GRAY)
    imS= cv2.resize(frame, (960,540))
    cv2.inwrite('ex.jpg',imS)
    with open("ex.jpg", "rb") as f:
        file_bytes = f.read()
    #This is the model ID of a publicly available General model. You may use any other public or custom model ID.
    request = service_pb2.PostModeloutputsRequest(
        model_id='e9359dbe6ee44dbc8842ebe97247b201',
...         inputs=[resources_pb2.Input(data=resources_pb2.Data(image=resources_pb2.Image(base64=file_bytes))
```

```
...         inputs=[resources_pb2.Input(data=resources_pb2.Data(image=resources_pb2.Image(base64=file_bytes))
...                                     )])
...     response = stub.PostModelOutputs(request, metadata=metadata)
...     if response.status.code != status_code_pb2.SUCCESS:
...         raise Exception("Request failed, status code: " + str(response.status.code))
...     detect=False
...     for concept in response.outputs[0].data.concepts:
...         #print('%12s: %.f' % (concept.name, concept.value))
...         if(concept.value>0.98):
...             #print(concept.name)
...             if(concept.name=="animal"):
...                 print("Alert! Alert! animal detected")
...                 playsound.playsound('alert.mp3')
...                 picname=datetime.datetime.now().strftime("%y-%m-%d-%H-%M")
...                 cv2.inwrite(picname+'.jpg',frame)
...                 multi_part_upload('Dhakshesh', picname+'.jpg', picname+'.jpg')
...                 json_document={"link":COS_ENDPOINT+'/'+'Dhakshesh'+'/'+picname+'.jpg'}
...                 new_document = my_database.create_document(json_document)
...                 if new_document.exists():
...                     print(f"Document successfully created.")
...                 time.sleep(5)
...                 detect=True
...     moist=random.randint(0,100)
...     humidity=random.randint(0,100)
...     myData={'Animal':detect,'moisture':moist,'humidity':humidity}
...     print(myData)
```

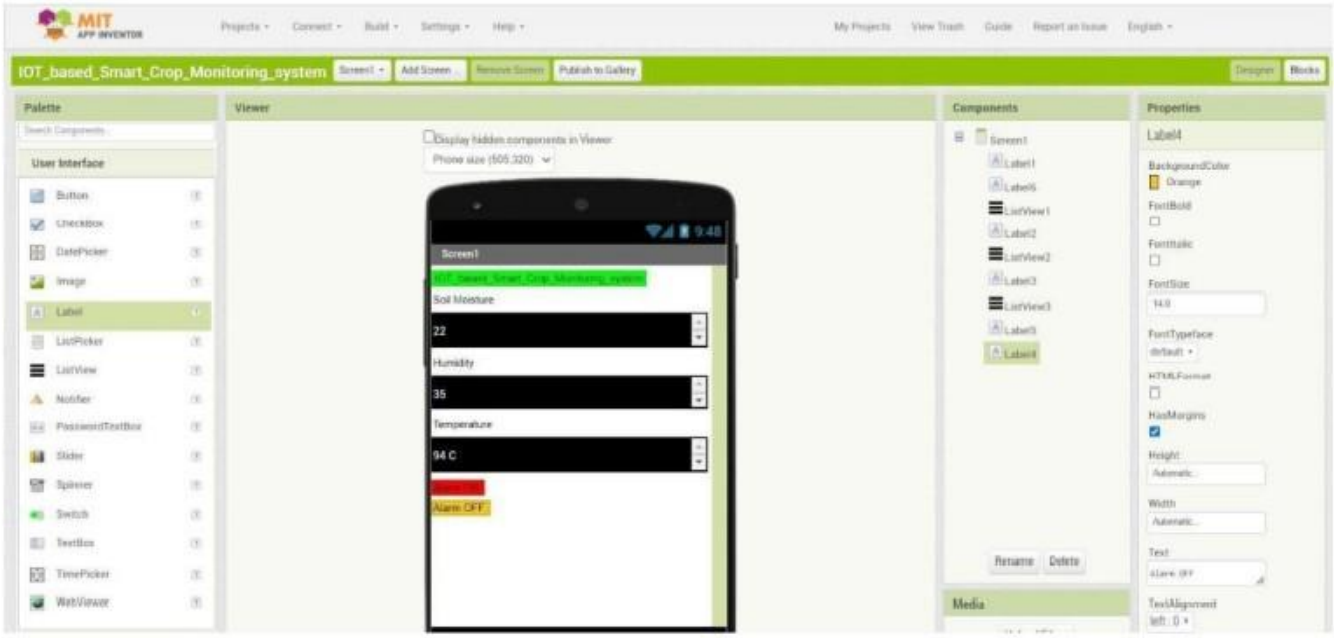

IDLE Shell 3.8.8
File Edit Shell Debug Options Window Help
Python 3.8.8 (tags/v3.8.8:024d805, Feb 19 2021, 13:18:16) [MSC v.1928 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: C:/Users/HP/Desktop/crop/crop_protect.py ==========
2021-04-06 12:52:19,640 wiotp.sdk.device.client.DeviceClient INFO Connected successfully: d:hj5fmy:NodeMCU:12345
'sample' successfully created.
File opened
{'Animal': False, 'moisture': 17, 'humidity': 41}
Publish Ok..
{'Animal': False, 'moisture': 84, 'humidity': 16}
Publish Ok..
{'Animal': False, 'moisture': 48, 'humidity': 43}
Publish Ok..
{'Animal': False, 'moisture': 0, 'humidity': 3}
Publish Ok..
{'Animal': False, 'moisture': 73, 'humidity': 68}
Publish Ok..
{'Animal': False, 'moisture': 26, 'humidity': 26}
Publish Ok..
{'Animal': False, 'moisture': 96, 'humidity': 59}
Publish Ok..
Ln: 10 Col: 11

7.2 FEATURE 2

MIT APP INVENTOR TO DESIGN THE APP



CUSTOMIZING THE APP INTERFACE TO DISPLAY THE VALUES:



8. TESTING

8.1.TEST CASES

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	11	4	2	2	19
Duplicate	1	1	2	0	4
External	2	3	0	1	6
Fixed	10	2	3	20	35
Not Reproduced	0	0	2	0	2
Skipped	0	0	2	1	3
Won't Fix	0	5	2	1	8
Totals	24	15	13	25	77

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	5	0	1	4
Client Application	47	0	2	45
Security	3	0	0	3
Outsource Shipping	2	0	0	2
Exception Reporting	11	0	2	9
Final Report Output	5	0	0	5
Version Control	3	0	1	2

9.RESULTS

Thus the IOT based Smart Crop Protection has been build successfully with the help of MIT app, Node.Js, and node red. And the output has been tested and verified using MIT app.

The problem of crop vandalization by wild animals and fire has become a majorsocial problem in currenttime.

It requires urgent attention as no effectivesolution exists till date for this problem. Thus this project carries a great social relevance as it aims to address this problem. This project willhelp farmers in protecting their orchards and fields and save them from significant financial losses and will save them from the unproductive efforts that they endure for the protection their fields. This will also helpthem in achievingbetter crop yields thus leading to theireconomic wellbeing.

10.ADVANTAGES AND DISADVANTAGES

Advantage:

Controllable food supply.you might have droughts or floods, but if you are growing the crops and breeding them to be hardier, you have a better chanceof not straving. It allows farmers to maximize yields using minimumresources such as water,fertilizers.

Disadvantage:

The main disadvantage is the time it can take to process the information.in order to keep feeding people as the population grows you have to radically change theenvironment of the planet.

11.CONCLUSION:

The aim of this project is to make the life and work of the farmer much easier. This can be achieved using the technique - Precision Farming, this involves autonomous monitoring of crops and other environmental parameters which has an effect on the crop, these environmental conditions are:

1. Environmental Humidity
2. Environmental Temperature.
3. Soil Moisture.
4. Rain Sensing.

Above mentioned are some of the conditions monitored autonomously, threshold parameters for various crops are automatically set upon user input of crop variety to be monitored. By this system one could achieve a good yield and better nutritional crops in their agricultural produce.

12. FUTURE SCOPE:

Future scope of our project relies on the farmers and their feedbacks, in future we are planning to add the following features: 1. One device one farm - Cover the entire farm area with a single device.

2. Pest monitoring system.
3. Estimated yield calculator.
4. Estimated time of cultivation.
5. Individual cloud management dashboard.

13.APPENDIX

SOURCE CODE MOTOR.PY impor

time import sys import

ibmiotf.application # to install pip

install ibmiotf import ibmiotf.device

```
# Provide your IBM Watson Device
Credentials organization = "63004g"
# replace the ORG ID deviceType =
"MainDevice" # replace the Device
type deviceId = "9344022806" #
replace Device ID authMethod =
"token"
authToken = "a-63004g-86womzydrf" # Replace the authtoken

def myCommandCallback(cmd): # function for

    Callback if cmd.data['command'] ==

    'motoron':

        print("MOTOR ON IS RECEIVED")

    elif cmd.data['command'] ==
        'motoroff':
        print("MOTOR OFF
        IS RECEIVED")
    if cmd.command ==
```

```
    "setInterval":

    if 'interval'

    not in

    cmd.data:

        print("Error - command is missing required information:
                                                        'interval'")
    el
       s
       e
       :
       i
       n
       t
       e
       r
       v
       a
       l
       =
cmd.data['interval'] elif
cmd.command ==
"print": if 'message' not in cmd.data: print("Error - command
    is missing required information: 'message'")
```

```
        else:
            output =
            cmd.data['messa
            ge
            '] print(output)



    t
    r
    y
    :
        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:
        deviceCli.commandCallback = myCommandCallback

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

SENSOR.PY

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

#Provide your IBM Watson Device
Credentials organization = "63004g"
deviceType = "MainDevice"
deviceId =
    "9344022806"
    authMethod =
    "token"
    authToken =
    "9944611970"

    # Initialize GPIO def myCommandCallback(cmd):
    print("Command received: %s" %
    cmd.data['command'])
```

```
status=cmd.data['command'] if status ==
"motoron": print ("motor is on") elif status ==
"motoroff": print ("motor is off")
    else : print ("please send
        proper command")



try:
        deviceOptions = {"org": organization, "type": deviceType, "id":
                                                                deviceId,
        "auth- method":
authMethod, "auth-
token": authToken}
deviceCli =
ibmiotf.device.Client(devi
ceOptions)
        #.....
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
        animal=random.uni
        form(0.
        1, 0.99)
        moisture=random.randi
        nt(0
        ,110)
        temperature=random.
        randin t(-20,125)
        Humid=random.randint(0,1
        00)

        data = {'animal':animal,'moisture': moisture, 'temperature' :
temperature, 'Humid': Humid } #print data
        def myOnPublishCallback(): print ("Published Soil Moisture =
            %s %%" %moisture,"Temperature =
%s C" % temperature, "Humidity = %s %%" % Humid,'animal = %s'%animal,
```

```
"to IBM Watson")
            if
                animal>
                0
                .
                9
                8
                :
                p
                ri
                n
                t(
                "
                Alert") success     =
        deviceCli.publishEvent("IoTSensor",
"json",                                     data,
qos=0, on_publish=myOnPublishCallback)
        if              not
        success:
        print("Not
        connected
        to        IoTF")
        time.sleep(1
        0)
```

```
        deviceCli.commandCallback = myCommandCallback

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

GitHub Link

https://github.com/IBM-EPBL/IBM-Project-48646-1660810853

PROJECT DEMO VIDEO LINK

https://drive.google.com/file/d/1XIGaeroZGxREgXgwwGk-Z0RZOxDHxpmH/view?usp=drivesdk