IoT BASED CROP PROTECTION SYSTEM FOR AGRICULTIRE

PROJECT REPORT

TEAM ID : PNT2022TMID22860

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1. INTRODUCTION

1.1 Project Overview

The title of our project is “IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE”. The overview of our project is to safeguard the farm from climatic changes like soil erosion, landslide and birds, animals etc.. So that we making a cloud based project and placing IOT based sensor. Over which it will produce sound and notification. From which we can protect our farm. And it will provide better yield for us.

1.2 Purpose

The main purpose of our project is to protect the farm from climatic changes, animals, birds, pests and to make the crop to grow better and provide better yield.

2. LITERATURE SURVEY

2.1 Existing problem

1.“Food” is the important thing which is needed for everyone to survive in this world. For that, farmers are doing their own part in an effectivemanner, during

which they have to face some problems such as:

2. There are increasing pressures from climate change, soil erosion and biodiversity loss and from consumers’ changing tastes in food and concerns about how it is produced.

3. And the natural world that farming works with – plants, pests and diseases –continues to pose its own challenges beyond that, they have to

4. Stay resilient against global economic factors.

5. Inspire young people to stay in rural areas and become futurefarmers

6. The effects of climate change affect farmers’ ability to grow the food we all need. Increasingly volatile weather and more extreme events –like floods and droughts –change growing seasons, limit the availability ofwater, allow weeds, pests, and fungi to thrive, and can reduce crop productivity.

2.2 References

[1]ISSN No:-2456-2165 Volume 4, Issue 2 Feb – 2019: "Solars' Energy: - A safeand reliable, eco-friendly and sustainable Clean Energy Option for Future India: - A Review."

[2]Universal Paper of advanced science and science and exploration technology.

[3]GRD Journals- Global Research and Development Journal for Engineering

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Implementation of advanced security system for farm protection from wild animals.

2.3 Problem Statement

1.Agriculture is one of the area which required urgent attention and advancement for high yield and efficient utilisation of resources.

2.In this paper an approach smart crop monitoring is presented through Internet of Things (IOT).

3.A Level 4 framework is proposed namely sensing devices, sensor data level, base station level ,edge computing and cloud data level for smartcrop monitoring.

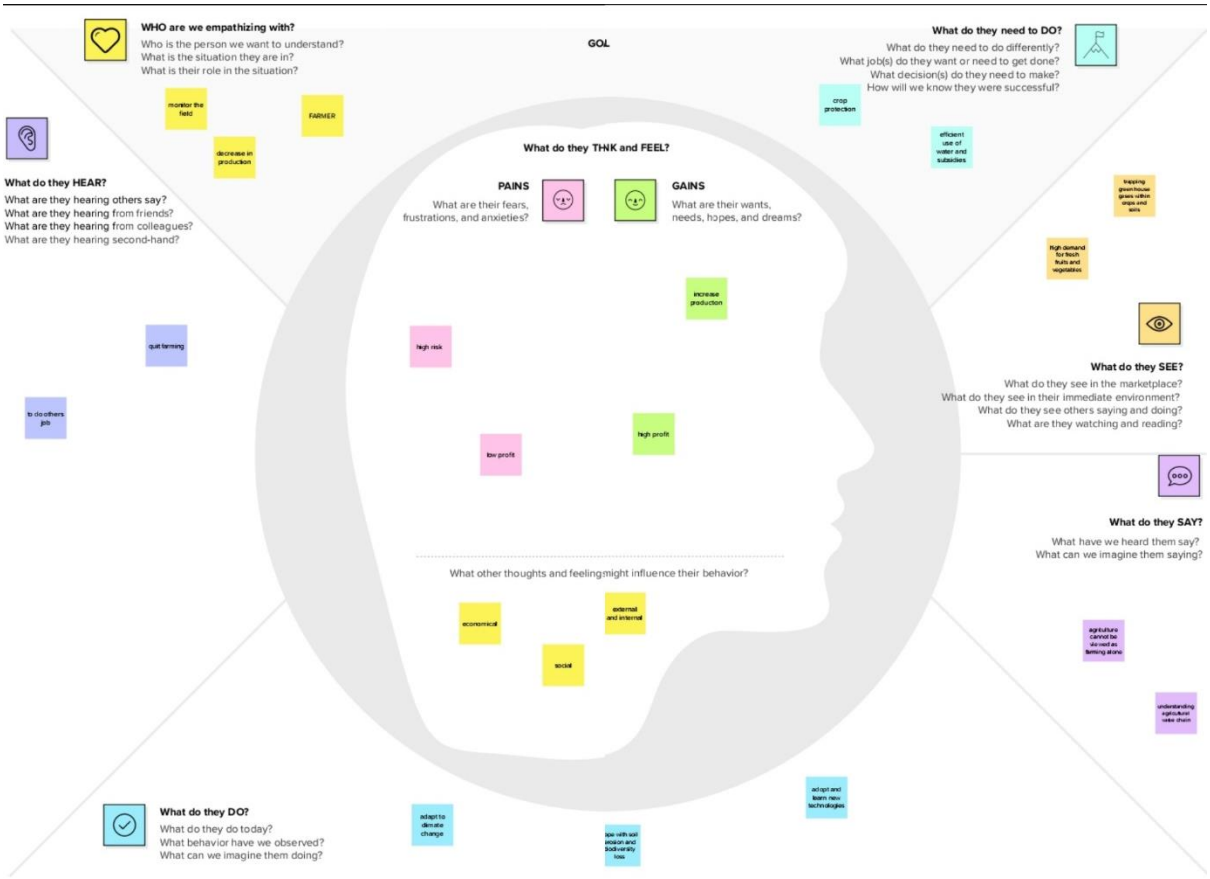
4.In this Project, Farm is going to get protected from humidity, Temperature and Animals with the help of IOT cloud module.

5.The Agricultural Farm is been monitored with the help of MIT appand then data will be collected and stored in it cloud.

6.It will monitor and sense the humidity level and movement ofanimals and will sent the message as notification to the user.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy map canvas



3.2 Ideation and Brainstorming

What do they think and feel?

As its name may imply, smart farming is the use of technology in animal agriculture, and its something that's been around sincethe Industrial Revolution . The biggest difference between then and now, though? "Motorized devices are being replaced with IOT".

What do they hear?

Smart farming is about using the new technologies whichhave arisen at the drawn of the Fourth Industrial Revolution in the area of Agriculture and cattle production to increase quality and quantity by making maximum use of resources and minimizing the environmental impact.

What do they see?

Smart farming is a management concept focused onproviding the agriculture industry with the infrastructure to leverage advanced technology - including Big Data, the cloud and the Internet ofThings(IOT)- for tracking, monitoring , Automating and Analysing operations.

What do they say and do?

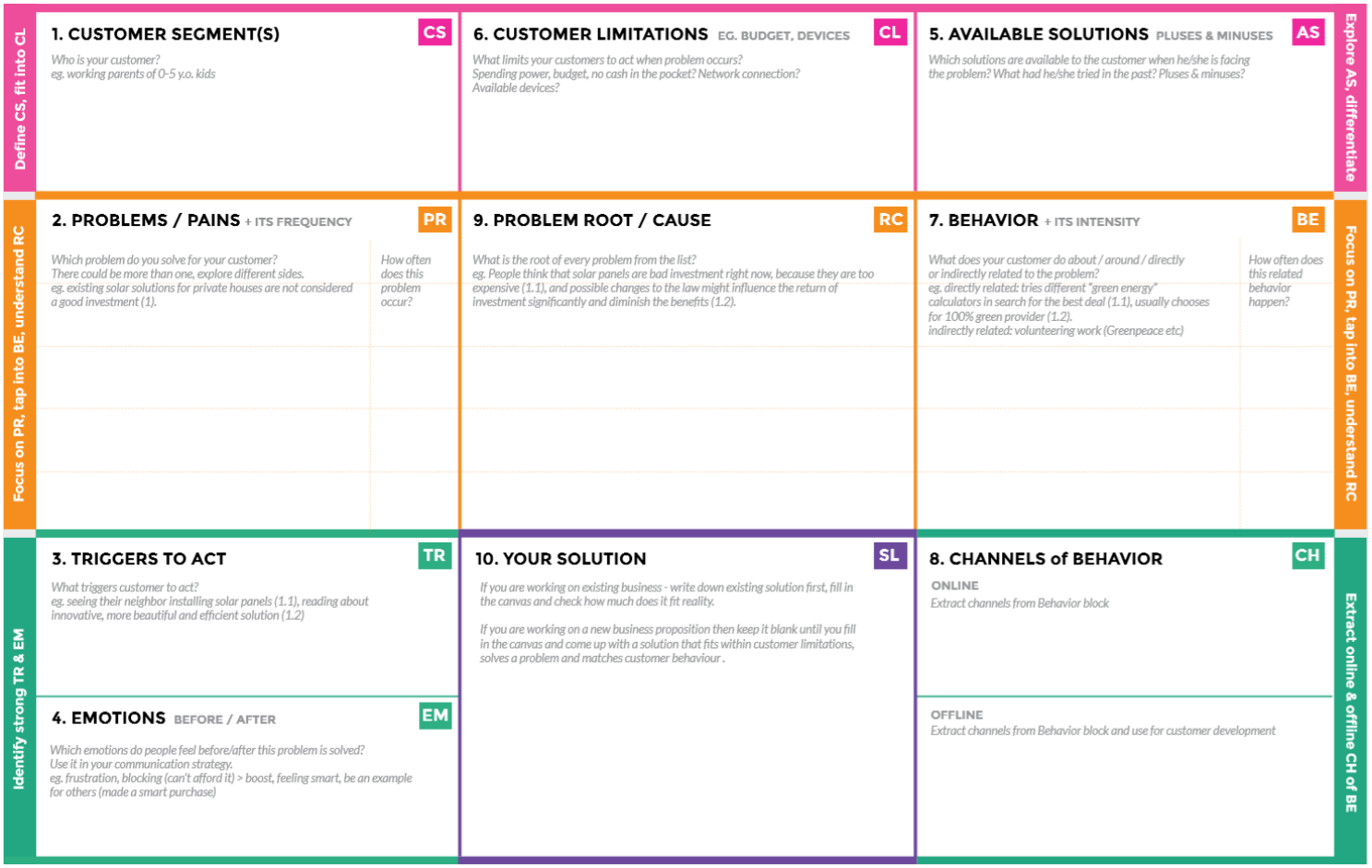
1.The aim of this technology is to make The most of all the Data collected by various tools, by converting them into real sources if information in order to the define ways of simplifying agricultural work.It also allow for accurate and Predictive analysis of all situation that may affectthe farms, Such as weather condition (temperature, humidity etc..) and sanitary .For Example: This makes it easier to organize the supply of energy ,water, livestock feed and fertilizer.

2.In its most advanced form, Smart farming facilitate theexchange of information between different farms, Creating a real network ofconnected farm accessible from a smart phone to the computer.

3.2 PROBLEM SOLUTION

S.NO	PARAMETERS	DESCRIPTION
1	Problem Statement (Problem to be solved)	Increase the crop production and save the crops from the animals and birds
2	Idea/Solution description	Using modern technologies to monitor temperature ,soil moisture and to save crops
3	Novelty/Uniqueness	IoT sensors can measure soil temperature, volumetric water content, photosynthetic radiation, soil water potential and soil oxygen levels.
4	Social Impact / Customer Satisfaction	Smart farming systems reduce waste, improve productivity and enable management of a greater number of resources through remote sensing.
5	Business Model (Revenue Model)	By protecting the crops productivity increases, the customer satisfaction also increases and it leads need for many applications so the revenue also increases.
6	Scalability of the Solution	It is scalable because of the adaptability of a system to increase the capacity

3.3 PROBLEM SOLUTION FIT



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

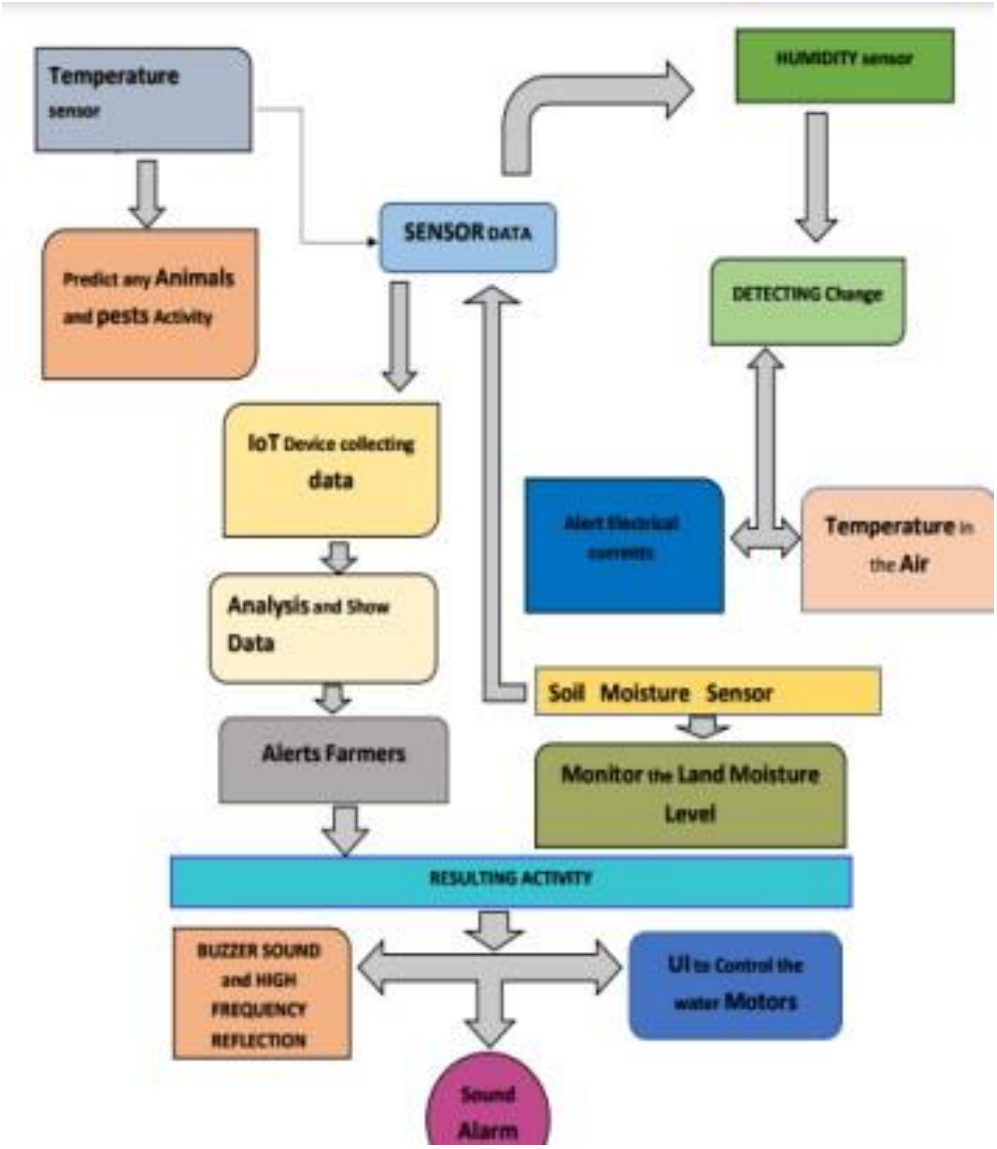
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Install the app. Signing up with Gmail or phone number Creating a profile. Understand the guidelines.
FR-2	User Confirmation	Email or phone number verification required via OTP.
FR-3	Accessing datasets	Data's are obtained by cloudant DB.
FR-4	Interface sensor	Connect the sensor and the application When animals enter the field , the alarm is generated.
FR-5	Mobile application	It is used to control motors and field sprinklers.

4.2 NON FUNCTIOAL REQUIREMENT

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	This project's contributes the farm protection through the smart protection system.
NFR-2	**Security**	It was created to protect the crops from animals.
NFR-3	**Reliability**	Farmers are able to safeguard their lands by help of this technology. They will also benefits from higher crop yields, which will improve our economic situation.
NFR-4	**Performance**	When animals attempt to enter the field, IOT devices and sensors alert the farmer via message.
NFR-5	**Availability**	We can defend the crops against wild animals by creating and implementing resilient hardware and software.
NFR-6	**Scalability**	This system's integration of computer vision algorithms with IBM cloudant services makes it more efficient to retrieve photos at scale, enhancing scalability.

5. PROJECT DESIGN

5.1 DATA FLOW



5.2 Solution & Technical Architecture

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson/node red
4.	Application Logic-3	Logic for a process in the application	IBM Watson/node red
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM Cloudant.
7.	Temperature sensor	Monitor the temperature	TMP36
8.	Humidity sensor	Monitor the humidity	DHT11
9.	Soil moisture sensor	Measure the amount of water in the soil	Soil maoisture sensor
10.	Weather monitoring	Monitor the weather	Temperature sensor

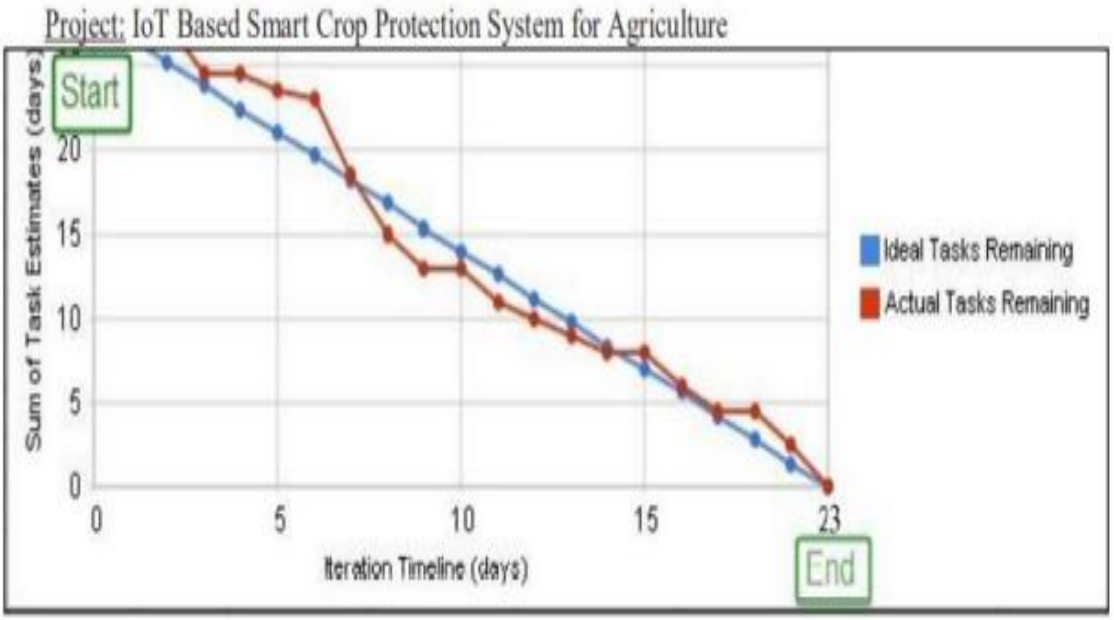
S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Clarifai,Node- red	Software
2.	Security Implementations	Senisitive and private data must be protected from their protection untill the decision-making and storage stages.	Encryption process
3.	Scalable Architecture	Scalability is a major concern for IOT platform it has been shown that different architectural choices of IOT platform affect system capability and that automatic real time decision making is feasible in an environment composed of dozens of thousand.	Software
4.	Availability	Automatic adjustment of farming equipment made possible by linking information like crops/weather and temperature,humidity etc.	Software
5.	Performance	The ideas of implementing integerated sensors with sensing soil and envirenmental or ambient parameters in framing will be more efficient for overall monitoring .	Software

6. PROJECT PALNNING AND SCHEDULING

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points (40)	Priority (Low to High)	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the required dataset by entering my email, password, and confirming my password	3	High	Sakthipraba g s
Sprint-1		USN-2	As a user, I will receive confirmation email and the SMS once I have registered for the application	2	High	Srisabari k v
Sprint-2	Cloud services	USN-3	As a user, I can register for the application through Facebook or any social media	1	Low	Soniyasri m
Sprint-4		USN-4	As a user, I can register for the application through Gmail/web service	2	medium	Sridhar n
Sprint-3	Login	USN-5	As a user, I can log into the application network by entering email & password	4	high	Sakthipraba g s
Sprint-2	Pre processing	USN-6	As a farmer, the user must be able to find the system easy to access so pre-processes and other task must be perfect.	3	High	Soniyasri m
Sprint-1	Collecting Dataset	USN-7	To collect various sources of animal threats and keep developing a dataset.	3	medium	Srisabari k v
Sprint-4	Integrating	USN-8	To integrate the available dataset and keep improving the accuracy of finding animals	2	High	Sakthipraba g s

Sprint-3		USN-9	To find and use appropriate compiler to run and test the data so that we can implement our program	1	Low	Sridhar n
Sprint-2		USN-10	Request Saveetha Engineering College to deploy the project in our campus and test	1	Low	Soniyasri m
Sprint-1	Training	USN-11	As programmer, we need to train our data perfectly so that the program runs smoothly	3	High	Sakthipraba g s
Sprint-3		USN-12	Train the data using out available services and IBM dataset from server and improve that	2	Medium	Srisabari k v
Sprint-4	Coding	USN-13	To modify the code according to our program and improve the efficiency of that code	4	High	Sridhar n
Sprint-2		USN-13	To improve performance	1	Low	Srisabari k v
Sprint-2	Record	USN-5	To record the data and plot the graph to show the characteristics officially	4	High	Sakthipraba g s
Sprint-1	Planning	USN-4	Plan the programming language and feasibility	3	Medium	Soniyasri m
Sprint-4		USN-14	Demonstrate the working and improve accuracy overall	2	Low	Srisabari k v

BURNDOWM CHART



7. CODING AND SOLUTIONING

```
import wiotp.sdk.device
import time
import random
myConfig={
   "identity": {
      "orgId": "c0b4co",
      "typeId": "NodeMCU",
      "deviceId":"12345"},
   "auth": {
      "token": "12345678"
}}
def myCommandCallback(cmd):
   print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
   m=cmd.data['command']
   if(m=="motoron"):
      print("Motor is switched on")
   elif(m=="motoroff"):
      print("Motor is switched off")
   print(" ")

client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

while True:
   temp=random.randint(-20,125)
   hum=random.randint(0,100)
   moist=random.randint(0,14)
   animal=random.randint(0,1)
   if(animal>0.5):
```

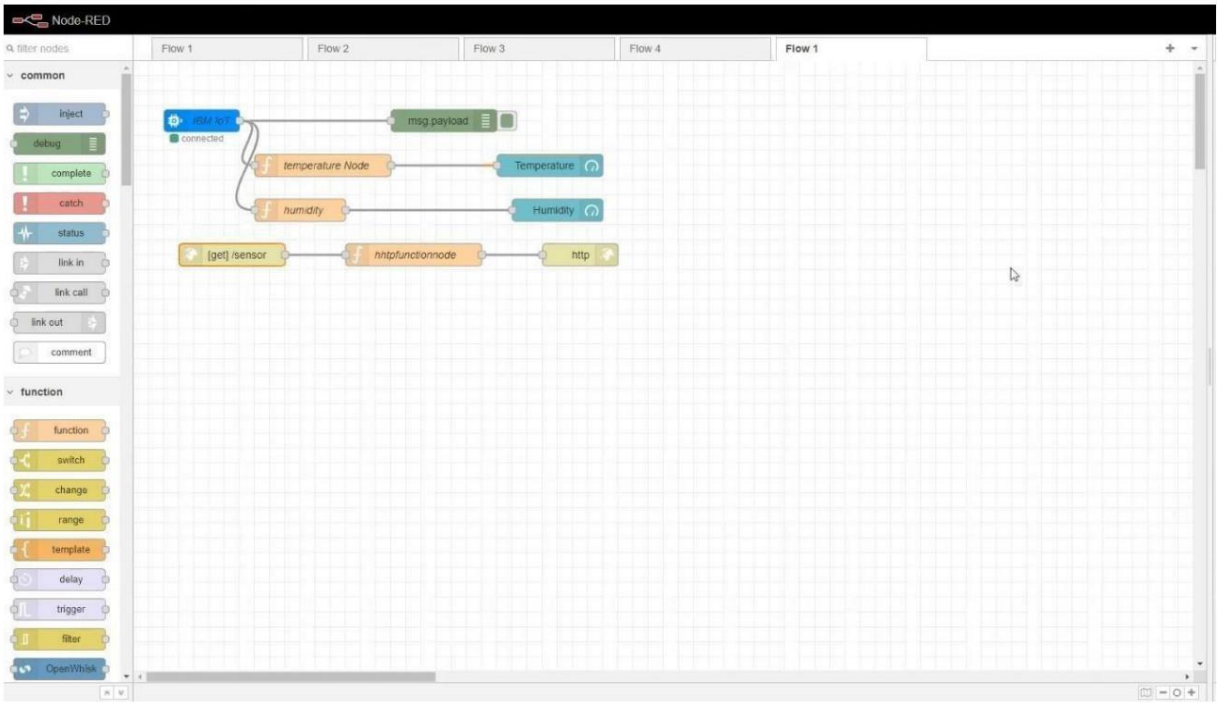
```
        an="animal is present"
    else:
        an="animal is not present"
    myData={'temperature':temp, 'humidity':hum, 'Moisture':moist,"animal status":an}
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)
    print("Published data Successfully: %s", myData)



    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()
```

8. TESTING

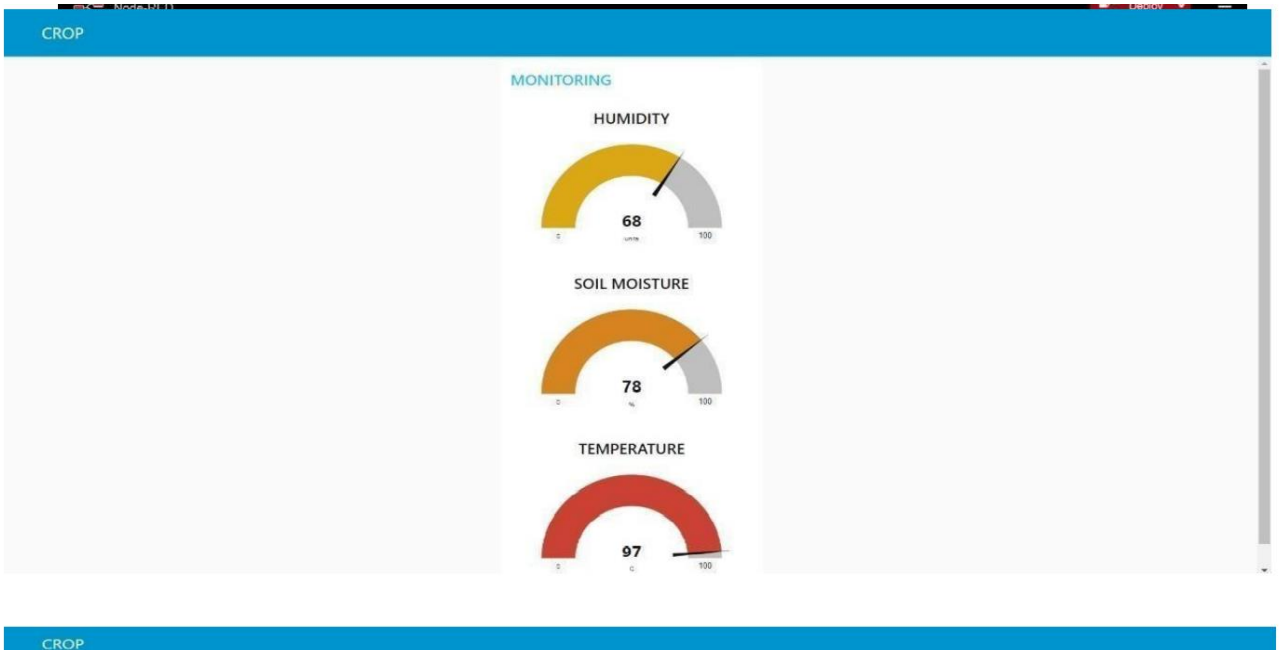
8.1 TEST CASES

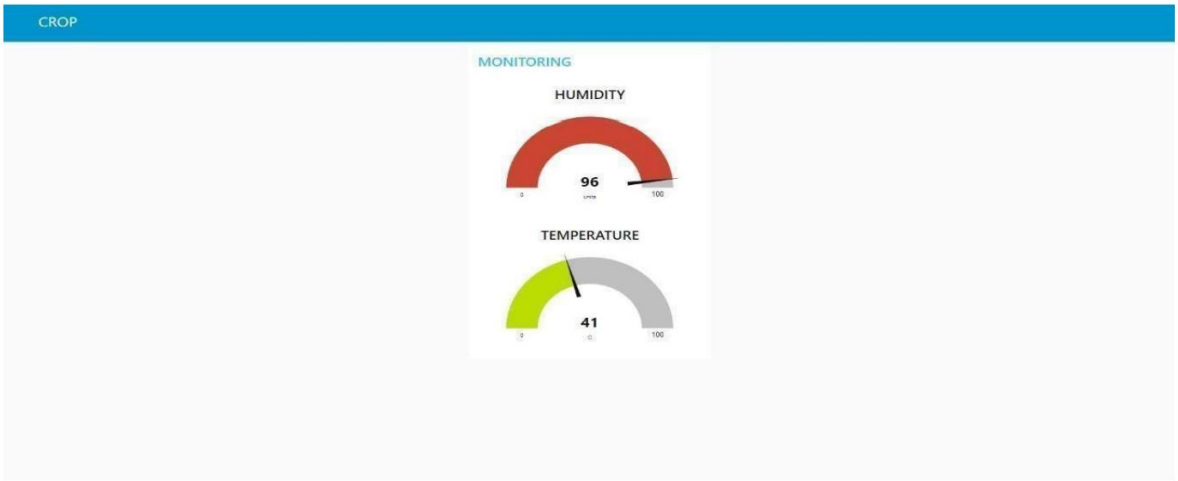


9. RESULTS

1.The problem of crop vandalization by wild animals and firehas become a major social problem in current time.

2.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 address this problem. This project will help farmers in protecting their orchards and fields and savethem from significant financial losses and will save them from the unproductive efforts that they endure for the protection their fields. This will also help them in achieving better cropyields thus leading to their economic 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, youhave a better chance of not straving. It allows farmers to maximize yields using minimum resources 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 growsyou have to radically change the environment of the planet.

11.CONCLUSION

A IoT Web Application is built for smart agricultural system usingWatson IoT platform, Watson simulator, IBM cloud and Node-RED.

12.FUTURE SCOPE

I In the future, there will be very large scope, this project can be madebased on Image processing in which wild animal and fire can be detected bycameras and if it comes towards farm then system will be directly activated through wireless networks. Wild animals can also be detected by using wireless networks such as laser wireless sensors and by sensing this laser orsensor’s security system will be activated.

13.APPENDIX SOURCE

CODE

```
import wiotp.sdk.device
import time
import random
myConfig={
   "identity": {
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      "typeId": "NodeMCU",
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   "auth": {
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def myCommandCallback(cmd):
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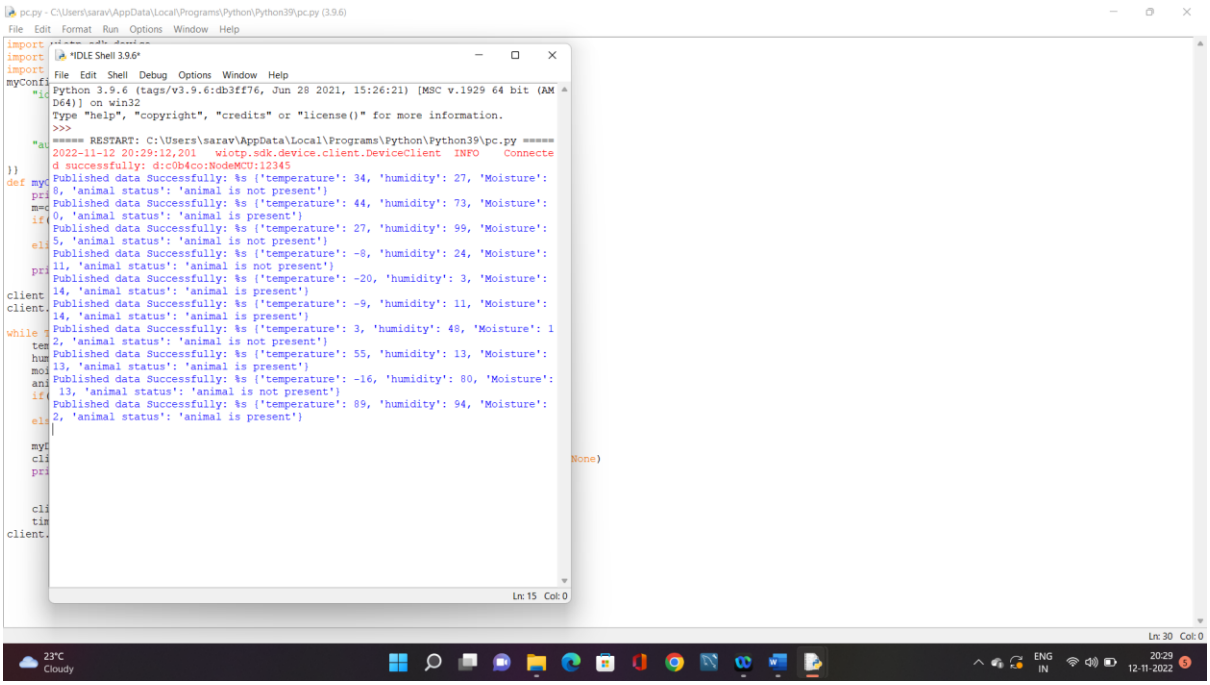

https://github.com/IBM-EPBL/IBM-Project-35901-1660290184