Project Report Format

Date	19 November 2022
Team ID	PNT2022TMID49537
Project name	Smart farmer - IoT Enabled Smart Farming Application

1.Introduction:

1.1.project overview:

The identification of the techniques of smart farming that can give a boost to the traditional agricultural sector. Use of smart techniques like Precision farming, efficient water management, Soil moisture and humidity monitoring are sure-shot methods to increase yield per acre of land. Precision Agriculture avoids the improper and excess application of pesticides and fertilizers and enables the farmer to use land according to its quality and nature. Precision Farming is a potential salvager at a time when the water tables in India are
diminishing at a rapid rate due to unprecedented demand by the agricultural and industrial sectors. Farmers still procrastinate or stubborn to traditional practices and delay in implementation may further decrease the GDP in India.

2.1.Abstract:

The farming of agriculture started 12000 years back, the Neolithic age gave birth to civilization, Farming and later continued as traditional farming practices. India being an agrarian country, Mostly Indian farming is dependent on rains, soil, dampness and environment challenges .Our farmers upgraded to modern state of art technology in cultivation. Globally the IoT systems has contributed its application in many fields and proven to be successful. It is the time that Indian farmers need to introduce the Smart Agricultural systems for higher crop yield. The productivity with compilation of data from sensors, actuators and modern electronic gadgets the farmer can monitor agricultural fields. Smart Agriculture can forecast weather data, switching ON the pump motor acknowledging the dampness of soil in terms of moisture levels with the help of sensors which are interfaced to the process module. The Smart agriculture system can be operated from anywhere with the help of networking technology. The joining process in research and development in Smart Agriculture & Artificial Intelligence Can be cutting edge technology in data compiling and resource optimization .The pest & insect controls that protect damaging the crop and also optimize resources utilization can be breakthrough.

2.2.EXISTING AGRICULTURAL PRACTICES:

The majority of rural people, agricultural activities continue to be one of their main livelihood strategies. Production of food crops is not dependent on any formally acquired knowledge of farming but is solely based on indigenous agricultural knowledge passed from generation to generation through experience and careful observations. Resource-poor farmers, especially in rural areas, follow traditional farming methods to produce their food crops and these are specifically tailored to suit their environments.Household members are the main
source of farm labor with men mainly responsible for plowing activities while the bulk of planting, weeding and harvesting activities is the responsibility of women. Crop protection against pests is done through traditional methods where farmers mix some combinations of pest control made from locally available resources in order to minimize losses. However there is no weather monitoring, moisture dampness and water management, they depend on rains and flow of water upstream to downstream and canal watering system. As the agriculture has turned to more labor intensive, and skilled people have migrated to urban community for livelihood and
comfort living, left the traditional agriculture farmers much more expensive and risky. We heard yield versus suicidal of farmer. To convert loss making traditional farming into high crop yielding and profit making, a proposed smart agriculture system is brought out.

2.3.LITERATURE SURVEY:

The Internet of things (IOT) are being revamping the agribusiness engaging the farmers by the expansive compilation of techniques, for instance, accuracy and conservative cultivation to go up against challenges in the field.Researchers have proposed different modalities for the agriculture sector with one or multiple technologies mentioned, e.g. irrigation system based on soil water measurement to decide irrigation amount of the water is described in. Which uses the Bluetooth model for the communication which has its own limitations like limited range and device accommodation?In the year of 2016, an author suggested scheduling in the power supply to the sensors which will help in improving energy efficiency.Use of IoT in agriculture is mentioned by an author in paper.However it shows lack of interoperability which is necessary when we talk about large agricultural fields. For comparison of energy consumption between two appliances,Jinsoohan has provided an approach in a paper published in 2017. N.K. Suryadevara, S.C. Mukhopadhyay has used concepts of pervasive computing, data aggregation etc to monitor the environmental factors using Zigbee in their paper. However it might raise the issue of more power consumption, automation of agriculture as more nodes have been deployed . Approach to provide the real time information to the farmers about the land and crops is defined in the paper, which provides the necessary information yet it's a standalone system. In the year of 2015 concepts of IoT, cloud-computing, Mobile computing are used in smart agriculture in paper ,
where by Prem Prakash Jayaraman, Doug Palmer, ArkadyZaslavsky the concept of phononet was introduced,which is a network of smart wireless sensor nodes who share the information with each other as well as the central system.

2.4.REFERENCES:

1. M.K.Gayatri, J.Jayasakthi, Dr. G.S. Anandha Mala, (2015). Providing Smart Agricultural Solutions to Farmers for better yielding using IoT. IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015) .

2. Nikesh Gondchawar, Dr. R.Complexion.Kawitkar, "IoT based agriculture", all-embracing almanac consisting of contemporary analysis smart minicomputer additionally conversation planning (ijarcce), vol.5, affair 6, June 2016. Overall Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321- 8169 Volume: 5 Issue: 2 177 – 181

3. SoumilHeble, Ajay Kumar, K.V.V Durga Prasad, Soumya Samirana, P.Rajalakshmi, U. B. Desai. A Low Power IoT Network for Smart Agriculture [15] Rajesh M, Salmon S, Dr. Veena .

4. Dr. N. Suma, Sandra Rhea Samson, S. Saranya, G. Shanmugapriya, R..Subhashri, (2017). IOT Based Smart Agriculture Monitoring System. International journal on recent and innovation trends in computing , energy efficiency and communication-IJRITCC volume: 5 issue:

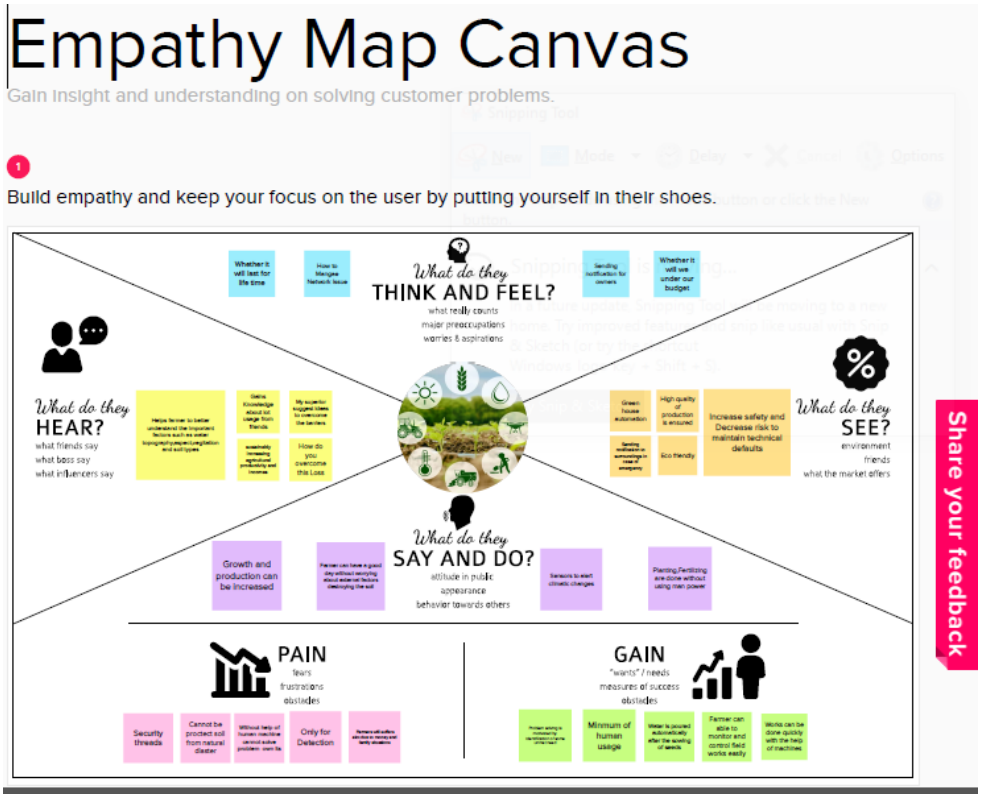
5. PaparaoNalajala, D. Hemanth Kumar, P. Ramesh and Bhavana Godavarthi, 2017. Design and Implementation of Modern Automated Real Time Monitoring System for Agriculture using Internet of Things (IoT). Journal of Engineering and Applied Sciences, 12: 9389- 9393.

6. R. Nageswara Rao, B. Sridhar, (2018). IoT based smart crop field monitoring and automation irrigation system. Proceedings of the second international conference on inventive system and control (icisc2018).

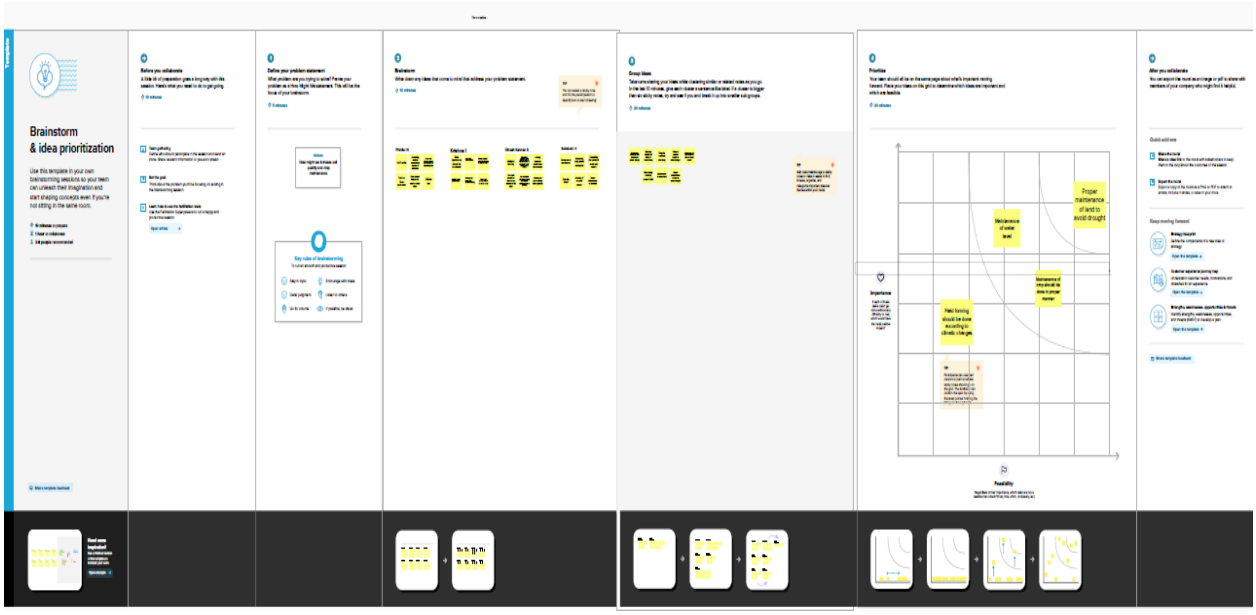
7. Yick, J., Biswanath, M., Ghosal, D., Wireless Sensor Network Survey, Computer Networks, vol.52, issue 12: p.2292-2330, 2008.

3.Ideation and Proposed Solution:

3.1.Empathy map



3.2.Ideation and brainstorming:



3.3.Proposed Solution:

Project Design Phase-1
Proposed Solution Template

Date	24 September 2022
Team ID	PNT2022TMID49537
Project Name	Smart Farmer - IOT Enabled Smart Farming Application
Maximum Marks	2Marks

Proposed Solution Template:

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

S.NO	Parameter	Description
1	Problem Statement(Problem to be solved)	To protect my crop that are getting affected by insects
2	Idea / Solution description	• Sensor to identify climate changes. • GSM Module to notify owner. • Automotive water pumping system.
3	Novelty / Uniqueness	Usage of Proximity sensor to notify the owner immediately in case of any issues.
4	Social Impact / Customer Satisfaction	Customers can live happily with natural sources. Without worrying about infections and health issues.
5	Bussiness Model(Revenue Model)	• Low budget and Easy to Buy. • Maintenance can be done ones in 2 to 5 years.
6	Scalability of the solution	This can work efficiently even under critircal situation(water proof).

3.4.Problem Solution fit:

Project Design Phase-I
Problem – Solution Fit Template

Date	05 October 2022
Team ID	PNT2022 TMID49537
Project Name	Project – Smart Farmer - IOT Enabled Smart Farming Application
Maximum Marks	2 Marks

Problem – Solution Fit Template:

4.Requirements analysis:

4.1.Functional Requirements:

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	19 October 2022
Team ID	PNT2022TMID49557
Project Name	Smart Farmer - IOT Enabled smart farming Application
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User collects the real time data	• The user collects the real time data to identify the exact weather condition.
FR-2	Sensors used in field	• The data is collected from the sensors.
FR-3	Store the Data	• The data stored in the cloud.
FR-4	Notification	• Once the motion or drought is detected it is notified through the message and water flow.

Non-functional Requirements:

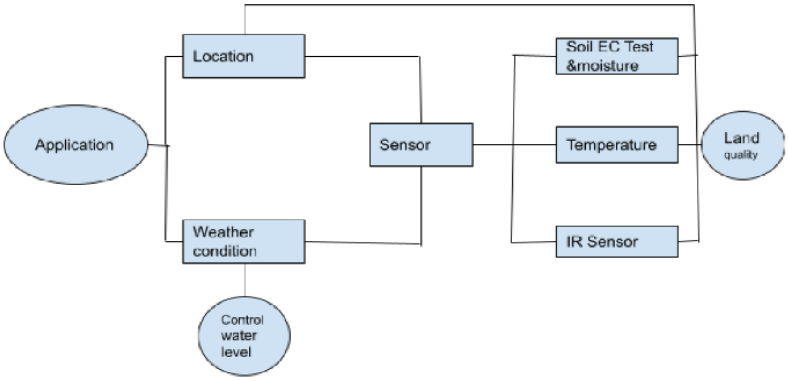
Following are the non-functional requirements of the proposed solution.

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	• Fertile land can only be used for agricultural purposes. Its use in for residential, commercial or industrial purposes.
NFR-2	Security	• Agricultural security areas are a tool for protecting our farms and farmland from non-agricultural uses. These security areas are reevaluated every seven years.
NFR-3	Reliability	• The policymakers have to use proxy indicators like production estimates and prices to arrive at average incomes for the base year.
NFR-4	Performance	• The Performance of the Indian economy is dependent upon the growth of the agricultural sector. In 2021 India will be the world's second largest food producer.
NFR-5	Availability	• The application gives alerts and live feeds 24/7.
NFR-6	Scalability	• Multiple cropping can increase production and income scalability can be measured by increased crop diversity, reduced use of inorganic fertilizers and pesticides.

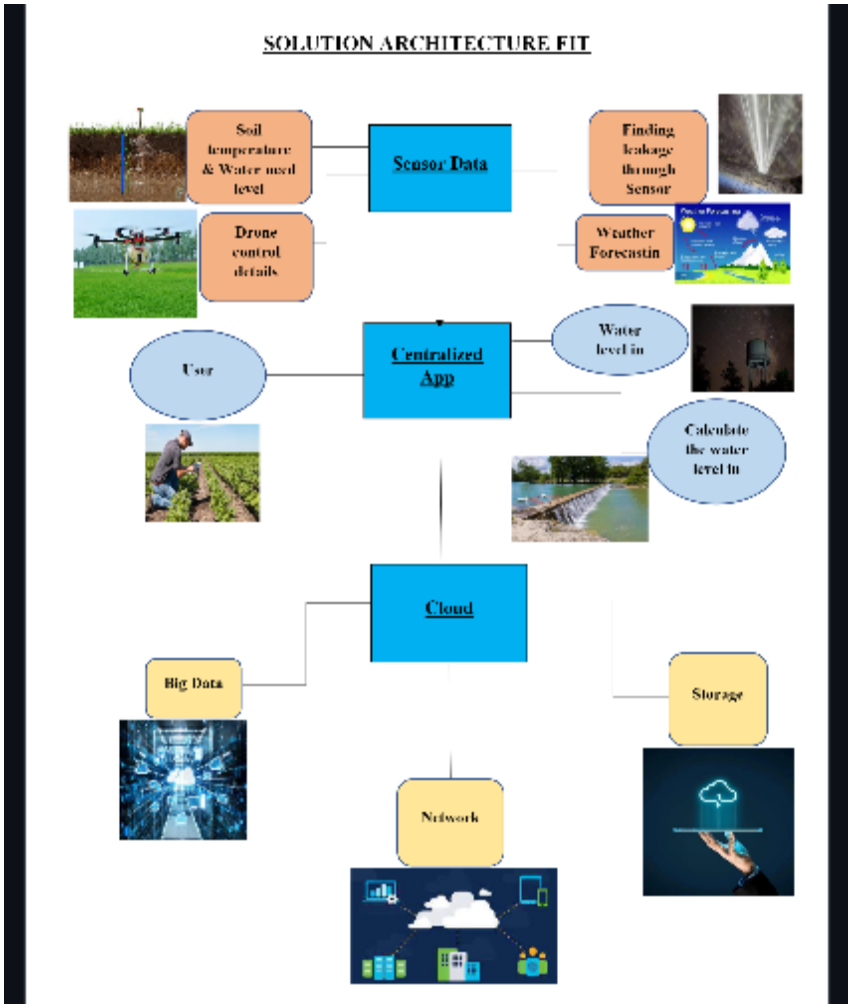
5.Project design:

5.1.Data flow

Data Flow Diagrams:



5.2.Solution and technical architecture:

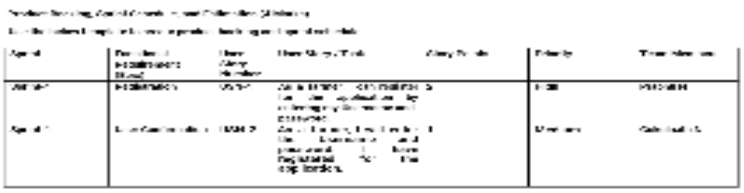


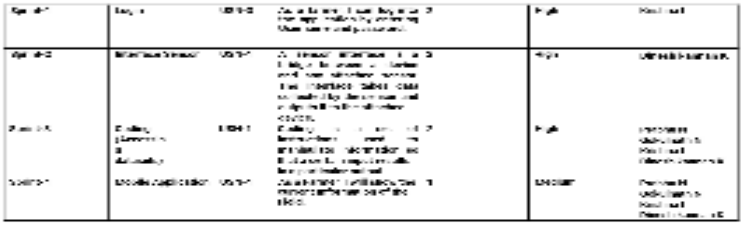
5.3.User stories:

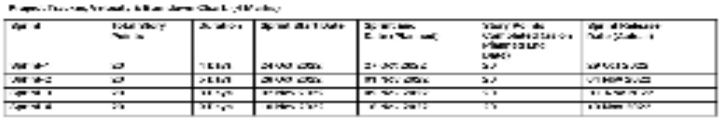
User Type	Functional Requirement (Epic)	User Story Number	Use ask	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by ente password.	I can access my account / dashboard.	High	Sprint-1
		USN-2	As a user, I will receive a confirmation email once I have registered for the application.	I can receive confirmation email & click confirm.	High	Sprint-1
		USN-3	As a user, I can register for the application through facebook.	I can register & access the dashboard with Facebook Login.	High	Sprint-1
		USN-4	As a user, I can register for the application through Gmail.	I can register & access the mail.	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password.	I can successfully login into the application.	High	Sprint-1
	Dashboard	USN-6	As a user,I can access the dashboard.	I can refer to the dashboard for certainty.	Medium	Sprint-1
Customer (Farmer)	Smart Farming	USN-7	As a user, I can farm without human help by using robotics.	I can improve the yields growth	Medium	Sprint-1
Customer Care Executive	Customer queries	USN-8	As a user,I can register the complaint in the application.	I can get immediate solution	HIgh	Sprint-1
Administrato r	Getting data	USN-9	When there is an issue in getting analysed data.	Through administrators getting data.	Low	Sprint-2

6.Project Planning & Scheduling:

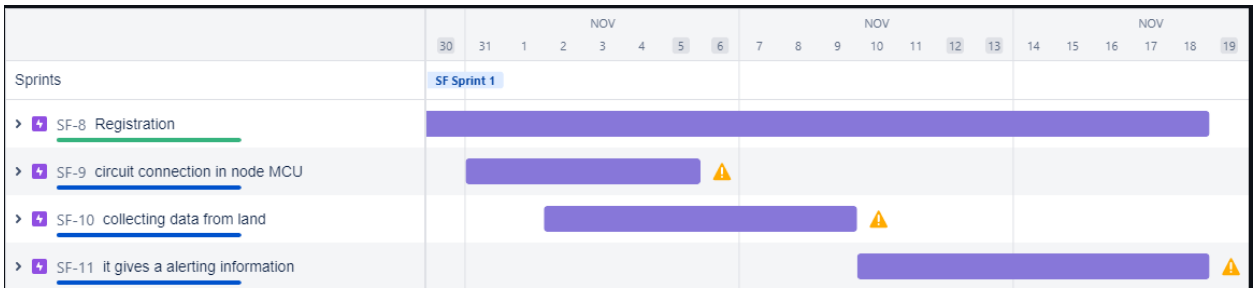
6.1.Sprint delivery







6.2.Reports from Jiira:



7.Testing

7.1.User acceptance:

Acceptance Testing
UAT Execution & Report Submission

Date	18 November 2022
Team ID	PNT2022TMID49537
Project Name	Smart farming -IoT Enabled Smart Farming Application
Maximum Marks	4 Marks

1. Purpose of Document

User Acceptance Testing (UAT) is a type of testing performed by the end user or the client to verify/accept the software system before moving the software application to the production environment. UAT is done in the final phase of testing after functional, integration and system testing are done.

The main Purpose of UAT is to validate end to end business flow. It does not focus on cosmetic errors, spelling mistakes or system testing. User Acceptance Testing is carried out in a separate testing environment with production-like data setup. The arises once software has undergone Unit, Integration and System testing because developers might have built software based on requirements document by their own understanding and further required changes during development may not be effectively communicated to them, so for testing whether the final product is accepted by client/enduser, user acceptance testing is needed.

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	1	1	1	0	3
Duplicate	0	0	0	0	0
External	0	0	2	1	3
Fixed	4	1	4	1	10
Not Reproduced	0	0	0	0	0
Skipped	5	0	1	1	7
Won't Fix	0	0	0	1	1
Totals	10	2	8	4	24

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
Client Application	10	0	0	10
Security	2	0	0	2
Performance	2	0	0	2
Exception Reporting	2	0	0	2
Final Report Output	3	0	0	3

7.2.Test Case:

Date	18-Nov-22
Team ID	PNT2022TMID49537
Project Name	Project -Smart Farmer IOT Enabled with smart farming application
Maximum Marks	4 marks

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	Executed By
LoginPage_TC_OO1	Functional	Home Page	user name& password	Easily accessable	Install the application	Required app user name : gokul password:12345	login should displayed	Working as expected	Pass	The user should be be able to navigate to all the pages in the app		
LoginPage_TC_OO2	UI	Home Page	wonderful!!! You are logged in successfully	verified successfully	Register a account in app	Required app	application run by UI	Working as expected	Pass	Easily Evaluvate		
LoginPage_TC_OO3	Functional	Home page	temperature humidity soil moisture motor ON, OFF	Compact connectivity	Make your app eco-friendly	Temperature: 24 Humidity:60 Soil moisture:45	application should run with temperature, humidity, soil moisture	Working as expected	Pass	High secure		

8.Results:

8.1:Performance testing:

Project Development Phase

Date	18 Nov 2022
Team ID	PNT2022TMID49537
Project Name	Smart farmer - IoT enabled smart farming application
Maximum Marks	10 Marks

NFT - Risk Assessment

S. no	Project Name	Scope \feature	Functional changes	Hardware changes	Software changes	Impact of Downtime	Load/ Volume Change	Risk Score	Justification
1	Smart farmer - IoT Enabled Smart Farming Application	New	Moderate	Moderate	High	Low	>5 to 10%	Orange	High Yield,low cost in easy way with application

9.Advantages and Disadvantages:

Advantages:

1.Increased work efficiency.

2.One of the greatest things about Smart Farming is its potential to save valuable time.
3.Improved fuel efficiency. Smart Farming allows farmers to be much more precise.
4.Reduced consumab**les.**
5.Increased yields.

Disadvantages:

1.Poor living conditions and hygiene for livestock.
2.Excessive use of agro-chemicals.
3.Deforestation and alteration of the natural environment.
4.Risks to human health.
5. Higher risks of cancer and birth defects.

10.Conclusion:

Smart farming reduces the ecological footprint of farming. Minimized or site-specific application of inputs, such as fertilizers and pesticides, in precision agriculture systems will mitigate leaching problems as well as the emission of greenhouse gasses.

11.Future Scope:

Image result for smart agriculture future scope of work Smart farming refers to managing farms using modern Information and communication technologies to increase the quantity and quality of products while optimizing the human labor required. Among the technologies available for present-day farmers are: Sensors: soil, water, light, humidity, temperature management

12.Appendix:

Source Code:

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

```
#Provide your IBM Watson Device Credentials
organization = "0f2n3e"
deviceType = "prabhu"
deviceId = "demo123"
authMethod = "token"
authToken = "12345678"

# Initialize GPIO



def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data['command'])
    status=cmd.data['command']
    if (status=="Motor ON"):
        print ("Motor is ON")
    elif (status=="Motor OFF"):
        print ("Motor is OFF")

    print(" ")




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

except Exception as e:
```

```
        print("Caught exception connecting device: %s" % str(e))
        sys.exit()

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

while True:
        #Get Sensor Data from DHT11

        Temperature=random.randint(-20,200)
        humidity=random.randint(0,100)
        SoilMoisture=random.randint(0,100)

        data = { 'Temperature' : Temperature, 'humidity': humidity, 'SoilMoisture' : SoilMoisture }
        #print data
        def myOnPublishCallback():
            print ("Published Temperature = %s C" % Temperature, "humidity = %s %%" % humidity, "SoilMoisture = %s " % SoilMoisture, "to IBM Watson")

        success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback)
        if not success:
            print("Not connected to IoTF")
        time.sleep(5)

        deviceCli.commandCallback = myCommandCallback

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

Github link:

https://github.com/IBM-EPBL/IBM-Project-20723-1659761299

Project demo link:

https://drive.google.com/file/d/1labDDhrh6rDrUNhX3-9WlSBOH2Pol7ud/view?usp=drivesdk