**NALAIYA THIRAN PROJECT REPORT**

**SMART FARMER – IOT ENABLED SMART FARMING APPLICATION**

**Submitted By**

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**1. INTRODUCTION**

**1.1 PROJECT OVERVIEW**

Agriculture is an essential resource for survival of all living things on earth. Agriculture also provides most of the food and fabrics to the world. Environmental changes have impacted today’s agriculture and it has slowed down the productivity of crops. Shortage of water and pests are the major issue that mitigates the yield in agriculture. To sort out these issues, experts and researchers have proposed new processes and adoption of new technologies like Internet of Things (IoT), Smart sensors, Wireless Sensor Networks (WSN), Image processing, Data analytics, Artificial Intelligence (AI) and Machine learning (ML) in agriculture in the last decade to make agriculture smart, easy and maximize the production with minimum resources. This paper studies the impact of new technologies and its applications in modern agriculture. Farmers usually work on large portions of land to grow different types of crops. It is not always possible for one person to be able to keep track of the entire farmland all the time. Sometimes it may happen that a given patch of land receives more water leading to water-logging, or it might receive far less or no water at all leading to dry soil. In either of the cases, the crops can get damaged and farmer may suffer losses. So in order to solve this problem, we propose an “IOT Irrigation Monitoring and Control Project”. This is a very useful project where in, the user can monitor and control the supply of water from a remote location. This system makes use of a concept called IOT (Internet of Things). So for our project, we connect our system to the internet using a Wi-Fi module. We use a Node mcu board to send the control signals and to connect to our desired website.

**1.2 PURPOSE**

IoT based Smart Farming improves the entire Agriculture system by monitoring the field in real-time. With the help of sensors and interconnectivity, the Internet of Things in Agriculture has not only saved the time of the farmers but has also reduced the extravagant use of resources such as Water and Electricity. It keeps various factors like humidity, temperature, soil etc. under check and gives a crystal-clear real-time observation.

**LITERATURE SURVEY**

**EXISTING PROBLEM**

Agriculture is a substantial source of revenue for Indians and has a huge impact on the Indian economy. Crop development is essential for enhanced yield and higher-quality delivery. As a result, crop beds with ideal conditions and appropriate moisture can have a big influence on output. Traditional irrigation systems, such as stream flows from one end to the other, are usually used. As a result of this delivery, the moisture levels in the fields can alter. A designed watering system can help to enhance the management of the water system. This research proposes a terrain-specific programmable water system that will save human work while simultaneously improving water efficiency and agricultural productivity. The setup is made up of an Arduino kit, a moisture sensor, and a Wi-Fi module. Data is acquired by connecting our experimental system to a cloud framework. After then, cloud services analyse the data and take the necessary actions. In the existing system of agriculture the crops are being monitored with the help of Arduino boards and GSM technology where in Arduino boards acts as a microcontroller but not as a server. Here the set up cost is bit high which may pose problems for the installation. Hence in order to overcome all these features Arduino boards or renesas microcontrollers are being replaced with the Raspberry Pi 3 which is a latest version and also which acts both as a microcontroller as well as server. Main feature of this methodology is its cheap cost for installation and multiple advantages. Here one can access as well as control the agriculture system in laptop, cell phone or a computer.

**REFERENCE**

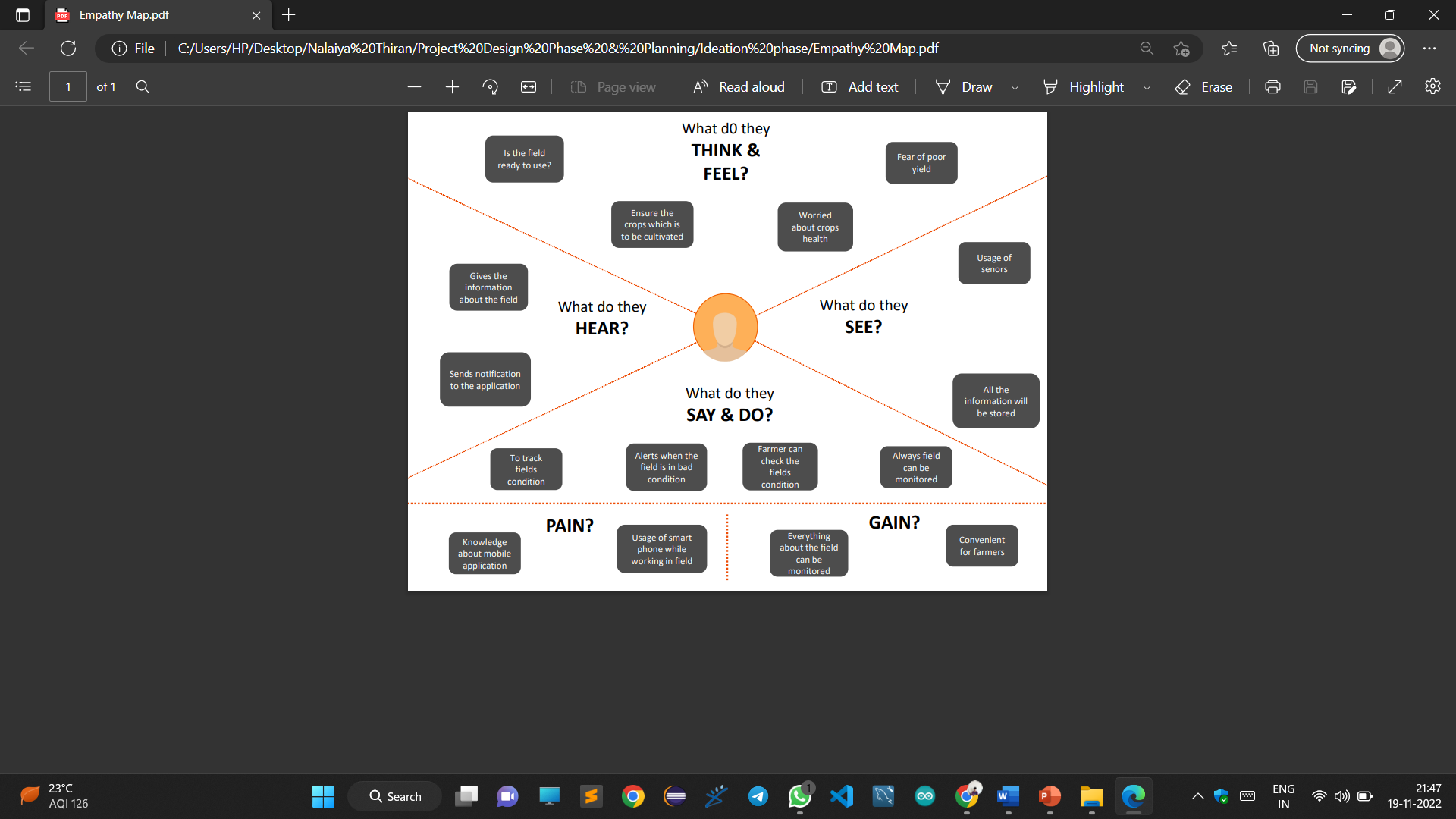
* + - Divya J., Divya M.,Janani V
    - H.G.C.R. Laksiri, H.A.C. Dharmagunawardhana
    - Anushree Math, Layak Ali, Pruthviraj
    - Dweepayan Mishra, Arzeena Khan, Rajeev Tiwari, Shuchi Upadhaye
    - R. Nageswara Rao, B.Sridhar
    - Shweta B. Saraf, Dhanashri H. Gawali
    - G. Sushanth, and S. Sujatha
    - Vaishali S, Suraj S, Vignesh G, Dhivya S and Udhayakumar S

**PROBLEM STATEMENT DEFINITION**

Smart farming is a management concept focused on providing the agricultural industry with the infrastructure to leverage advanced technology, the cloud and the internet of things . for tracking, monitoring, automating and analyzing operations. Also known as smart farming is software managed and sensor-monitored. Smart farming is growing in importance due to the combination of the expanding global population, the increasing demand for higher crop yield, the need to use natural resources efficiently, the rising use and sophistication of information and communication technology and the increasing need for climate-smart agriculture.

**IDEATION AND PROPOSED SOLUTION**

**EMPATHY MAP**



**IDEATION**

**IDEA I ABSTRACT:** The farming of agriculture has started past 12000 years back, Neolithic age gave birth of civilization, Farming and later being continued as traditional farming practices. India being an agrarian's country, Mostly Indian farming are 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 farmer 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 terms of moisture levels with help of sensors which are interfaced to process module Arduino-UNO. The Smart agriculture system can be operated from anywhere with help of networking technology. On joining process in research and development in Smart Agriculture& Artificial Intelligence can be cutting edge technology in data compiling and resource optimization .The pest & insects controls that protects damaging the crop and also optimisation resources utilisation can be breakthrough.

**ADVANTAGES:**

1. Crop monitoring can be done easily

2. Suitable machines can be identified.

**DISAVANTAGES:**

1. Smart farming continually requires internet connectivity.

2. The IoT related equipment allows the farmer to understand the use of technology.

**IDEA II ABSTRACT:** Despite the perception people may have regarding the agricultural process, the reality is that today's agriculture industry is data-centered, precise, and smarter than ever. The rapid emergence of the Internet-of-Things (IoT) based technologies redesigned almost every industry including “smart agriculture” which moved the industry from statistical to quantitative approaches. Such revolutionary changes are shaking the existing agriculture methods and creating new opportunities along a range of challenges. This article highlights the potential of wireless sensors and IoT in agriculture, as well as the challenges expected to be faced when integrating this technology with the traditional farming practices. IoT devices and communication techniques associated with wireless sensors encountered in agriculture applications are analyzed in detail. What sensors are available for specific agriculture application, like soil preparation, crop status, irrigation, insect and pest detection are listed. How this technology helping the growers throughout the crop stages, from sowing until harvesting, packing and transportation is explained. Furthermore, the use of unmanned aerial vehicles for crop surveillance and other favorable applications such as optimizing crop yield is considered in this article. State-of-the-art IoT-based architectures and platforms used in agriculture are also highlighted wherever suitable. Finally, based on this thorough review, we identify current and future trends of IoT in agriculture and highlight potential research challenges.

**ADVANTAGES:**

1. Smart Farming system reduce waste

2. It enables management of a greater number of resources through remote sensing.

**DISADVANTAGES:**

1. Diminishes soil fertility.

2. The soil of the fields is harmed.

**IDEA III ABSTRACT:** Internet of Things (IoT) is present and future of every field impacting everyone’s life by making everything intelligent. It is a network of different devices which make a self-configuring network. The new developments of Smart Farming with use of IoT, by day turning the face of conventional agriculture methods by not only making it optimal but also making it cost efficient for farmers and reducing crop wastage. The aim is to propose a technology which can generate messages on different platforms to notify farmers. The product will assist farmers by getting live data (Temperature, humidity, soil moisture, UV index, IR) from the farmland to take necessary steps to enable them to do smart farming by also increasing their crop yields and saving resources (water, fertilizers). The product proposed in this paper uses ESP32s Node MCU, breadboard, DHT11 Temperature and Humidity Sensor, Soil Moisture Sensor, SI1145 Digital UV Index / IR / Visible Light Sensor, Jumper wires, LEDs and live data feed can be monitored on serial monitor and Blynk mobile. This will allow farmer to manage their crop with new age in farming.

**ADVANTAGES:**

1. Improves productivity

2. Better water management

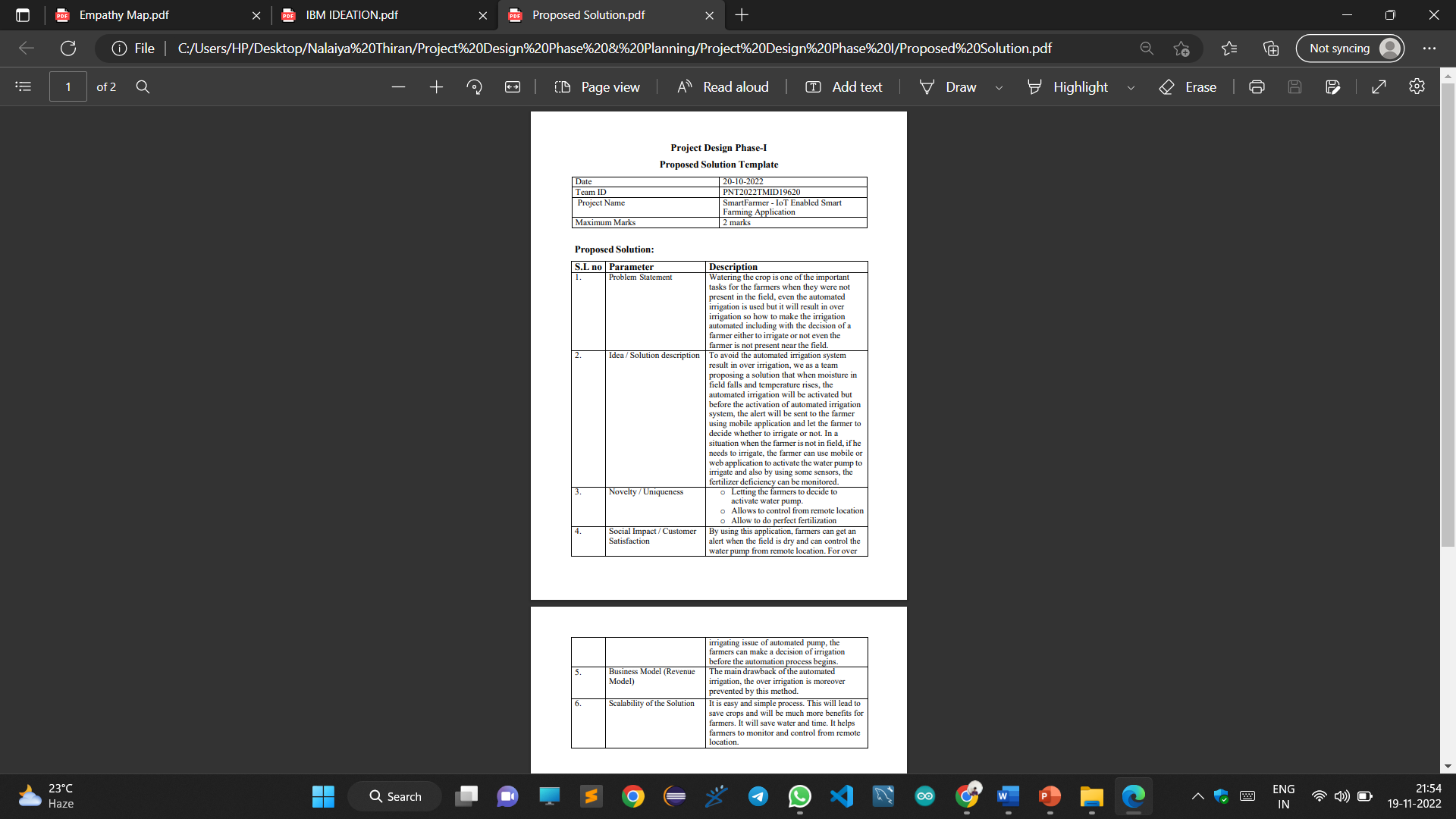
**DISADVANTAGES:**

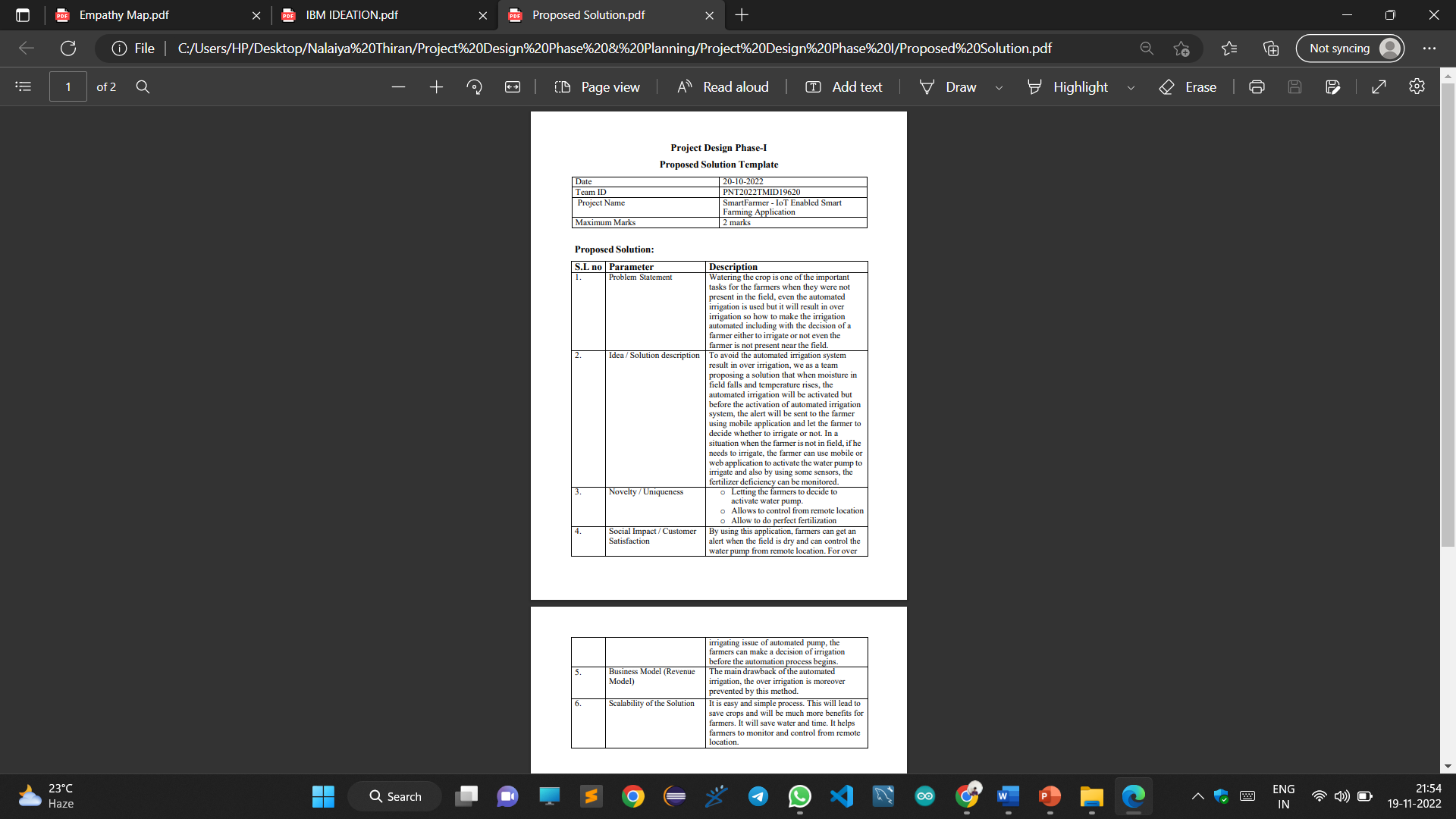
1. The system offers little power and can lead to various kinds of network attacks

2. Fertility is reduced.

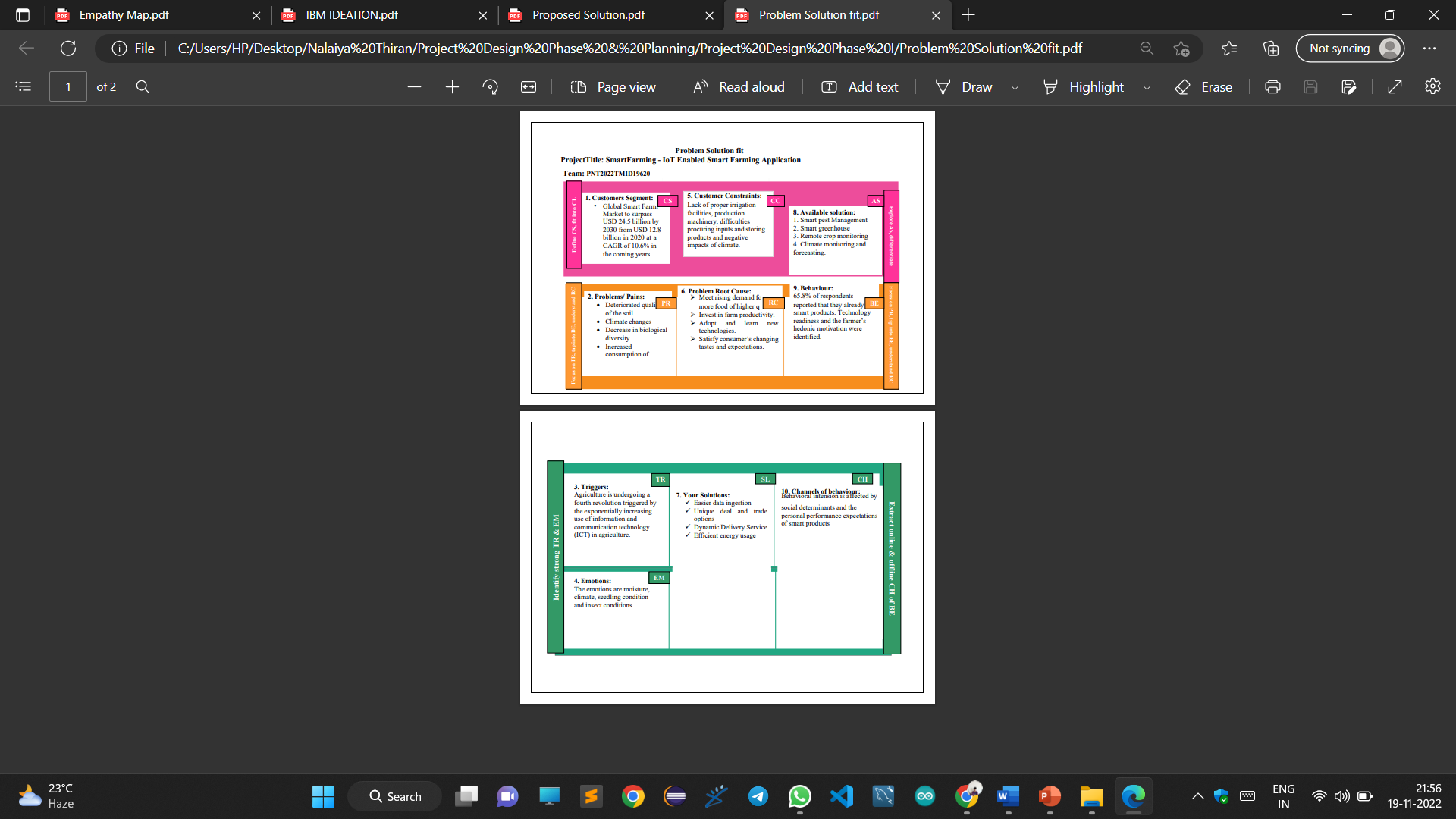


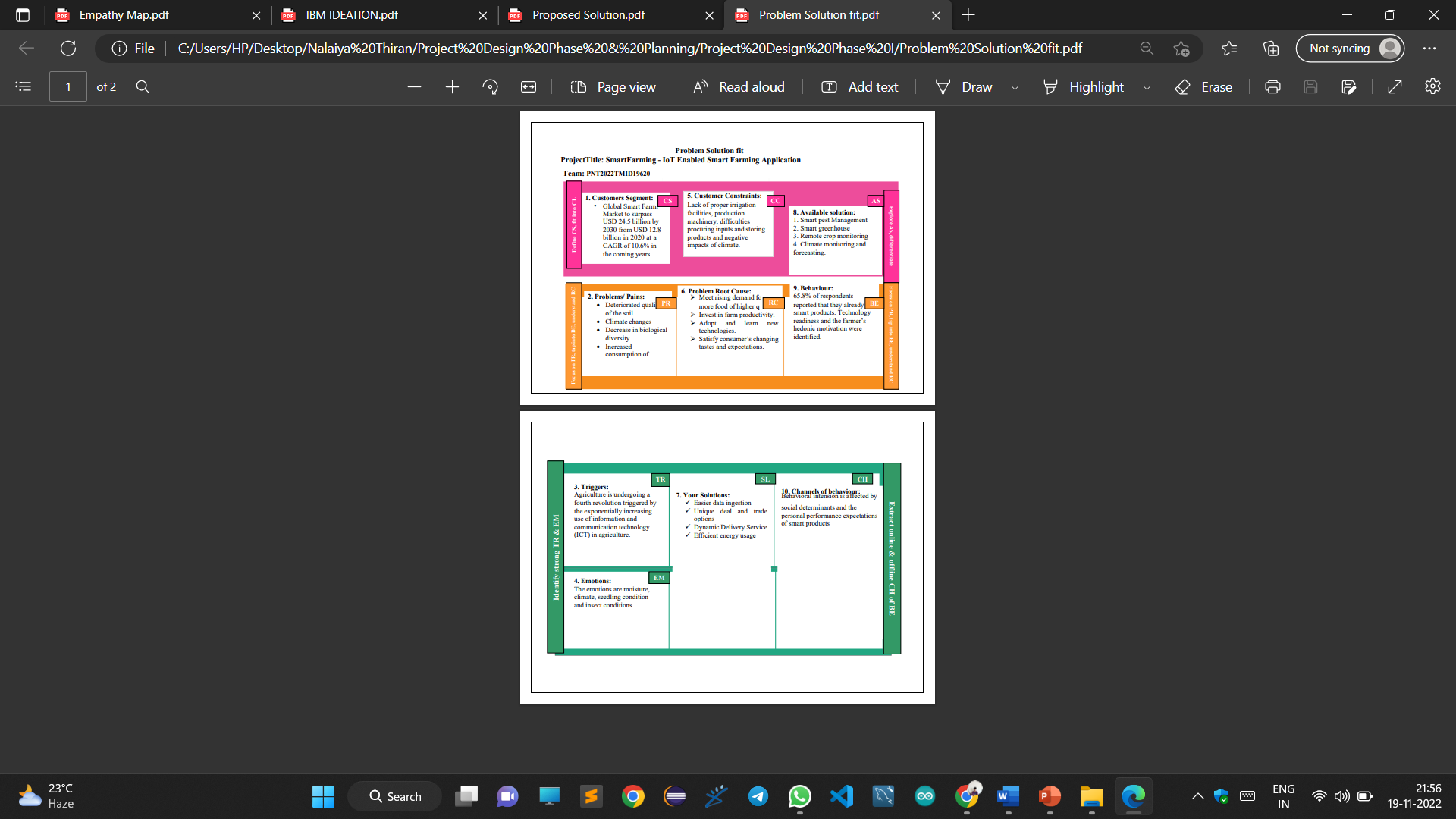
**PROPOSED SOLUTION**





**PROBLEM SOLUTION FIT**





**REQUIREMENT ANALYSIS**

**FUNCTIONAL REQUIREMENT**

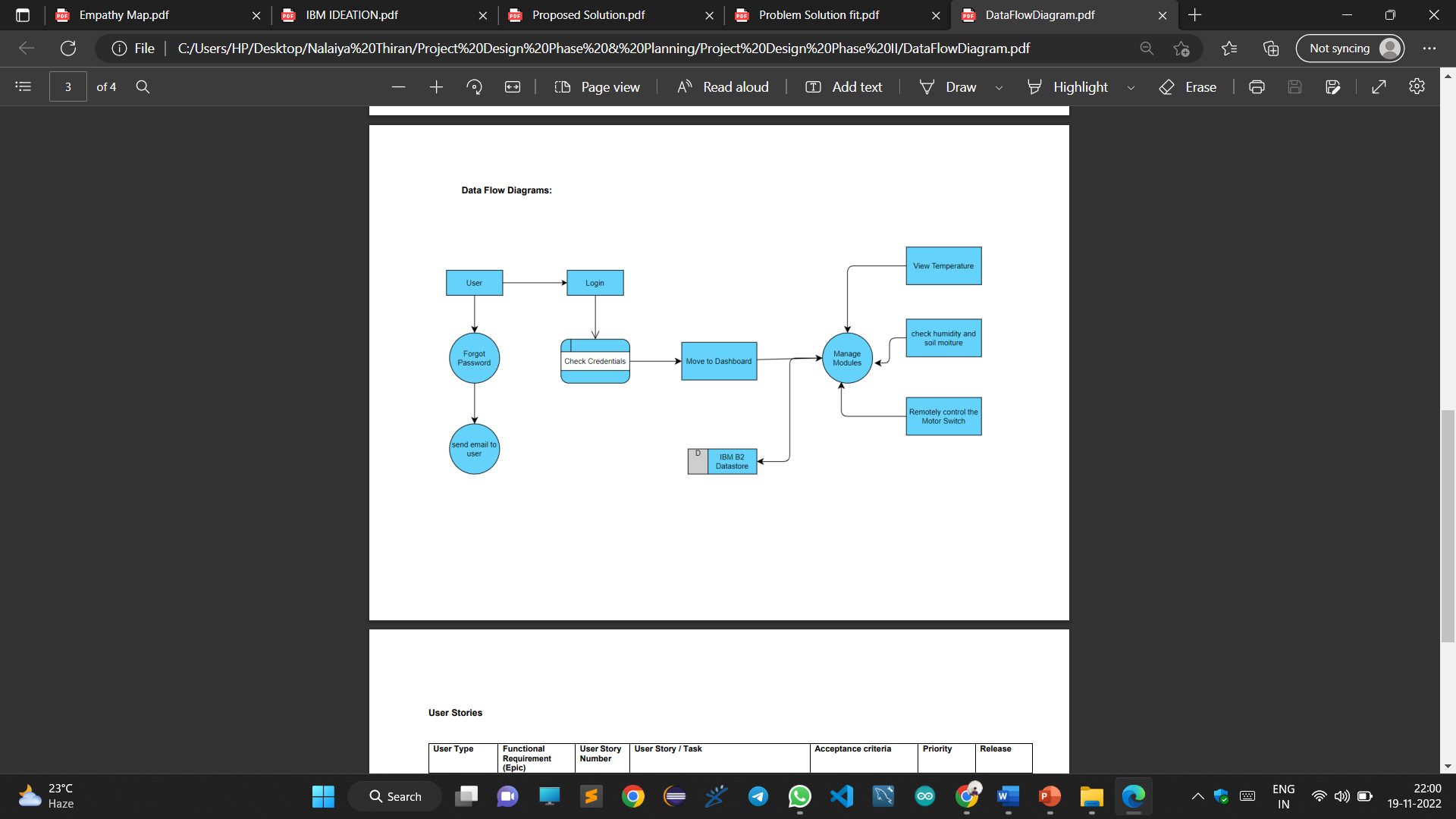
|  |  |  |
| --- | --- | --- |
| FR  No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
| FR-1 | Registration and Login | * User needs to login the app by using their Gmail.   ‘   * Registration needs to be done by giving their Name,Mobile Number and their locality.This is the required Field. |
| FR-2 | sensor and camera | * Small devices to collecting environment data, such as humidity ,   temperature,water level,soil moisture,weather monitor,etc… |
| FR-3 | Actuator | * Devices or systems for changing the environment state such us, sprinkler,   ventilation, and irrigation systems,etc.. |
| FR-4 | GPS | * A System that provides geolocation of sensors, agricultural machinery and   farm resources |
| FR-5 | Connection Technologies | * Devices and technologies to interconnecting remote devices and   transferring data via router, access points, protocols. |
| FR-6 | Security Features | * Security protocols and schemes for ensuring the availability, integrity,   and confidentiality of the system and data. |
| FR-7 | In-Out Interface | * Software and hardware interface for communication beyond the local area. |

**NON FUNCTIONAL REQUIREMENT**

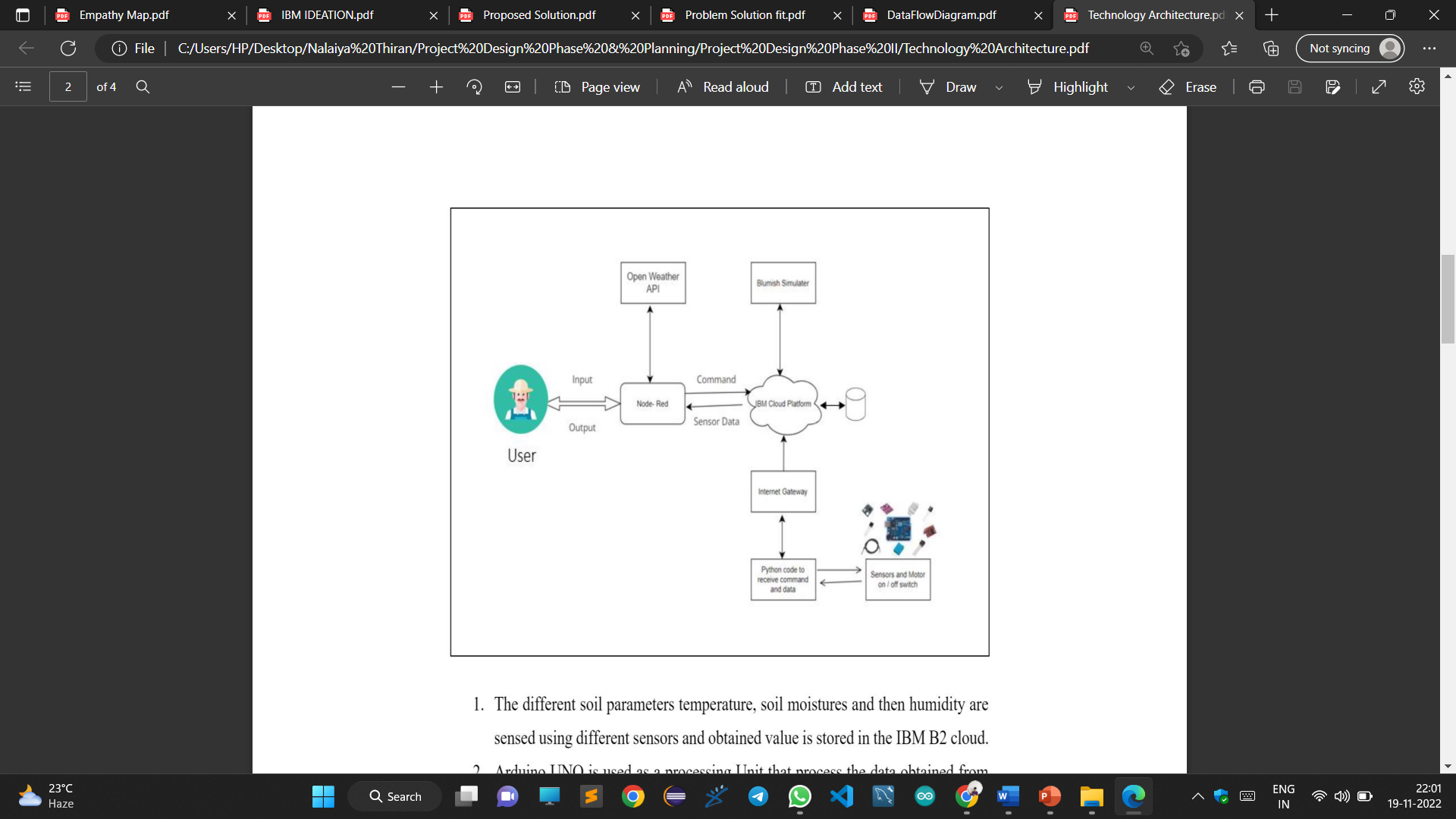
|  |  |  |
| --- | --- | --- |
| FR  No. | Non-Functional Requirement | Description |
| NFR- 1 | Usability | * Usability is a method for improving ease-of-use during the design process. Smart farming prototype was built using loT sensors and Cloud based Server running with custom software incorporating specialized algorithms and a graphical user interface. So it assesses how easy user interfaces are to use |
| NFR- 2 | Security | * Security incidents may be accidental or intentional. * Animals, farm working, and machinery can easily access farming environments and cause incidents. * Smart communication technologies introduce a vast exposure to   cybersecurity threats and |

**PROJECT DESIGN**

**DATA FLOW DIAGRAM**

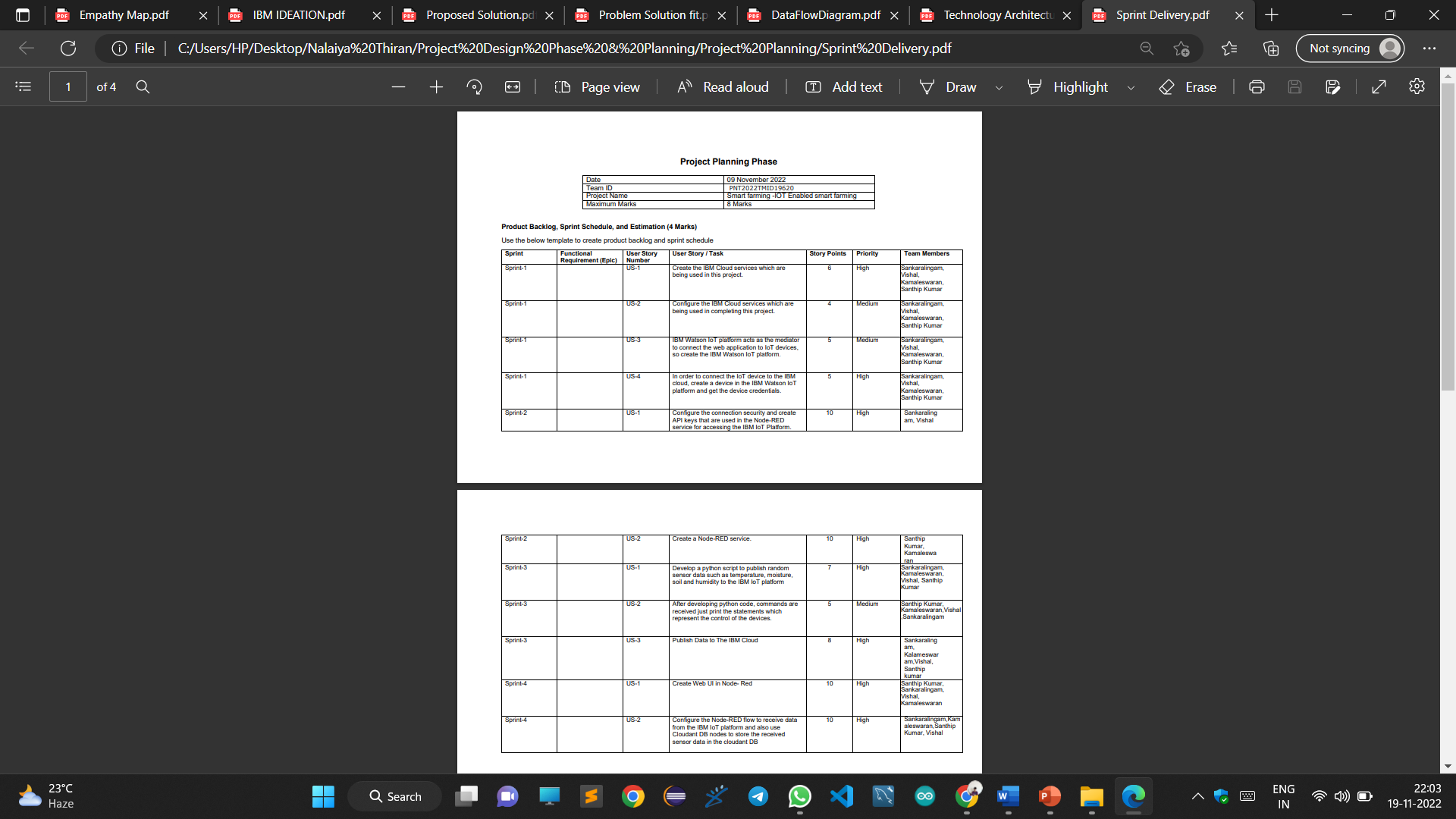


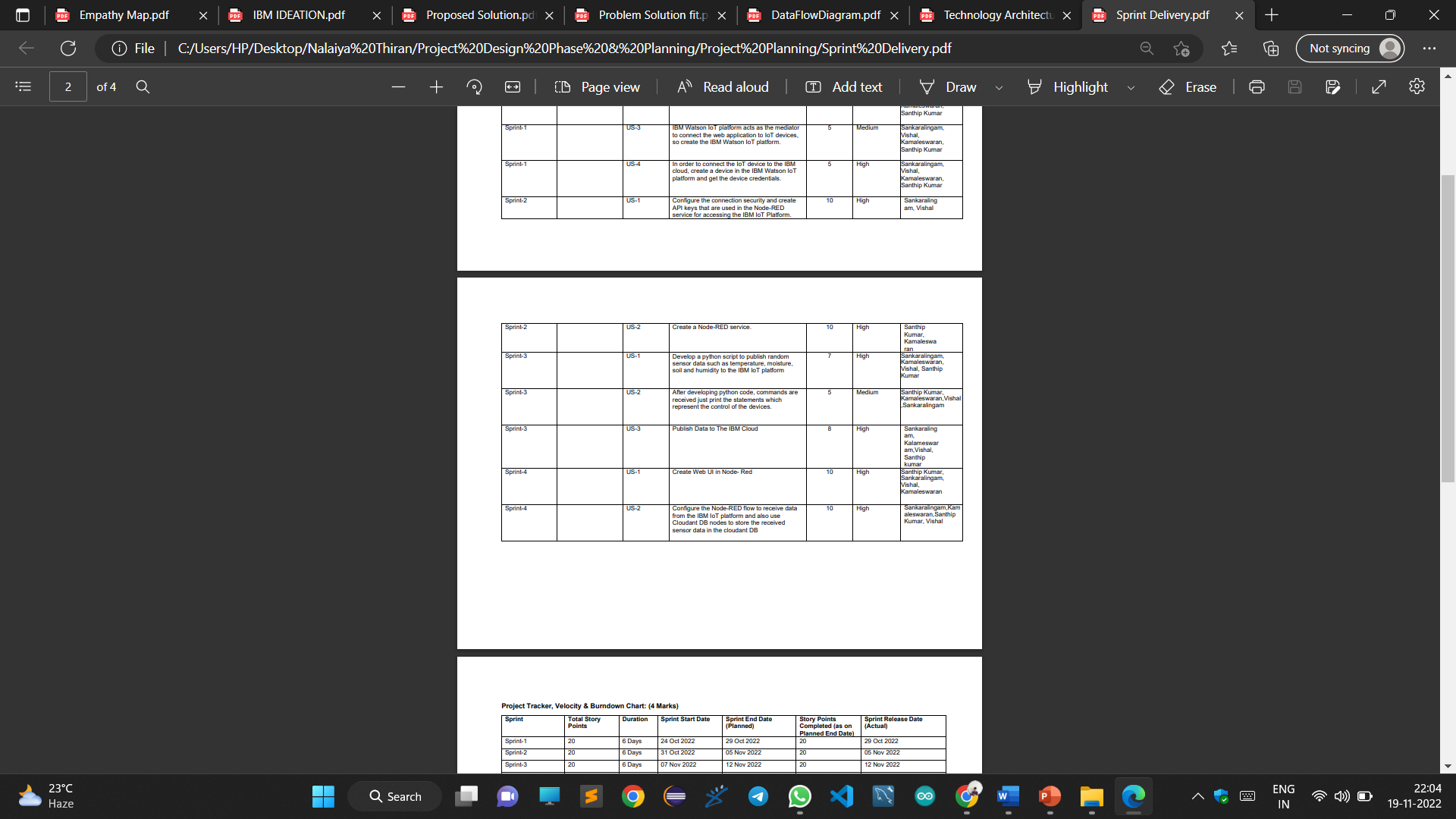
**TECHNICAL ARCHITECTURE**

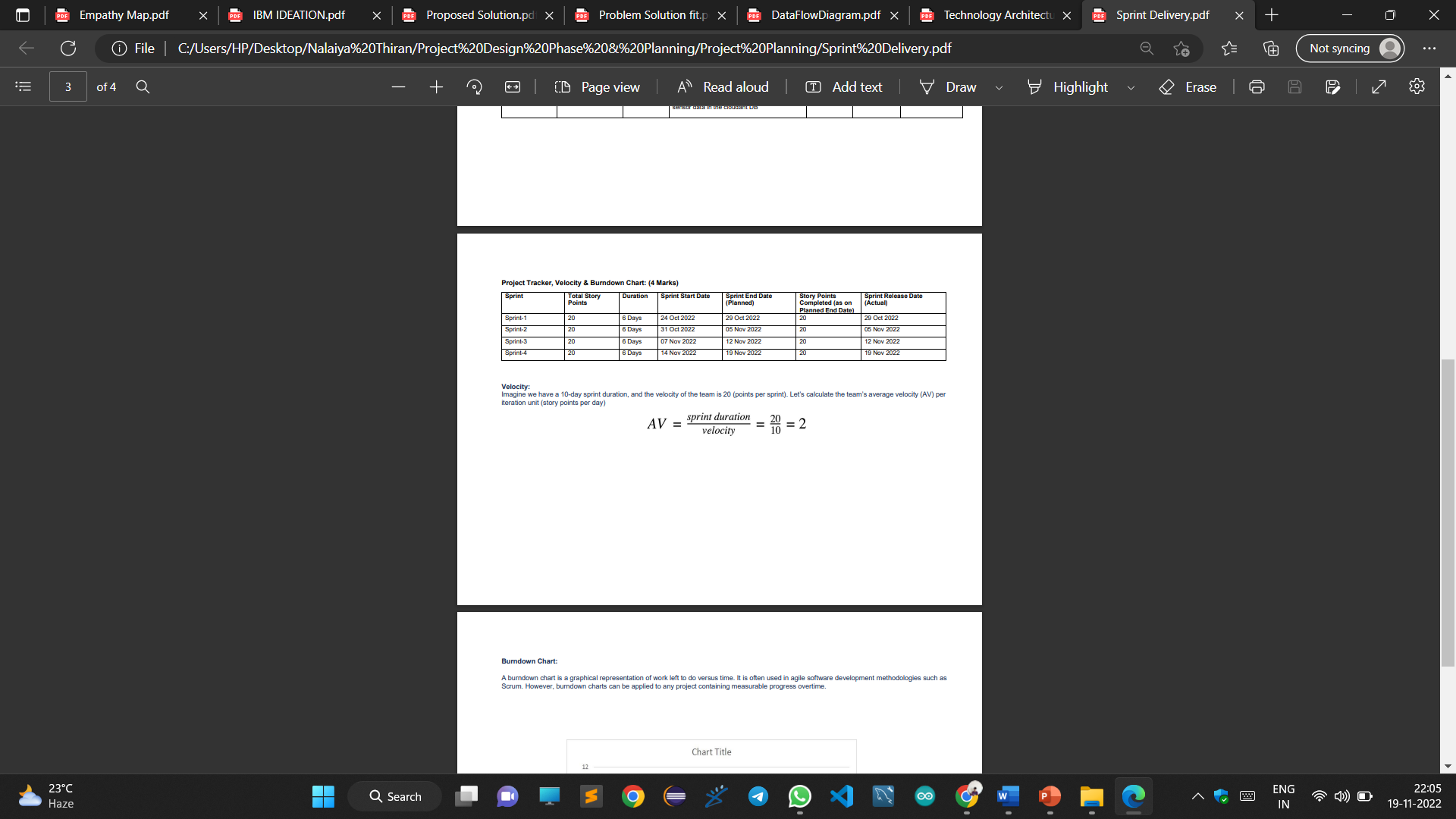


**PROJECT PLANNING**

**SPRINT PLANNING**







**CODING**

#include <DHT.h>

#include <ESP8266WiFi.h>

String apiKey = "X5AQ3EGIKMBYW31H";

const char\* server = "xxxxxxxxxxxx";

const char \*ssid = "xxxxxxx"; // Enter your WiFi Name

const char \*pass = "yyyyyyyy"; // Enter your WiFi Password

#define DHTPIN D3

DHT dht(DHTPIN, DHT11);

WiFiClient client;

const int moisturePin = A0;

const int motorPin = D0;

unsigned long interval = 10000;

unsigned long previousMillis = 0;

unsigned long interval1 = 1000;

unsigned long previousMillis1 = 0;

float h;

float t;

void setup()

{

Serial.begin(115200);

delay(10);

pinMode(motorPin, OUTPUT);

digitalWrite(motorPin, LOW);

dht.begin();

Serial.println("Connecting to ");

Serial.println(ssid);

WiFi.begin(ssid, pass);

while (WiFi.status() != WL\_CONNECTED)

{

delay(500);

Serial.print(".");

}

Serial.println("");

Serial.println("WiFi connected");

}++

void loop()

{

unsigned long currentMillis = millis();

h = dht.readHumidity();

t = dht.readTemperature();

if (isnan(h) || isnan(t))

{

Serial.println("Failed to read from DHT sensor!");

return;

}

moisturePercentage = ( 100.00 - ( (analogRead(moisturePin) / 1023.00) \* 100.00 ) );

if ((unsigned long)(currentMillis - previousMillis1) >= interval1) {

Serial.print("Soil Moisture is = ");

Serial.print(moisturePercentage);

Serial.println("%");

previousMillis1 = millis();

}

if (moisturePercentage < 50) {

digitalWrite(motorPin, HIGH);

}

if (moisturePercentage > 50 && moisturePercentage < 55) {

digitalWrite(motorPin, HIGH);

}

if (moisturePercentage > 56) {

digitalWrite(motorPin, LOW);

}

if ((unsigned long)(currentMillis - previousMillis) >= interval) {

sendThingspeak(); //send data to thing speak

previousMillis = millis();

client.stop();

}

}

void sendThingspeak() {

if (client.connect(server, 80))

{

String postStr = apiKey; // add api key in the postStr string

postStr += "&field1=";

postStr += String(moisturePercentage); // add mositure readin

postStr += "&field2=";

postStr += String(t); // add tempr readin

postStr += "&field3=";

postStr += String(h); // add humidity readin

postStr += "\r\n\r\n";

client.print("POST /update HTTP/1.1\n");

client.print("Host: api.thingspeak.com\n");

client.print("Connection: close\n");

client.print("X-THINGSPEAKAPIKEY: " + apiKey + "\n");

client.print("Content-Type: application/x-www-form-urlencoded\n");

client.print("Content-Length: ");

client.print(postStr.length()); //send lenght of the string

client.print("\n\n");

// send complete string

Serial.print("Moisture Percentage: ");

Serial.print(moisturePercentage);

Serial.print("%. Temperature: ");

Serial.print(t);

Serial.print(" C, Humidity: ");

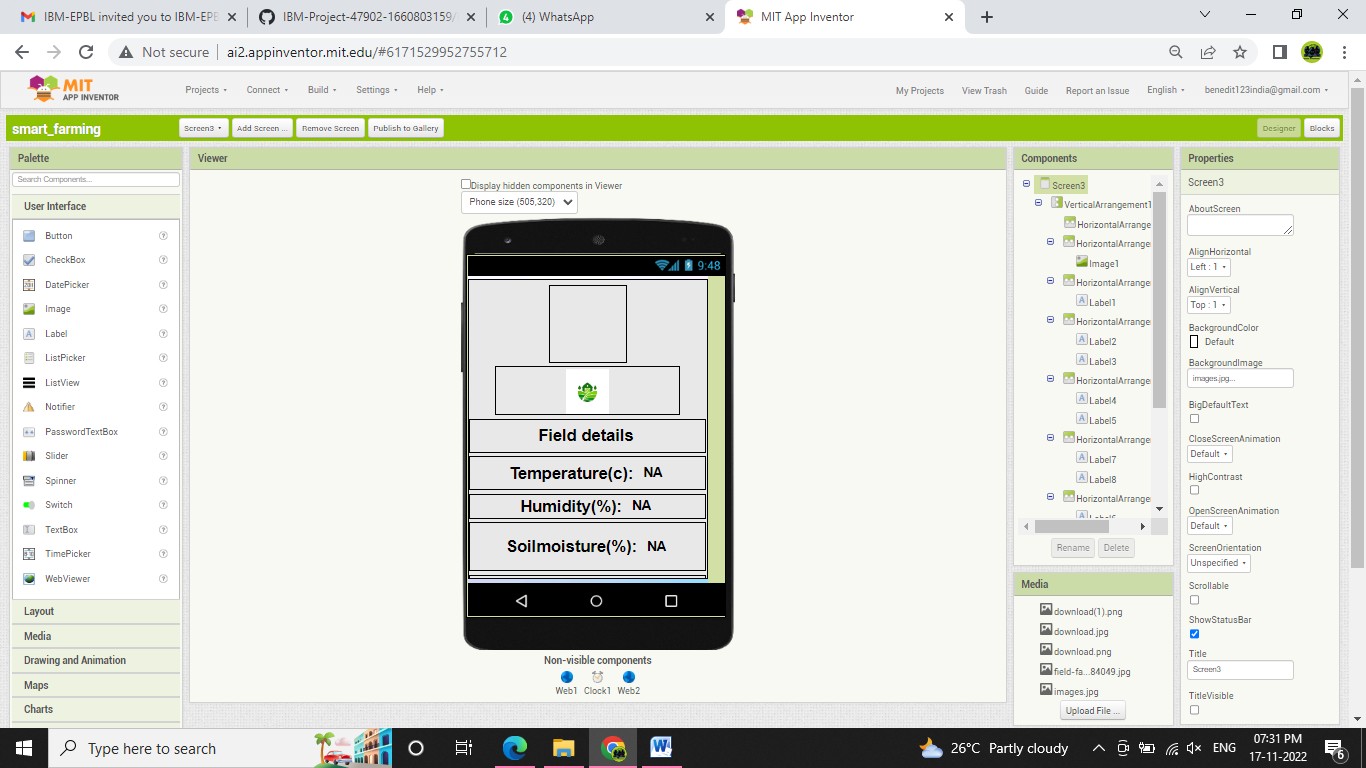
Serial.print(h);

Serial.println("%. .");

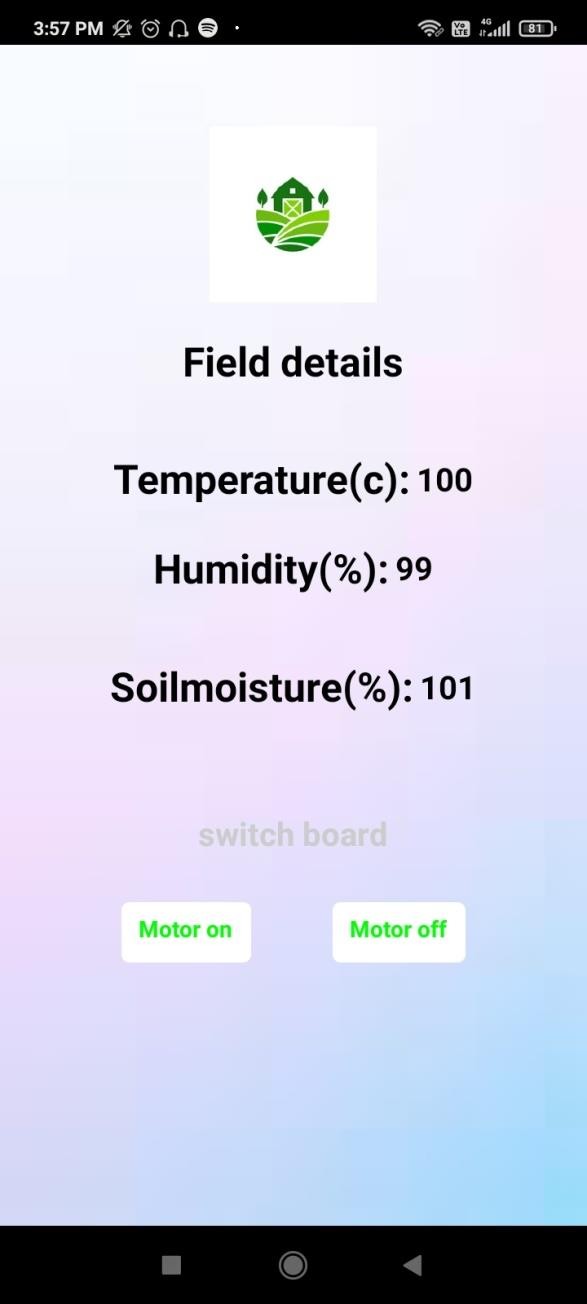
}

}

**TESTING**



**RESULTS**



**CONCLUSION AND FUTURE SCOPE**

Agriculture is still possible in today's globe by making use of the newest technologies. WSN are employed in this to produce crops at a minimal cost and with a high yield. Nowadays, people don't participate in cultivation. To minimise human effort. It uses sensor networks. Sensor nodes congregate here and the information that transmit it to farmers and agricultural specialist. Adding a few pieces of hardware Mobile devices receive software data. The Farmers can use their phones anywhere, at any time at any moment. This programme may aggregate numerous farms, the expert is also interested in it. This is more appropriate for nations like India that rely on agriculture. Agriculture can be done in this modern world using many latest technologies. Here WSN are used for producing crop with high yield and with low cost. Nowadays human beings are not involved in cultivation. To reduce the effort of human wireless sensors networks are used. Here sensor nodes collect the data and send to farmers as well as agriculture specialist. Using some additional hardware and software data are transmitted to smart phones. The farmer can operate mobile phones from anywhere at any time. This application can group many farmers into it and also the specialist. This is more suitable for agriculture dependent countries like India. The smart farm helps the farmer to yield high profit by growing the crop without infection and at exact soil moisture content. Due to automatic process it reduce the human effort and view the growth of crop through smart phone. The wireless communication reduce the cost of implementation. In future this is implemented for large area of land. The internet connectivity is required at all the time to communicate the data to farmer. The predefined prediction of weather condition helps the farmer to cultivate the crop based on weather condition.