# Project Report Format

## 1. INTRODUCTION

### 1.1 Project Overview

Climate Track Smart is a project that aims to use blockchain technology to address climate change issues. The project seeks to create a platform that can track carbon emissions and provide incentives for reducing them. The platform will use blockchain technology to ensure transparency, security, and immutability of data.

The project will involve the development of a decentralized application (dApp) that can be used by individuals, businesses, and governments to track their carbon emissions. The dApp will use smart contracts to automate the process of tracking emissions and issuing incentives for reducing them. The platform will also provide a marketplace where individuals and businesses can buy and sell carbon credits.

The Climate Track Smart project will have several benefits. Firstly, it will provide a transparent and secure platform for tracking carbon emissions. Secondly, it will incentivize individuals and businesses to reduce their carbon emissions by providing rewards for doing so. Thirdly, it will create a marketplace for carbon credits, which will help to reduce the overall level of carbon emissions.

### 1.2Purpose

One way in which blockchain technology can be used to address climate change is through the use of smart contracts. Smart contracts are stored on a distributed ledger. This makes them ideal for tracking and managing environmental data. These contracts could be made for all the companies that emit harmful pollutants.

## 2. LITERATURE SURVEY

### 2.1 Existing problem

One of the existing problems for climate tracking is the lack of consistent and accurate data. Climate data is collected from various sources such as satellites, weather stations, and ocean buoys, which can lead to inconsistencies in the data. Additionally, some regions may have limited or no data collection infrastructure, making it difficult to accurately track climate changes in those areas. Another problem is the complexity of climate systems, which makes it challenging to accurately model and predict future climate patterns. Finally, political and economic factors can also impact climate tracking efforts, as funding and resources may be limited or redirected to other priorities.

### 2.2References

distributed and decentralized open ledger that is cryptographically managed and updated various consensus protocols and agreements among its peers.

### 2.3Problem Statement Definition

Climate Change is the defining issue of our time and we are at a defining moment. From shifting weather patterns that threaten food production, to rising sea levels that increase the risk of catastrophic flooding, the impacts of climate change are global in scope and unprecedented in scale.

## 3. IDEATION & PROPOSED SOLUTION

Climate tracking is essential for understanding and addressing climate change. To develop an effective climate tracking solution, we need to consider various factors such as data collection methods, data analysis techniques, user accessibility, and scalability.

Our proposed solution for climate tracking is a comprehensive platform that integrates multiple data sources, utilizes advanced analytics, and provides user-friendly interfaces for easy access and interpretation of climate data. Here are the key features and components of our solution:

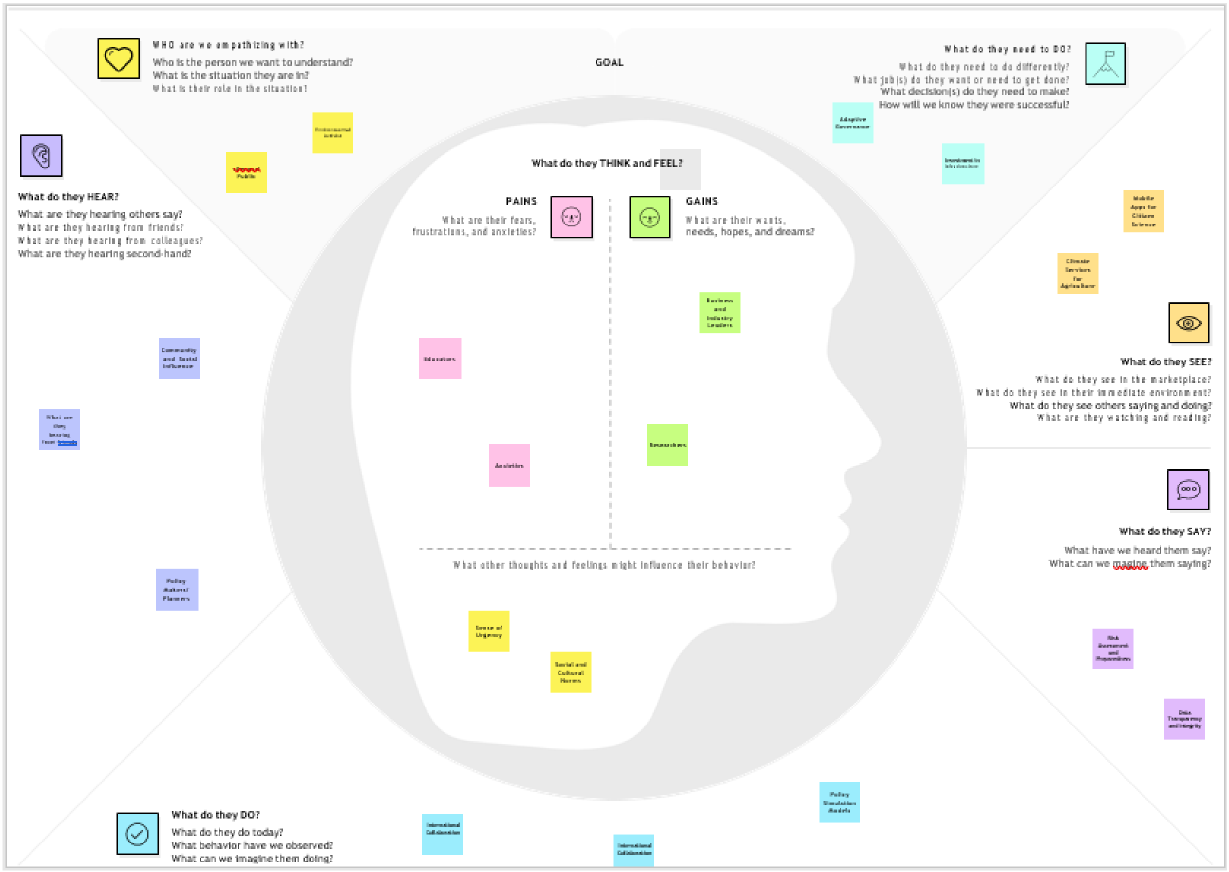
Integration of satellite imagery, weather stations, IoT sensors, and other relevant sources to collect real-time climate data.

Collaboration with national meteorological agencies, research institutions, and NGOs to access and incorporate their datasets.

Utilization of machine learning algorithms to fill data gaps and improve accuracy.

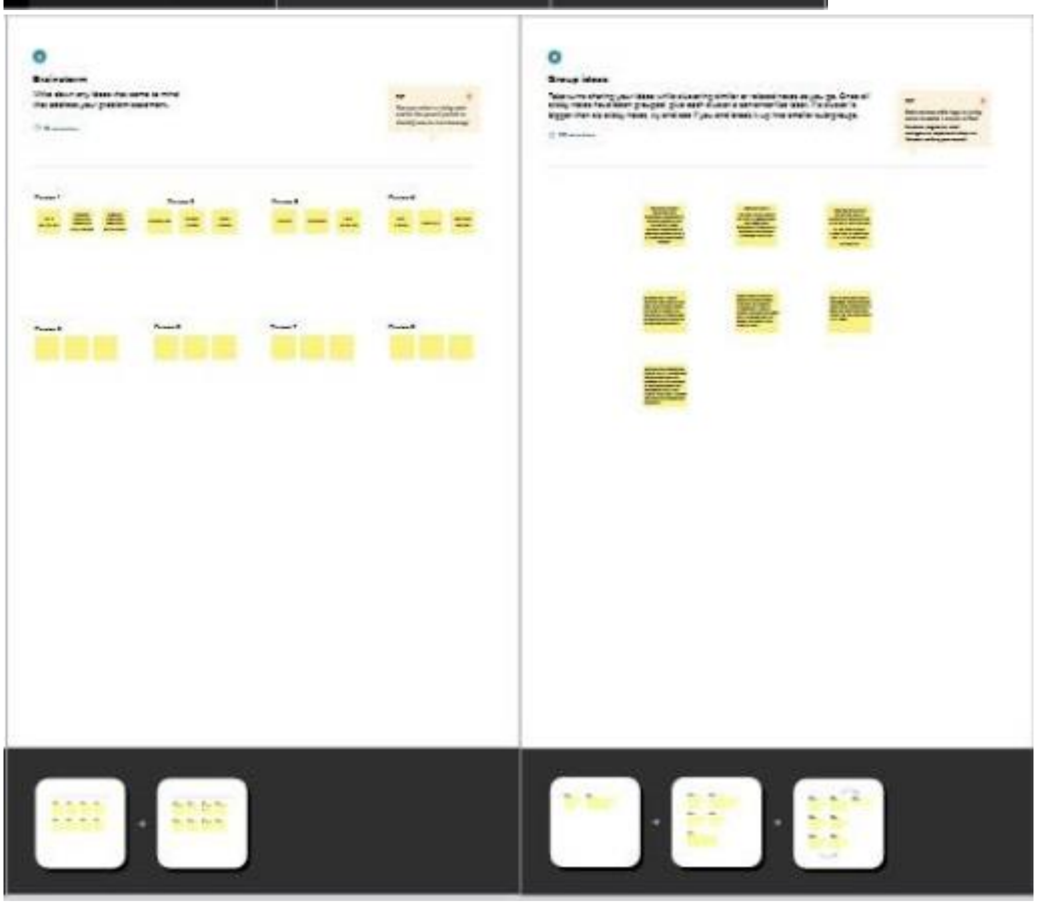
Application of advanced analytics techniques such as statistical modeling, machine learning, and pattern recognition to identify climate trends, anomalies, and potential risks.

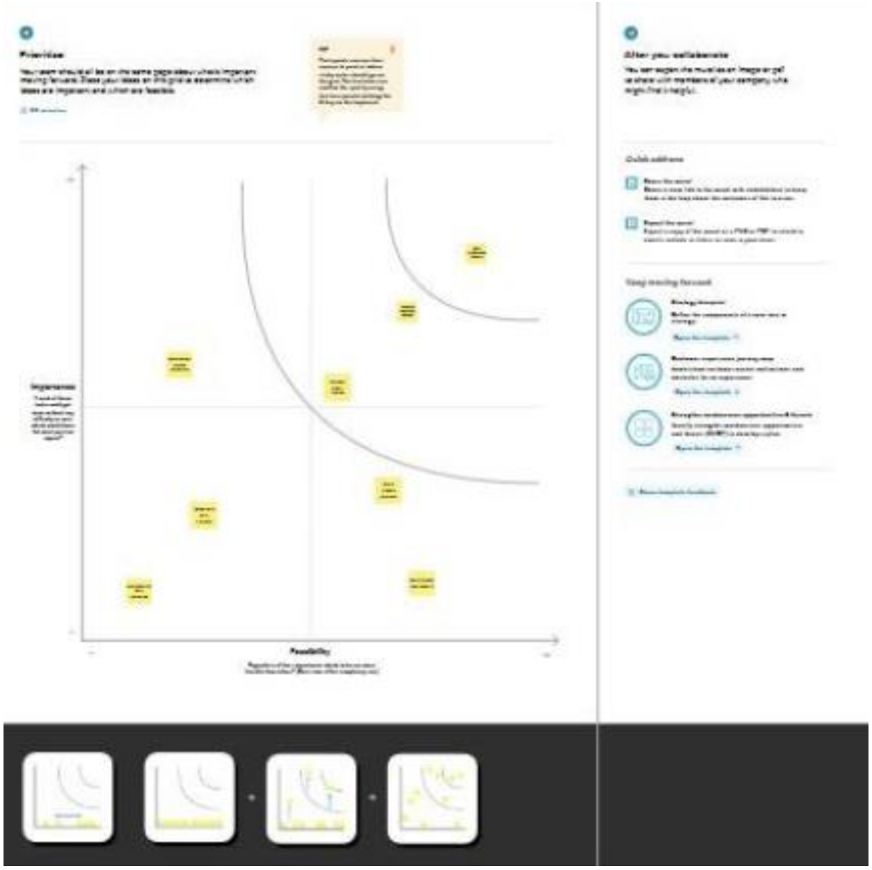
## 3.1Empathy Map Canvas




## 3.2Ideation & Brainstorming:


Brainstorm
& idea prioritization





**STEP:1** Teamgathering,Collaboration and Select the problem statement

**PROBLEM:**
Real-time monitoring: Develop a system that can monitor and track climate variables such as temperature, rainfall, wind speed, and humidity in real-time. The system should be able to collect data from various sources, including weather stations, satellites, and ground sensors. Predictive analytics: Use machine learning algorithms to analyze historical climate data and predict future trends. The system should be able to forecast extreme weather events such as hurricanes, floods, and droughts. Climate change impact assessment: Develop a tool that can assess the impact of climate change on different sectors.

**STEP:2** Brainstorm idea,listing and grouping

## GROUP IDEAS

Our group proposes a climate tracking system that focuses on monitoring and analyzing the impact of climate change on biodiversity. The system would use satellite data, ground sensors, and citizen science observations to track changes in ecosystems, species distribution, and habitat quality. Some possible features of our system could include:

Ecosystem mapping: Use satellite imagery to map the distribution and health of different ecosystems, such as forests, wetlands, and coral reefs. The system could also track changes in vegetation cover, water availability, and soil quality.Species monitoring: Use citizen science observations and automated sensors to track changes in the distribution, abundance, and behavior of different species. The system could also provide alerts for endangered or invasive species.Habitat quality assessment: Use machine learning algorithms to analyze the quality of different habitats, such as nesting sites, feeding grounds, and migration routes. The system could also identify areas that are at risk of habitat loss or fragmentation. Biodiversity hotspot identification: Use data analytics to identify areas with high levels of biodiversity and prioritize conservation efforts. The system could also track changes in biodiversity hotspots over time.

**STEP:3** Idea Prioritization

## 4.Functional requirements:

Data collection: The system should be able to collect data from various sources, including satellite imagery, ground sensors, and citizen science observations.

Data processing: The system should be able to process large volumes of data using machine learning algorithms and other data analytics tools.

Visualization: The system should be able to visualize data in a user-friendly way, such as maps, charts, and graphs.

Alerting: The system should be able to provide alerts for endangered or invasive species, as well as areas at risk of habitat loss or fragmentation.

Predictive analytics: The system should be able to use predictive analytics to assess the impact of climate change on different species and ecosystems.

Citizen engagement: The system should have a citizen engagement platform that allows citizens to report on species sightings.

### 4.1Non functional requirements:

Compliance: Adhere to legal and regulatory requirements related to data privacy, security, and environmental monitoring standards.

Data Integration: Establish mechanisms to maintain the integrity of climate data throughout its lifecycle, from collections.

Environmental Impact: Consider the environmental impact of the system's operations, striving for energy efficiency and sustainable practices in data centers and operations.

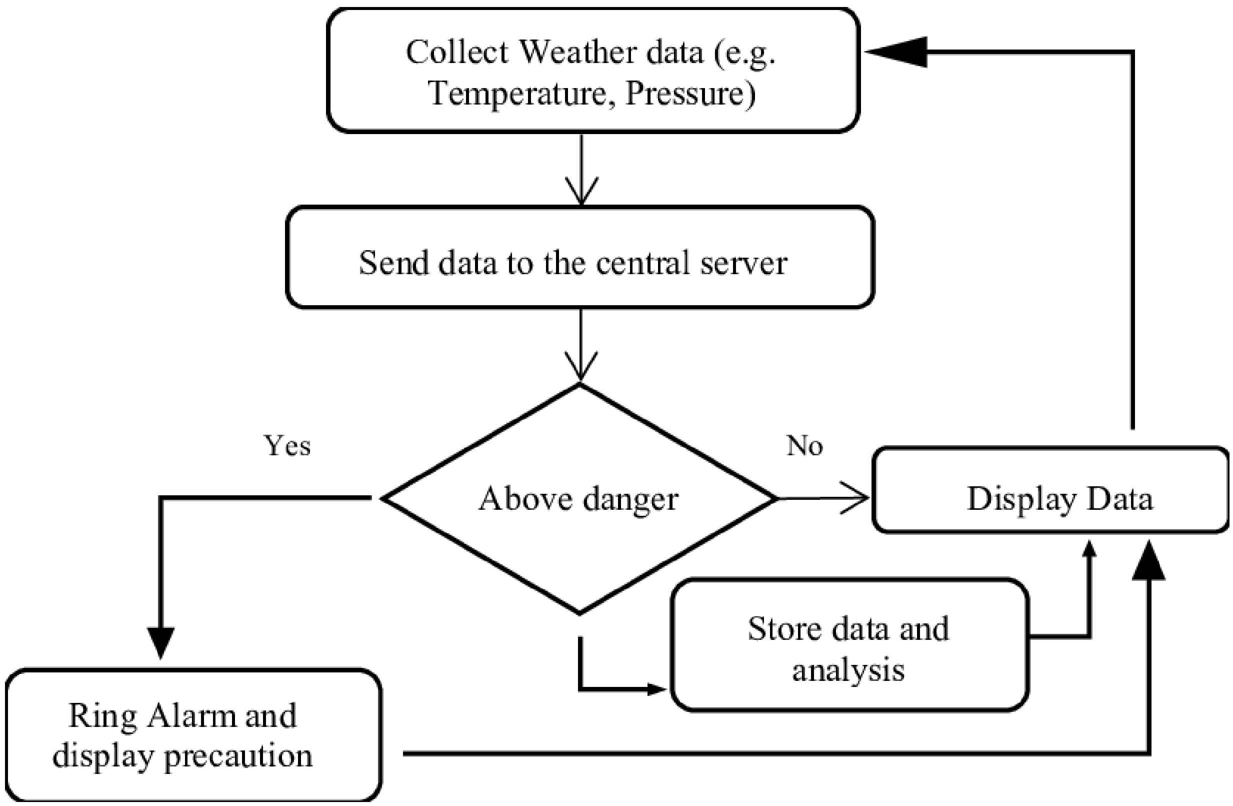
Error Handling: Implement effective error-handling mechanisms to gracefully manage and communicate errors to users, minimizing disruptions and ensuring a smooth user experience.

Capacity Planning:  Conduct regular capacity planning assessments to anticipate future resource requirements, ensuring the system can accommodate growing data volumes and user loads.

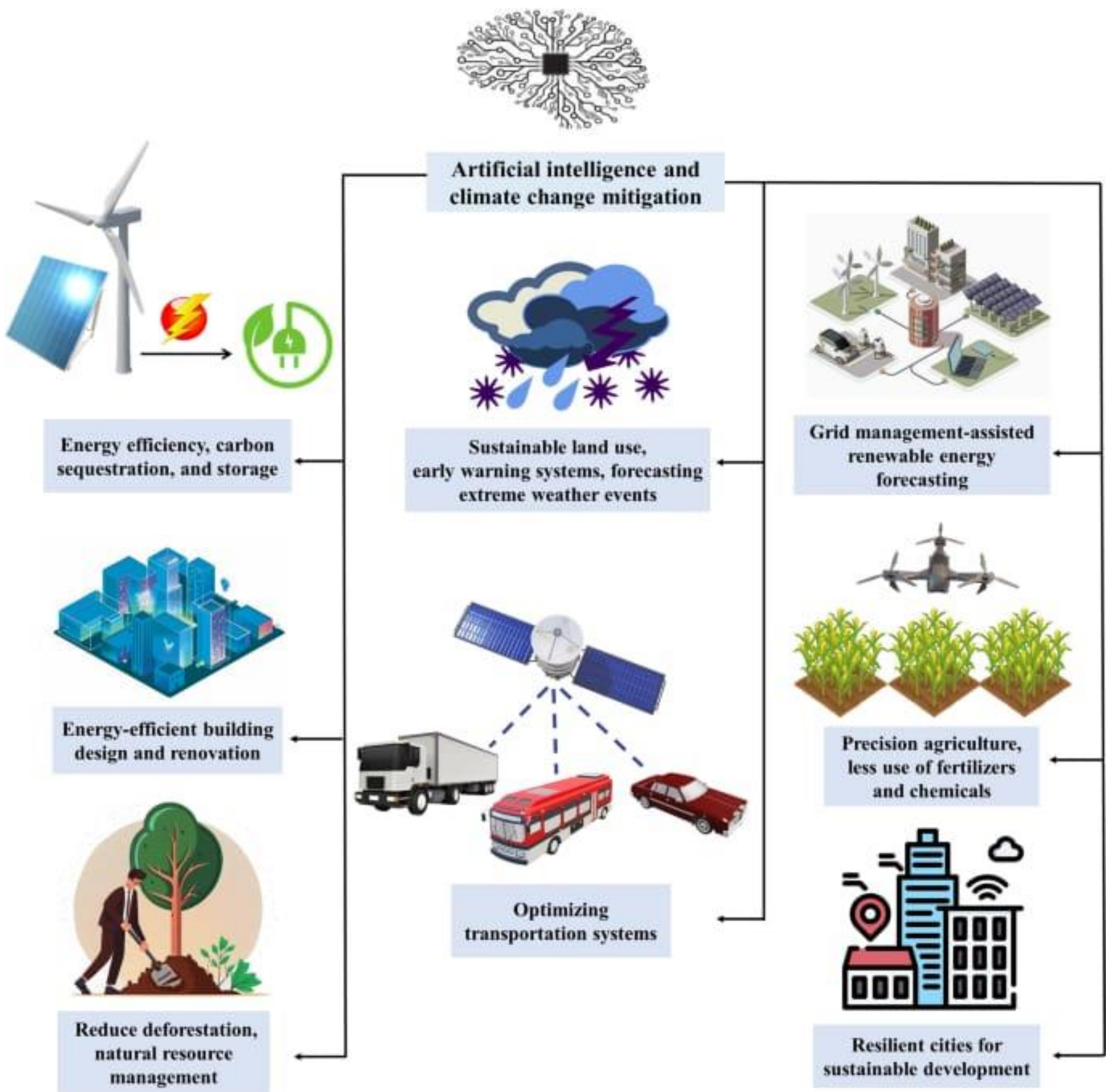
Auditability:  Enable auditing capabilities to track and log system activities, supporting accountability, compliance, and forensic analysis in case of security incidents.

## 5.PROJECT DESIGN

### 5.1  Data Flow Diagrams & User Stories:

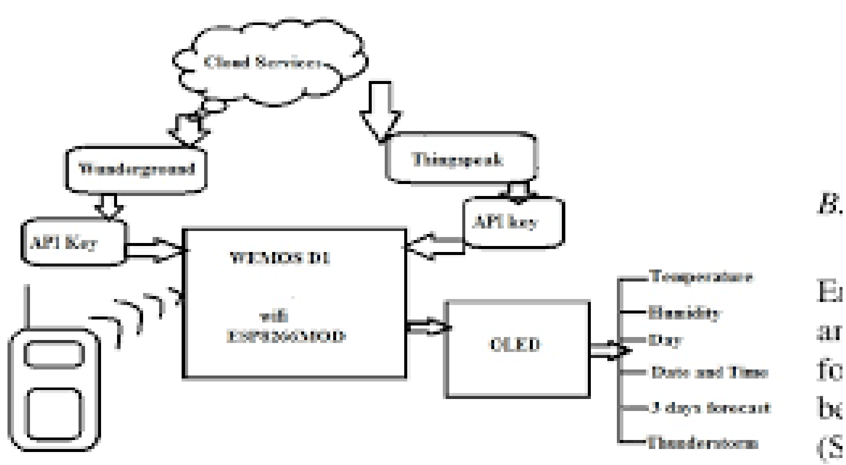



### 5.2  Solution Architecture:




# 6.PROJECT PLANNING & SCHEDULING

## 6.1 Technical Architecture:



## 6.2 Sprint Planning & Estimation:

Sprint planning is an event in scrum that kicks off the sprint. The purpose of sprint planning is to define what can be delivered in the sprint and how that work will be achieved. Sprint planning is done in collaboration with the whole scrum team.

The most important outcome for the sprint planning meeting is that the team can describe the goal of the sprint and how it will start working toward that goal. This is made visible in the sprint backlog.

Good estimation requires a trust-based environment where information is given freely, and assumptions are discussed in the pursuit of learning and improvement. If estimates are used in a negative, confrontational way after the work is completed, then it's likely that future estimates will be either be much bigger to ensure they never are wrong again or the time.

## 6.3 Sprint Delivery schedule :

Creating a sprint delivery schedule for a blockchain-based climate tracking project involves structuring the development process into a series of sprints, each with specific goals and tasks. The schedule outlined here covers seven sprints.

Sprint 1: focuses on setting up the project infrastructure, establishing the blockchain network, and creating basic user interfaces for data input.

Sprint 2: centers on implementing core features related to climate data recording, such as smart contract development and data security.

Sprint 3: aims to enhance data verification and access control, incorporating user roles and conducting security testing.

Sprint 4: extends functionality and user access by adding support for mobile applications and improving user interfaces. focuses on finalizing the system, conducting testing, and preparing for deployment, ensuring a thoroughly tested and documented vaccine tracking system.

Sprint 6: is dedicated to deployment and initial user training, including system monitoring and issue resolution.

Sprint 7: follow, focusing on continuous improvement, feature updates, scalability, and maintaining the system as it is in use.

The schedule allows for flexibility and adaptation to changing project needs. Effective communication with stakeholders throughout the process is vital to ensure alignment with their requirements and expectations. This structured approach helps manage the development of a blockchain-based climate tracking system efficiently and ensures that it evolves to meet evolving demands and challenges.

## 7.CODING & SOLUTIONING

Data Storage:

Database: Choose a database system (e.g., PostgreSQL, MongoDB) to store climate data.

Schema: Design a database schema to organize and store climate-related information.

Data Processing:

ETL (Extract, Transform, Load): Develop processes to extract data, transform it into a usable format, and load it into the database.

Data Cleaning: Implement algorithms to clean and filter noisy or inaccurate data.

Aggregation: Calculate aggregates (e.g., average temperature, precipitation totals) over specific time intervals.

Backend Development:

APIs: Create RESTful APIs to allow access to climate data.

Business Logic: Implement business logic to handle data requests, filtering, and processing.

User Authentication and Authorization: If needed, implement secure access controls.

Frontend Development:

User Interface (UI): Develop a user-friendly interface to visualize climate data.

Charts and Graphs: Use libraries like D3.js, Chart.js, or Plotly for interactive visualizations.

User Interactivity: Allow users to customize views, select date ranges, and explore data.

Notifications:

Alerts: Implement a notification system to alert users about significant climate events or changes.

Security:

Data Encryption: Ensure that sensitive data is encrypted, especially during transmission.

Access Control: Implement role-based access control to restrict data access.

Scalability:

Scaling Strategies: Plan for scalability by optimizing database queries and considering distributed systems if needed.

Technologies:

Backend: Node.js, Django, Flask, Express.js

Database: PostgreSQL, MongoDB

Frontend: React, Angular, Vue.js

Visualization: D3.js, Chart.js, Plotly

APIs: RESTful APIs for communication between frontend and backend

Authentication: JWT (JSON Web Tokens), OAuth

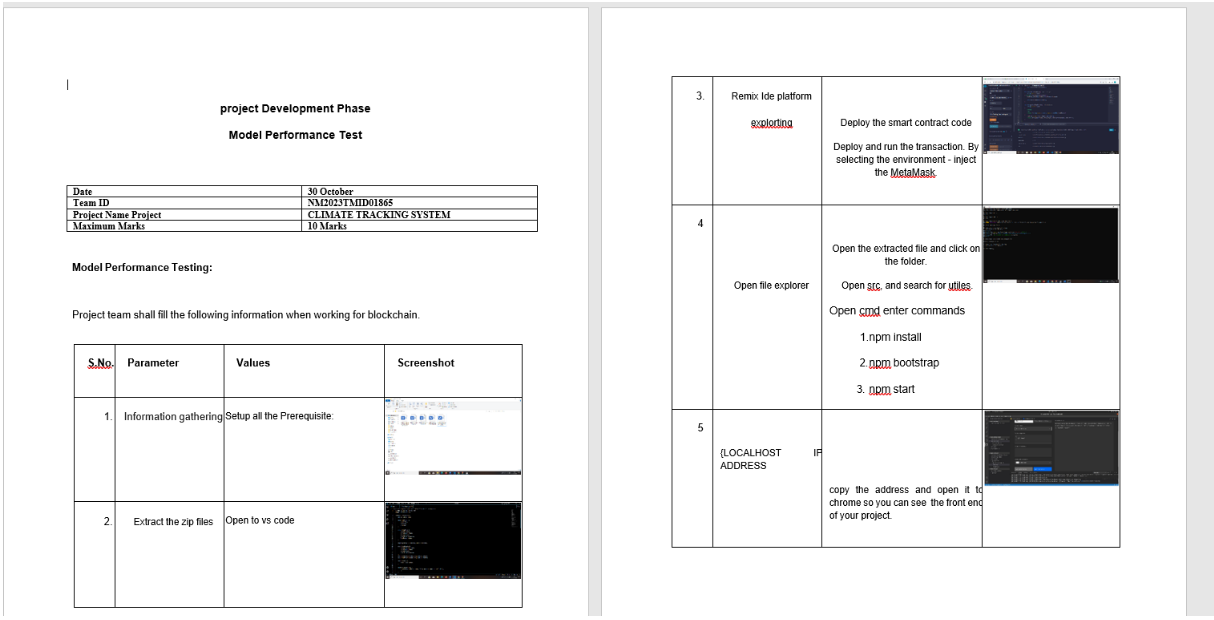
Considerations:

Data Privacy: Ensure compliance with data privacy regulations.

Performance: Optimize code and database queries for efficiency.

Documentation: Document code, APIs, and data schemas for future maintenance and development.

## 8.PERFORMANCE TETING



project Development Phase

Model Performance Test

| | |
|---|---|
| Date | 30 October |
| Team ID | NM2023TMID01865 |
| Project Name Project | CLIMATE TRACKING SYSTEM |
| Maximum Marks | 10 Marks |

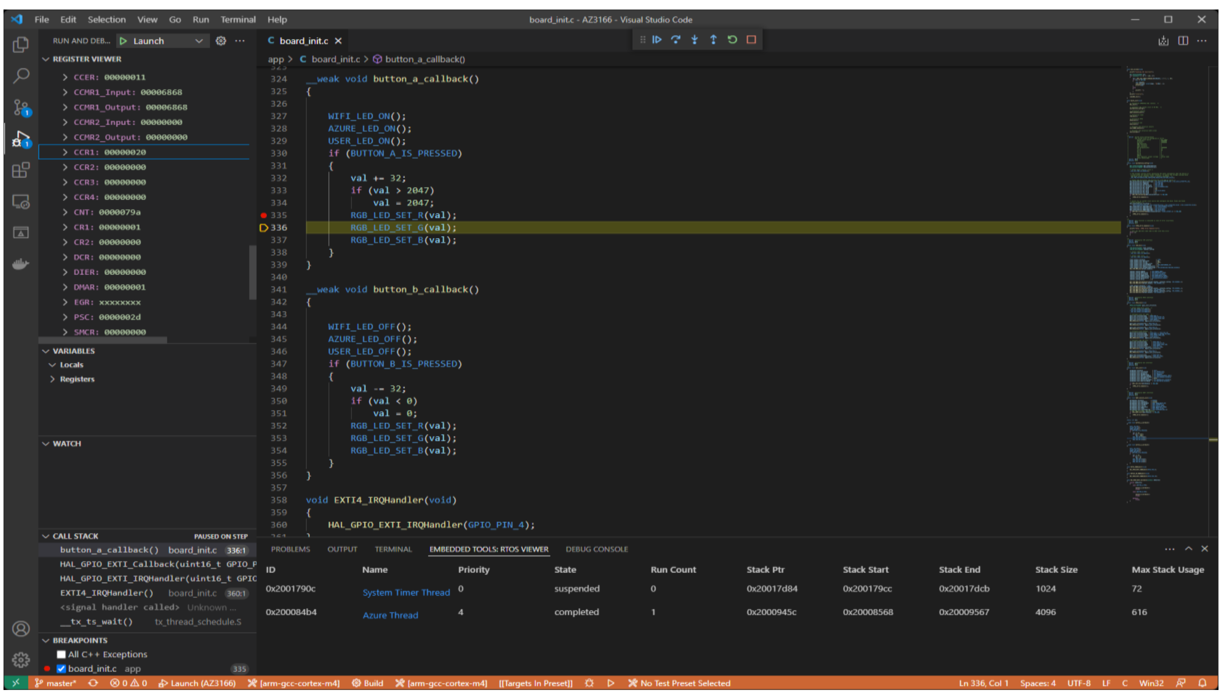
Model Performance Testing:

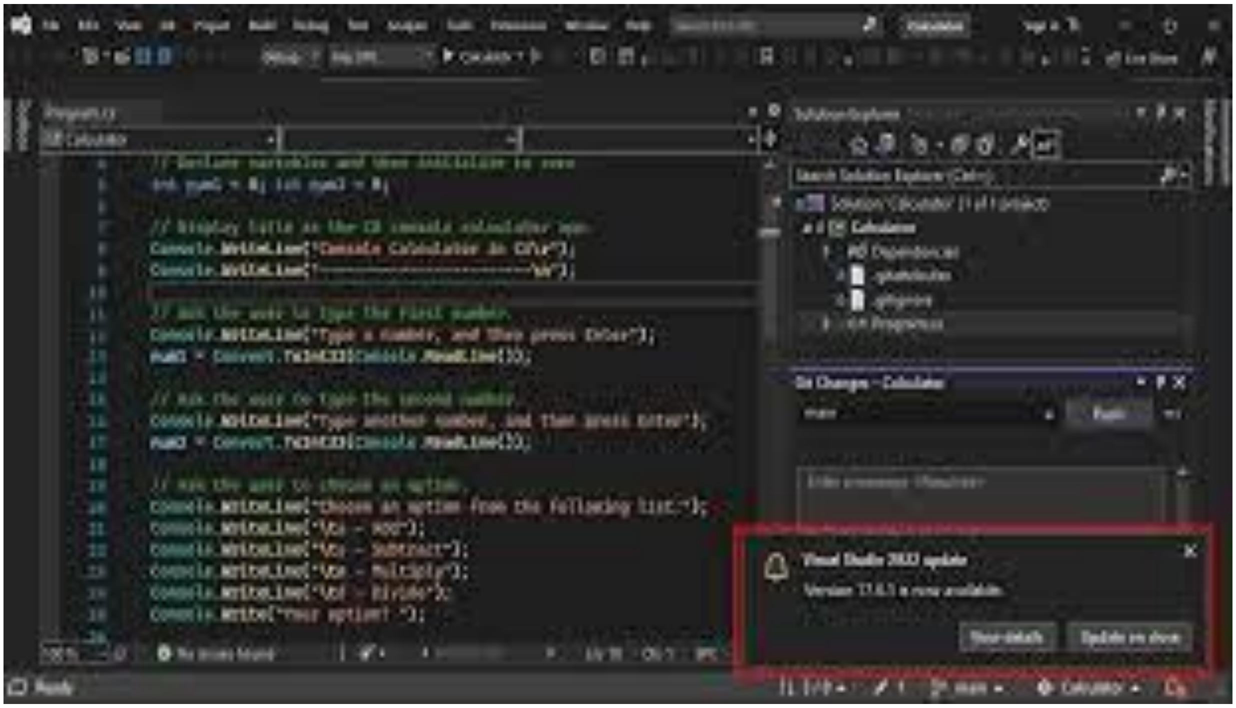
Project team shall fill the following information when working for blockchain.

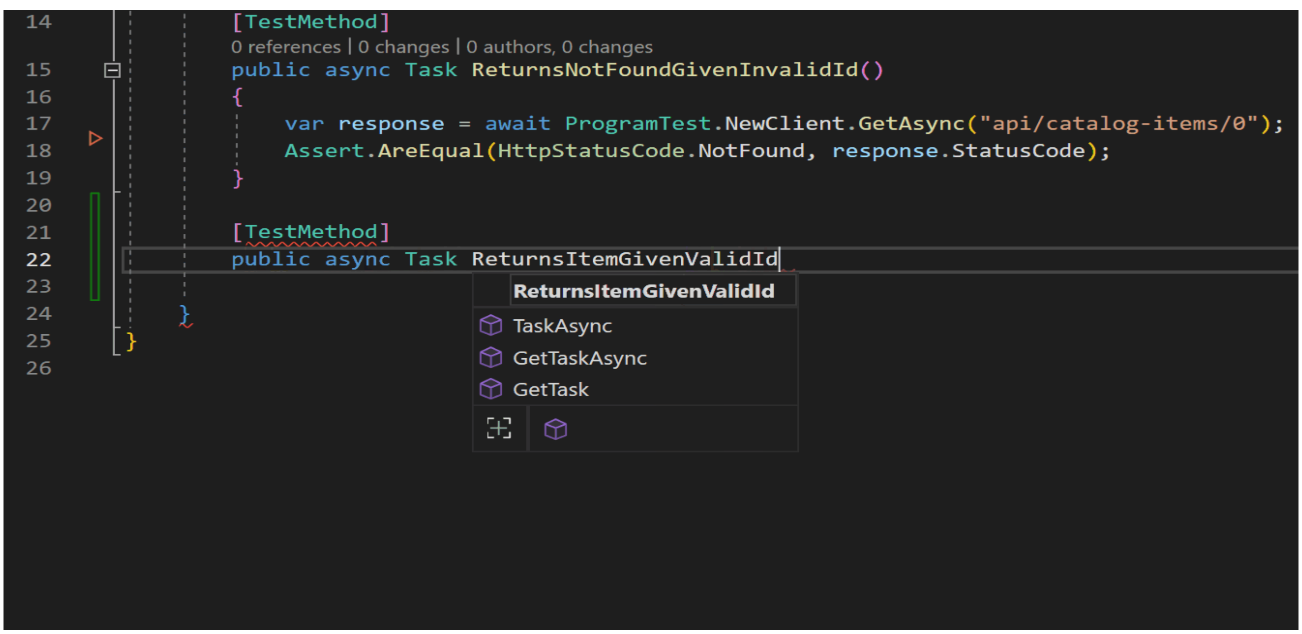
| S.No. | Parameter | Values | Screenshot |
|---|---|---|---|
| 1. | Information gathering | Setup all the Prerequisite: | |
| 2. | Extract the zip files | Open to vs code | |
| 3. | Remix Ide platform exploring | Deploy the smart contract code<br>Deploy and run the transaction. By selecting the environment - inject the MetaMask. | |
| 4 | Open file explorer | Open the extracted file and click on the folder.<br>Open src, and search for utiles.<br>Open cmd enter commands<br>1.npm install<br>2.npm bootstrap<br>3. npm start | |
| 5 | (LOCALHOST IP ADDRESS | copy the address and open it to chrome so you can see the front end of your project. | |

# 9.RESULTS

## 9.1 Output Screenshots








## 10.ADVANTAGES

Early warning and preparedness: A climate tracking system can provide early warning of severe weather conditions, allowing individuals and organizations to prepare and take appropriate measures to protect themselves and their property.

Improved decision-making: By providing accurate and up-to-date weather information, a climate tracking system can help individuals and organizations make informed decisions about activities such as farming, transportation, and outdoor events.

Resource management: A climate tracking system can help manage resources such as water, energy, and food by providing information on weather patterns and trends.

Climate change monitoring: A climate tracking system can help monitor the effects of climate change by tracking changes in temperature, precipitation, and other weather patterns over time.

**DISADVANTAGES**

Humans and wild animals face new challenges for survival because of climate change.

More frequent and intense drought, storms, heat waves, rising sea levels, melting glaciers and warming oceans can directly harm animals, destroy the places they live, and wreak havoc on people's livelihoods and communities.

Inaccurate data resulting from malfunctioning equipment, or gaps in coverage caused by lack of equipment, distort results and can lead to erroneous forecasting.

## 11.CONCLUSION:

Climate change is the most significant problem facing the world. Global warming is increasing day by day. If we cannot prevent it as soon as possible, our world will face undesirable consequences. helps us predict how much rain the next winter might bring, or how far sea levels will rise due to warmer sea temperatures. We can also see which regions are most likely to be affected by extreme weather, or which wildlife species are threatened by Climate researchers utilize a variety of direct and indirect measurements to investigate Earth's climate history comprehensively. Direct measurements include data from satellites in space, instruments on the International Space Station, aircraft, ships, buoys, and ground-based instruments.

## 12.FUTURE SCOPE:

Future changes are expected to include a warmer atmosphere, a warmer and more acidic ocean, higher sea levels, and larger changes in precipitation patterns. The extent of future climate change depends on what we do now to reduce greenhouse gas emissions. The more we emit, the larger future changes will be.

India has the world's highest social cost of carbon. A report by the London-based global think tank Overseas Development Institute found that India may lose anywhere around 3–10% of its GDP annually by 2100 and its poverty rate may rise by 3.5% in 2040 due to climate change.

Natural influences on climate (e.g., from volcanic activity and changes in the sun's intensity) and natural processes within the climate system (e.g., changes in ocean circulation patterns)

## 13.APPENDIX:

## SOURCE CODE:

```
pragma solidity ^0.8.0;

contract climateChange{
struct ClimateData {
 uint timestamp;
 string details;
}

mapping(address => ClimateData) public climateRecords;

function addClimateData(string memory details) public {
 ClimateData memory newData = ClimateData(block.timestamp, details);
 climateRecords[msg.sender] = newData;
}

function getClimateData() public view returns (ClimateData memory) {
 return climateRecords[msg.sender];
}

function updateClimateData(string memory details) public {
 climateRecords[msg.sender].details = details;
}

// These are very basic functions written to carry out the operation

}
```

## GITHUB & PROJECT DEMO LINK