

**MACHINE LEARNING BASED AUTOMATED CONSTRUCTION
PLANNING SYSTEM FOR SRI LANKA**

Group ID: RPJ_24-25J-201

Research Logbook

Silva A.A.I - IT21301254

B.Sc. (Hons) Degree in Information Technology Specialization in
Information Technology

Department of Information Technology


Sri Lanka Institute of Information

Technology Sri Lanka

June 2025

DECLARATION

I declare that this is my own work, and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Name	Student ID	Signature
Silva A.A.I	IT21301254	

The supervisor/s should certify the proposal report with the following declaration.
The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

.....
Signature of the Supervisor
(Mr. N.H.P. Ravi Supunya Swarnakantha)

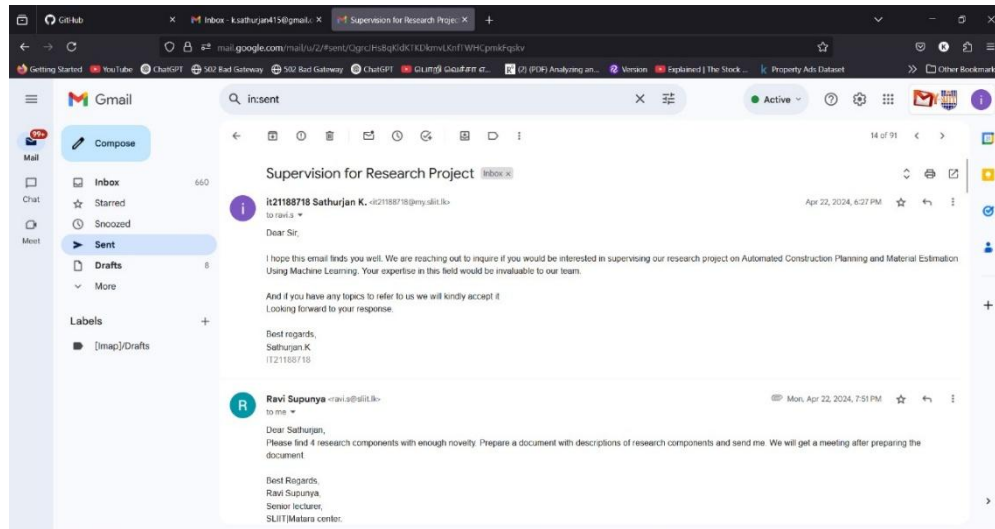
.....
Date

.....
Signature of the Co-Supervisor
(Dr. Dharshana Kasthurirathna)

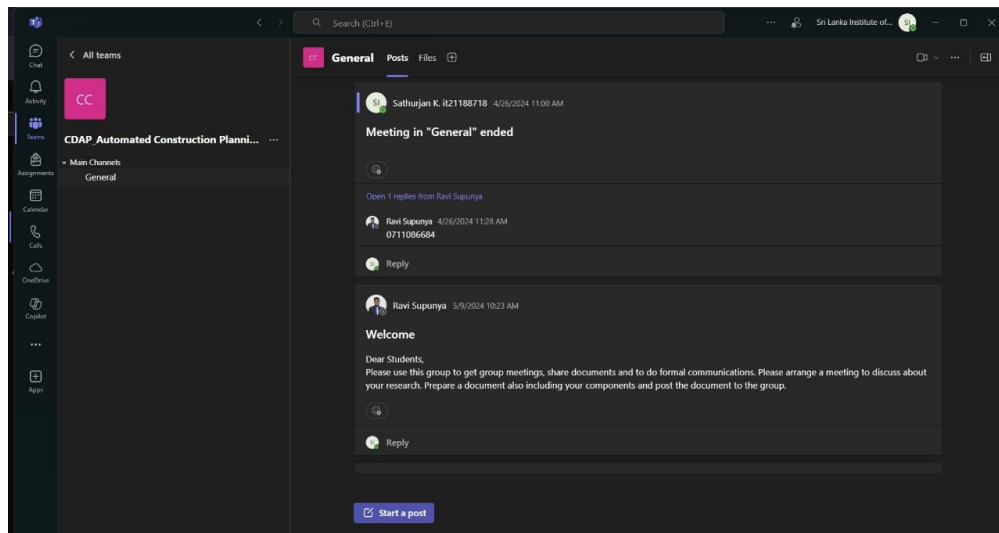
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Date

Tasks

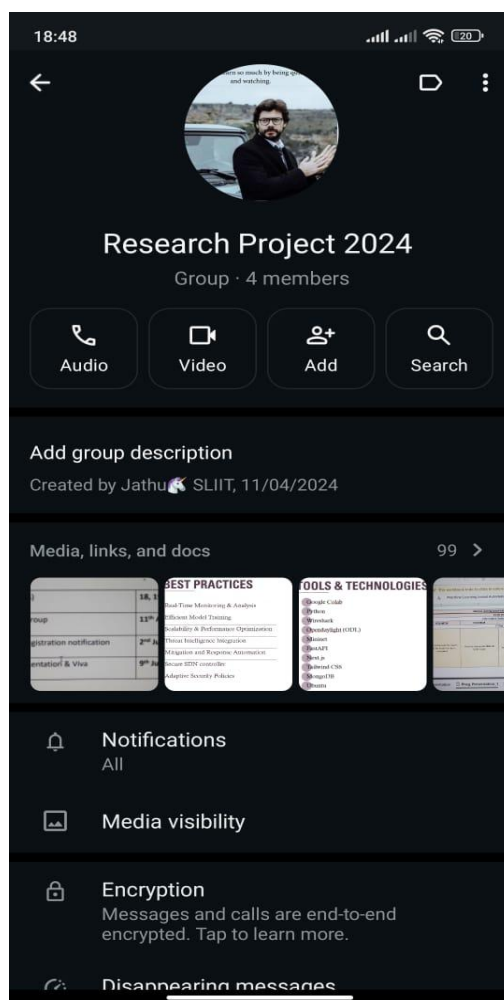
- ❖ Supervisor accept the Topic through the mail and check the send the details about topic.



- ❖ Meeting with the supervisor to discuss the project topic for the first time.
 - Meet the supervisor online.
 - Discuss the research project topic area.
 - Get the supervisor's ideas about the research topic.

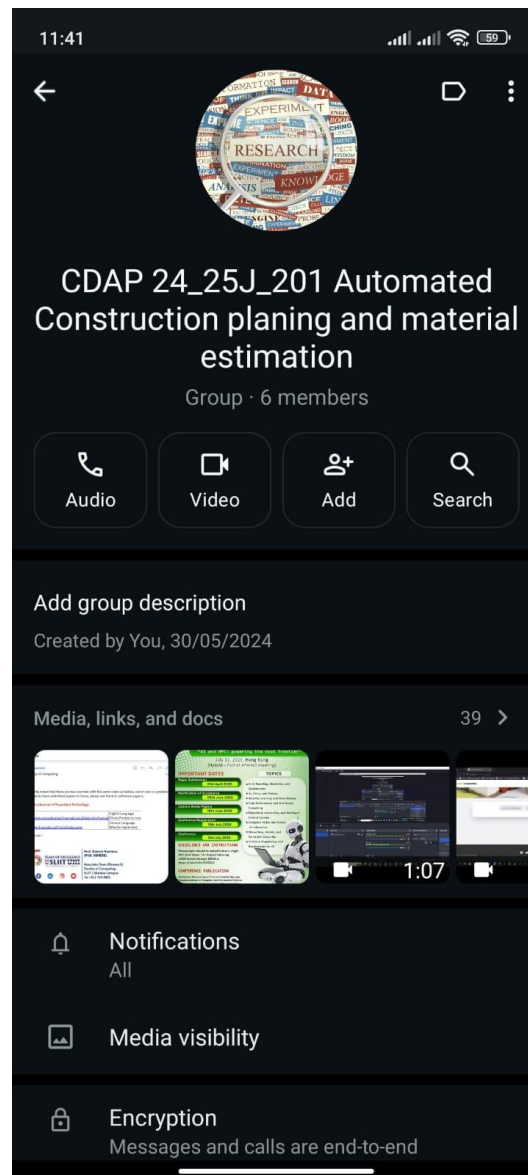


❖ Created separate WhatsApp Group for Conversation with team members.



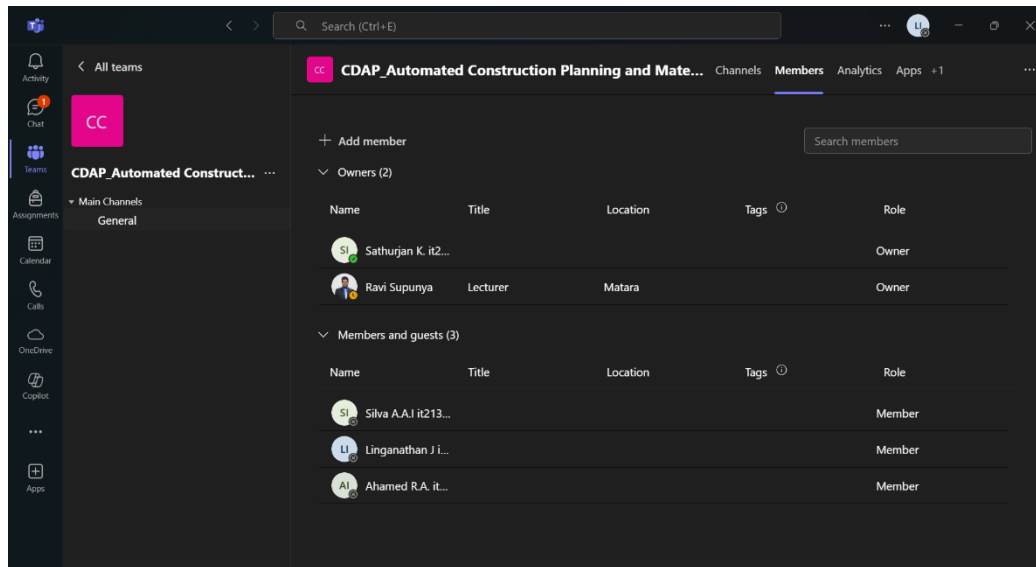
❖ Created the Research Team WhatsApp Group.

- Discuss the research topic with team members.
- Discuss the research problem.
- Get the solution ideas with brainstorming sessions.
- Identify the main solutions.
- Assign tasks and conversation highlights.



❖ Created a separate MS Teams channel with Supervisor conversation.

- Assign tasks and conversation highlights.
- Completed task and conversation highlights.



❖ Completed Task and Conversation Highlights

- Contacting Mr.Supunya Swarnakantha and Dr.Dharshana Kasthurirathna regarding the research topic.
- Writing a literature survey about the topic as requested by Mr.Supunya Swarnakantha.
- Narrowing of the scope as suggested by the Supervisor and Co-Supervisor.
- Submit proposal draft document.
- Changing the draft submission upon the advice of the supervisor.
- Accepting the proposal document.

...
X

CDAP 24_25J_201 Automated Construction planning and material estimation

✓ **Create Project Charter**
Completed on 36 minutes ago by you

LI

SI

SI

AI

High

Documentation

Bucket

Done

Progress

Completed

Priority

Medium

Start date

05/13/2024

Due date

05/24/2024

Repeat

Does not repeat

Notes

Show on card

After the TAF Submission , We received our research project panel feedback with minor changes. According to the feedback given by the panel to TAF, we changed it, obtained supervisor and co-supervisor signature and submitted it before the due date.

...
X

CDAP 24_25J_201 Automated Construction planning and material estimation

✓ **Project proposal individual report**
Completed on today by Sathurjan K. it21188718

LI

SI

SI

AI

Documentation

Bucket

Done

Progress

Completed

Priority

Medium

Start date

08/10/2024

Due date

08/23/2024

Repeat

Does not repeat

Notes

Show on card

Create an individual Project Charter Report for adding overall Project details with research gap in our components

❖ Completed Task and Conversation highlights.

- Creating the proposal document at supervisor request.
- Doing a literature review upon supervisor request.

1.4 Research Problem

The construction and real property sectors in Sri Lanka face significant inefficiencies due to guide approaches, previous methodologies, and terrible communication, main to delays, fee overruns, and faulty predictions. These challenges are specifically reported in 4 key regions, which these studies goals to deal with:

First off when picking out solar panels, folks don't have the right gear to figure out the best ones based on how big their land is where it's at, or the weather around them. This makes it hard to get the kind of energy setup that does the job well. The stuff out there now, from references isn't cutting it because it doesn't give advice that considers Sri Lanka's hot and wet weather, with all its rainy seasons and sticky air messing with how well solar panels do their thing.

Second, folks dealing with property in Colombo find it tough to guess prices right because they change so much. The old way of doing things just isn't cutting it, with all the different types of houses and places making it even harder to nail down the best moves for putting your money into property. The current ways—stuff from sources just isn't built for the ups and downs of Sri Lanka's money scene so the price guesses they make aren't too solid.

As for the third bit figuring out how much it's going to cost to build stuff is super tricky. The way people do it now just doesn't factor in all the changing prices for stuff you need, like materials and people to do the work. In Sri Lanka, the cash situation is all over the place so not getting this right means you could end up spending way more than you thought. The tools folks have right now, those things from just can't keep up with all the changes as they happen, and that's just making everything worse.

In the end, teaming up on interior design projects hits a snag when clients and designers don't speak the same language about tech stuff. Clients can't get their technical tastes across, which messes things up and slows everything down. The platforms out there, like numbers 16 to 20, haven't got the high-tech AI needed to fix this problem. So, the design workflow in Sri Lanka isn't as smooth or happy as it could

These challenges are combined by Sri Lanka's unique socio-economic and environmental context, which fails to address the existing systems widely. Economic instability, such as inflation rate in recent years, directly affects the price of material costs and real estate, though most ML models are not designed to control such instability. Similarly, with tropical climates, with its rain and moisture, affects the efficiency and timelines of the solar panel, but solar recommendation systems are rarely responsible for these factors in terms of Sri Lanka.

Moreover, lack of integration in these fields creates a fragmented approach to construction planning. For example, the decision to install solar panels affects construction costs, though

❖ Proposed AI-Powered Interior Design Collaboration Platform.

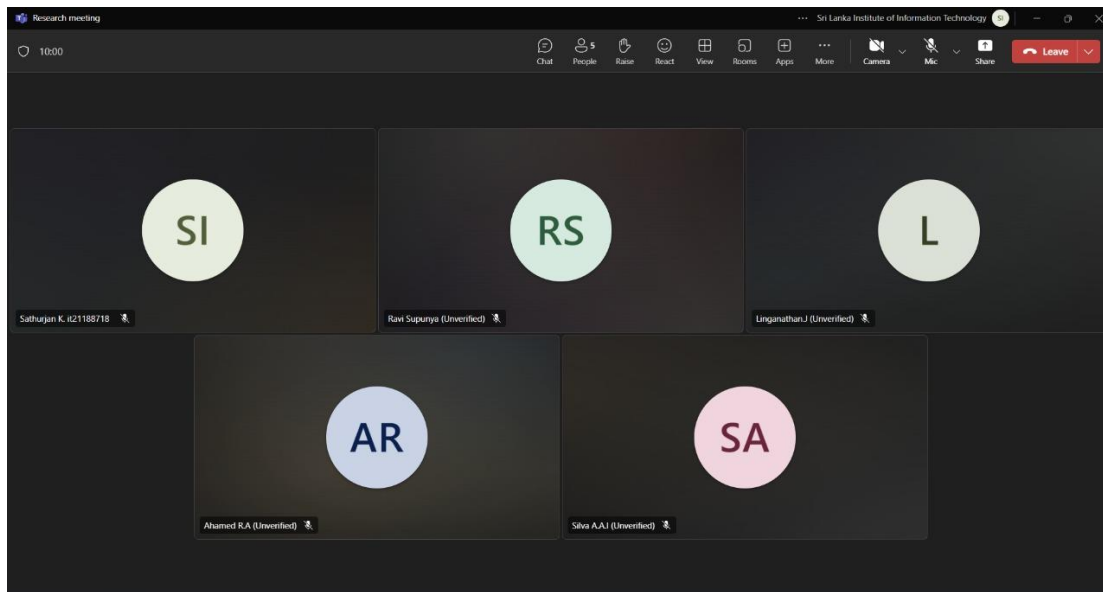
Member 4

**Silva A.A.I
IT21301254**

- The main purpose of the AI-Driven Interior Design component is to provide users with automated interior space transformation and design recommendations based on their aesthetic preferences, color schemes, and furniture styles. This allows users to visualize multiple design alternatives efficiently without requiring professional design expertise.
- The system uses advanced algorithms such as Stable Diffusion models for image-to-image transformation, VGG16 convolutional neural networks for feature extraction, and nearest [neighbors](#) algorithms to generate customized designs and recommend similar interior styles based on user preferences.
- Users input key design parameters such as base interior images, preferred color tones, furniture styles, architectural preferences (Modern, Classic, Art Deco, Scandinavian, etc.), and custom design requirements through an intuitive web interface.
- The data is processed using trained ML models including Stable Diffusion for design generation and VGG16-based feature extraction that identify patterns and style characteristics from a comprehensive dataset of over 4,000 interior design images across multiple architectural styles.
- A customized design visualization is generated for the user's space, transformed according to their specified parameters, with processing times averaging 6-8 seconds per generation while maintaining structural integrity and spatial relationships.
- The system presents detailed design alternatives with style recommendations, including similar design suggestions ranked by relevance, downloadable high-resolution outputs, and interactive customization options for iterative refinement.
- Optional style exploration tools allow users to browse curated galleries of different architectural styles and receive personalized recommendations based on their design history and preferences.
- Overall, the AI-Driven Interior Design system enhances accessibility and efficiency in interior design visualization. It assists users in making informed design decisions by combining cutting-edge generative AI technology with intelligent recommendation algorithms, reducing design exploration time by 90-95% compared to traditional methods.

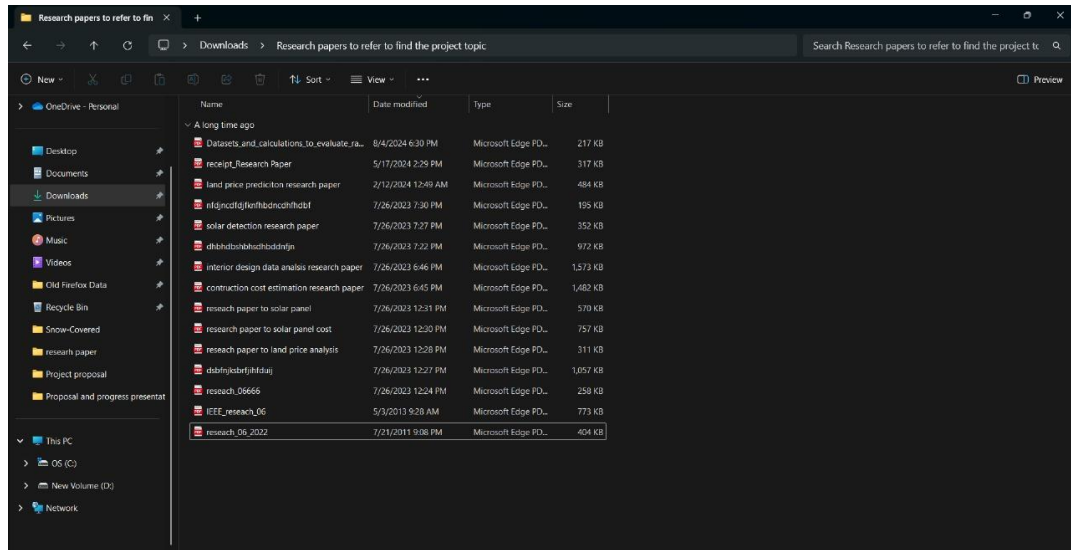
❖ Completed Task and Conversation Highlights.

- Determining the components for each member and discussing with the Supervisor.
- Fine tuning the scope for each component.
- Discussing the proposed components with Supervisor.



❖ Completed Task and Conversation Highlights.

- Find the Related research paper for individual AI-Powered Interior Design Collaboration Platform.
- Get a full idea of each research paper.
- Mark down the not covering Interior Design Collaboration
- Estimation areas in these research papers.
- Identify the novelty parts of each individual component.
- Creating the Topic Assignment Form (TAF)
- Getting the approval from the Supervisor.



VI. REFERENCES

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- [15] P. F. Katiraei, P. L. Ping, and W. Li, "Machine learning-based prediction models for solar panel performance evaluation," in *Proc. IEEE Int. Conf. Smart Grid Communications (SmartGridComm)*, pp. 162-169, 2020.
- [16] S. Das, A. Dutta, and A. B. Mandal, "Cost-effective solar power system design using predictive analytics," *IEEE Transactions on Sustainable Energy*, vol. 12, pp. 2942-2951, 2021.
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IT4010 – Research Project - 2024

Topic Assessment Form

Project ID:

24-25J-201

1. Topic (12 words max)

Machine Learning based Automated Construction Planning system for Sri Lanka

2. Research group the project belongs to

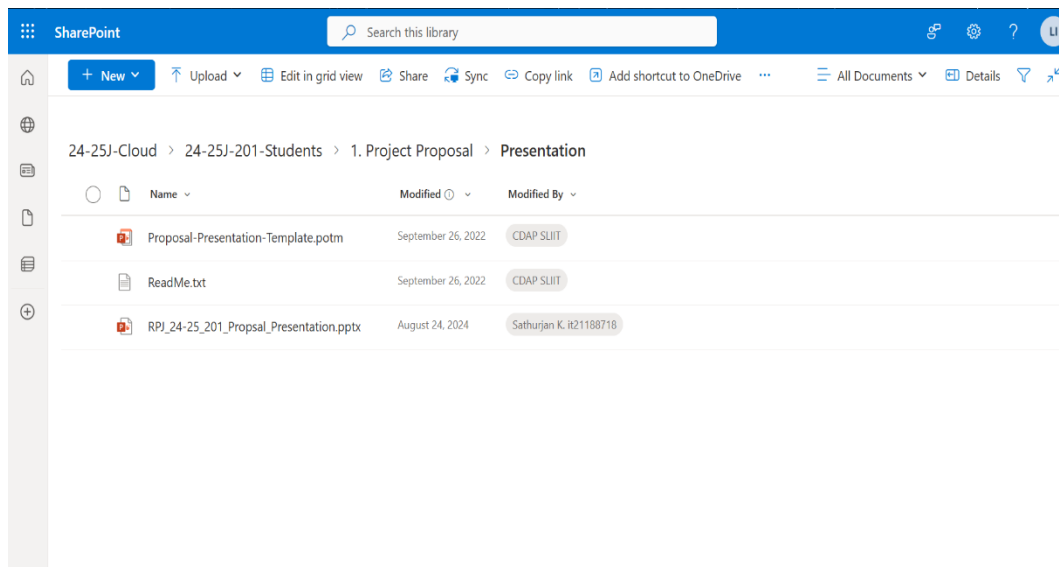
Software Systems & Technologies (SST)

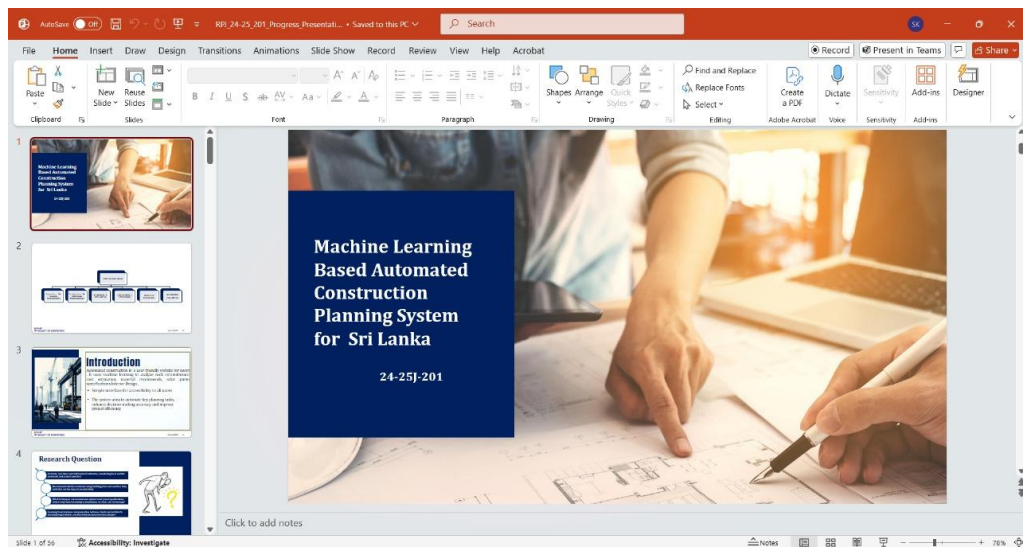
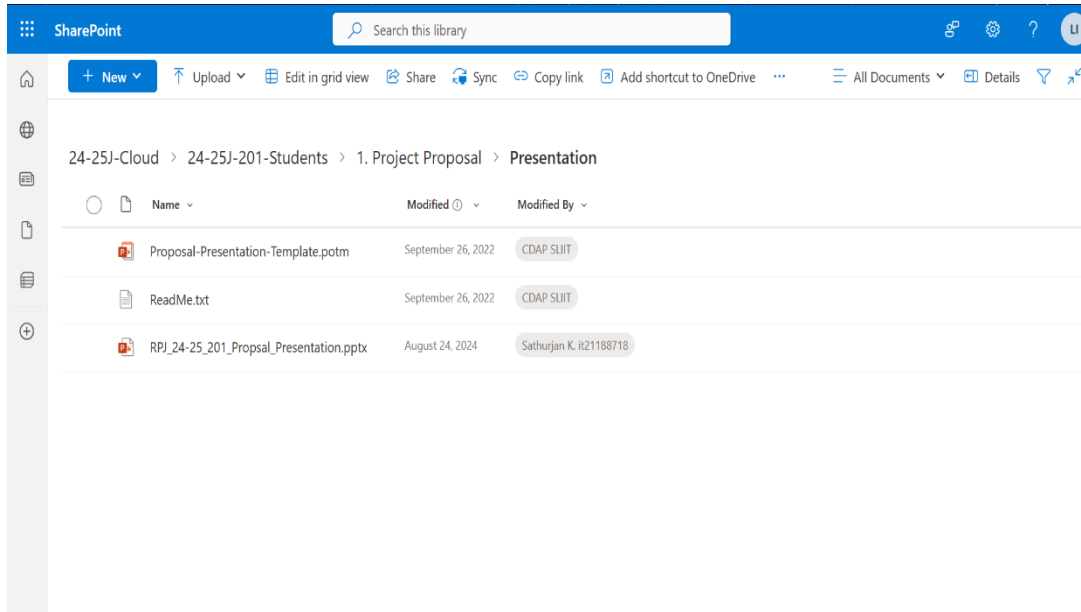
3. Research area the project belongs to

ICT for Development (ICTD)

❖ Complete Task and Conversation Highlights.

- Finalizing the components and getting ready for the progress presentation.
- Discussion the project with the supervisor before the proposal presentation.







❖ Complete Task and Conversation Highlights


- Reading research papers related to time series prediction.
- Reading documentation of Interior Design Collaboration and understanding which data set could be taken.
- Developing different models for prediction of time series.

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CDAP 24_25J_201 Automated Construction planning and material estimation

✓ **Implement the Model implemet to interior design**
Completed on yesterday by Linganathan J it21223808

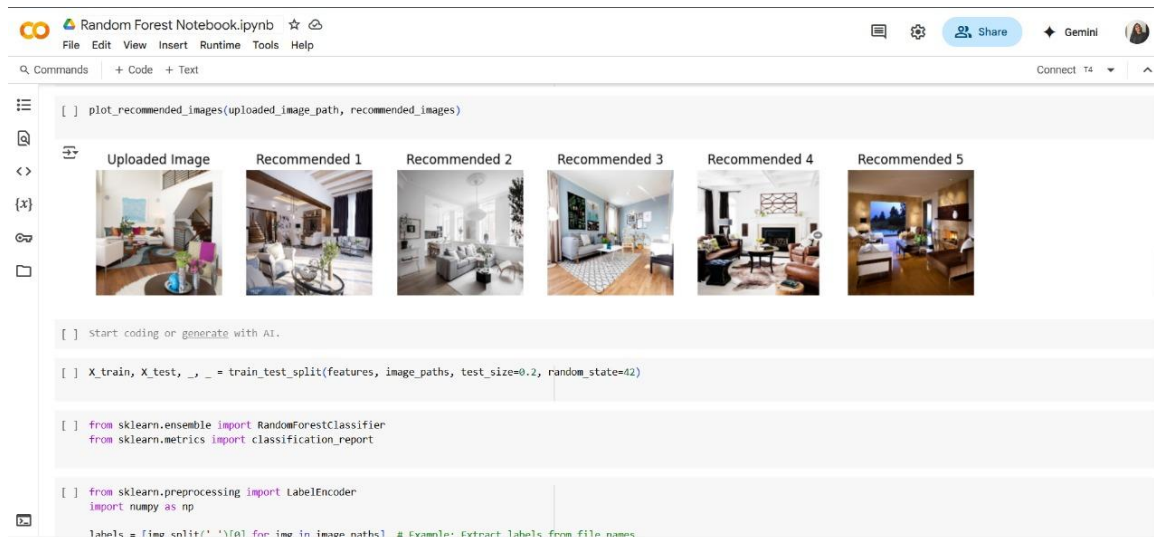
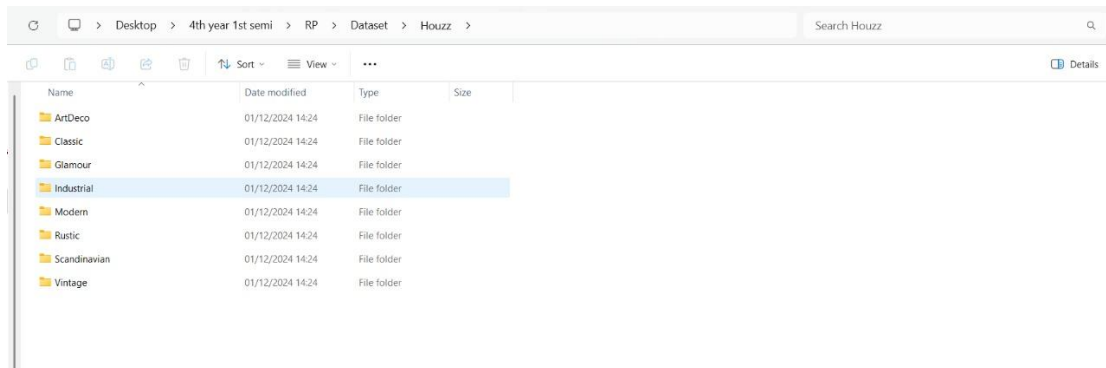
  Silva A.A.I it21301254

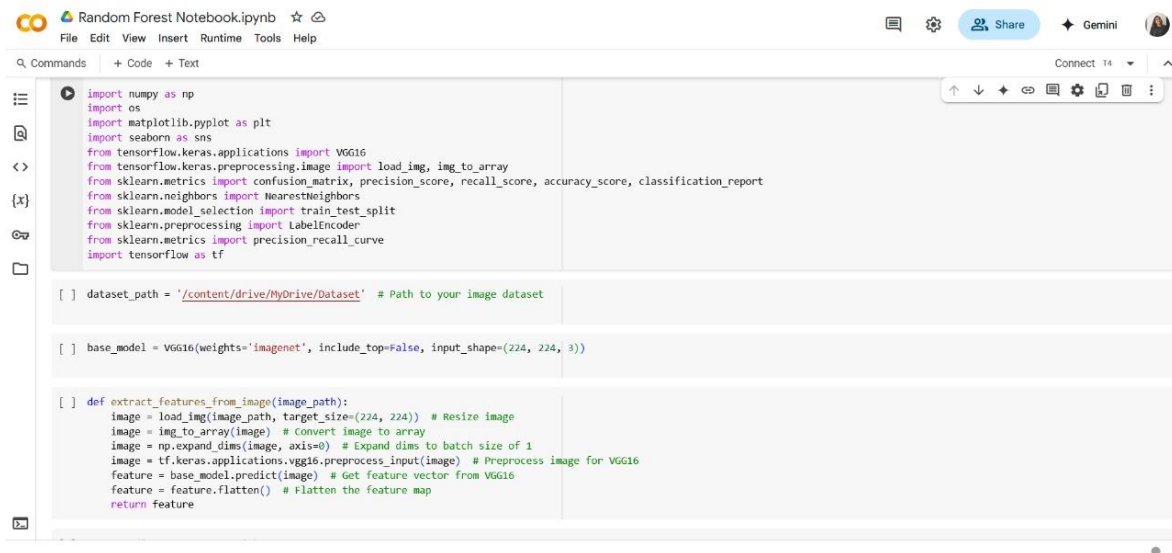


Bucket	Progress	Priority
<div>In progress</div>	<div>✓ Completed</div>	<div>• Medium</div>
Start date	Due date	Repeat
<div>Start anytime</div>	<div>03/16/2024</div>	<div>↺ Does not repeat</div>

❖ Completed Task and Conversation Highlights

- Finding the sample dataset until system develop.
- Discussing with the supervisor the potential model and its accuracy and which model we should proceed with for the prediction.



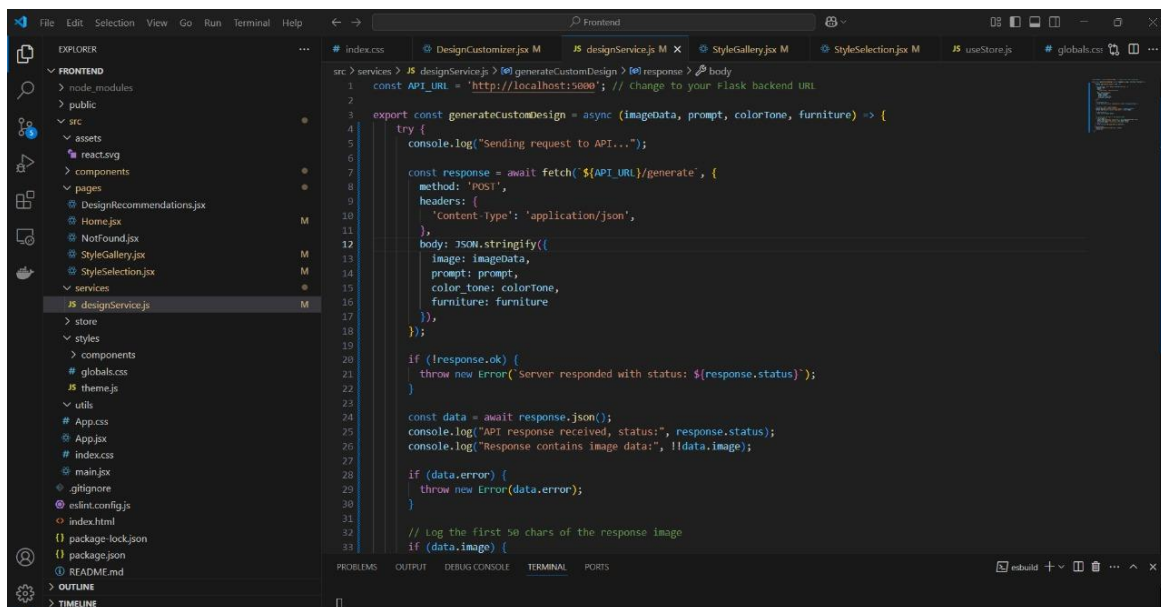


```
import numpy as np
import os
import matplotlib.pyplot as plt
import seaborn as sns
from tensorflow.keras.applications import VGG16
from tensorflow.keras.preprocessing.image import load_img, img_to_array
from sklearn.metrics import confusion_matrix, precision_score, recall_score, accuracy_score, classification_report
from sklearn.neighbors import NearestNeighbors
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.metrics import precision_recall_curve
import tensorflow as tf

[ ] dataset_path = '/content/drive/MyDrive/Dataset' # Path to your image dataset

[ ] base_model = VGG16(weights='imagenet', include_top=False, input_shape=(224, 224, 3))

[ ] def extract_features_from_image(image_path):
    image = load_img(image_path, target_size=(224, 224)) # Resize image
    image = img_to_array(image) # Convert image to array
    image = np.expand_dims(image, axis=0) # Expand dims to batch size of 1
    image = tf.keras.applications.vgg16.preprocess_input(image) # Pre-process image for VGG16
    feature = base_model.predict(image) # Get feature vector from VGG16
    feature = feature.flatten() # Flatten the feature map
    return feature
```



```
const API_URL = 'http://localhost:5000'; // change to your flask backend URL

export const generateCustomDesign = async (imageData, prompt, colorTone, furniture) => {
  try {
    console.log("Sending request to API...");

    const response = await fetch(`${API_URL}/generate`, {
      method: 'POST',
      headers: {
        'Content-Type': 'application/json',
      },
      body: JSON.stringify({
        image: imageData,
        prompt: prompt,
        color_tone: colorTone,
        furniture: furniture
      })
    });

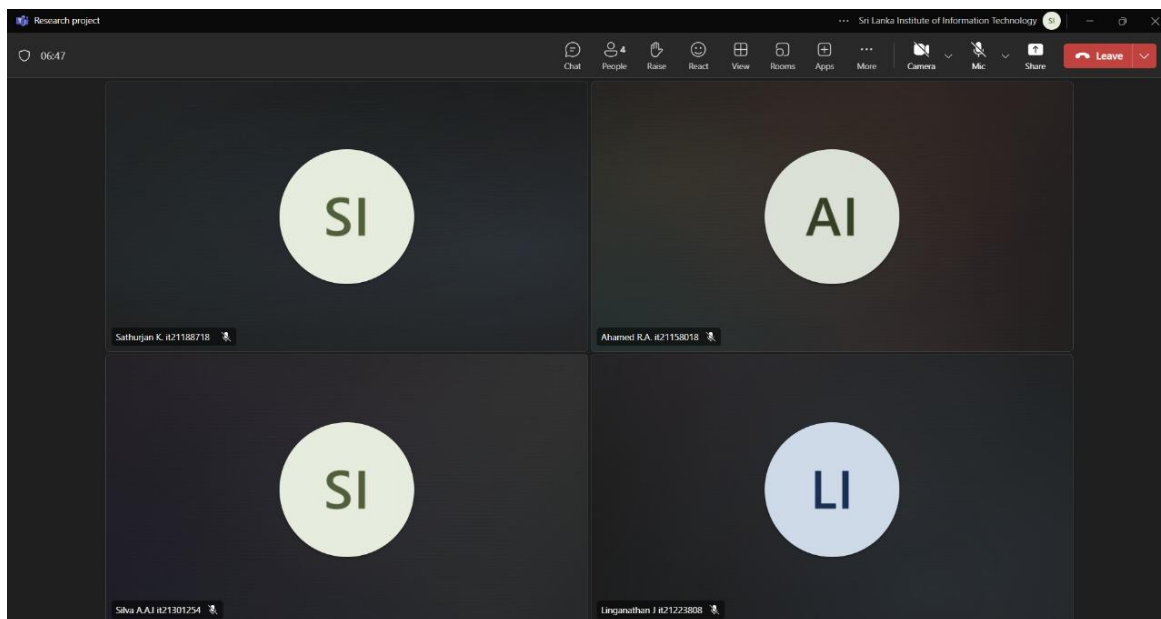
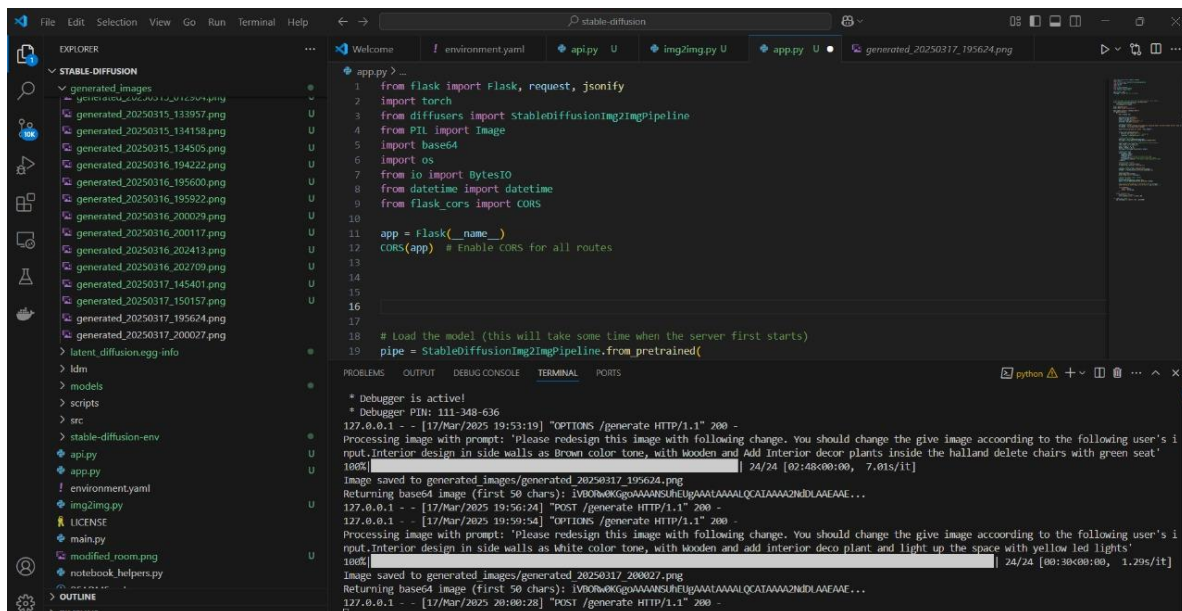
    if (!response.ok) {
      throw new Error("Server responded with status: ${response.status}");
    }

    const data = await response.json();
    console.log("API response received, status:", response.status);
    console.log("Response contains Image data:", !!data.image);

    if (data.error) {
      throw new Error(data.error);
    }

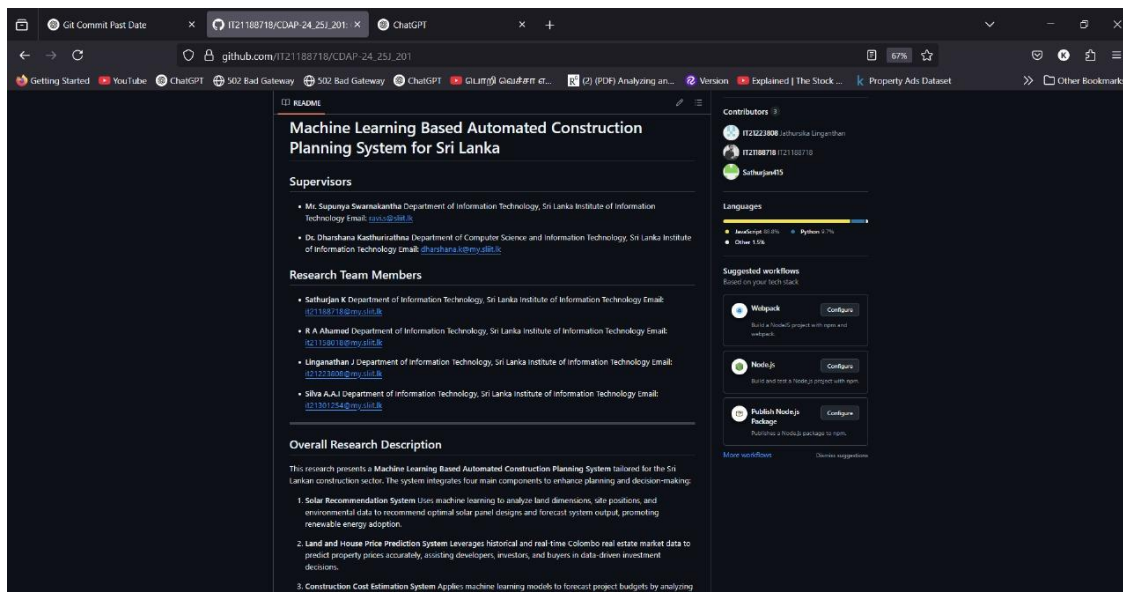
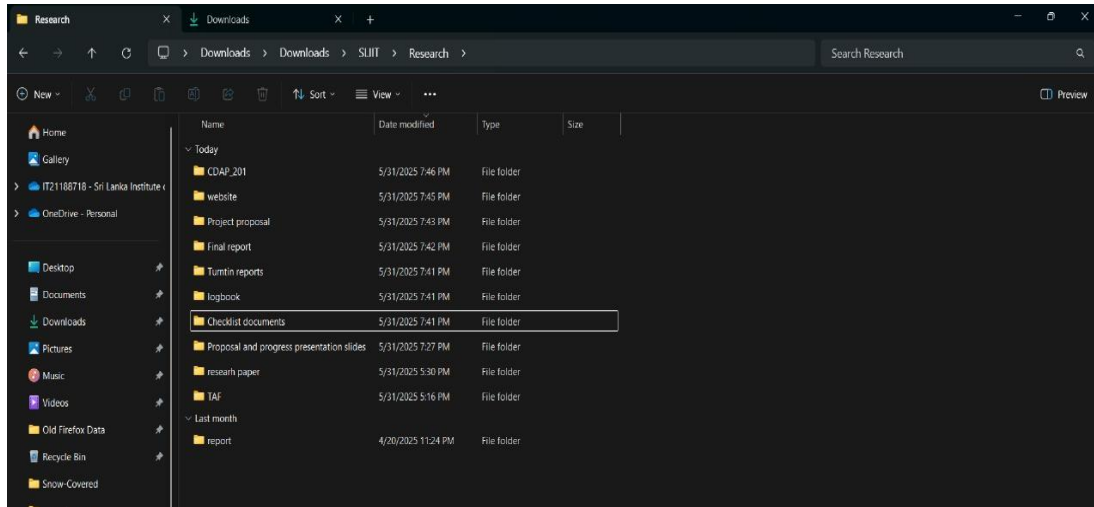
    // Log the first 50 chars of the response image
    if (data.image) {

```

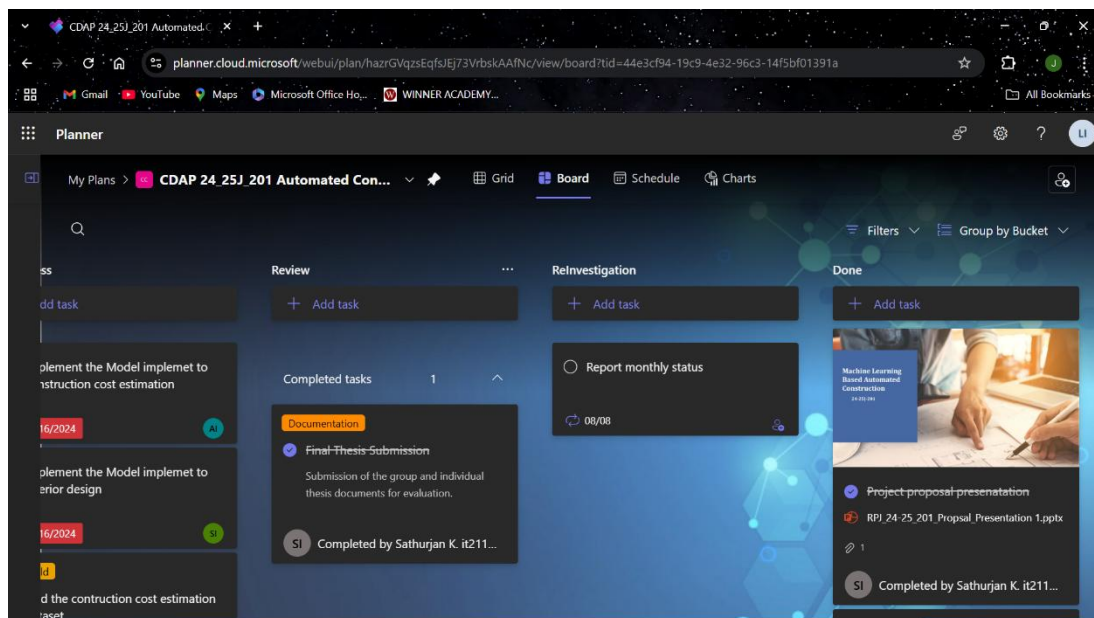
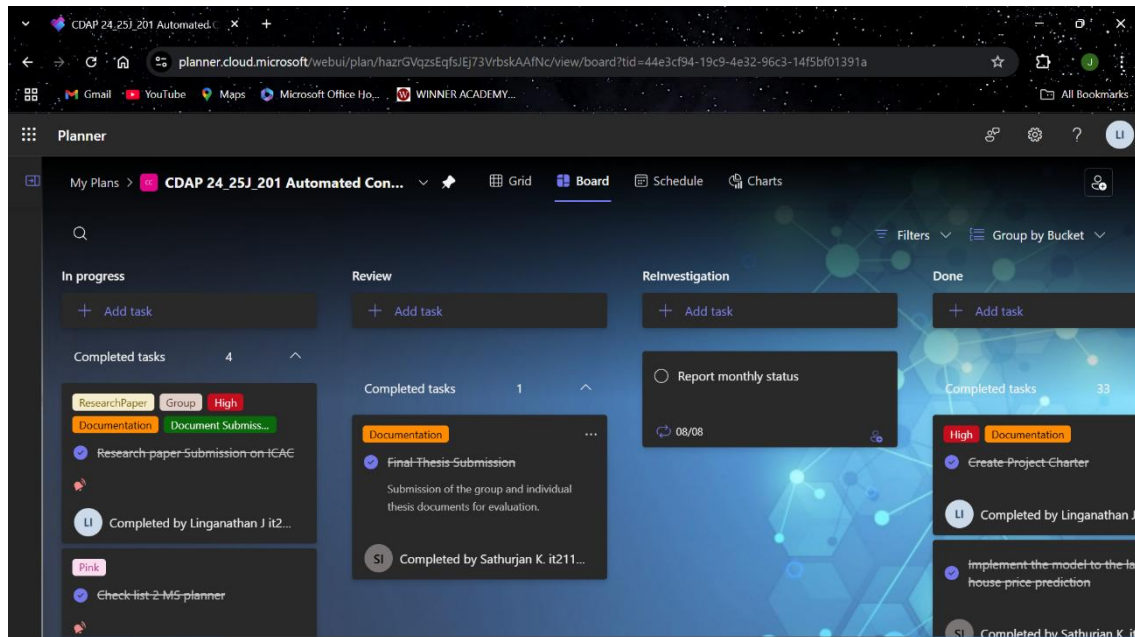
❖ Complete Tasks and Conversation Highlights

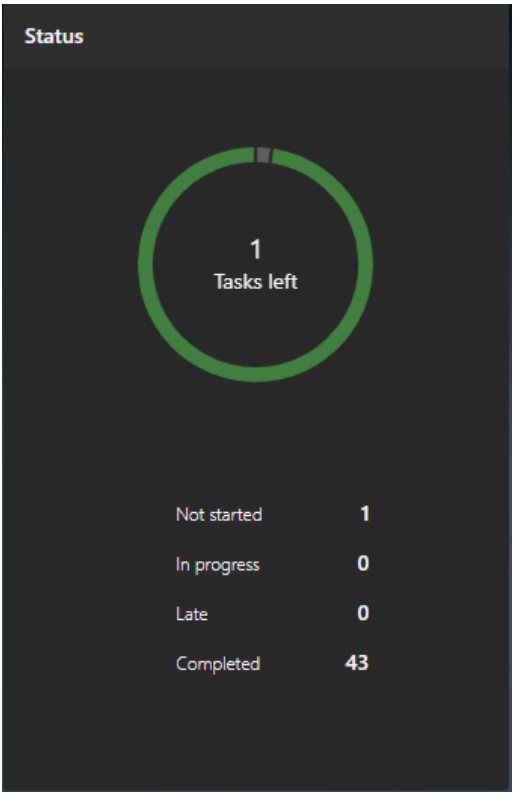
- Creating initial project folder structure.
- Adding the readme files, configuration files and setup instructions for the project.
- Initializing the startup scripts.

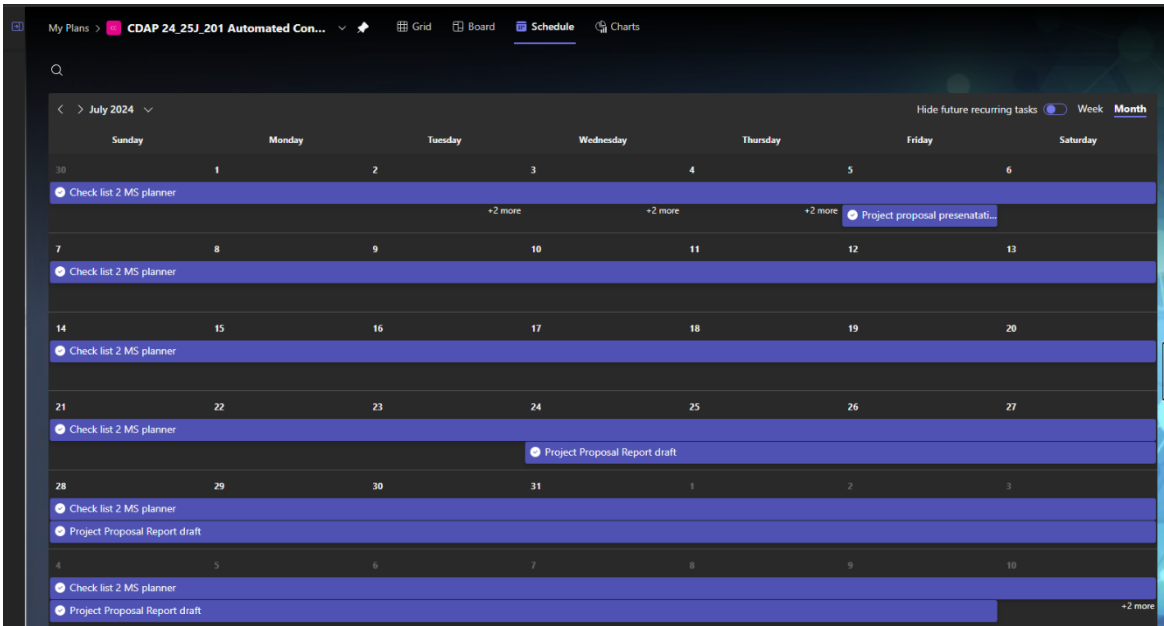
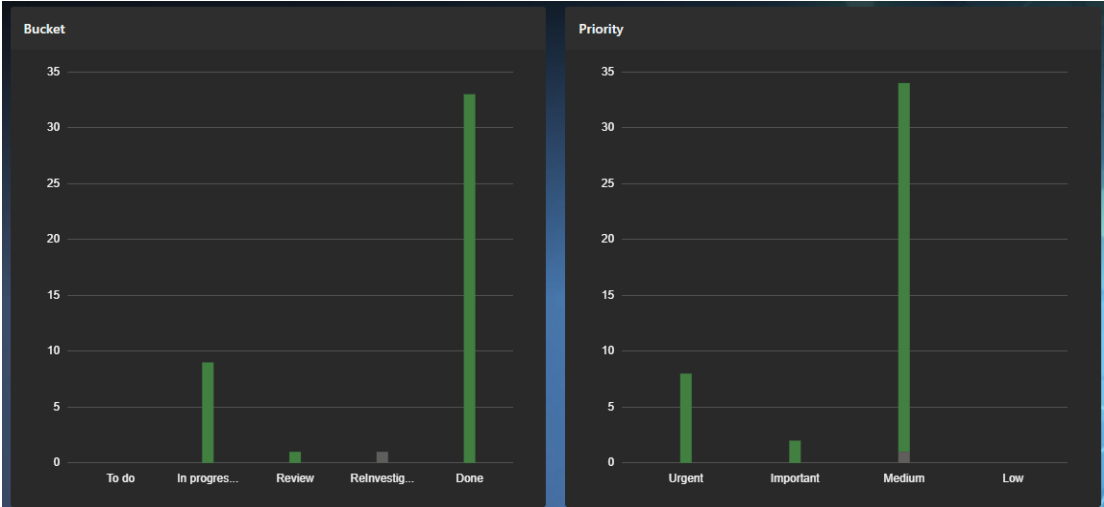


❖ Complete Tasks and Conversation Highlights

- Meeting with the research team and deciding the implementation milestone on Microsoft planner.
- The tasks were labeled so that it's easy to filter the important tasks.

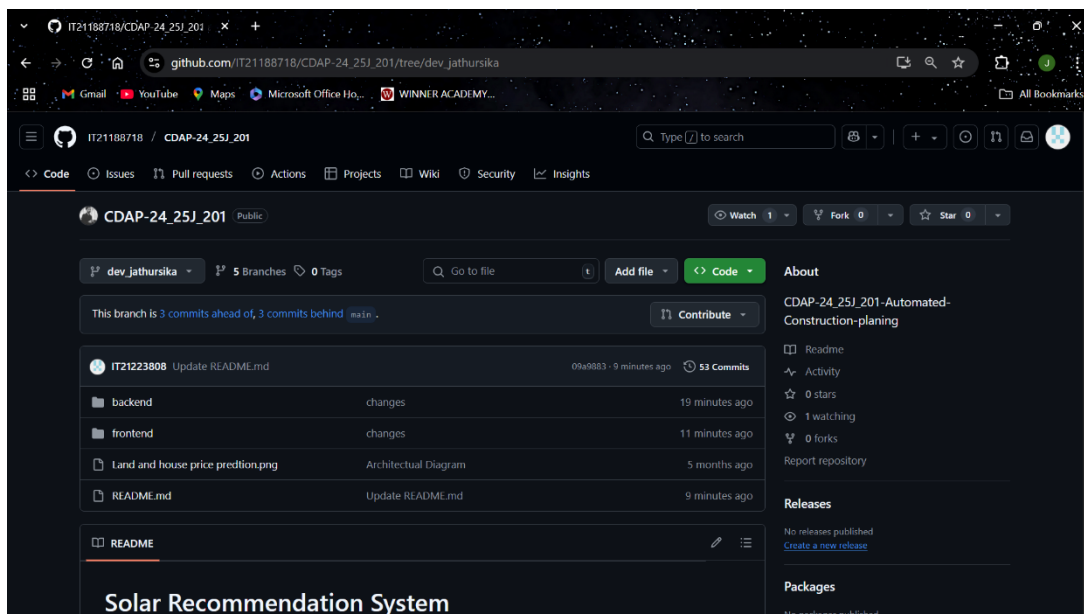






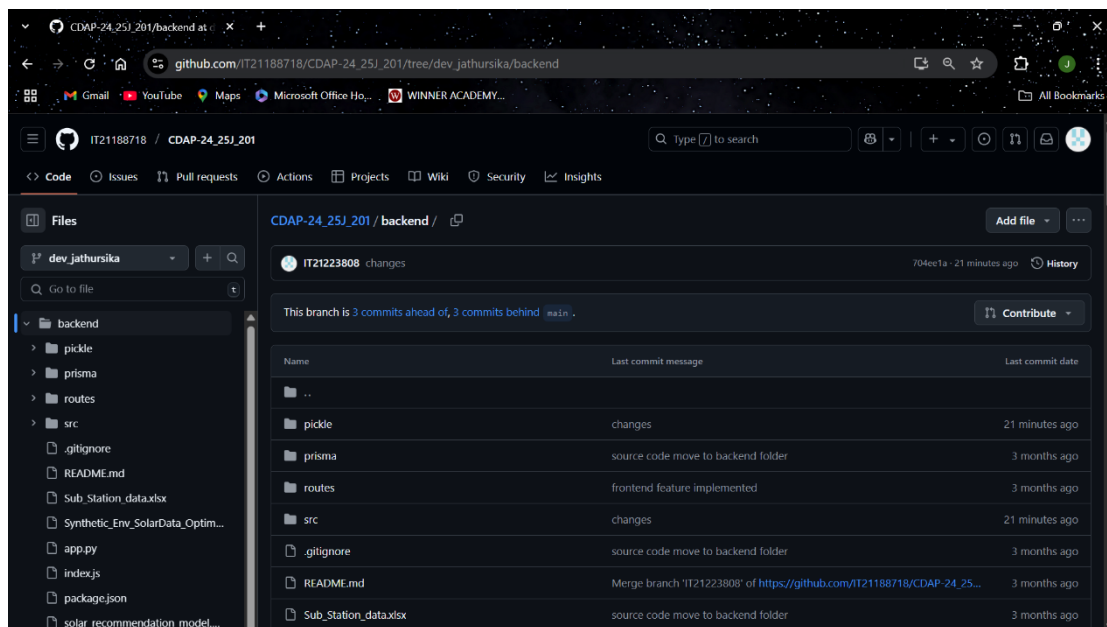
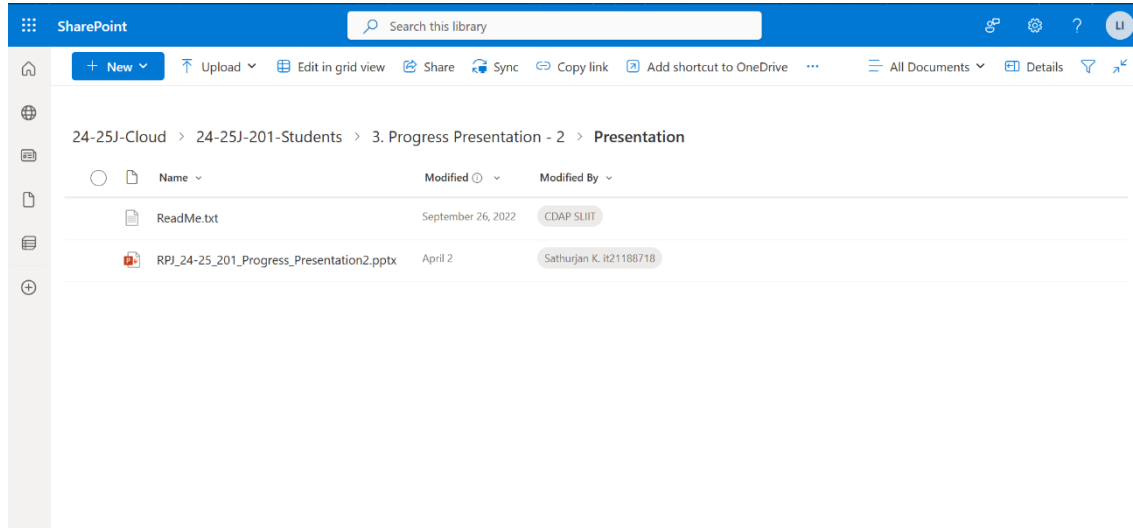
❖ Completed Tasks and Conversation Highlights

- Prepare for Progress Presentation 1 (PP1).
- Creating the presentation.
- Finalizing the GitLab Projects.
- Communication with the supervisor after finalizing the project.



❖ Completed Task and Conversation Highlights

- Prepare for Progress Presentation 2 (PP2).
- Creating the presentation.
- Finalizing the GitHub Projects.
- Communication with the supervisor after finalizing the project.



❖ Completed Task and Conversation Highlights

- Started writing the research paper.
- Exploring Mendeley tool.
- Exploring the IEEE standards and word tools.
- Communicating with supervisor and getting the supervisor feedback.
- Attending Prof. Dasuni Nawinna's Session on how to write a good research paper.

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CDAP 24_25J_201 Automated Construction planning and material estimation

✓

Research written

Completed on yesterday by Sathurjan K. it21188718

LI

SI

SI

AI

🏷️

Add label

Bucket

Done

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Progress

✓ Completed

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Priority

● Medium

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Start date

01/15/2025

📅

Due date

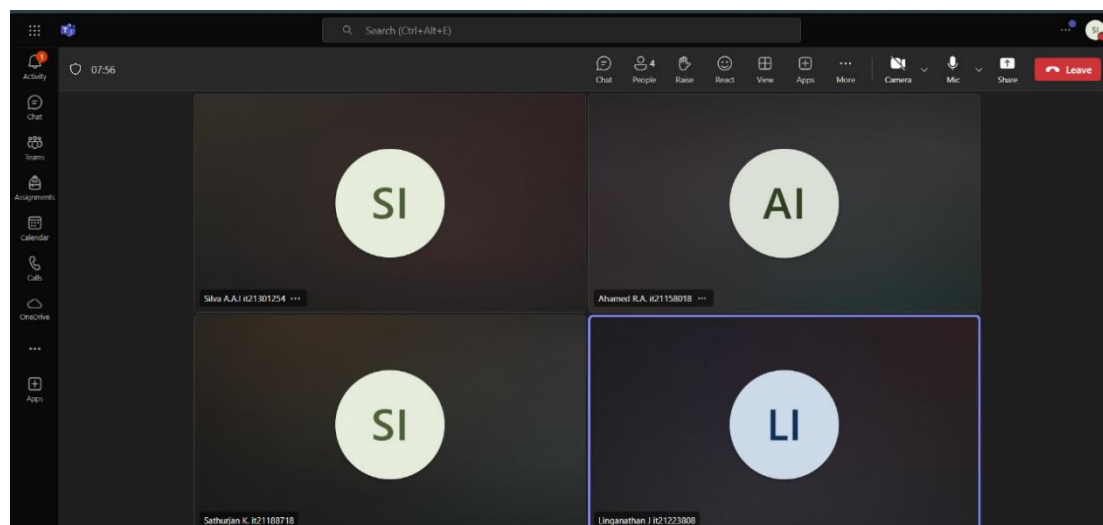
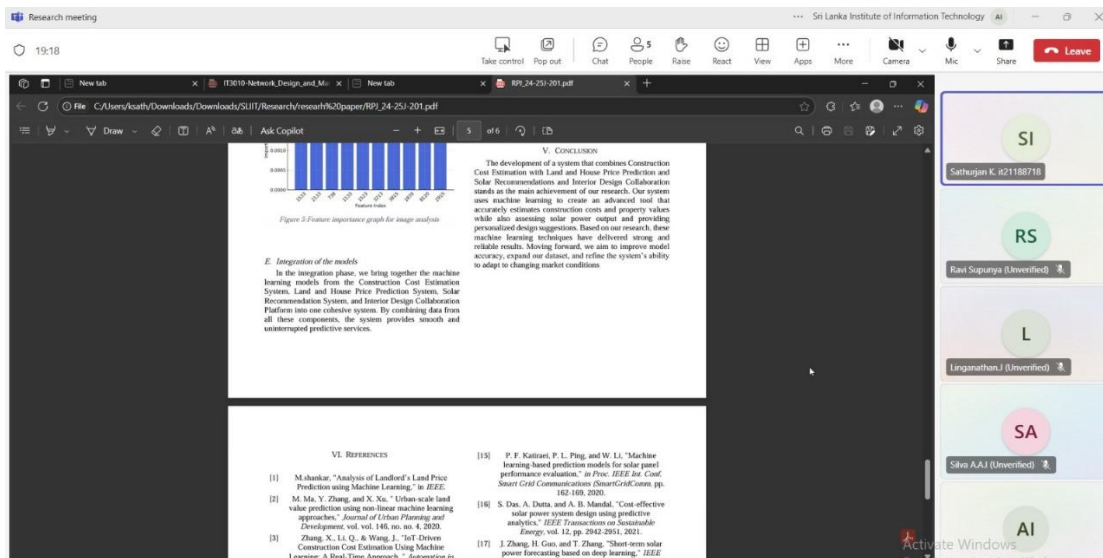
03/12/2025

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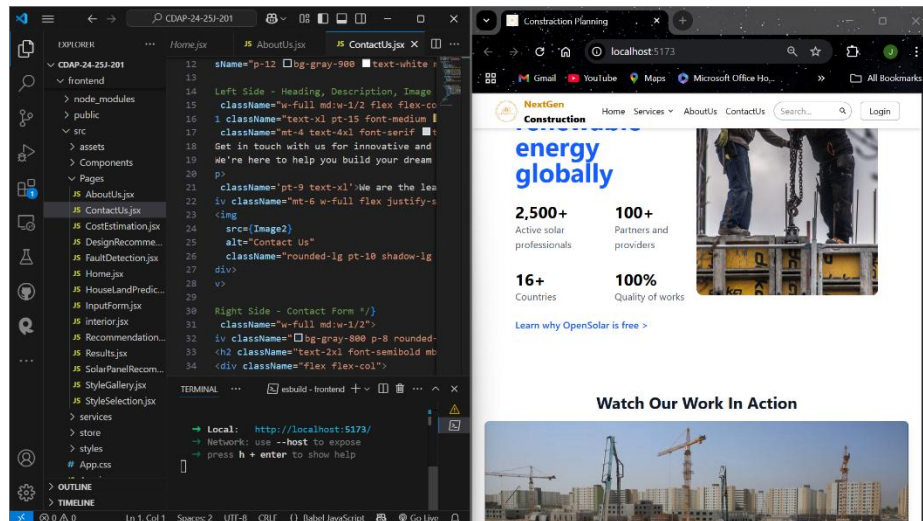
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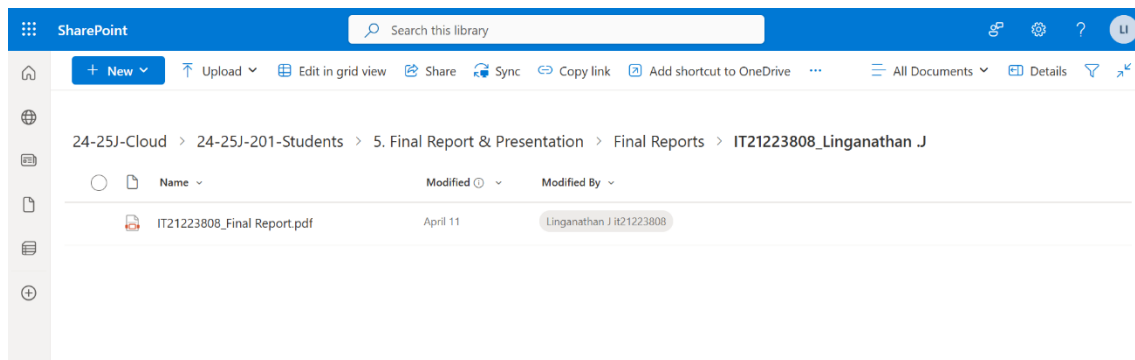
❖ Completed Tasks and Conversation Highlights

- Creating the front-end of the application.
- Integration of all the components.
- Discussing the supervisor's suggestions.



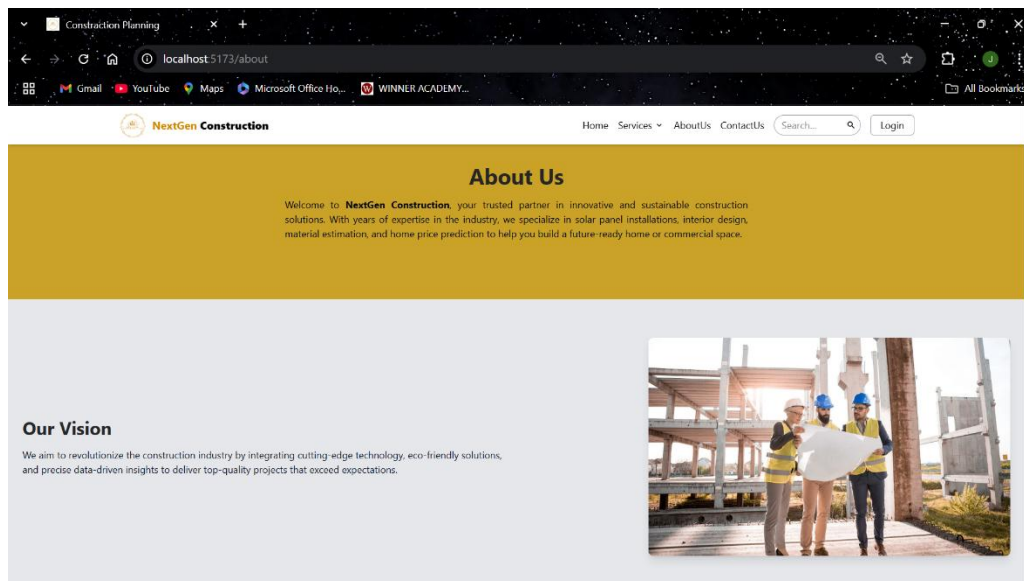
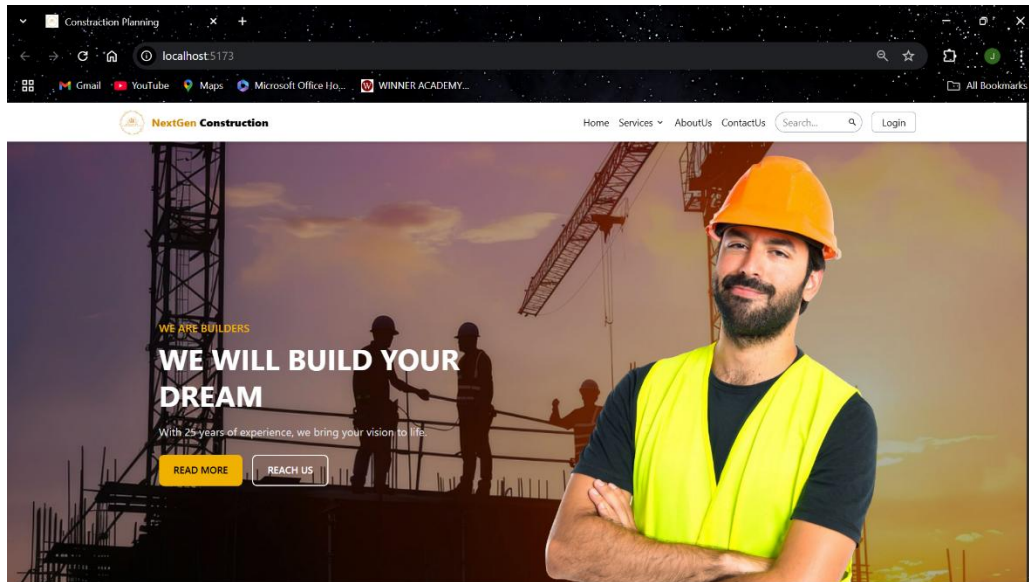
❖ Completed Tasks and Conversation Highlights

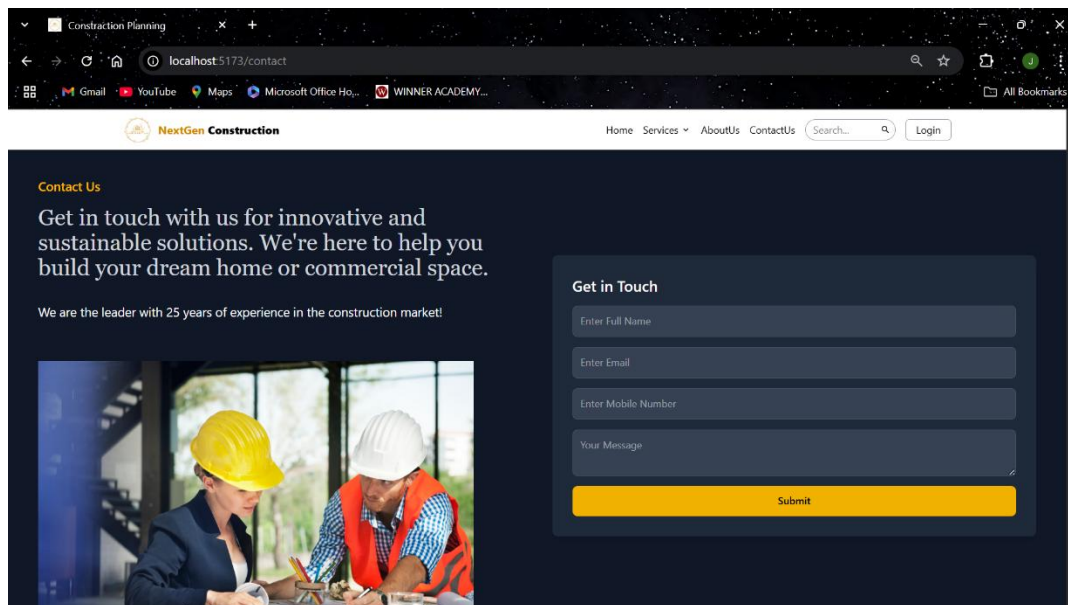
- Complete Individual Thesis Reports.
- Creation Group Thesis Reports.



❖ Completed Tasks and Conversation Highlights

- Create a website for the solution.



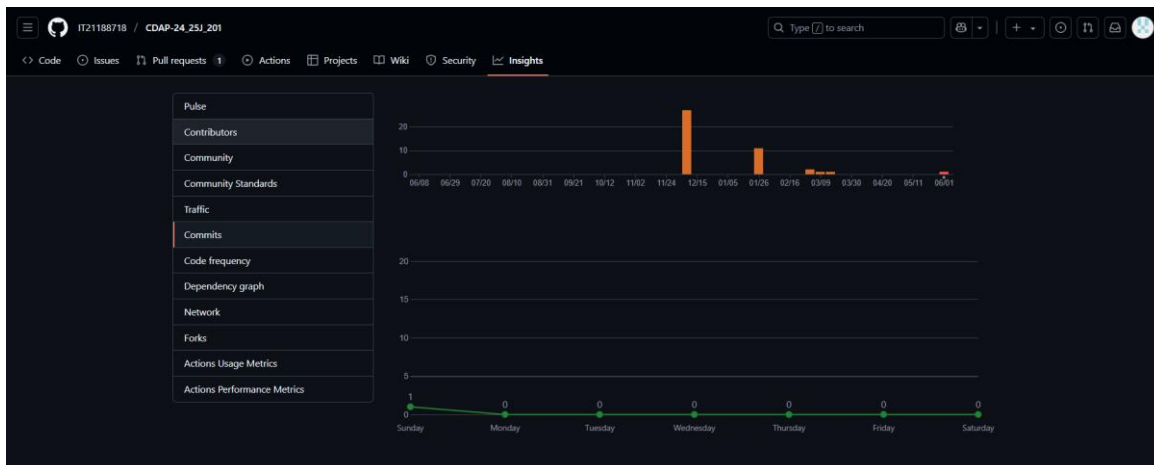


❖ Completed Tasks and Conversation Highlights

- Creation Branches for Each Commitments.
- Merge Request to Main Branch

This screenshot displays the commit history of the repository IT21188718, filtered by date. The commits are organized into three groups: Mar 16, 2025; Mar 15, 2025; and Mar 3, 2025. Each commit entry includes a description, the commit hash, and a link to view the commit details.

Date	Commit Description	Commit Hash
Mar 16, 2025	frontend code change	bad1156
Mar 15, 2025	Merge pull request #7 from IT21188718/IT21223808	9cfd763
Mar 15, 2025	Merge pull request #6 from IT21188718/dev_jathursika	9ee1c38
Mar 15, 2025	frontend feature implemented	86f8858
Mar 3, 2025	Merge pull request #5 from IT21188718/IT21223808	d6225cd
Mar 3, 2025	Merge branch 'IT21223808' of https://github.com/IT21188718/CDAP-24_25J_201 into IT21223808	e4dd379
Mar 3, 2025	Merge branch 'main' of https://github.com/IT21188718/CDAP-24_25J_201 into IT21223808	f88a5c4
Mar 3, 2025	Merge pull request #4 from IT21188718/dev_jathursika	ea147d1
Mar 3, 2025	source code move to backend folder	7712215
Mar 3, 2025	changes	bee4419



Commits on Dec 9, 2024		
implemented database connection	Verified	7fe9be1f
● 1721223808 authored on Dec 9, 2024		
Create util.js	Verified	c61e58a
● 1721223808 authored on Dec 9, 2024		
Delete src/models/model.js	Verified	d57c2e5
● 1721223808 authored on Dec 9, 2024		
implemented models	Verified	3559d38
● 1721223808 authored on Dec 9, 2024		
Create model.js	Verified	c66c263
● 1721223808 authored on Dec 9, 2024		
Delete src/services/service.js	Verified	ee295c4
● 1721223808 authored on Dec 9, 2024		
service functions implemented	Verified	34cde18
● 1721223808 authored on Dec 9, 2024		
Create service.js	Verified	95d233b
● 1721223808 authored on Dec 9, 2024		
Delete src/solarRecommendController.js	Verified	88c914a
● 1721223808 authored on Dec 9, 2024		
Delete src/controllers/s.js	Verified	1e7e67b
● 1721223808 authored on Dec 9, 2024		
Delete src/recommendationService.js	Verified	2666fe7
● 1721223808 authored on Dec 9, 2024		

main			All users	All time
Commits on Dec 9, 2024				
Delete src/locationController.js	Verified	3a68a1e		
● 1721223808 authored on Dec 9, 2024				
Delete src/controllersolar.js	Verified	e42e872		
● 1721223808 authored on Dec 9, 2024				
controller functions implemented	Verified	c3c6f5a		
● 1721223808 authored on Dec 9, 2024				
Create s.js	Verified	6c77f5b		
● 1721223808 authored on Dec 9, 2024				
controller functions implemented	Verified	ca5c1b57		
● 1721223808 authored on Dec 9, 2024				
Create controllersolar.js	Verified	f9d3da1		
● 1721223808 authored on Dec 9, 2024				
Create routes.js	Verified	01892a8		
● 1721223808 authored on Dec 9, 2024				
Schema implemented	Verified	184ac7f		
● 1721223808 authored on Dec 9, 2024				
Create prismaffiles.js	Verified	c18ae8b		
● 1721223808 authored on Dec 9, 2024				
Models implemented	Verified	6eacdf5		
● 1721223808 authored on Dec 9, 2024				
Create model.pkl	Verified	3a6c81b		
● 1721223808 authored on Dec 9, 2024				
solar prediction implemented	Verified	f9ae959		
● 1721223808 authored on Dec 9, 2024				

