
COME VISIT
SRI LANKA

WORLD OF HERITAGE

SRI LANKA

Introduction

The tourism industry is a vital sector for many countries, providing a significant boost to their economies. Sri Lanka is a country with a rich history spanning over 2500 years and boasts of many historical places and cultural landmarks that attract tourists from all over the world. According to the Sri Lanka Tourism Development Authority, approximately 2.3 million tourists visited the country in 2019. However, due to the impact of the COVID-19 pandemic, the number of visitors dropped by 76% in 2021. Therefore, it is crucial to take steps to promote Sri Lanka's historical places and cultural landmarks to attract more tourists and boost the economy.

We are

Chathra Navoda

IT20209520

Faculty of Computing
Department of
Computer Science and
Software Engineering

Kavindu Ushan

IT20259266

Faculty of Computing
Department of
Computer Science and
Software Engineering

Niketh Munasinghe

IT20122478

Faculty of Computing
Department of
Information Technology

Manul Methsara

IT20122478

Faculty of Computing
Department of
Information Technology

We propose....

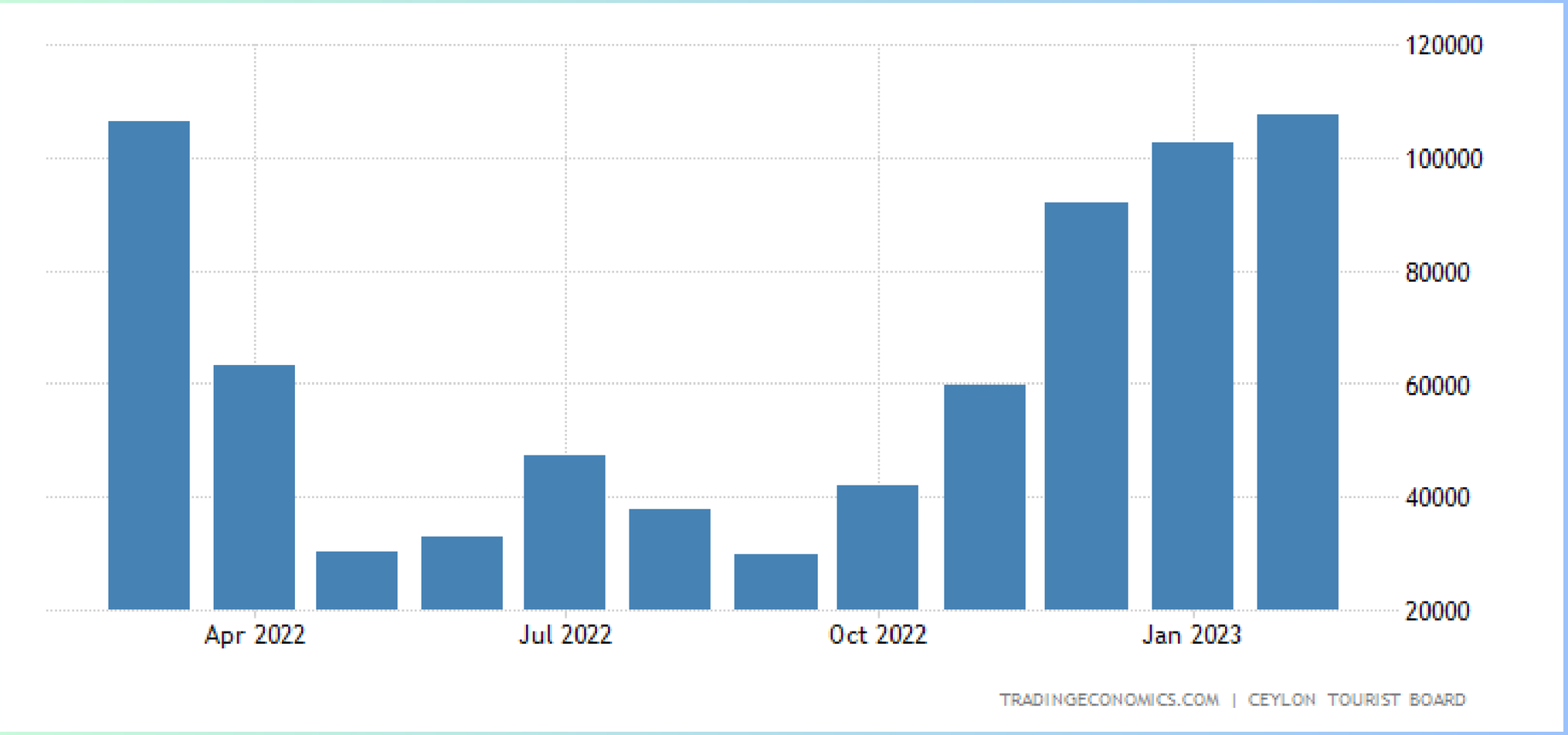
To address this challenge, we are proposing a comprehensive solution that combines machine learning, image processing, and 3D modeling technologies to enhance the tourist experience and promote Sri Lanka's historical places. The research has four major components, each offering a unique solution


HistoMind
AI-Powered Historical Place navigator
TMP-23-378

Research Problem

Despite the high value of Sri Lanka's historical places and their direct impact on the country's economy, the COVID-19 pandemic has caused a significant decline in tourism, resulting in an urgent need to boost the industry. Although various projects have been implemented, there is a lack of software solutions and innovative techniques to promote historical places to the society and facilitate cost-effective travel for tourists.

Research Problem



Comprehensive Solution

provides a comprehensive solution to enhance the tourist experience by making it more personalized, user-friendly, and immersive. It addresses the research problem of promoting historical tourism in Sri Lanka by attracting more visitors to historical sites and boosting the country's economy.

HistoMind Consists of...

Weather-Enhanced Location-based Recommendation System for Historical Travel Planning

AI based Chatbot to facilitate the smart communication for native speakers using machine learning.

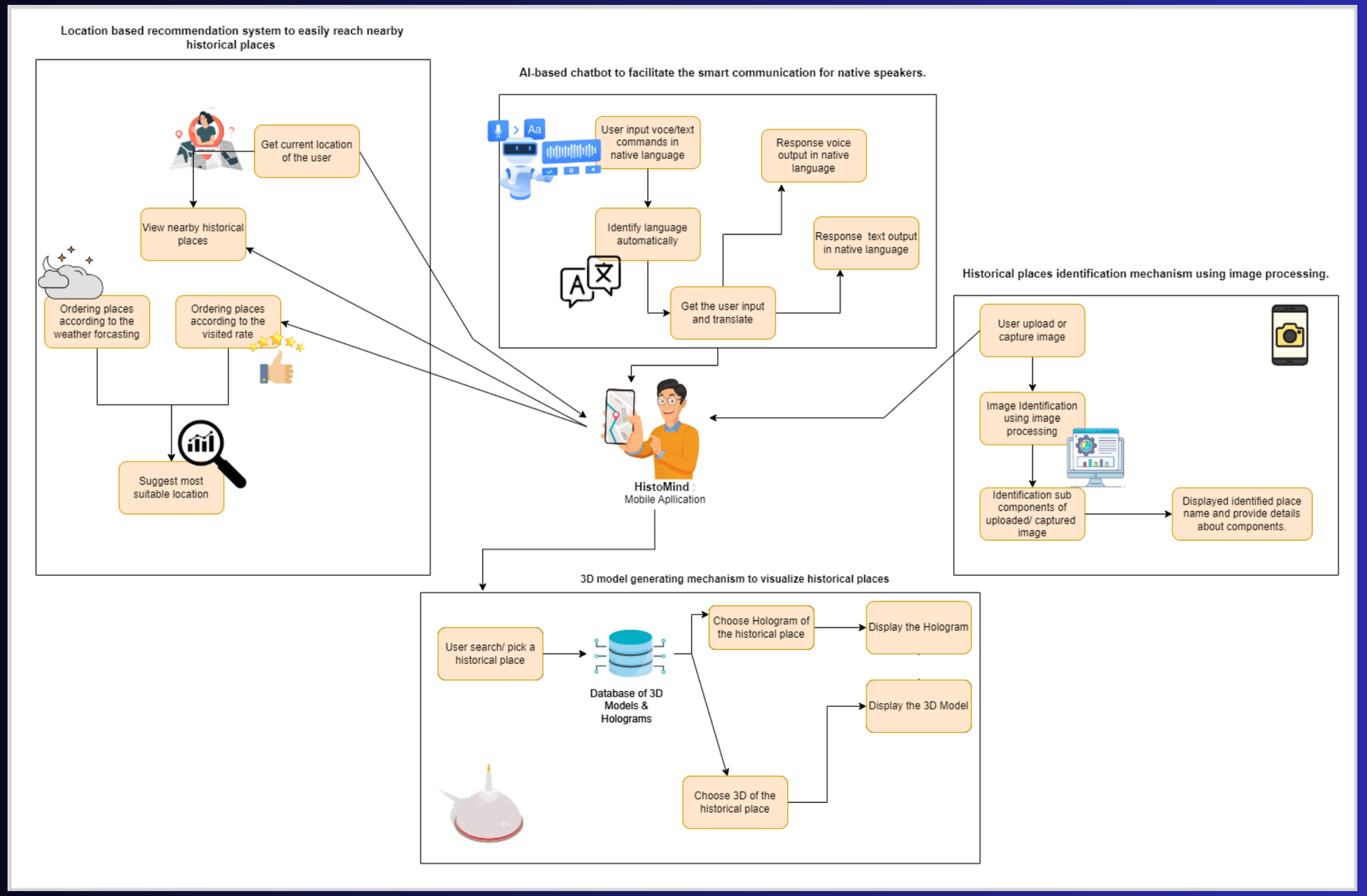
3D model generating mechanism to visualize historical places.

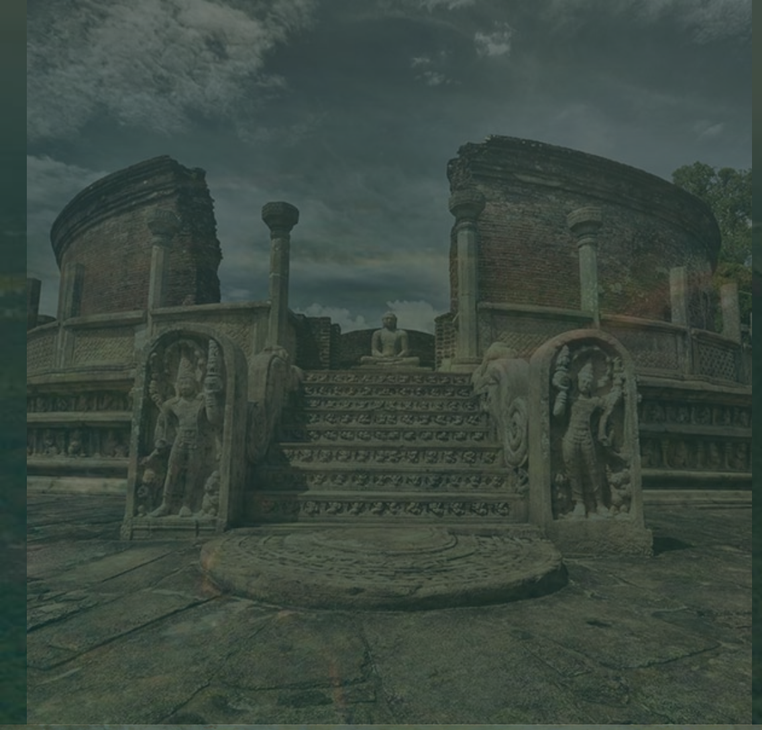
Smart Historical places identification mechanism using image processing.

Overrall Objective

The objective of this research project is to enhance the tourist attraction to historical places in Sri Lanka by introducing a novel approach that incorporates weather-based recommendation, AI-based chatbot, 3D modeling, and image processing. The main aim is to provide a comprehensive solution to the user's travel planning needs and to facilitate smart communication with locals. The project also aims to create a more realistic virtual environment using 3D modeling to showcase the unique cultural characteristics of Sri Lanka's historical places and to identify historical places using image processing. Ultimately, the goal is to increase the number of tourists visiting Sri Lanka and boost the country's economy.

Overall System Diagram





IT20209520 | Navoda R.C

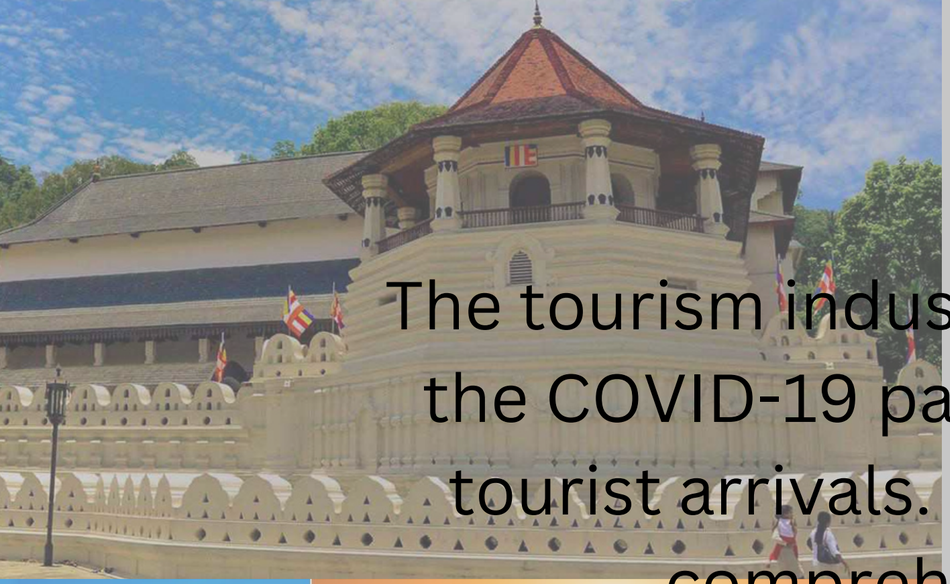
IT20209520 Navoda R.C TMP-23-378

Weather-Enhanced Location-based Recommendation System for Historical Travel Planning

IT20209520 Navoda R.C TMP-23-378

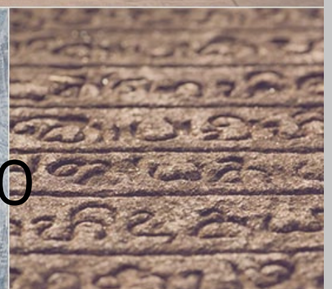
INTRODUCTION

- Many tourists visit Sri Lanka for its rich cultural and historical heritage.
- Existing travel planning-based research provides location-based recommendations for historical places but lacks an easy-to-reach approach.
- Our Smart Location-based Historical Travel Planner mobile app combines a location-based recommendation system, shortest path finding, and real-time weather updates to enhance the user experience.









Background

The tourism industry in Sri Lanka has been severely impacted by the COVID-19 pandemic, resulting in a decline in the number of tourist arrivals. Existing travel planning-based research lacks a comprehensive mobile app that combines personalized recommendations with an easy-to-reach approach for historical places. The proposed Smart Location-based Historical Travel Planner fills this gap by utilizing machine learning to **provide personalized recommendations based on weather conditions and the shortest paths to recommended places**.

IT20209520 Navoda R.C TMP-23-378

Research Gap

- Existing travel planning apps lack consideration of weather conditions, which can impact the user's experience.
- We propose a novel approach that combines location-based recommendation and weather prediction using machine learning.
- Our system filters recommendations based on the user's interests, weather, and time constraints for a personalized experience.
- Users can also get the shortest path to selected locations, maximizing their time and minimizing costs.
- Our approach provides a comprehensive travel planning solution not seen in existing research.

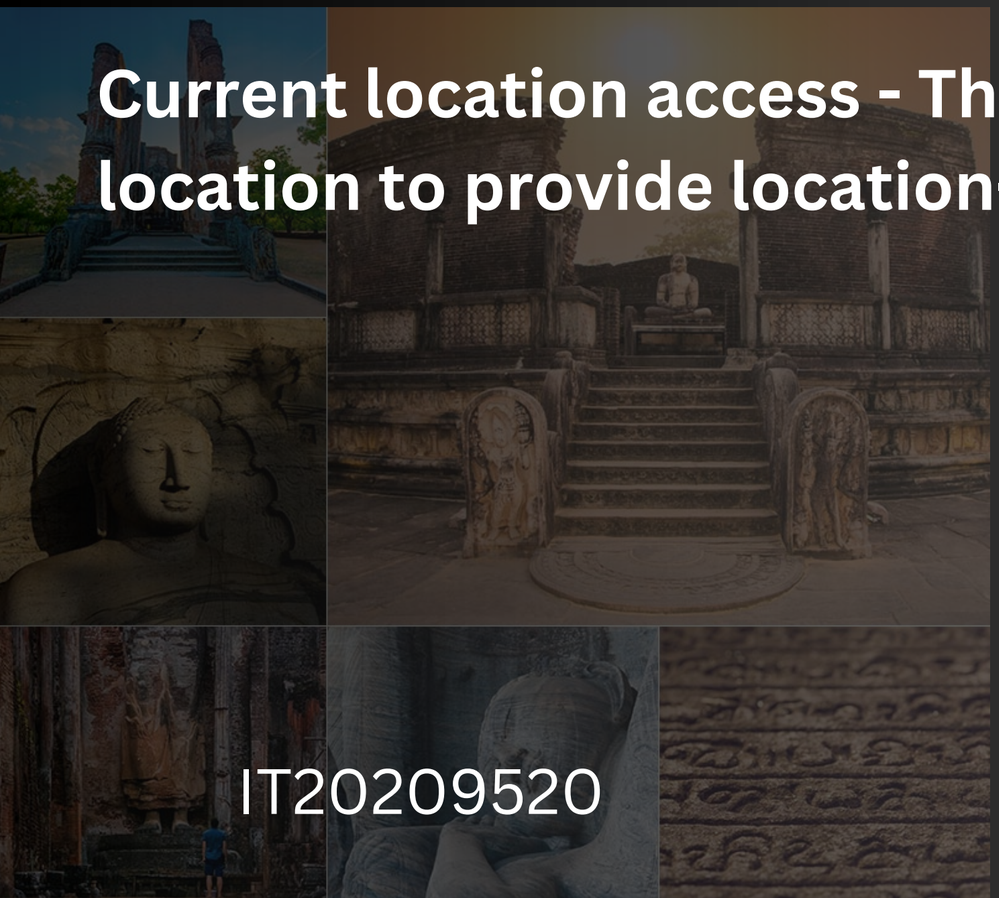
Research Problem

Tourism is a vital sector for Sri Lanka's economy, generating significant revenue and employment opportunities. However, the COVID-19 pandemic and economic crisis have severely impacted the tourism industry. According to the Sri Lanka Tourism Development Authority (SLTDA), the number of tourist arrivals in Sri Lanka declined by 97% in 2020 compared to the previous year. To attract more tourists to Sri Lanka's historical places, there is a need for a location-based travel planner that provides personalized recommendations, shortest path finding, and real-time weather updates. Currently, no such comprehensive system exists, presenting an opportunity for the development of a Smart Location-based Historical Travel Planner.

IT20209520 Navoda R.C TMP-23-378

Specific and Sub-Objective

Sub-Objective 1



Current location access - The system must have access to the user's current location to provide location-based recommendations.

Specific and Sub-Objective

Sub-Objective 2

Location-based recommendation - Based on the user's current location, the system provides a list of nearby historical places that match the user's preferences. This is done using machine learning algorithms that take into account the user's ratings and preferences.

IT20209520 Navoda R.C TMP-23-378

Specific and Sub-Objective

Sub-Objective 3

Weather prediction - The system predicts the weather conditions for the user's location, taking into account factors such as temperature, humidity, and precipitation. This is also done using machine learning algorithms that analyze historical weather data.

Specific and Sub-Objective

Sub-Objective 4

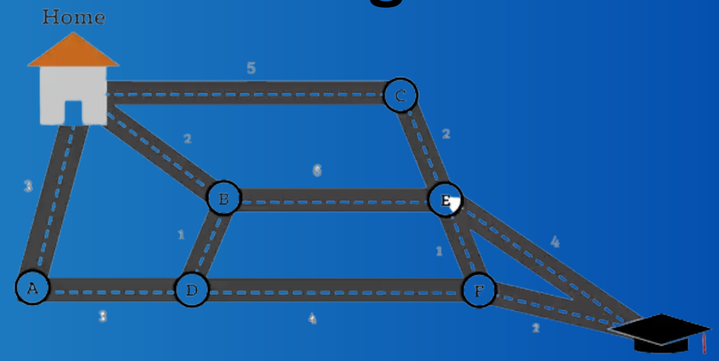
Combined recommendation - The system combines the location-based recommendation and weather prediction to provide a list of historical places that are both nearby and suitable for the current weather conditions.

Specific and Sub-Objective

Sub-Objective 5

Selection of preferred location - The user selects a historical place from the recommended list.

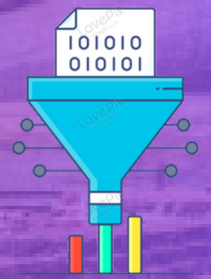
Shortest path calculation - The system calculates the shortest path from the user's current location to the selected historical place, taking into account factors such as traffic conditions and road closures. This is also done using machine learning algorithms.



Proposed Methodology

Location Access: The system can use machine learning algorithms to determine the user's current location based on GPS or network signals. This can be done using techniques such as,
k-nearest neighbors or decision trees.

Location-based Recommendation: Machine learning can be used to analyze the user's preferences and past behavior to provide personalized recommendations for historical places to visit. This can be achieved through techniques such as collaborative filtering or content-based filtering.

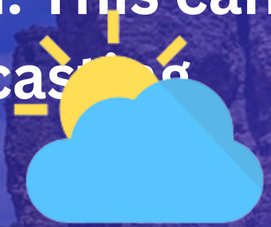


IT20209520 Navoda R.C TMP-23-378

Proposed Methodology

Weather Prediction :

Machine learning can be used to analyze historical weather data and current weather conditions to predict the weather for the user's current location. This can be done using techniques such as regression analysis or time series forecasting



.

Combined recommendation :

combine location-based recommendation and weather prediction is to use a hybrid recommender system approach that incorporates both collaborative and content-based filtering techniques.

Proposed Methodology

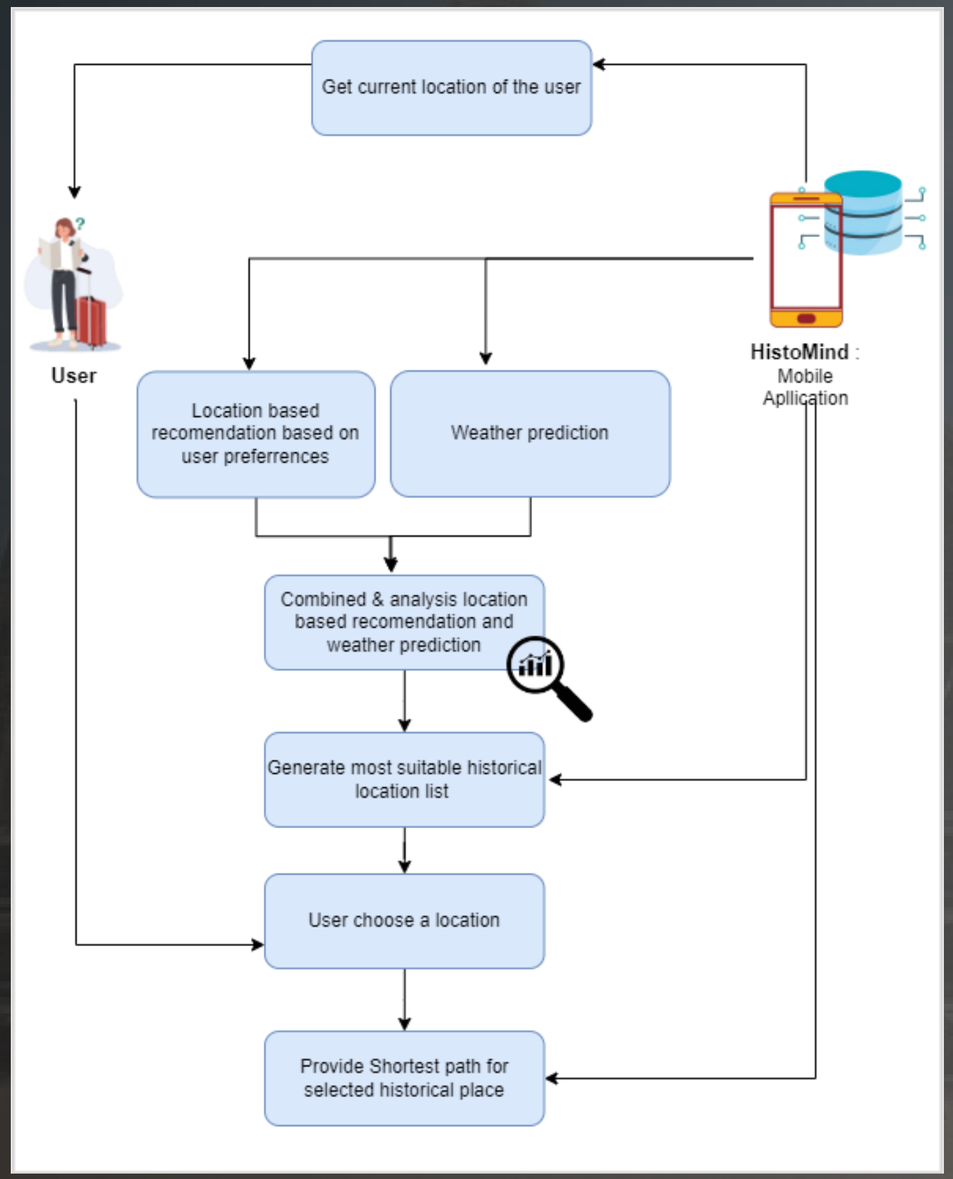
Shortest Path :

Machine learning can be used to optimize the route between the user's current location and the recommended historical place, taking into account factors such as traffic, road conditions, and the distance between locations. This can be achieved through techniques such as shortest-path algorithms or reinforcement learning.

Overall, the use of machine learning can enhance the accuracy and efficiency of the location-based recommendation system, allowing for a more personalized and efficient travel experience.

IT20209520 Navoda R.C TMP-23-378

System Overview Diagram



Tools and Technologies



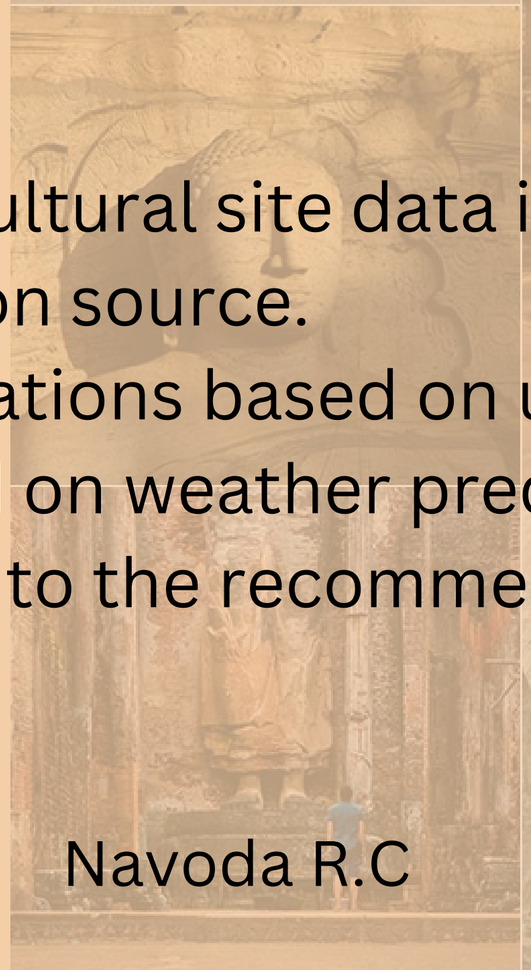
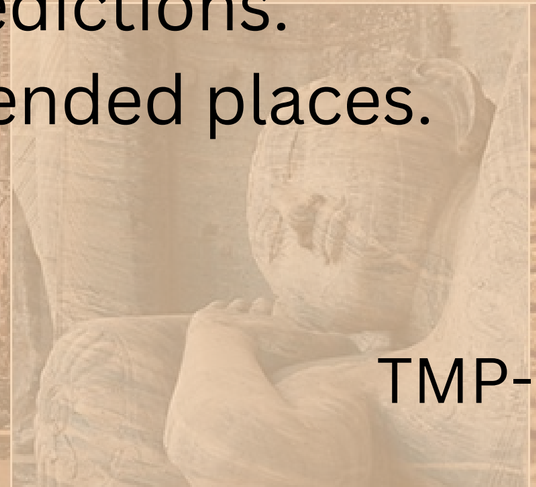




IT20209520 Navoda R.C TMP-23-378

System Specification Requirements




- User's current location.
- Access to historical and cultural site data in Sri Lanka.
- Reliable weather prediction source.
- Personalized recommendations based on user ratings and preferences.
- Recommend places based on weather predictions.
- Provide the shortest path to the recommended places.

IT20209520 Navoda R.C TMP-23-378

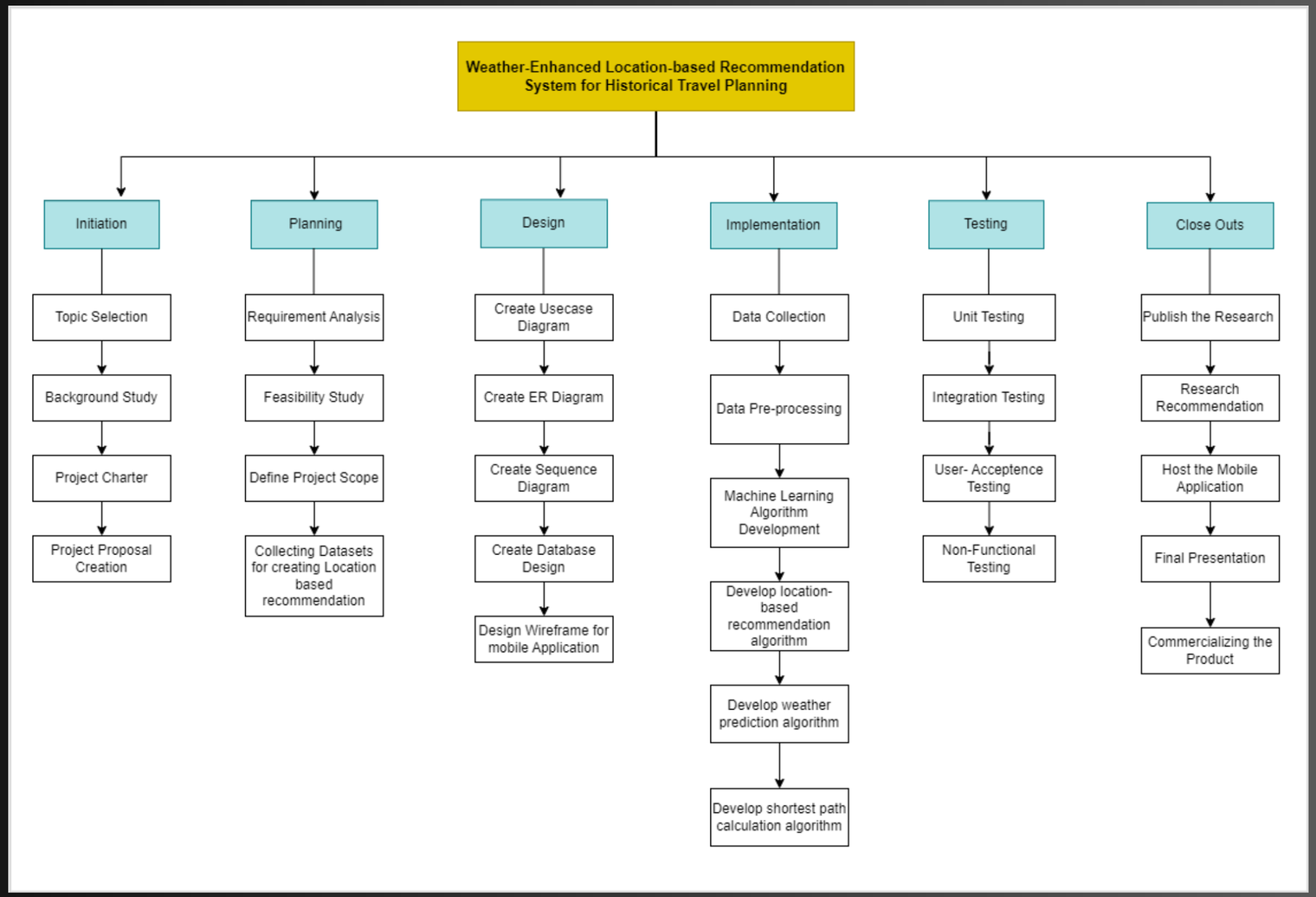
Personal Specification Requirements

- **Smartphone with an active internet connection.**
- **Ability to download and install the mobile app.**
- **Willing to provide their preferences and ratings to the system.**

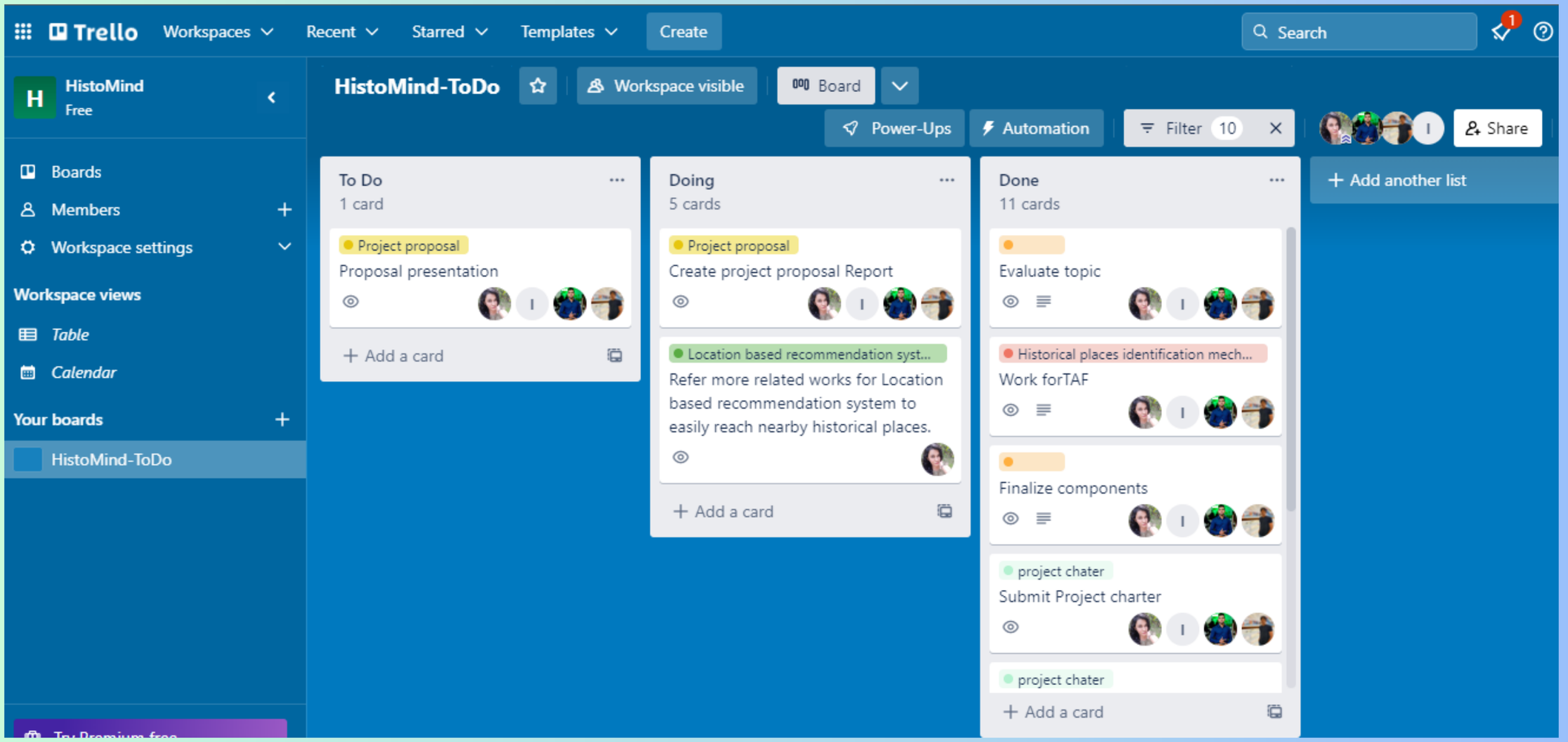
Software Specification Requirements

- Use Flutter.
- DB is Firebase
- Machine learning algorithms for weather prediction and recommendation systems.
- Python for the backend.
- Hosted on AWS EC2 or a similar cloud platform.
- User-friendly interface for easy navigation and use

Work Breakdown Structure (WBS)

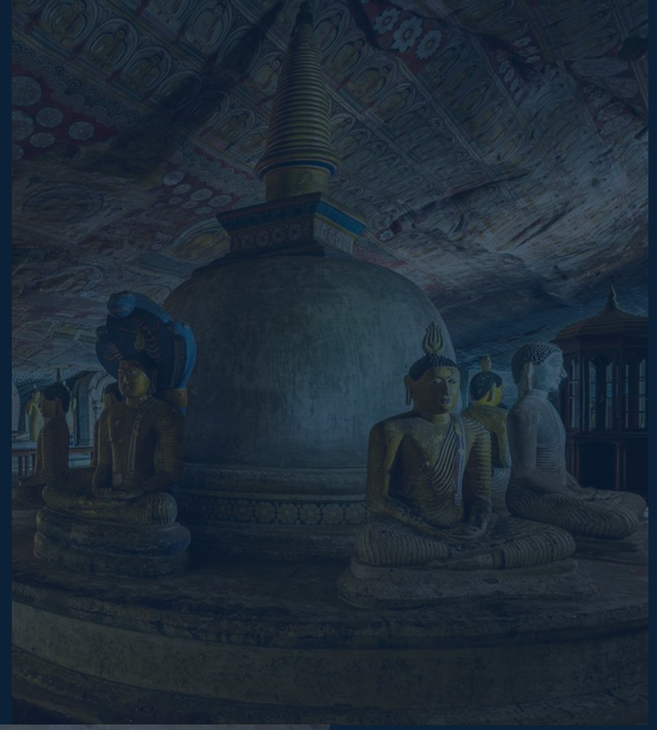


My Progress

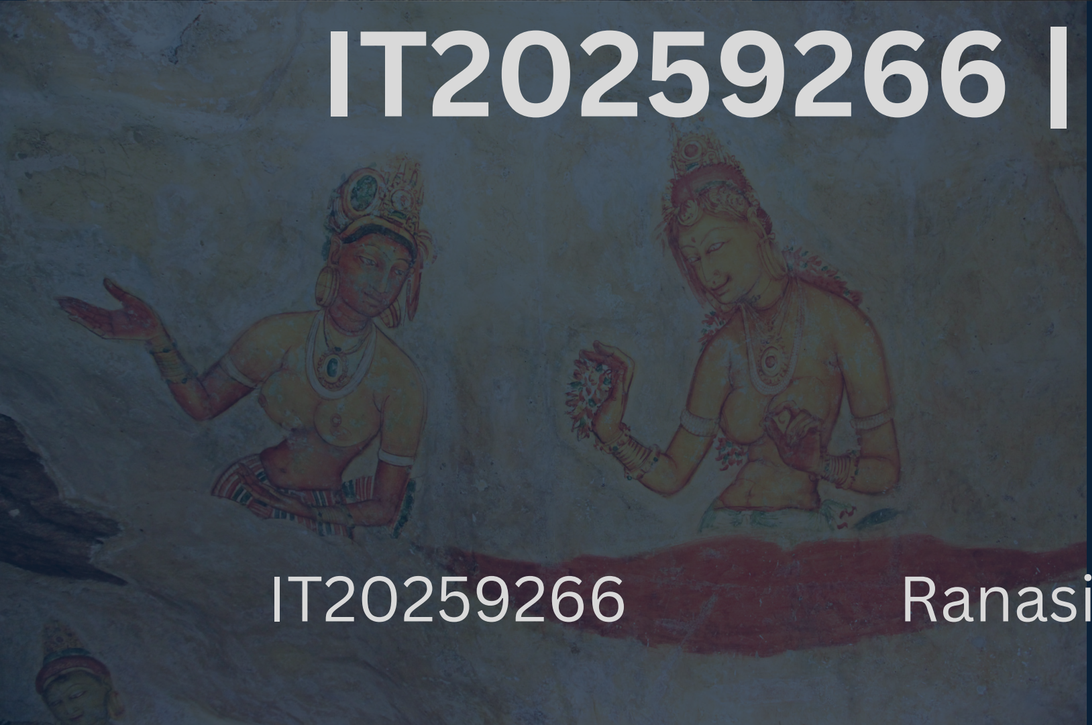


IT20209520 Navoda R.C TMP-23-378

Thank you!



IT20259266 | Ranasinghe P.R.K.U.



IT20259266 Ranasinghe P.R.K.U TMP-23-378

AI-based Chatbot to facilitate the smart communication for native speakers

IT20259266 Ranasinghe P.R.K.U

TMP-23-378

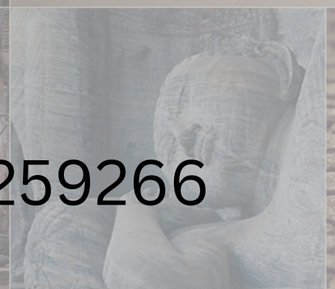
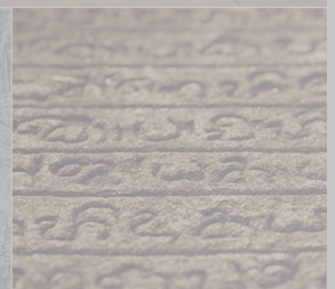
INTRODUCTION

Our AI-based chatbot for tourism is a mobile application designed to provide tourists with information about historical landmarks and places in their native language. **By using automatic language recognition and providing text and voice responses**, the chatbot aims to enhance the overall tourism experience for non-native speakers. The chatbot is built using natural language processing (NLP) and machine learning technologies.

IT20259266 Ranasinghe P.R.K.U TMP-23-378





Background

Tourism can be challenging for travelers who don't speak the local language. To improve their experience, we propose an AI-based **chatbot that allows users to communicate in their native language, automatically detects it, and provides both text and voice responses**.

IT20259266 Ranasinghe P.R.K.U TMP-23-378

Research Gap

- **The proposed chatbot's key feature is its ability to detect the user's native language when they input text or voice commands**, utilizing AI-based automatic language detection technology.

- This is aimed at improving the tourist experience by providing a user-friendly way for tourists to communicate with locals and access helpful information.

- The chatbot supports input in three languages: **English, Tamil, and German** and provides responses in the user's native language as well as in English.

Research Problem

- Tourists in Sri Lanka face **language barriers** while visiting historical sites.
- **The inability to communicate effectively and access information in their native language is a significant challenge.**
- Access to accurate and relevant information is crucial for tourists to appreciate the cultural significance of the sites.
- An AI-based chatbot can address this issue by providing language translation and communication support.

IT20259266 Ranasinghe P.R.K.U TMP-23-378

Specific and Sub-Objective

Sub-Objective 1

- **Our proposed AI-based chatbot for tourism allows users to speak or type in their native language, making the communication process more accessible and intuitive for tourists who may not be fluent in the local language(English, German, Tamil).**

Specific and Sub-Objective

Sub-Objective 2

- **This is a mobile application that enables tourists to get information about historical places and landmarks in a way that feels natural and conversational.**

Specific and Sub-Objective

Sub-Objective 3

- **This chatbot provides both text and voice responses in the user's native language, enhancing the user experience and improving the accessibility of information for all tourists**

Proposed Methodology

- •**Data Collection :** **Collect and prepare a dataset of tourist questions and answers related to historical places and landmarks in various languages.**
- •**Model Development :** **Train and optimize an AI-based chatbot model using NLP and ML techniques on the collected dataset.**

Proposed Methodology

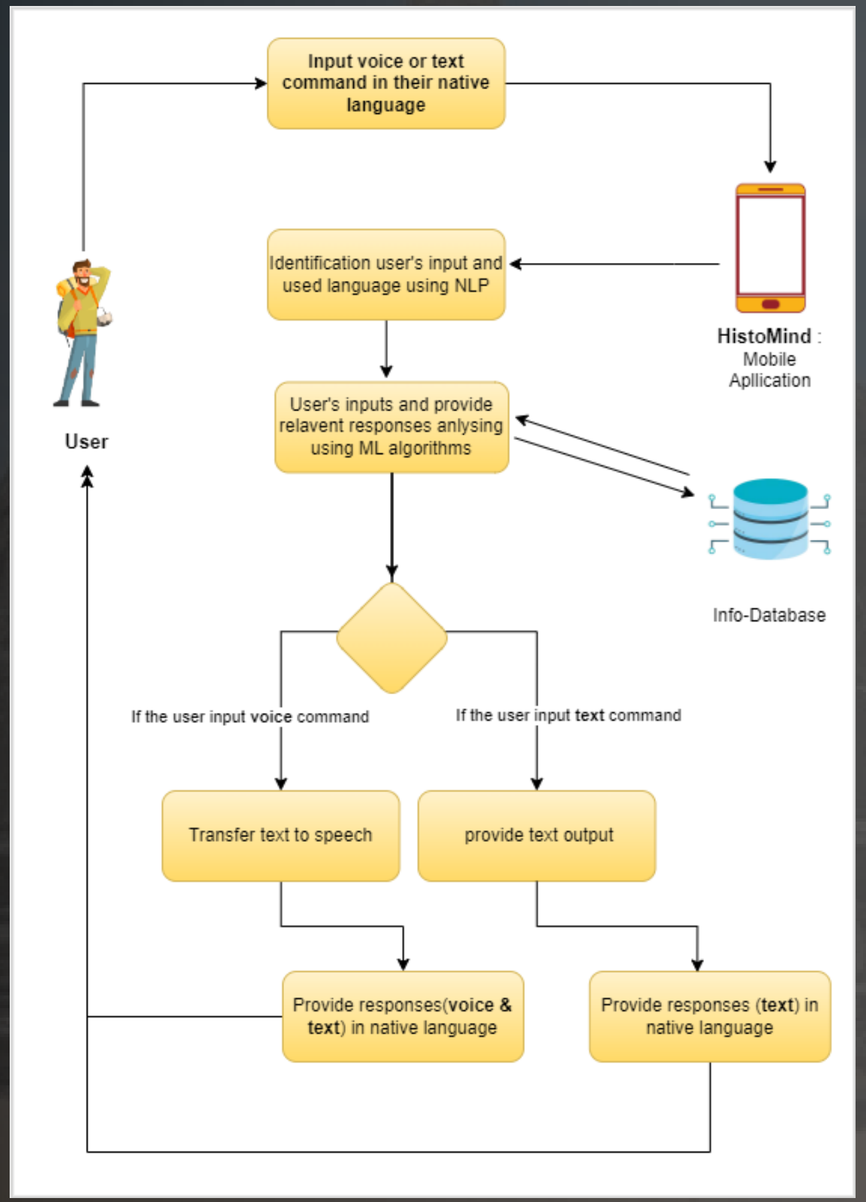
- **Integration :** Integrate the trained model into a mobile application, allowing tourists to speak or type in their native language, which the chatbot will recognize automatically.

- **Testing:** Conduct thorough testing of the chatbot's functionality and accuracy to ensure it provides accurate and helpful responses to tourist inquiries.

Proposed Methodology

- **Deployment : Deploy the mobile application with the AI-based chatbot to make it available to tourists and other users, with regular updates and improvements based on user feedback.**

System Overview Diagram



Tools and Technologies







IT20259266 Ranasinghe P.R.K.U TMP-23-378

System Specification Requirements

- Natural Language Processing (NLP) tools: NLTK
- Machine learning libraries: TensorFlow
- Text and voice datasets: Stanford Sentiment TreebankGoogle Speech Commands dataset or Mozilla Common Voice dataset
- Speech recognition APIs: Google Cloud Speech-to-Text
- Translation APIs: Google Cloud Translate or Microsoft Azure Translator
- Cloud computing services: Amazon Web Services or Google Cloud Platform

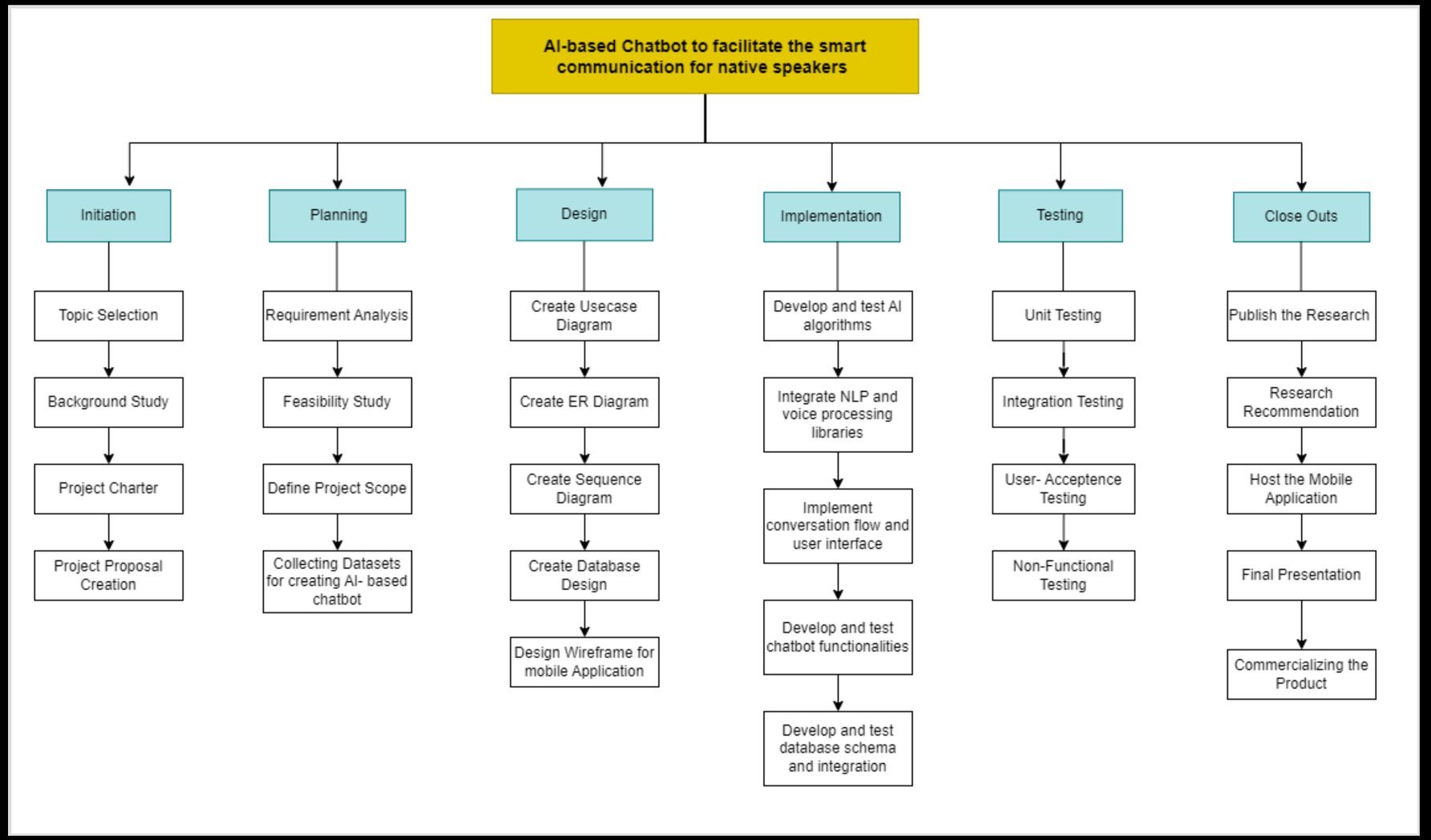
Personal Specification Requirements

- Smartphone with an active internet connection.
- Ability to download and install the mobile app.
- Willing to provide their preferences and ratings to the system.

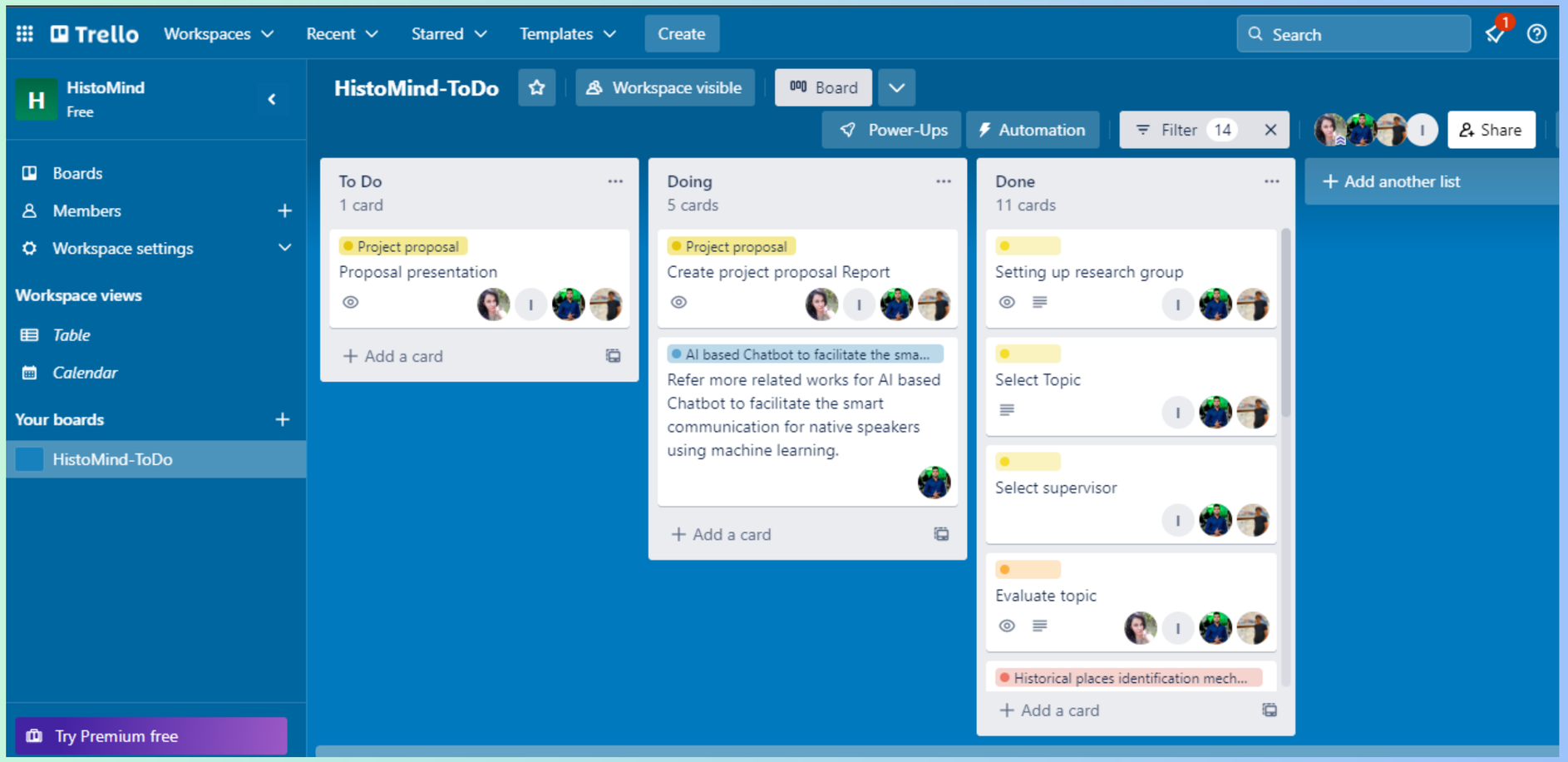
Software Specification Requirements

- Use Flutter.
- DB is Firebase
- NLP techniques & Artificial Neural Networks(RNNs).
- Python for the backend.
- Hosted on AWS EC2 or a similar cloud platform.
- User-friendly interface for easy navigation and use

Work Breakdown Structure (WBS)



My Progress



IT20259266 Ranasinghe P.R.K.U TMP-23-378

Thank you!

IT20122478 | Munasinghe N.N.DE. Z

IT20122478

Munasinghe N.N.DE. Z

TMP-23-378

3D Modling & Hologram Historical Places

INTRODUCTION

The technique of 3D modeling includes implementing specialized software to produce a three-dimensional representation of an object or scene. Applications for the completed 3D model include visualizations, simulations, animations, and video games, among other things. Blender & Google Colab are only a few of the numerous techniques and tools available for 3D modeling. Each method has its own advantages and disadvantages, and some objects or settings may suit it more than others. The capacity to alter the model's geometry to produce various shapes and forms is one of the most crucial elements of 3D modeling. Vertices, edges, and faces can be modified, as well as by applying deformers and other modifiers.

IT20122478 Munasinghe N.N.DE.Z TMP-23-378

Background

Making holograms and 3D model of most famous historical places with high details is some kind of hard but making a good quality hologram can impress the audience specially the tourists who have seen them only with 2d pictures and videos.

IT20122478 Munasinghe N.N.DE.Z TMP-23-378

Research Gap

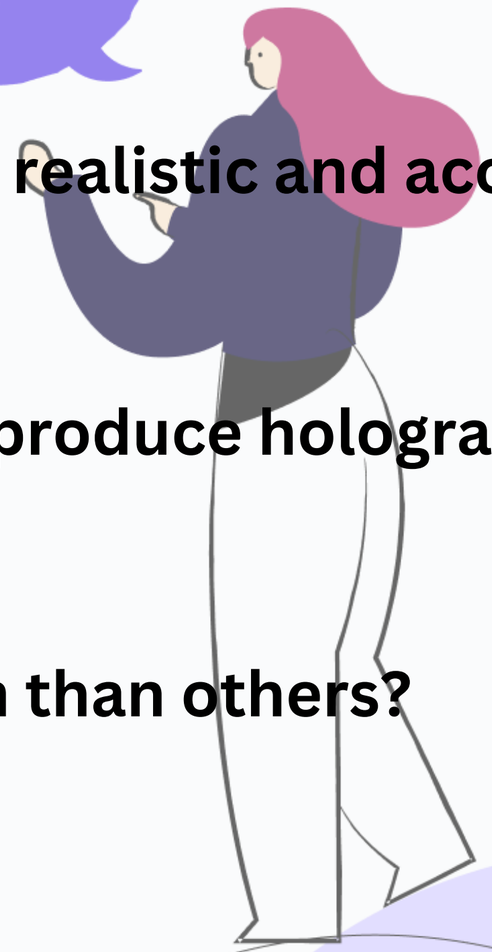
The research gap will be fixed in one of the following ways. The examples that below show how specific features have been discussed in earlier studies. These are simply a few of the features.

1 - Making a cheapest good quality larger hologram.

2 - 3D modeling historical places with great quality and include every important things.

3 - Access to larger hologram with phone wirelessly and control the hologram.

Research Problem



1) How can 3D modeling techniques be used to create realistic and accurate Objects?

2) What are the technological specifications needed to produce holograms of excellent quality?

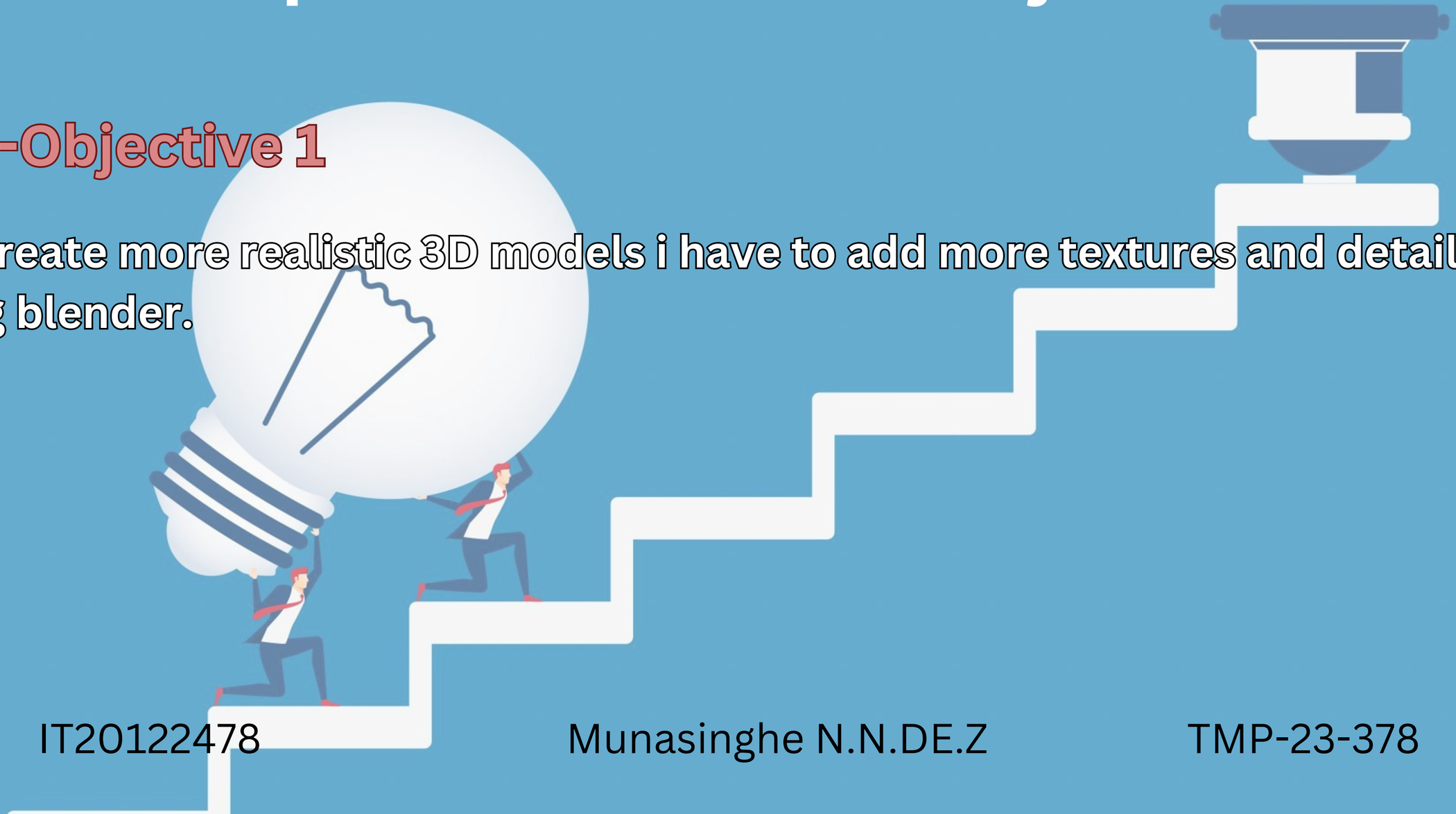
3) How do we make a more specific hologram than others?

IT20122478 Munasinghe N.N.DE.Z TMP-23-378

Specific and Sub-Objective

Sub-Objective 1

•To create more realistic 3D models i have to add more textures and details using blender.



Specific and Sub-Objective

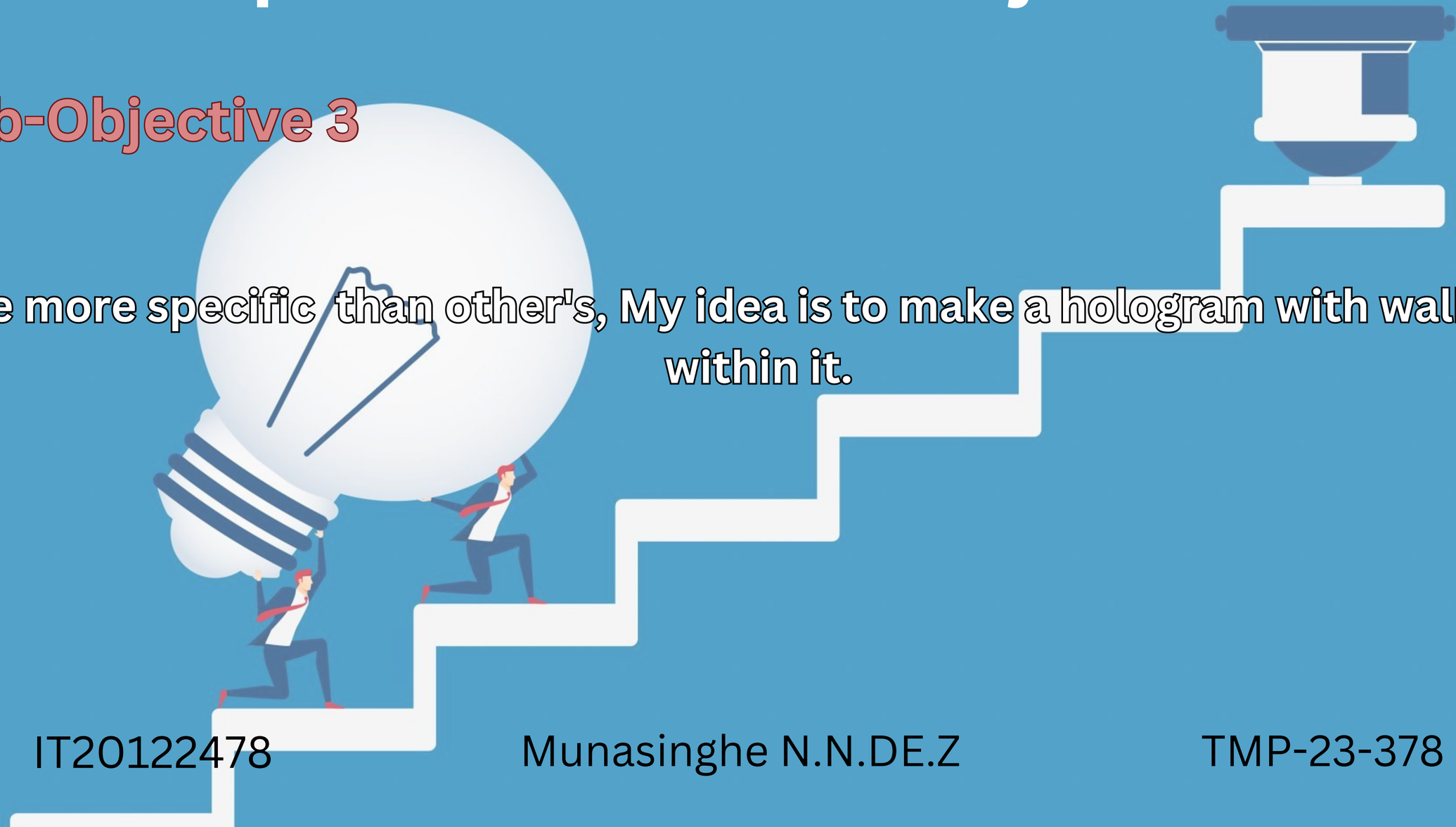
Sub-Objective 2

- To get super attractive quality hologram we want Superb Quality Projector, Misty Transparent wall, Super Quality Tv.

IT20122478 Munasinghe N.N.DE.Z TMP-23-378

Specific and Sub-Objective

Sub-Objective 3



- To be more specific than other's, My idea is to make a hologram with walkthrough within it.

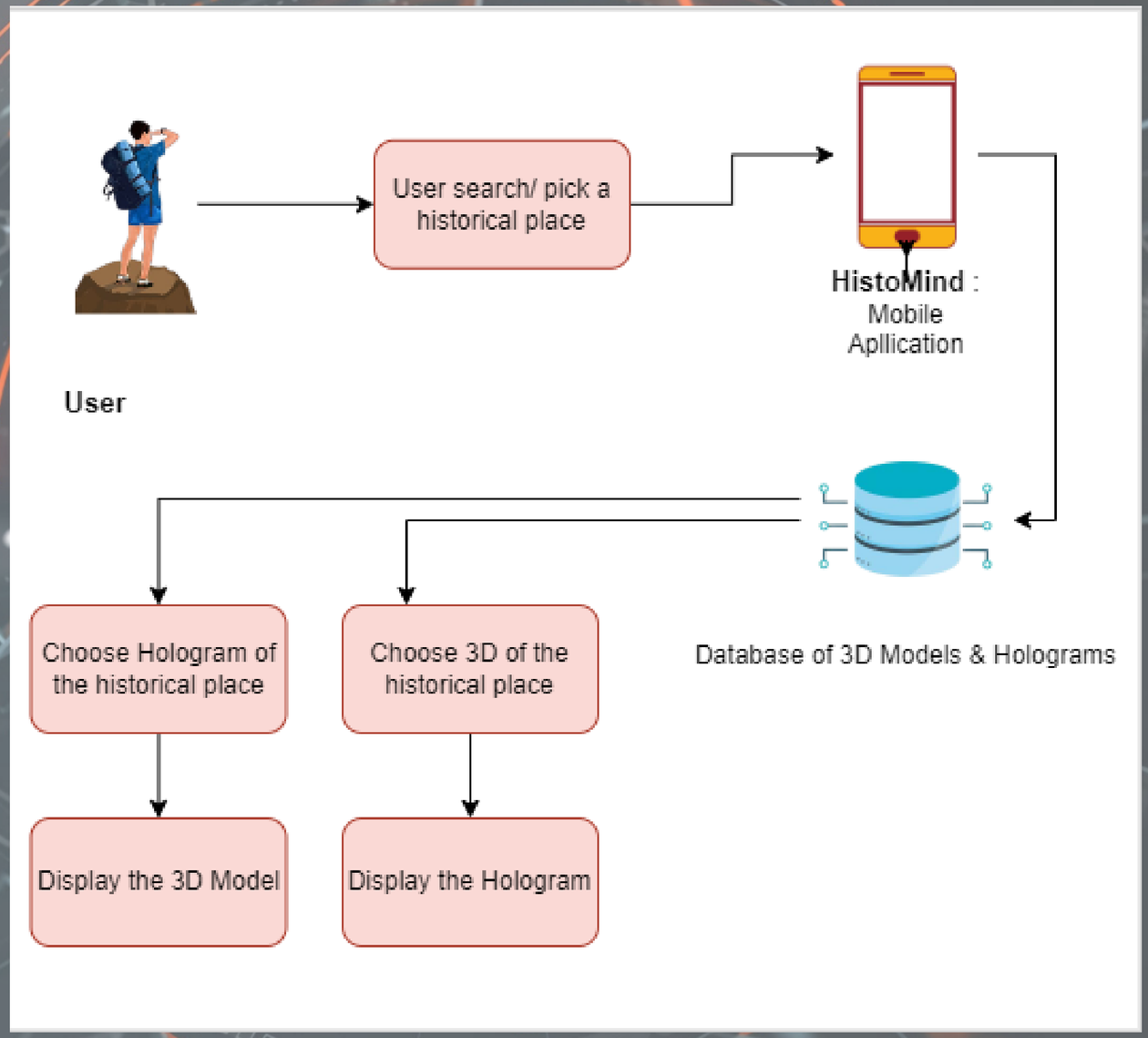
IT20122478 Munasinghe N.N.DE.Z TMP-23-378

Proposed Methodology

The purpose of my function is to provide a 3D modelling and holographic experience of historical places. It uses the Unreal Engine 5 to create an interactive 3D model of any historical site chosen by a tourist. The function displays a hologram of the site, allowing the user to explore and interact with it. Additionally, the function is designed to be cost-effective, ensuring that the experience is accessible to all.

IT20122478 Munasinghe N.N.DE.Z TMP-23-378

System Overview Diagram



Tools and Technologies

IT20122478 Munasinghe N.N.DE.Z TMP-23-378

System Specification Requirements

- User's access to storage.
- Quality Phone display to give the best quality of the 3D model.

Personal Specification Requirements

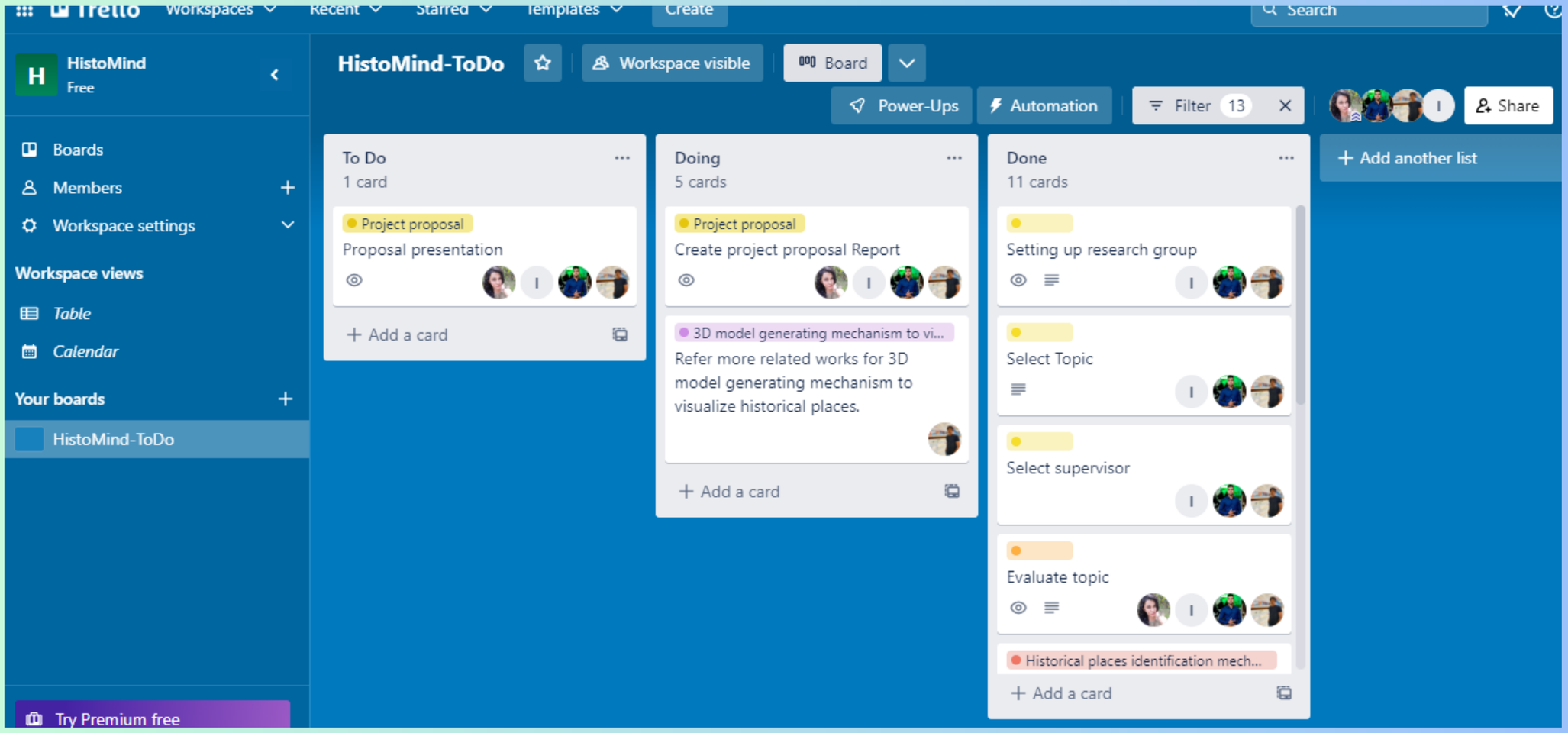
- Smartphone with an active internet connection.
- Ability to download and install the mobile app.
- Willing to provide their preferences and ratings to the system.

IT20122478 Munasinghe N.N.DE.Z TMP-23-378

Software Specification Requirements

- Blender
- DB is Firebase
- Unreal Engine 5
- Google Colab
- Python
- Davinchi

My Progress



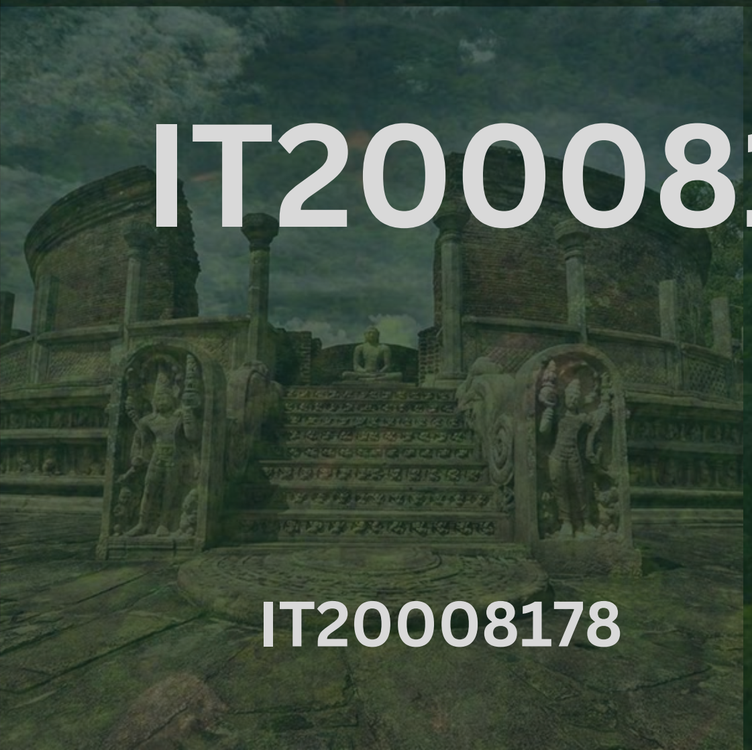
IT20122478

Munasinghe N.N.DE.Z

TMP-23-378

Thank you!

IT20008178 | Priyaratne K.K.M.M



IT20008178

Priyaratne K.K.M.M

TMP-23-378

Historical Places Identification Using Image Processing

IT20008178 Priyaratne K.K.M.M

TMP-23-378

INTRODUCTION

This research proposal aims to develop a smart mechanism for **identifying historical places using image processing and machine learning algorithms.**

The proposed mechanism will extract unique features from images of historical places and classify them to identify the specific place depicted. The system will be integrated with a database containing historical information, providing users with an efficient and user-friendly way to explore and learn about historical sites.

Background

Historical places are invaluable cultural assets that provide insight into past societies. However, identifying these places can be challenging, particularly when dealing with large volumes of images. In this proposal, we introduce a smart mechanism that integrates image processing and machine learning to efficiently identify historical places and their unique sub-components.

IT20008178 Priyaratne K.K.M.M TMP-23-378

Research Gap

Although some research has been done in the field of historical place identification using image processing, few studies have focused on **identifying sub-components of historical landmarks**. Additionally, there is still **a gap in developing algorithms that can accurately classify and identify historical landmarks in real-world scenarios, which this research aims to address.**

IT20008178 Priyaratne K.K.M.M TMP-23-378

Research Problem

Our research aims to develop a reliable and accurate image recognition system for identifying and categorizing historical landmarks. We will address challenges such as variations in lighting, historical changes, and cultural differences to create a dependable system that works consistently in real-world contexts.

IT20008178 Priyaratne K.K.M.M TMP-23-378

Specific and Sub-Objective

Sub-Objective 1

- **To review the literature on image processing techniques for historical places identification.**

Specific and Sub-Objective

Sub-Objective 2

- **To create a database of images captured from various locations to show historic places.**

Specific and Sub-Objective

Sub-Objective 3

- **To perform image processing to adjust for differences in lighting and weather.**

Specific and Sub-Objective

Sub-Objective 4

- **To compare the performance of different machine learning algorithms, such as Convolutional Neural Networks (CNNs) and Support Vector Machines (SVMs), for historical places identification.**

Proposed Methodology

- **Data collection: Gather a large dataset of images of historical sites and landmarks from different regions and time periods.**

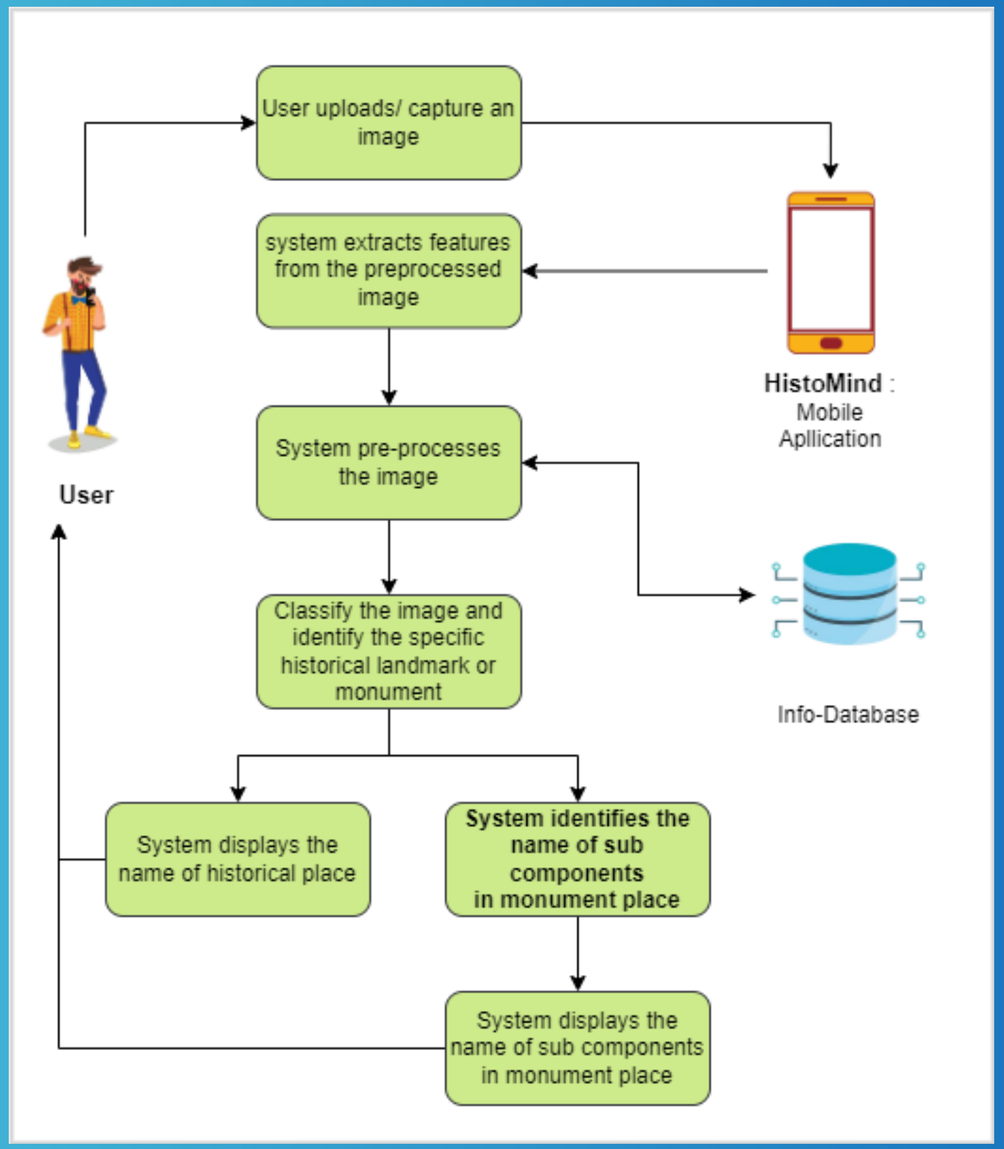
- **Integration: Integrate the image recognition algorithm into a user-friendly platform, such as a mobile app or website.**

Proposed Methodology

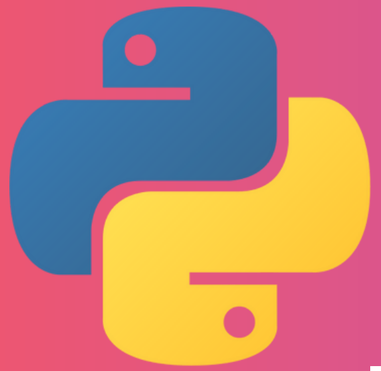
- **Training and testing: Train the algorithm using the preprocessed images and their corresponding labels.**

- **Database Integration: Our proposed mechanism integrates image processing and machine learning with a historical places database, providing users with efficient identification and informative descriptions.**

System Overview Diagram



Tools and Technologies



IT20008178 Priyaratne K.K.M.M TMP-23-378

System Specification Requirements

System Requirements:

Processor: Intel Core i5 or higher

RAM: 8GB or higher

Graphics Card: NVIDIA GeForce GTX 1050 or higher

Hard Disk: 1TB or higher

Operating System: Windows 10

System Specification Requirements

Personal Requirements:

Basic knowledge of image processing and computer vision

Basic programming skills in Python

Familiarity with machine learning algorithms and GIS software

System Specification Requirements

Software Requirements:

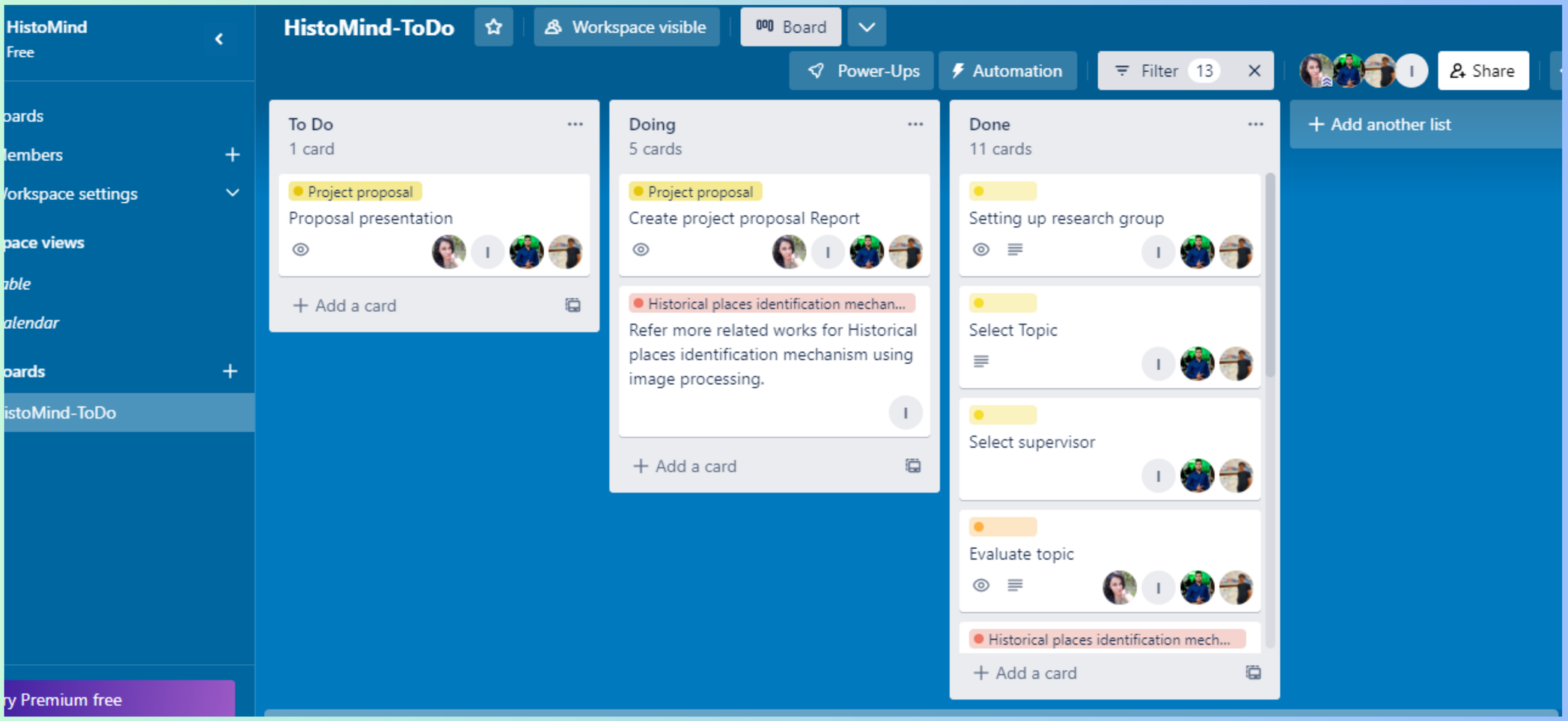
Python Programming Language (Version 3.6 or higher)

OpenCV (Image Processing Library)

scikit-image (Image Processing Library)

Pillow (Image Processing Library)

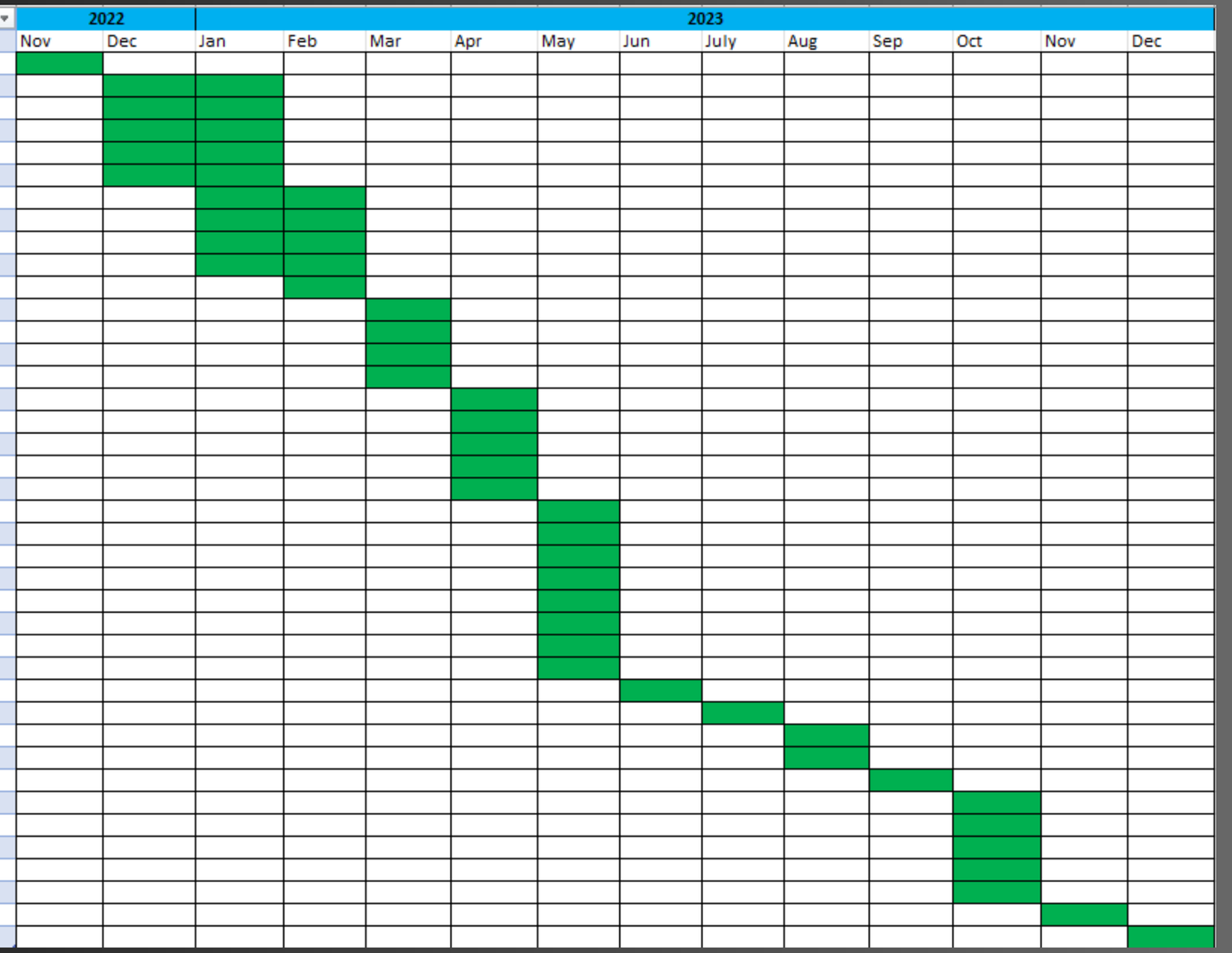
My Progress



IT20008178 Priyaratne K.K.M.M TMP-23-378

Gantt Chart

Research Project Tasks	Priority	Due Date
Project Topic Selection & Supervisor Selection	1	13-Nov
Supervisor Selection	1.1	Nov - Jan
Interest Discussion	1.2	Nov - Jan
Field Study	1.3	Nov - Jan
Group Discussion	1.4	Nov - Jan
Topic Selection	1.5	Nov - Jan
Feasibility Study	2	Jan - Feb
Planning/ Investigating	2.1	Jan - Feb
Techonology Analysis	2.2	Jan - Feb
Resources Evaluation	2.3	Jan - Feb
Topic Assestment Form	3	13-Feb
Project Charter Submission	4	14-Mar
Project Charter Confirmation Submission	5	16-Mar
Project Proposal Report(Draft)	6	20-Mar
Project Proposal Presentation	7	27-Mar
Design	8	1-Apr
Field Study	8.1	2-Apr
Specification	8.2	3-Apr
Interface Design	8.3	4-Apr
Implementation of Functions (1)	9	20-Apr
Testing Level 01	10	16-May
Unit Testing	10.1	16-May
Component Testing	10.2	16-May
Integration Testing	10.3	16-May
System Testing	10.4	16-May
User Testing	10.5	16-May
Project Status Document	11	20-May
Progress Presentation 01 (50%)	12	25-May
Prepare Research Paper	13	15-Jun
Implementation of Functions (2)	14	Jul
Testing Level 02	15	Aug
Final Report Draft Submission	16	Aug
Progress Presentation 02 (90%)	17	10-Sep
Final Report Feedback	18	2-Oct
Website Assestment	19	Oct
Final Report(Soft ound)	20	Oct
Project Status Document	21	Oct
Student Log Book	22	Oct
Final Presentation & Viva	23	Nov
Final Report (Hard Bound)	24	Dec



References

[1]S. L. T. D. Authority, "Tourism Research and Statistics," [Online]. Available: https://sltda.gov.lk/en/statistics.

[2]macrotrends, "Sri Lanka Tourism Statistics 1995-2023," [Online]. Available: https://www.macrotrends.net/countries/LKA/sri-lanka/tourism-statistics.

[3]T. Economics, "Sri Lanka Tourist Arrivals," [Online]. Available: https://tradingeconomics.com/sri-lanka/tourist-arrivals.

[4] S, A. et al. (2022) “An improved chatbot for medical assistance using machine learning,” 2022 International Conference on Inventive Computation Technologies (ICICT) [Preprint].

[5] Mahanan, W. et al. (2022) “College agent: The machine learning chatbot for college tasks,” 2022 Joint International Conference on Digital Arts, Media and Technology with ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (ECTI DAMT & NCON) [Preprint]

[6] K. J. C. N. P. C. B. H. J. A. Navod Godewithana1, "Historical Places & Monuments Identification," in IEEE REGION 10 CONFERENCE (TENCON), 2020.

[7] N. Sripriya, S. Poornima, S. Mohanavalli, R. P. Bhaiya, and V. Nikita, "Speech-Based Virtual Travel Assistant For Visually Impaired," in 4th International Conference on Computer, Communication and Signal Processing (ICCCSP), 2020.

[8] M. Polignano, F. Narducci, A. Iovine, C. Musto, M. D. Gemmis and G. Semeraro, "HealthAssistantBot: A Personal Health Assistant for the Italian Language," in IEEE Access (Volume: 8), 2020.

[9] A. K. M. Masum, S. Abujar, S. Akter, N. J. Ria and S. A. Hossain, "Transformer Based Bengali Chatbot Using General Knowledge Dataset," in 20th IEEE International Conference on Machine Learning and Applications (ICMLA), 2021.

10] S. V. Prajwal, G. Mamatha, P. Ravi, D. Manoj, and S. K. Joisa, "Universal Semantic Web Assistant based on Sequence to Sequence Model and Natural Language Understanding," in 9th International Conference on Advances in Computing and Communication (ICACC), 2019.

[11] "Tourism_in_Sri_Lanka," [Online]. Available: https://en.wikipedia.org/wiki/Tourism_in_Sri_Lanka.


THANK YOU