Apeksha Hospital Donor Engagement System

2023-24-100

Status Document 1

Punchihewa S.N

BSc (Hons) in Information Technology specializing in Software Engineering

Department of Information Technology

Sri Lanka Institute of Information Technology Sri Lanka

August 2023

Intelligent Donor-Driven Inventory System for Essential Items

2023-24-100

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August 2023

Declaration of The Candidate & Supervisor

I declare that this is my work, and this proposal does not incorporate without acknowledgment 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 acknowledgment is made in the text.

Name	**Student ID**	**Signature**
Punchihewa S. N	IT20665166	

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor: Date:

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Signature of the Co-supervisor: Date:

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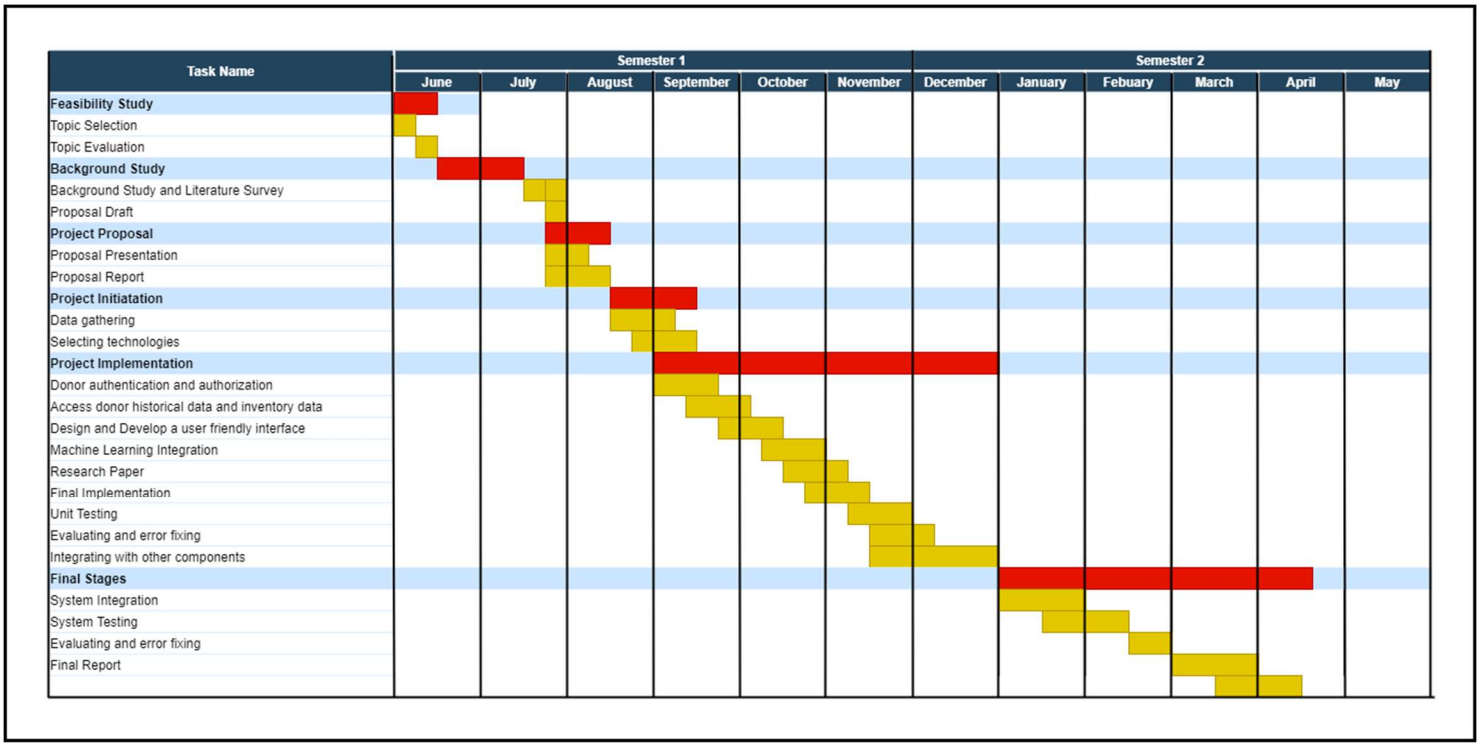
Table of Contents

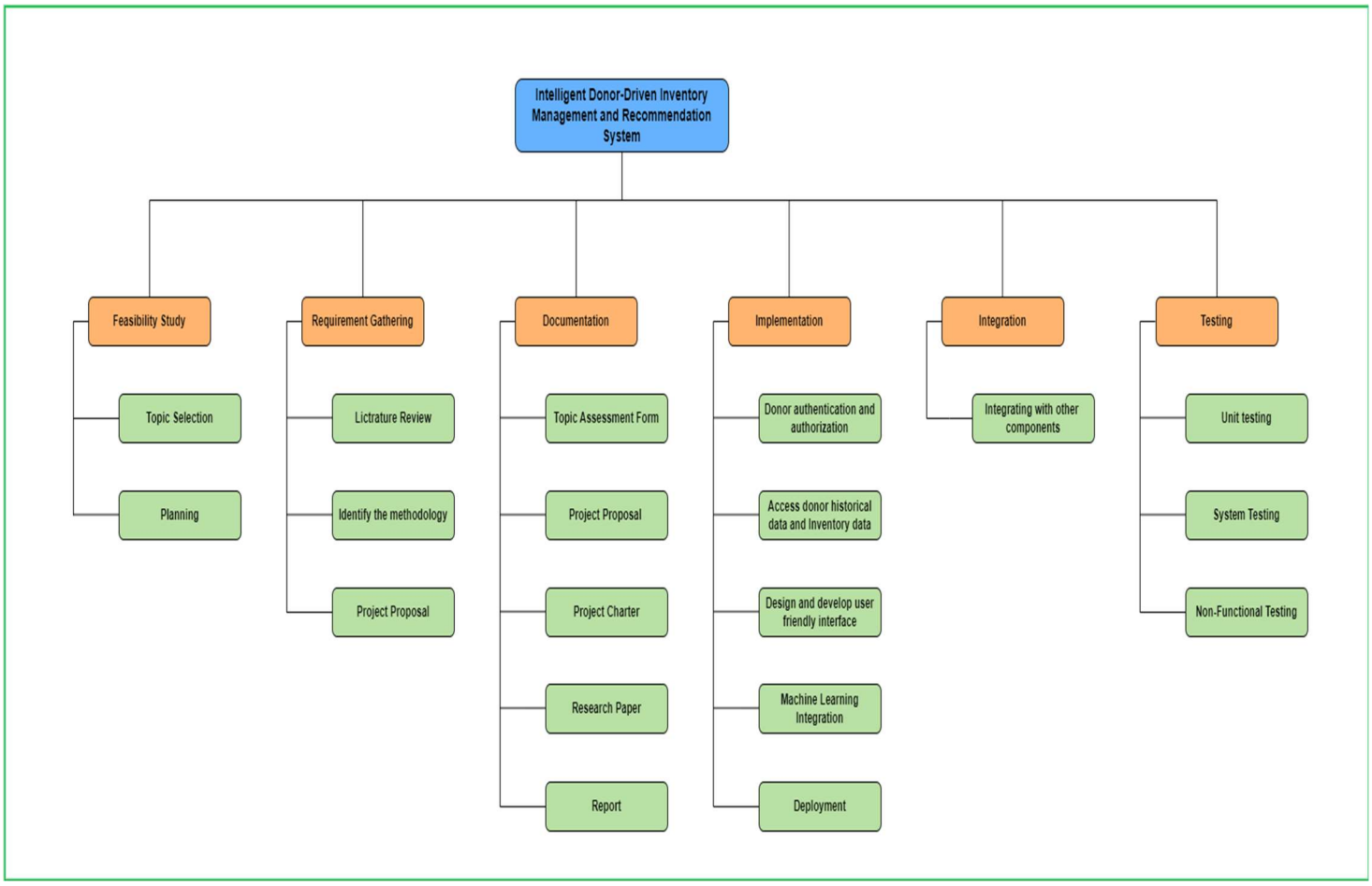
1. Introduction

Apeksha Hospital has the significant problem of enhancing donor involvement and enhancing the management of essential item inventory. To overcome this difficulty, this study proposes a new Intelligent Donor-Driven Inventory System for Essential Supplies. The main goal is to make use of machine learning algorithms to better understand donor habits, preferences, and giving patterns over time. As a result of this knowledge, the system will be in a position to skillfully suggest essential products to prospective donors, therefore stimulating their donations that are in line with the hospital's immediate demands. The ultimate goal of this research is to provide an engaging platform that integrates donor engagement with inventory control. Donors will be able to see the direct results of their donations and get personalized product recommendations from the system. By using these strategies, we want to increase donor pleasure and engagement while establishing a positive cycle of engagement. The research being conducted hopes to make the present of essential items more useful by concluding the gap between what donors want to do and what hospitals need. This collaborative method, which is made possible by machine learning and a donor-centered interface, not only improves the way resources are used but also makes the experience for donors as a whole better. Because of this, the results of this research are likely to make a big difference in how people give donations to Apeksha Hospital.

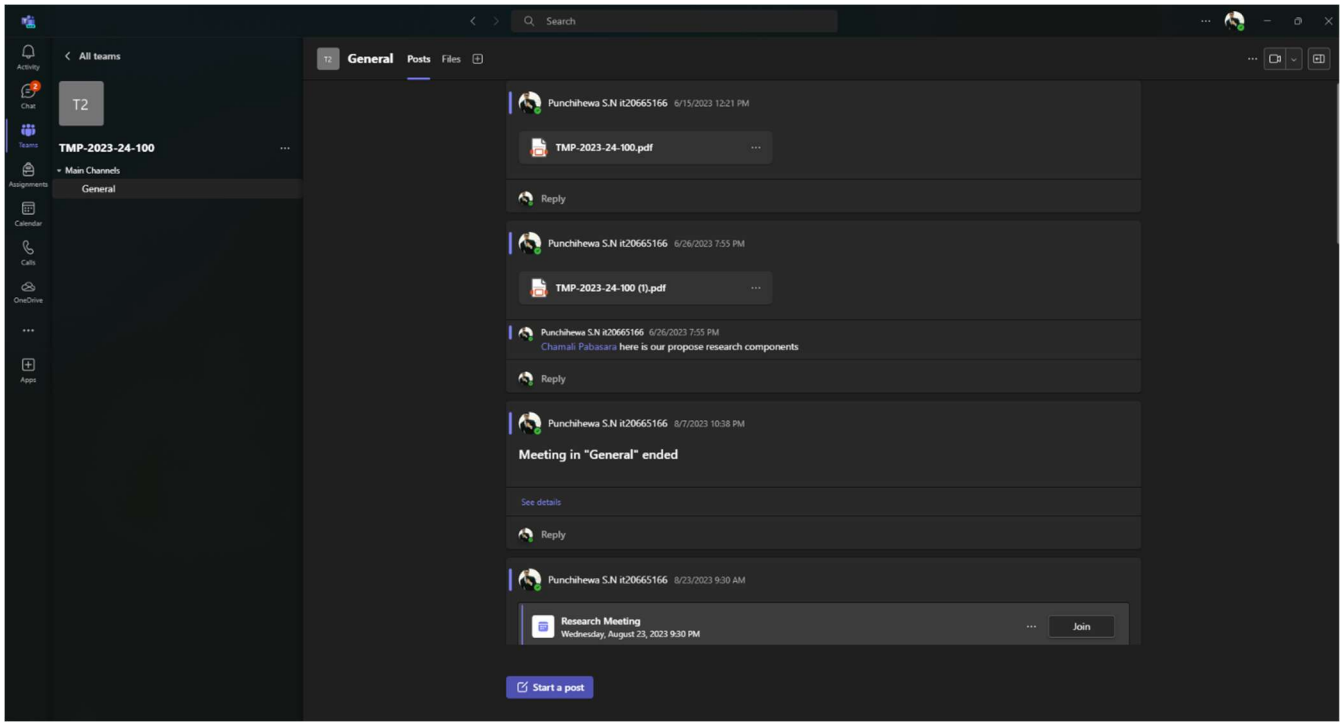
2. Gantt Chart

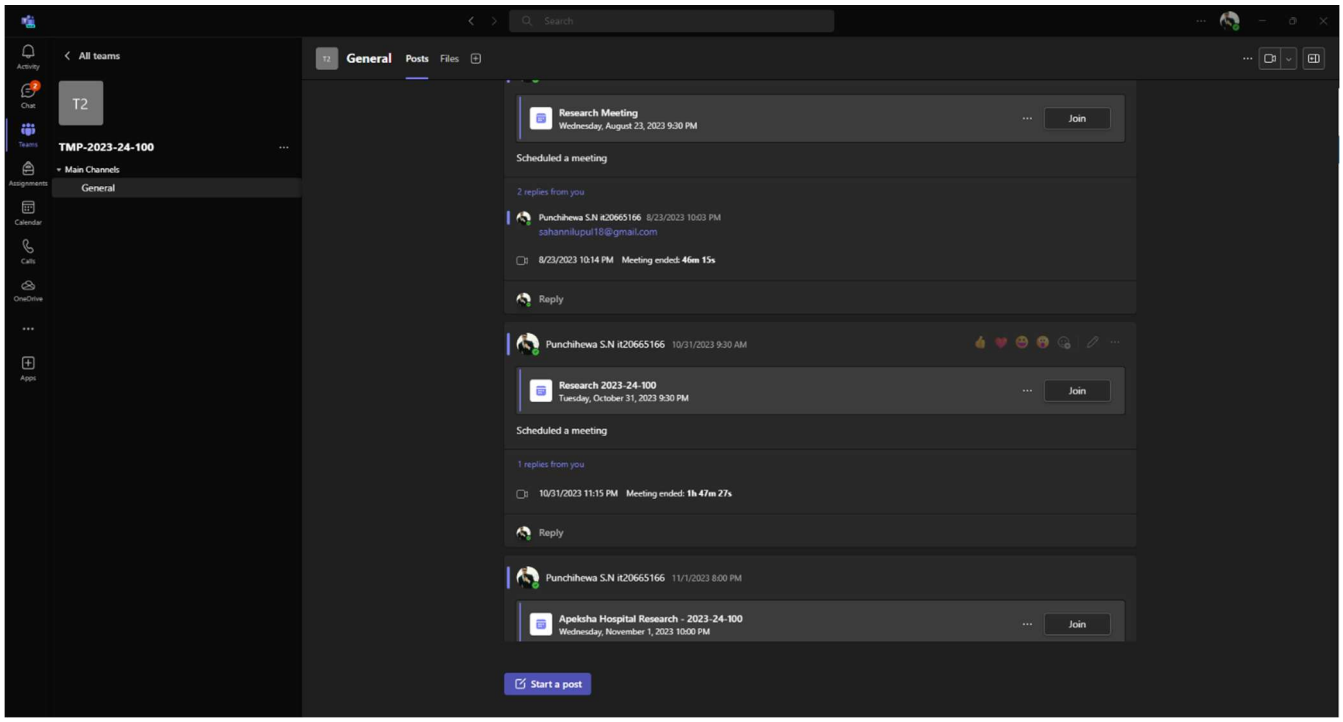


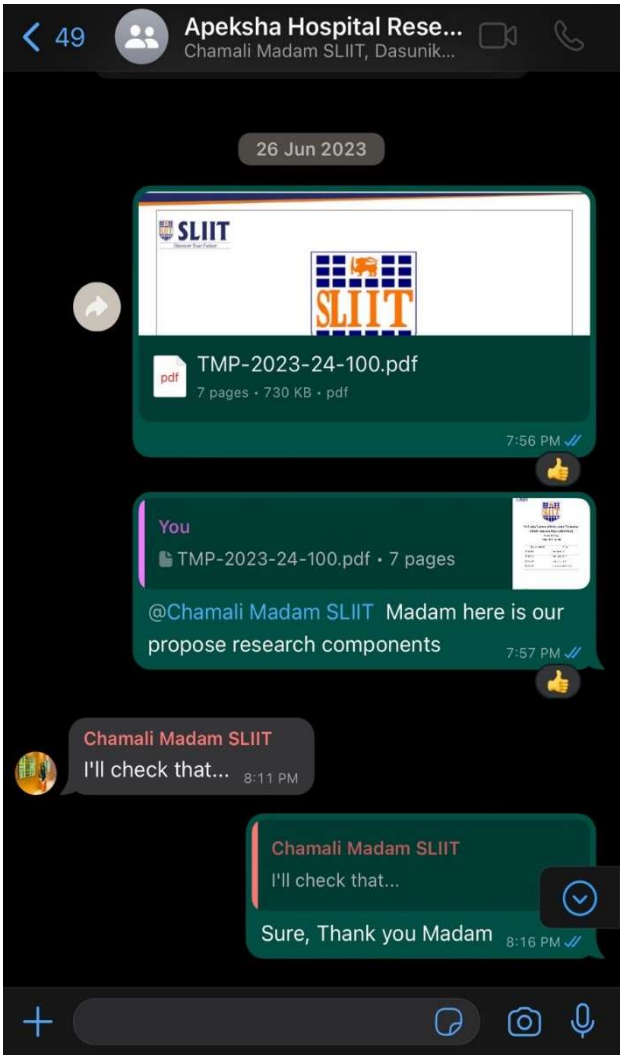
3. Work-Break-Down Chart



4. Screenshot of Meetings and Conversations






49
Apeksha Hospital Rese...
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26 Jun 2023
SLIIT
TMP-2023-24-100.pdf
7 pages • 730 KB • pdf
7:56 PM
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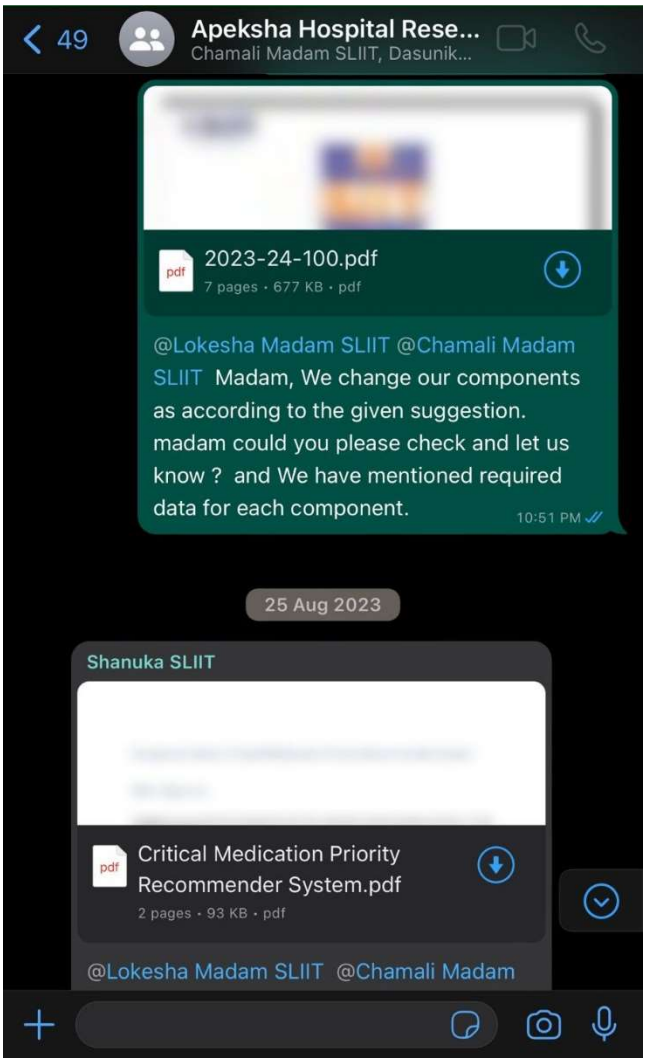
@Chamali Madam SLIIT Madam here is our propose research components
7:57 PM
Chamali Madam SLIIT
I'll check that... 8:11 PM
Chamali Madam SLIIT
I'll check that...
Sure, Thank you Madam 8:16 PM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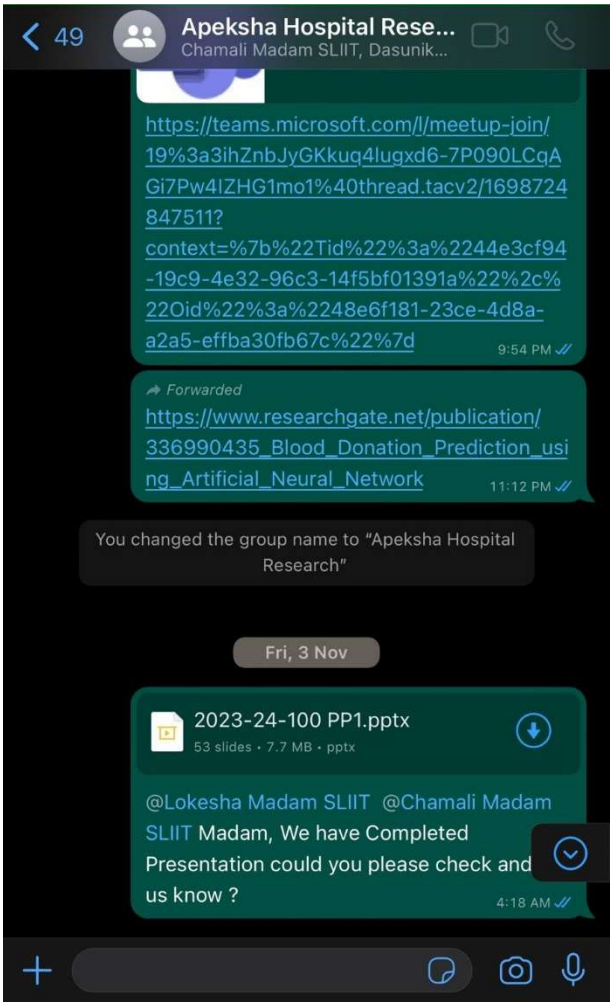
Chamali Madam SLIIT, Dasunik...
2023-24-100.pdf
7 pages • 677 KB • pdf
@Lokesha Madam SLIIT @Chamali Madam SLIIT Madam, We change our components as according to the given suggestion. madam could you please check and let us know ? and We have mentioned required data for each component.
10:51 PM
25 Aug 2023
Shanuka SLIIT
Critical Medication Priority Recommender System.pdf
2 pages • 93 KB • pdf
@Lokesha Madam SLIIT @Chamali Madam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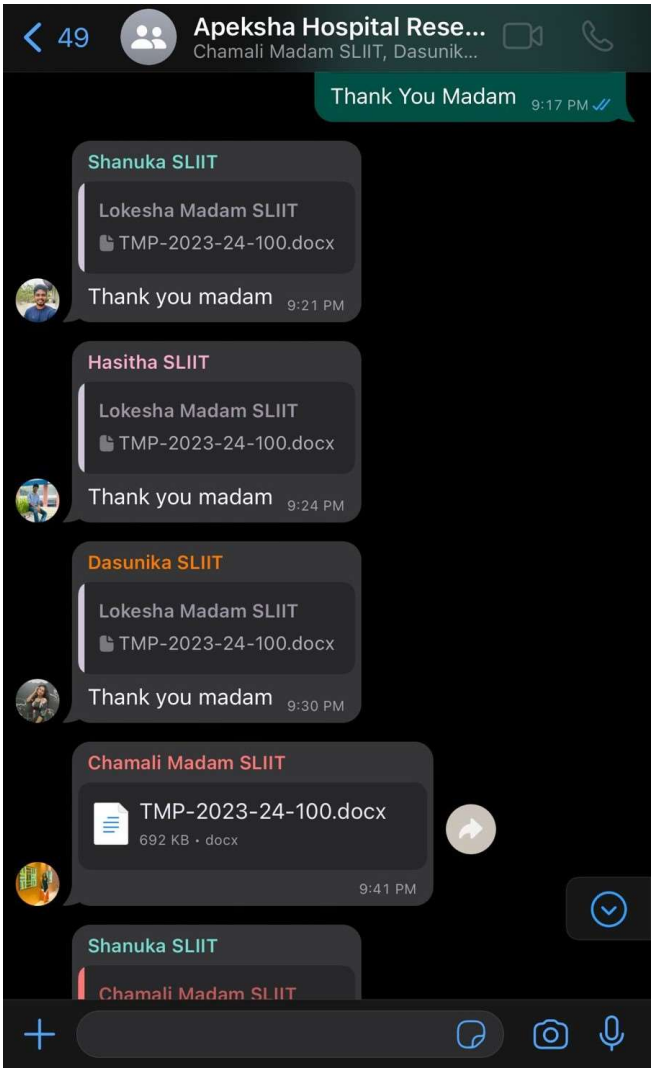
https://www.researchgate.net/publication/336990435_Blood_Donation_Prediction_using_Artificial_Neural_Network
11:12 PM
You changed the group name to "Apeksha Hospital Research"
Fri, 3 Nov
2023-24-100 PP1.pptx
53 slides • 7.7 MB • pptx
@Lokesha Madam SLIIT @Chamali Madam SLIIT Madam, We have Completed Presentation could you please check and us know ?
4:18 AM


49
Apeksha Hospital Rese...
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Thank You Madam
9:17 PM
Shanuka SLIIT
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Thank you madam
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Hasitha SLIIT
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Dasunika SLIIT
Lokesha Madam SLIIT
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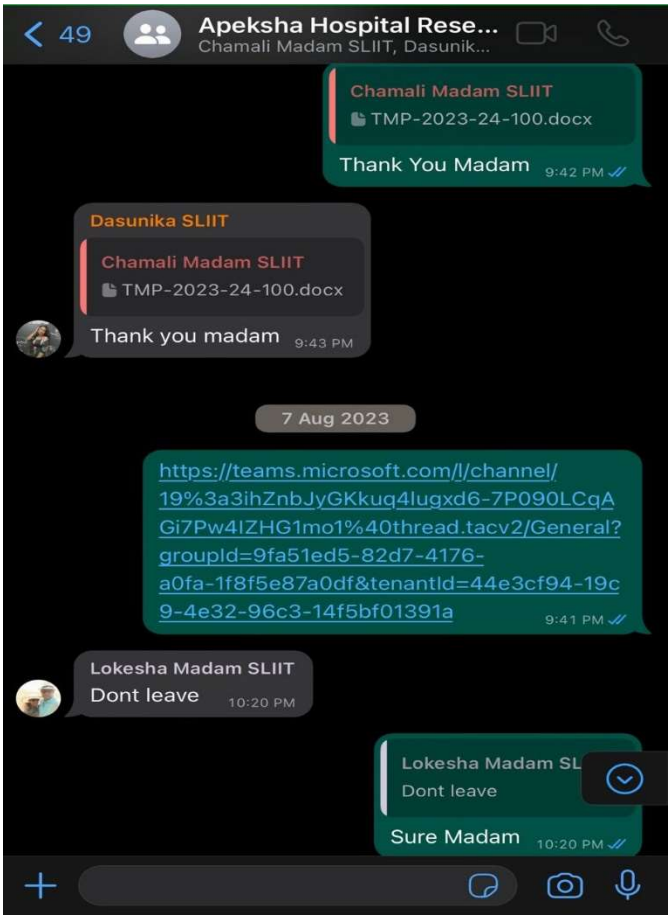
Shanuka SLIIT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Thank You Madam 9:42 PM
Dasunika SLIIT
Chamali Madam SLIIT
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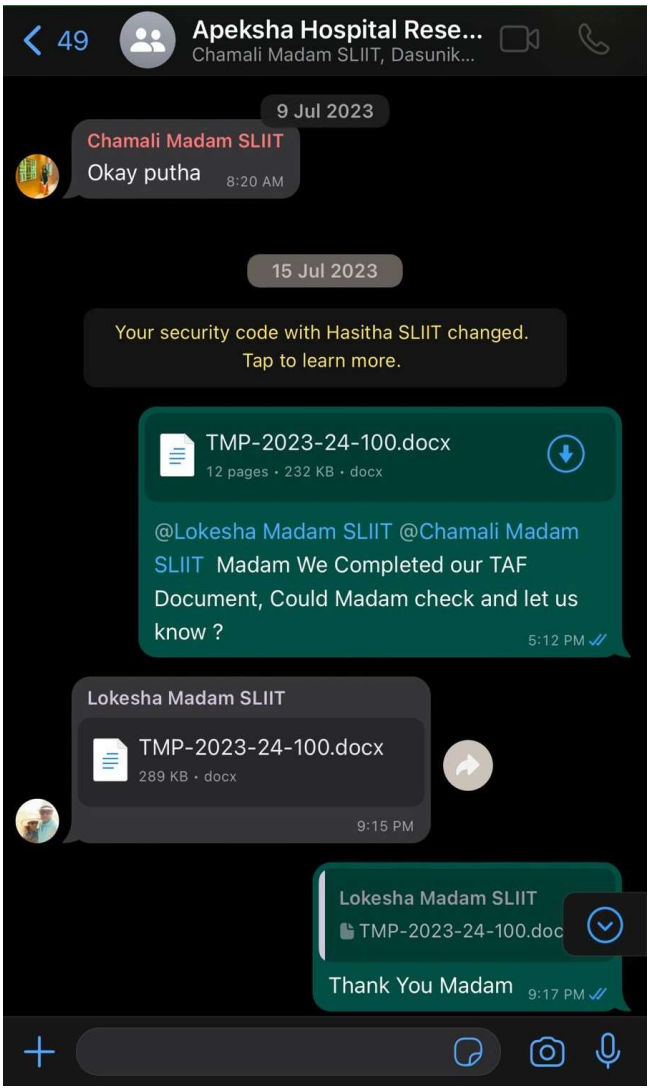
Thank you madam 9:43 PM
7 Aug 2023
https://teams.microsoft.com/l/channel/19%3a3ihZnbJyGKkuq4lugxd6-7P090LCqAGi7Pw4lZHG1mo1%40thread.tacv2/General?groupId=9fa51ed5-82d7-4176-a0fa-1f8f5e87a0df&tenantId=44e3cf94-19c9-4e32-96c3-14f5bf01391a 9:41 PM
Lokesha Madam SLIIT
Dont leave 10:20 PM
Lokesha Madam SL
Dont leave
Sure Madam 10:20 PM


49
Apeksha Hospital Rese...
Chamali Madam SLIIT, Dasunik...
9 Jul 2023
Chamali Madam SLIIT
Okay putha 8:20 AM
15 Jul 2023
Your security code with Hasitha SLIIT changed.
Tap to learn more.
TMP-2023-24-100.docx
12 pages • 232 KB • docx
@Lokesha Madam SLIIT @Chamali Madam SLIIT Madam We Completed our TAF Document, Could Madam check and let us know ?
5:12 PM
Lokesha Madam SLIIT
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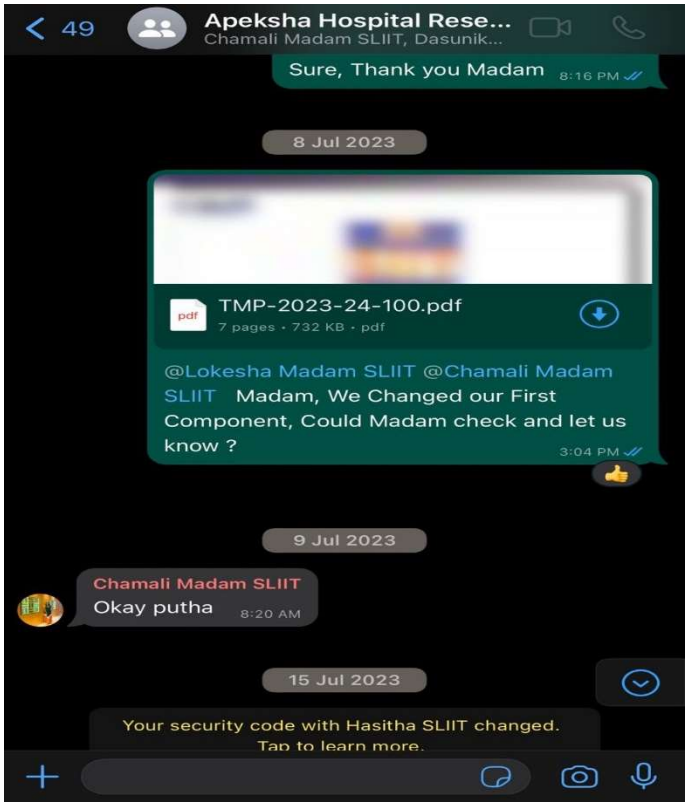
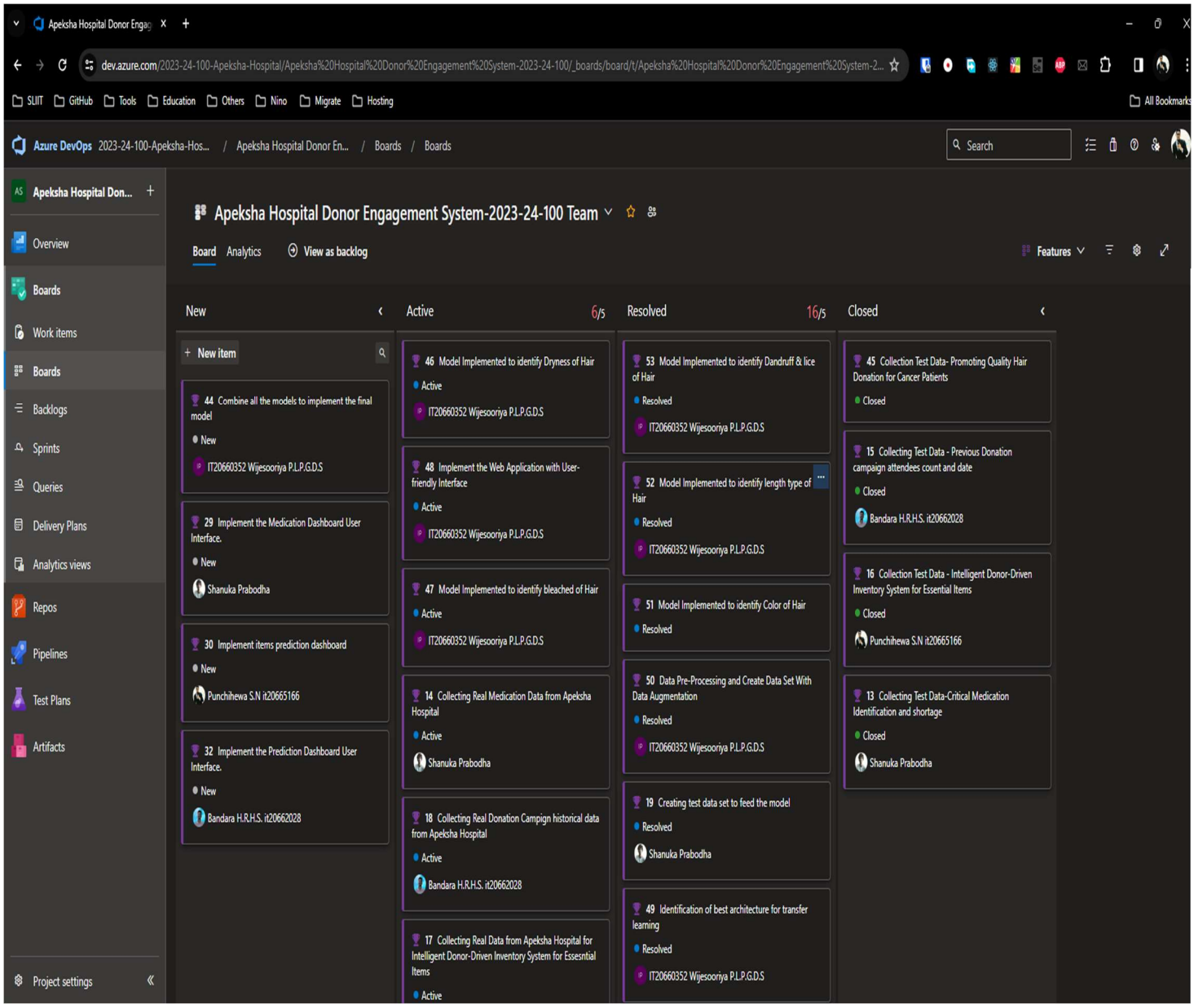
Thank You Madam 9:17 PM

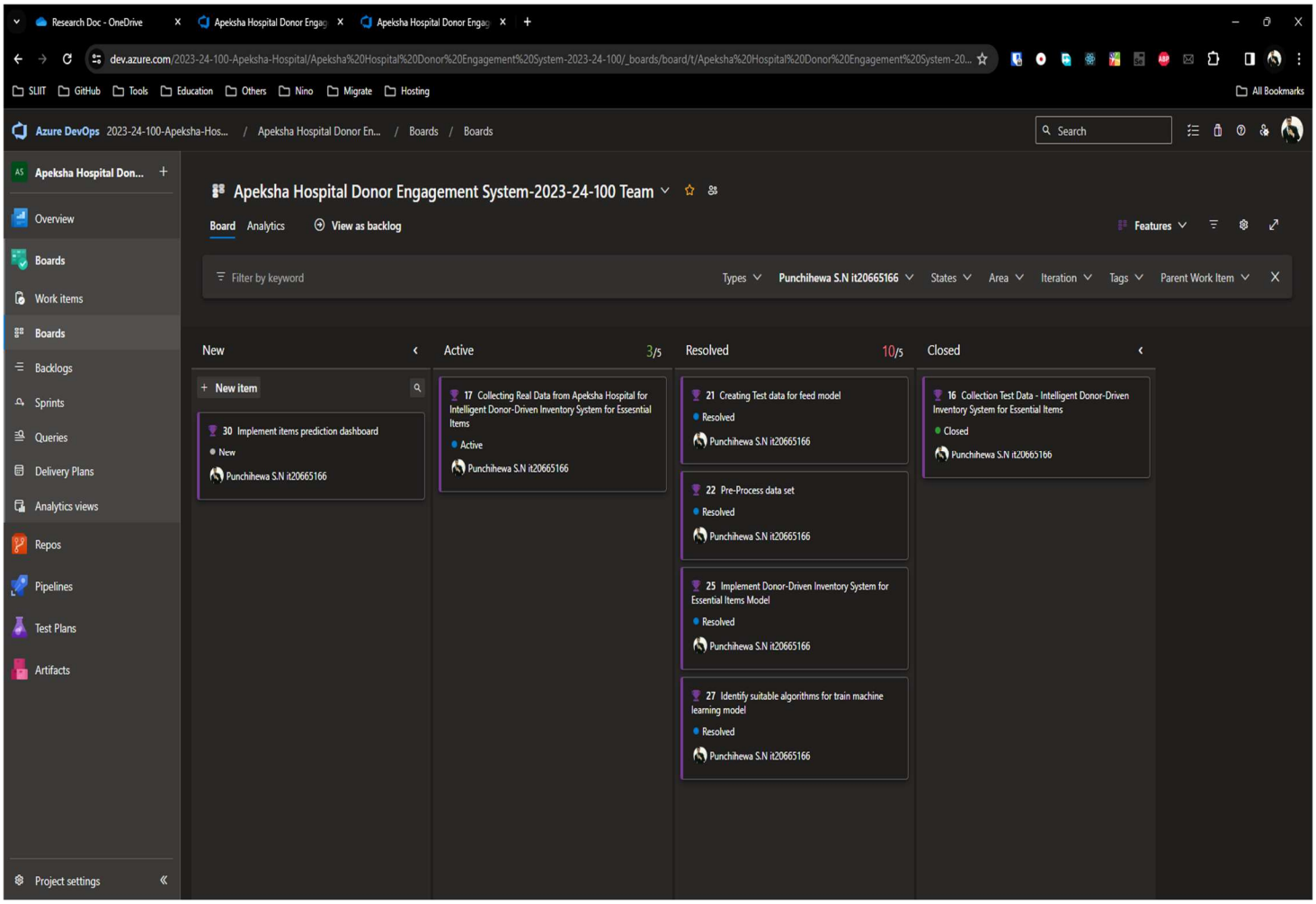

49
Apeksha Hospital Rese...
Chamali Madam SLIIT, Dasunik...
Sure, Thank you Madam 8:16 PM
8 Jul 2023
TMP-2023-24-100.pdf
7 pages • 732 KB • pdf
@Lokesha Madam SLIIT @Chamali Madam SLIIT Madam, We Changed our First Component, Could Madam check and let us know ?
3:04 PM
9 Jul 2023
Chamali Madam SLIIT
Okay putha 8:20 AM
15 Jul 2023
Your security code with Hasitha SLIIT changed.
Tap to learn more.

5. Project Management Tools & Screenshot

5.1 Overall Backlog



5.2 Personal Backlog



6. Trained Model Screenshot

6.1 Linear Regression

jupyter InventoryPrediction Last Checkpoint: 4 hours ago (autosaved)

Logout

File Edit View Insert Cell Kernel Widgets Help

Trusted | Python 3 (ipykernel)

Run Code

In [1]:
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import accuracy_score, classification_report
from sklearn.preprocessing import LabelEncoder
from sklearn.metrics import ConfusionMatrixDisplay
import matplotlib.pyplot as plt
```

In [2]:
```
# Load the dataset
df = pd.read_csv('newdataset.csv')
```

In [3]:
```
# calculate the correlation coefficient between the "RequestedQuantity" column in the inventory DataFrame and all the other numer
df.corr(numeric_only = ['RequestedQuantity'])["RequestedQuantity"]
```

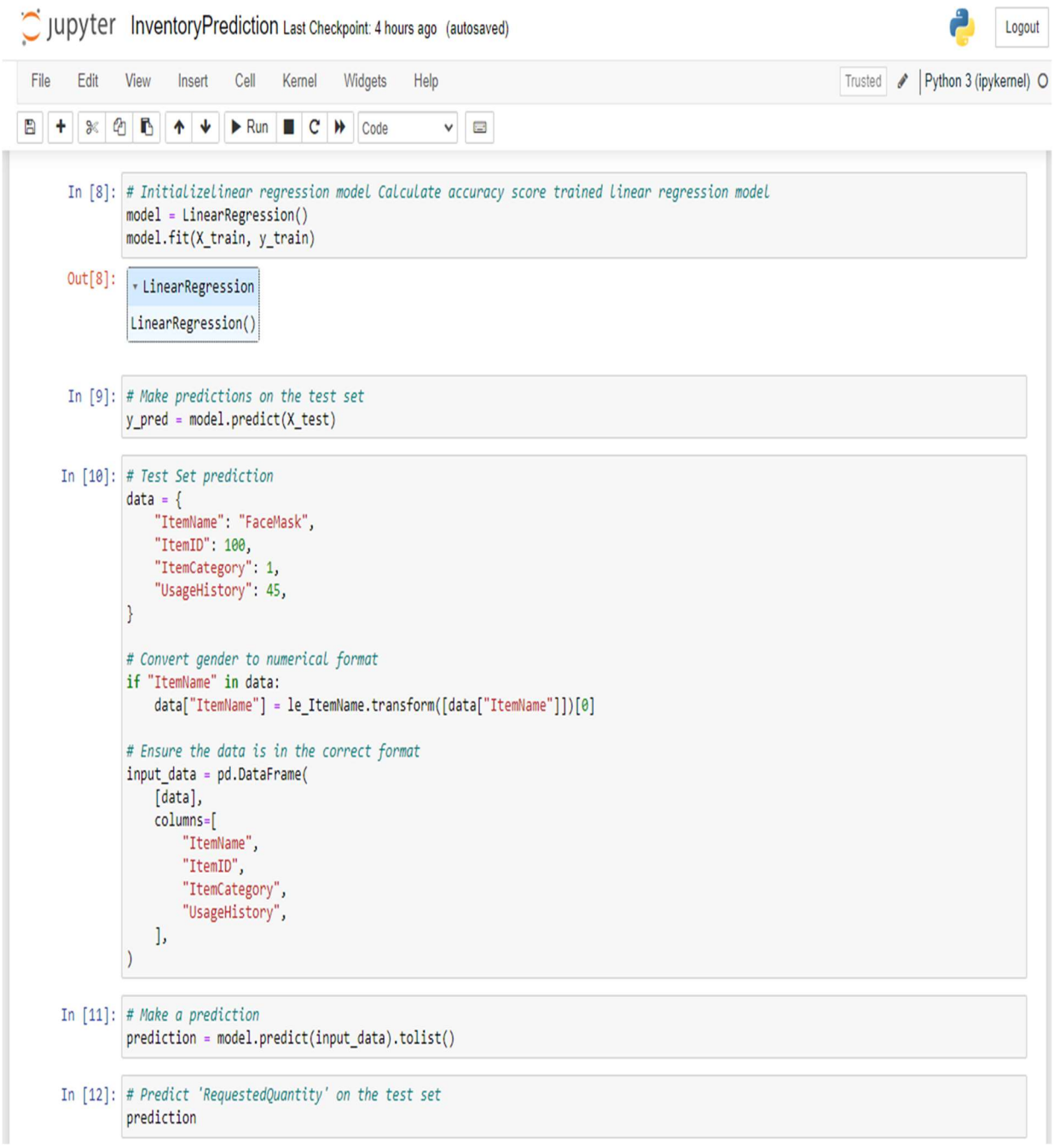
Out[3]:
```
ItemID             -0.174915
ItemCategory       -0.210888
QuantityInStock     0.244093
UsageHistory       -0.522111
RequestedQuantity   1.000000
Demand              0.044951
Name: RequestedQuantity, dtype: float64
```

In [4]:
```
# Preprocess the Data
le_ItemName = LabelEncoder()
df["ItemName"] = le_ItemName.fit_transform(df["ItemName"])
```

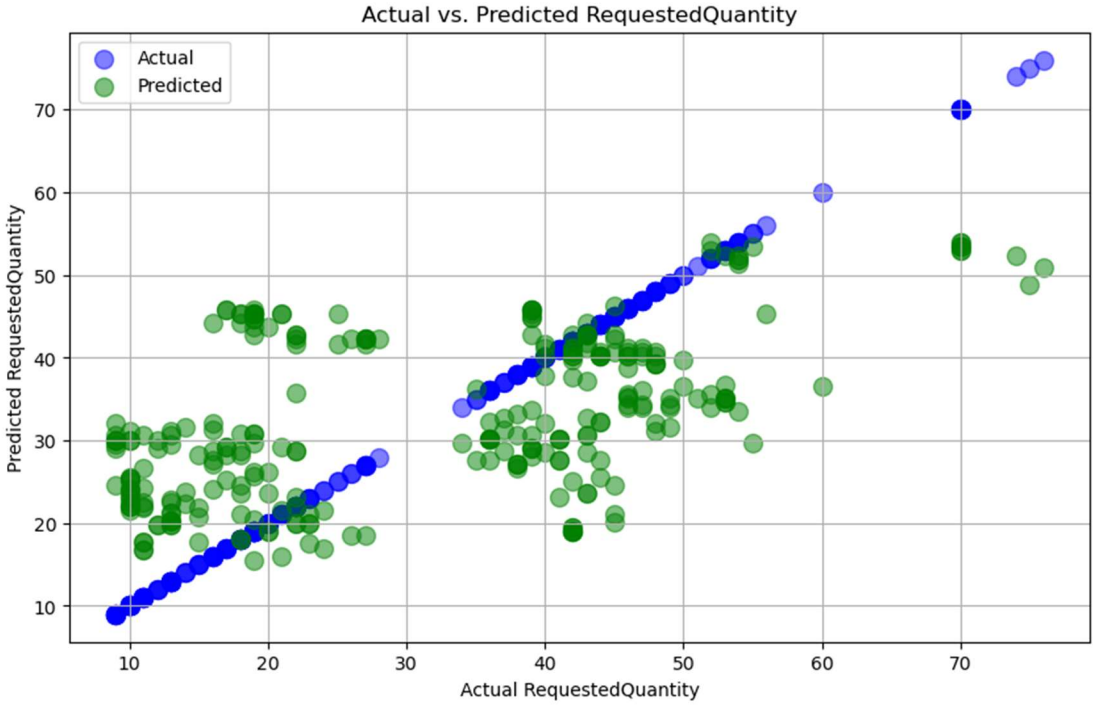
In [5]:
```
# Define independent variables (features) and the target variable
X = df[["ItemName", "ItemID", "ItemCategory", "UsageHistory"]]
y = df["RequestedQuantity"]
```

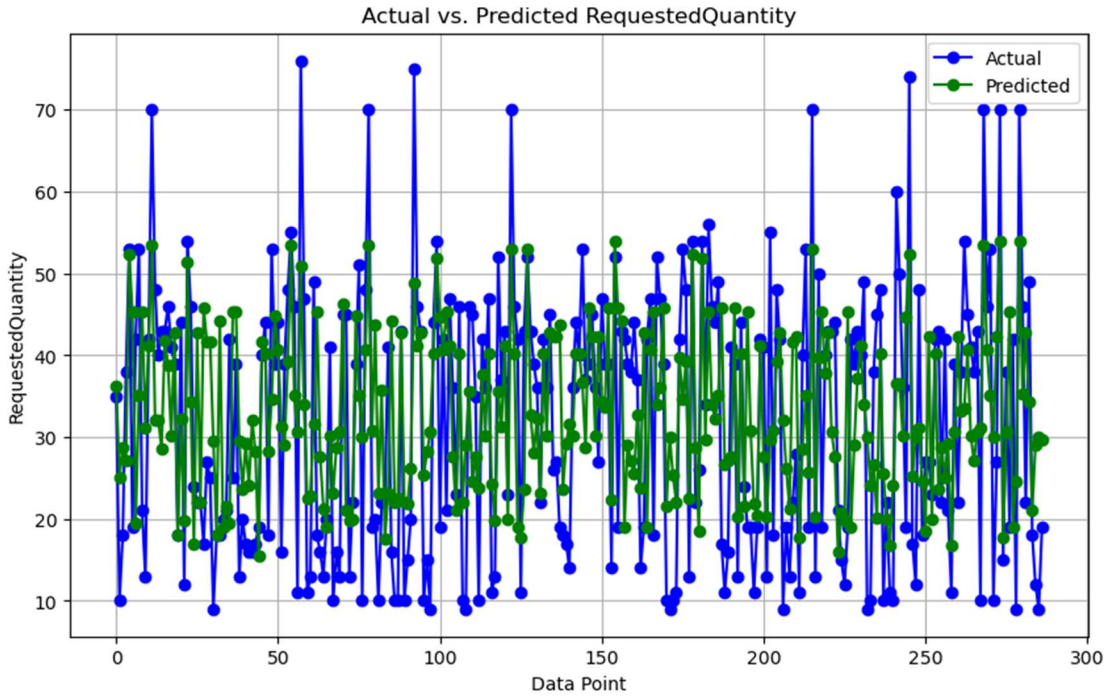
In [6]:
```
# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=10)
```

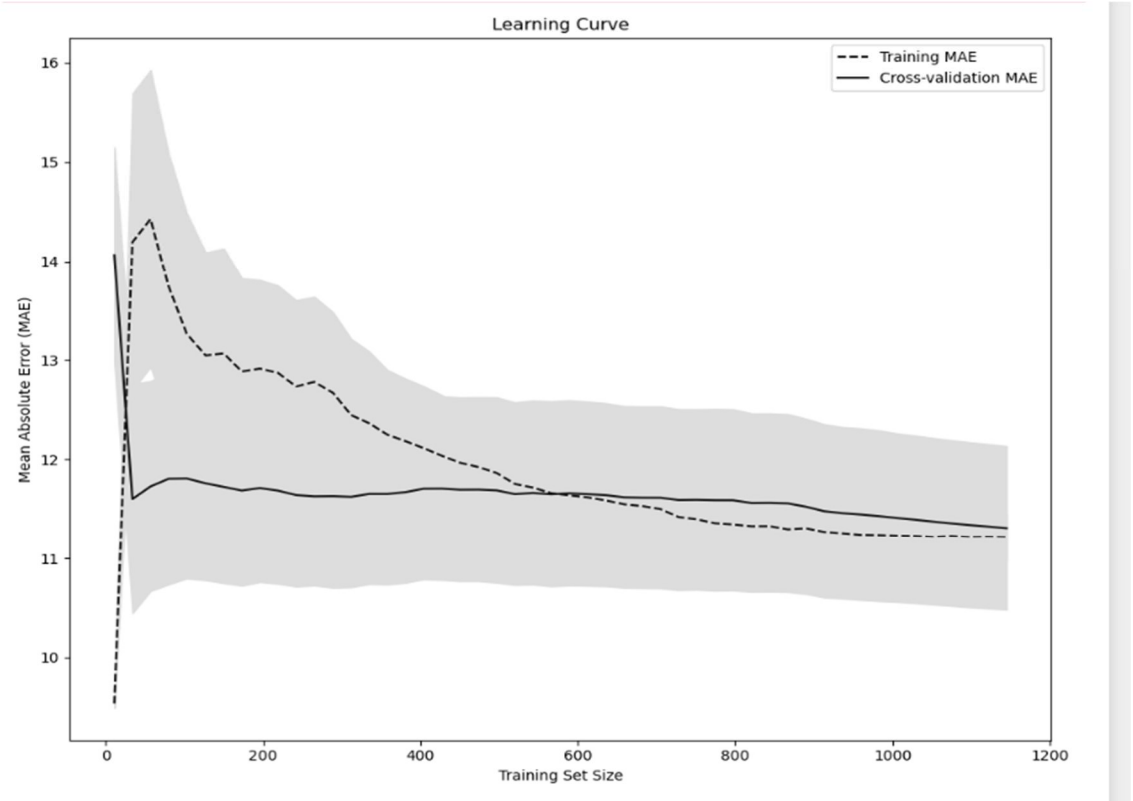
In [7]:
```
# print out the shape of the training and testing sets
print("Training set shape : ", X_train.shape, y_train.shape)
print("Testing set shape : ", X_test.shape, y_test.shape)
```


jupyter InventoryPrediction Last Checkpoint: 4 hours ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3 (ipykernel)
Run
Code
In [8]:
# Initializelinear regression model Calculate accuracy score trained linear regression model
model = LinearRegression()
model.fit(X_train, y_train)
Out[8]:
LinearRegression
LinearRegression()
In [9]:
# Make predictions on the test set
y_pred = model.predict(X_test)
In [10]:
# Test Set prediction
data = {
"ItemName": "FaceMask",
"ItemID": 100,
"ItemCategory": 1,
"UsageHistory": 45,
}
# Convert gender to numerical format
if "ItemName" in data:
data["ItemName"] = le_ItemName.transform([data["ItemName"]])[0]
# Ensure the data is in the correct format
input_data = pd.DataFrame(
[data],
columns=[
"ItemName",
"ItemID",
"ItemCategory",
"UsageHistory",
],
)
In [11]:
# Make a prediction
prediction = model.predict(input_data).tolist()
In [12]:
Predict 'RequestedQuantity' on the test set
prediction

```
In [11]: # Make a prediction
         prediction = model.predict(input_data).tolist()

In [12]: # Predict 'RequestedQuantity' on the test set
         prediction

Out[12]: [37.79863989744041]

In [13]: prediction

Out[13]: [37.79863989744041]

In [14]: # model.fit(X_train, y_train)
         model.score(X_train, y_train)

Out[14]: 0.36888600431470053
```




Actual vs. Predicted RequestedQuantity
Actual
Predicted
RequestedQuantity
Data Point
10
20
30
40
50
60
70
0
50
100
150
200
250
300


Learning Curve
Training MAE
Cross-validation MAE
Mean Absolute Error (MAE)
Training Set Size
10
11
12
13
14
15
16
0
200
400
600
800
1000
1200

6.2 Decision Tree Regression

Training Set Size

In [20]:
```
# Decision Tree Regression Algorithm
```

In [21]:
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeRegressor  # Import DecisionTreeRegressor
import matplotlib.pyplot as plt
```

In [22]:
```
# Load the dataset
df = pd.read_csv('newdataset.csv')

# Preprocess the Data
# (You can keep the LabelEncoder for ItemName)
from sklearn.preprocessing import LabelEncoder
```

In [23]:
```
le_ItemName = LabelEncoder()
df["ItemName"] = le_ItemName.fit_transform(df["ItemName"])

# Define independent variables (features) and the target variable
X = df[["ItemName", "ItemID", "ItemCategory", "UsageHistory"]]
y = df["RequestedQuantity"]
```

In [24]:
```
# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

In [25]:
```
# Print out the shape of the training and testing sets
print("Training set shape:", X_train.shape, y_train.shape)
print("Testing set shape:", X_test.shape, y_test.shape)
```

```
Training set shape: (1145, 4) (1145,)
Testing set shape: (287, 4) (287,)
```

In [26]:
```
# Initialize Decision Tree Regression model
model = DecisionTreeRegressor(random_state=42)  # You can specify other hyperparameters if needed
```

In [27]:
```
# Train the Decision Tree model
model.fit(X_train, y_train)
```

Out[27]:
```
DecisionTreeRegressor(random_state=42)
```

DecisionTreeRegressor(random_state=42)

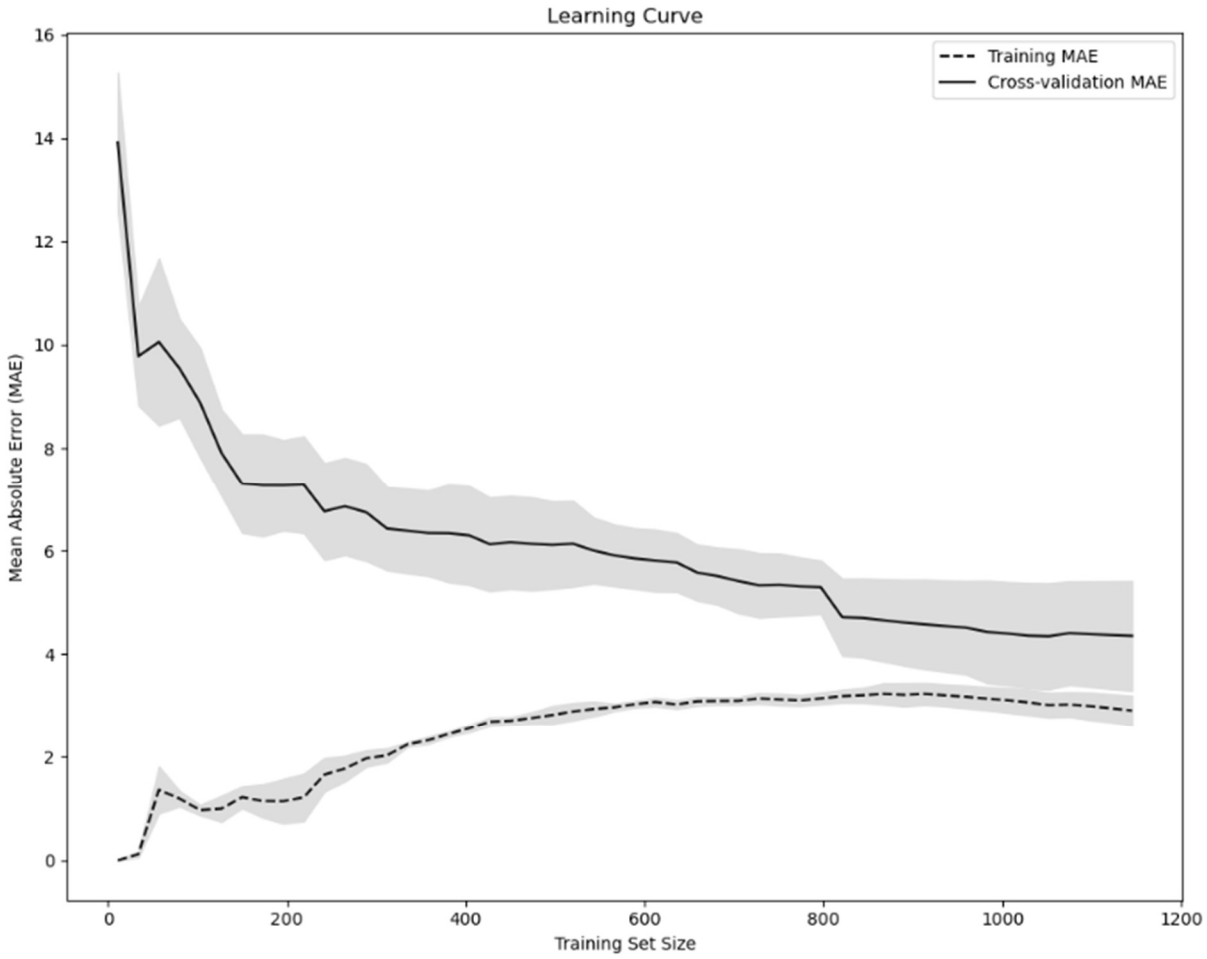
In [28]:
```
# Test Set prediction
data = {
    "ItemName": "FaceMask",
    "ItemID": 100,
    "ItemCategory": 1,
    "UsageHistory": 45,
}

# Convert "ItemName" to numerical format using the LabelEncoder
if "ItemName" in data:
    data["ItemName"] = le_ItemName.transform([data["ItemName"]])[0]

# Ensure the data is in the correct format
input_data = pd.DataFrame(
    [data],
    columns=[
        "ItemName",
        "ItemID",
        "ItemCategory",
        "UsageHistory",
    ],
)
```

In [29]:
```
# Make a prediction using the Decision Tree model
prediction = model.predict(input_data).tolist()

# Print the predicted 'RequestedQuantity' on the test set
print("Prediction:", prediction)
```

```
Prediction: [46.666666666666664]
```

In [30]:
```
model.score(X_train, y_train)
```

Out[30]:
```
0.8945812178633263
```


Learning Curve
Training MAE
Cross-validation MAE
Mean Absolute Error (MAE)
Training Set Size
0
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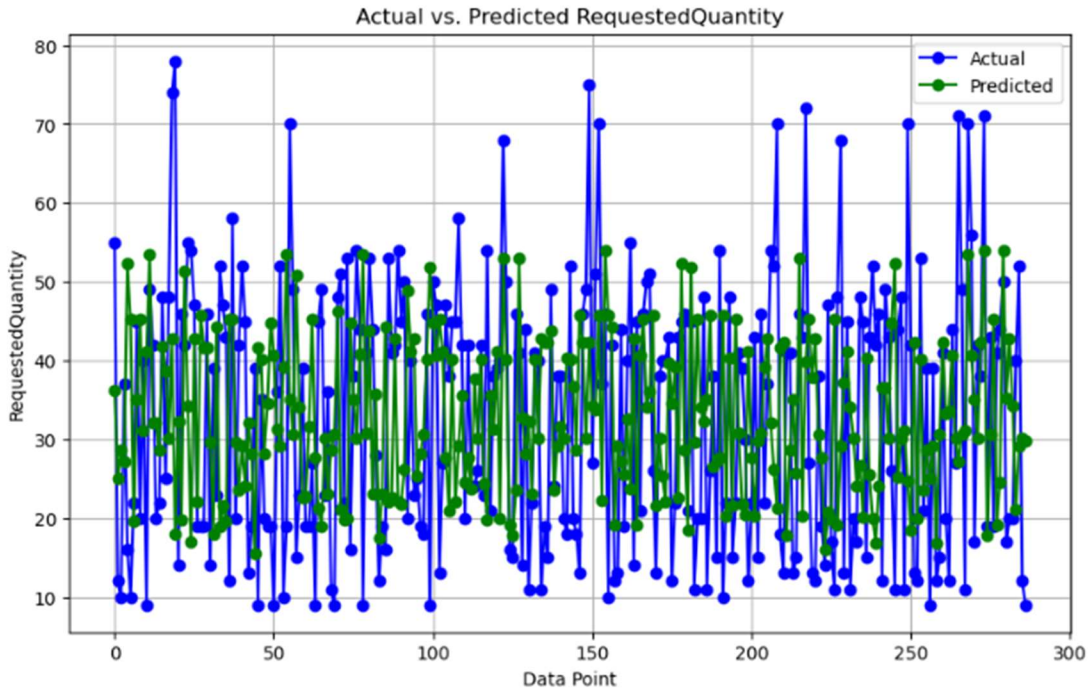
Actual vs. Predicted RequestedQuantity
Actual
Predicted
RequestedQuantity
Data Point
80
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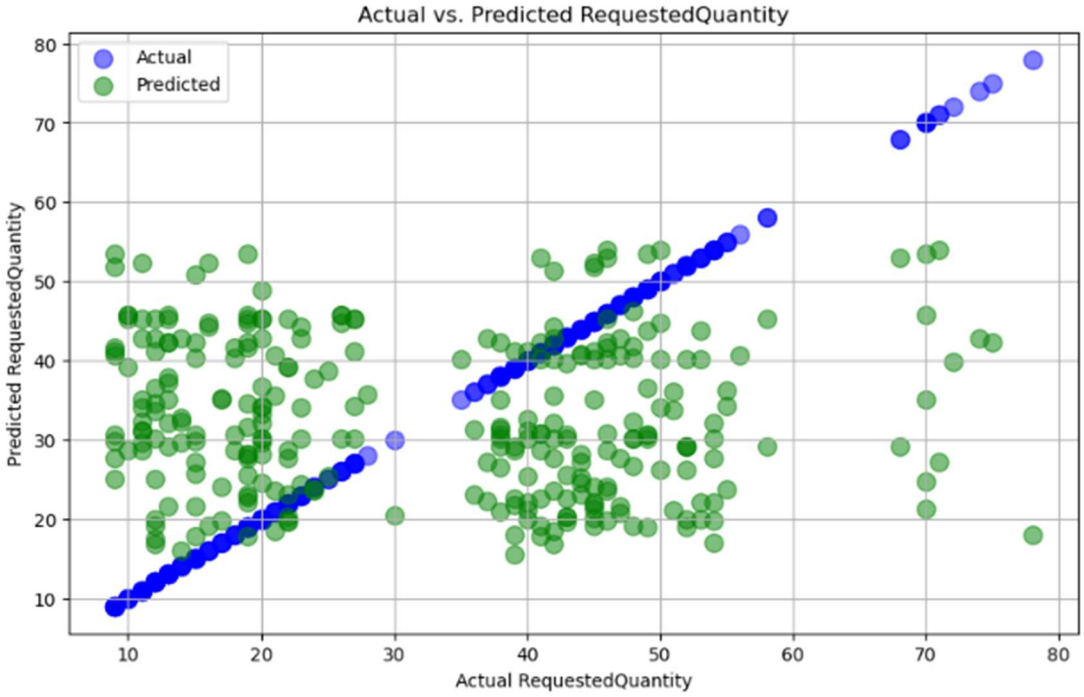
Actual vs. Predicted RequestedQuantity
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Predicted RequestedQuantity
Actual RequestedQuantity
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80

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2023-24-100

Status Document 01

Prabodha K.W.D.S

BSc (Hons) in Information Technology specializing in Software Engineering

Department of Information Technology

Sri Lanka Institute of Information Technology Sri Lanka

August 2023

Critical Medication Priority Recommender System

2023-24-100

Status Document 01

Prabodha K.W.D.S

BSc (Hons) in Information Technology specializing in Software Engineering

Department of Information Technology

Sri Lanka Institute of Information Technology Sri Lanka

August 2023

Declaration of The Candidate & Supervisor

I declare that this is my work, and this proposal does not incorporate without acknowledgment 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 acknowledgment is made in the text.

Name	**Student ID**	**Signature**
Prabodha K.W.D. S	IT20665098	

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor: Date:

--- ---

Signature of the Co-supervisor: Date:

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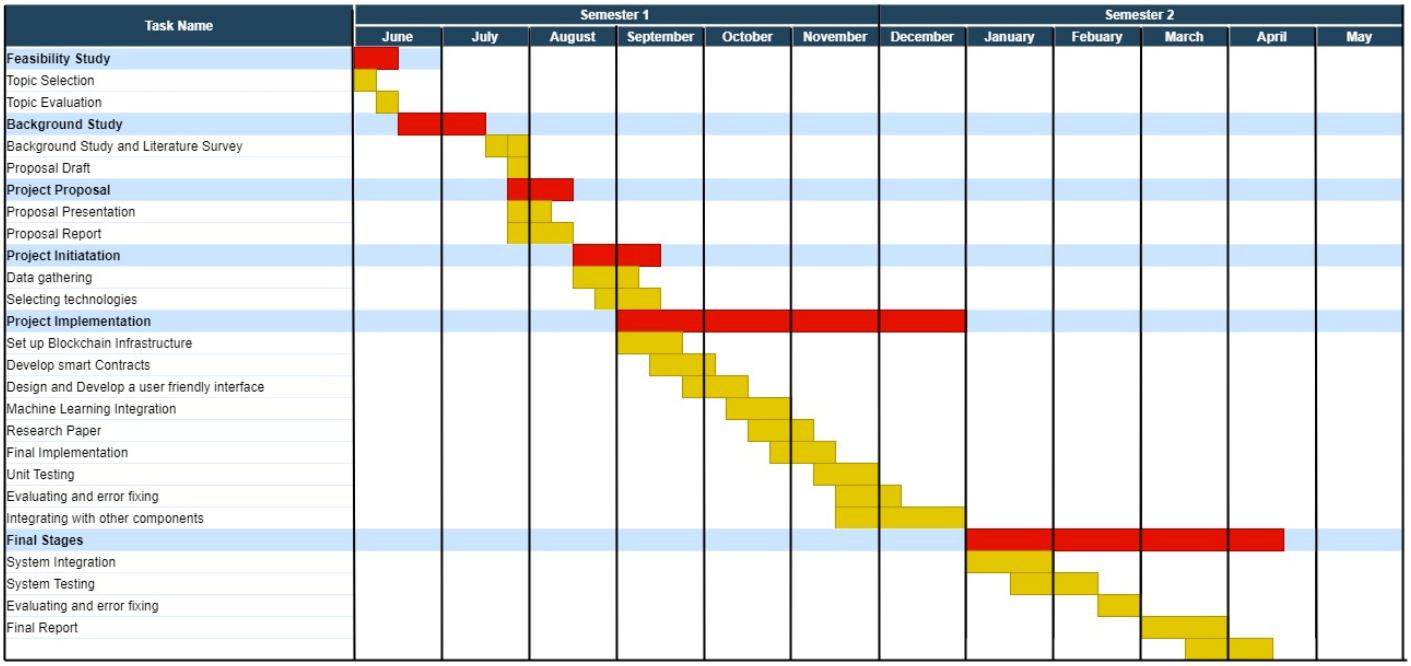
Table of Contents

Introduction

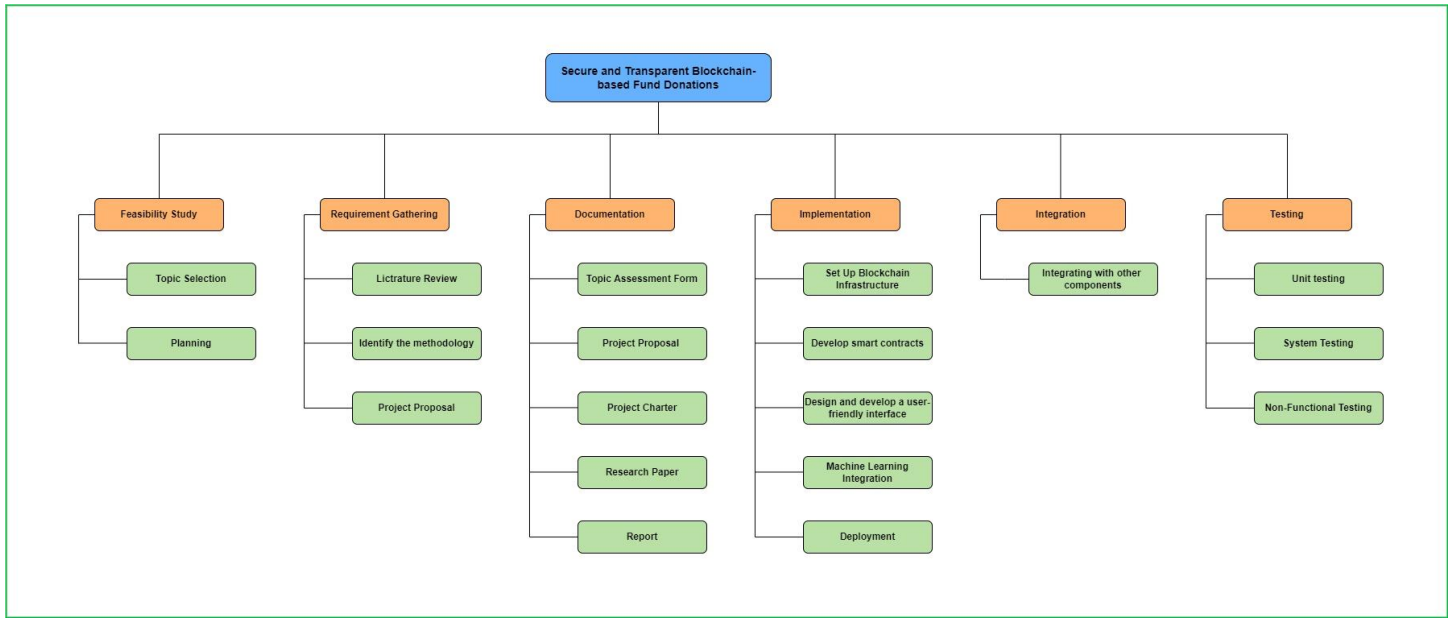
The "Critical Medication Priority Recommender System" presents a novel machine learning-based solution aimed at addressing the persistent challenge faced by Apeksha Hospital in identifying and prioritizing essential medications in low supply, ultimately affecting patient care quality. This research component outlines the development of a medication recommendation platform that strategically assesses historical medication usage, donation records, and medication attributes. The system integrates two pivotal machine learning models: a "Shortage Prediction" model to anticipate medication scarcities, a "Critical Medication Identification" model ranking medications based on medical significance. This process is further enhanced through optimization algorithms that rigorously prioritize medications by importance, availability, and expiration. Leveraging existing medication donation frameworks, this research not only fills a critical gap in medication allocation but also bolsters resource efficiency, offering a comprehensive solution for ensuring high-quality patient care in the face of limited resources.

Keywords: Medication shortage, Machine learning-based system, Shortage prediction model, Donation utilization

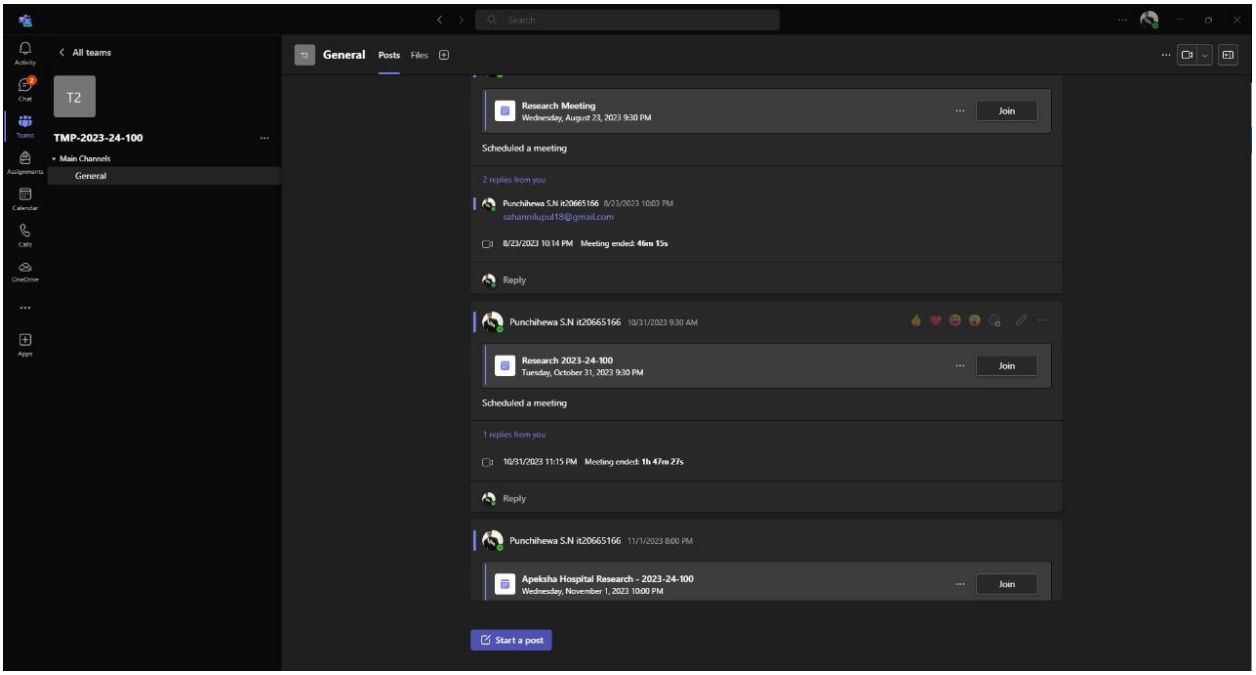
Gantt Chart

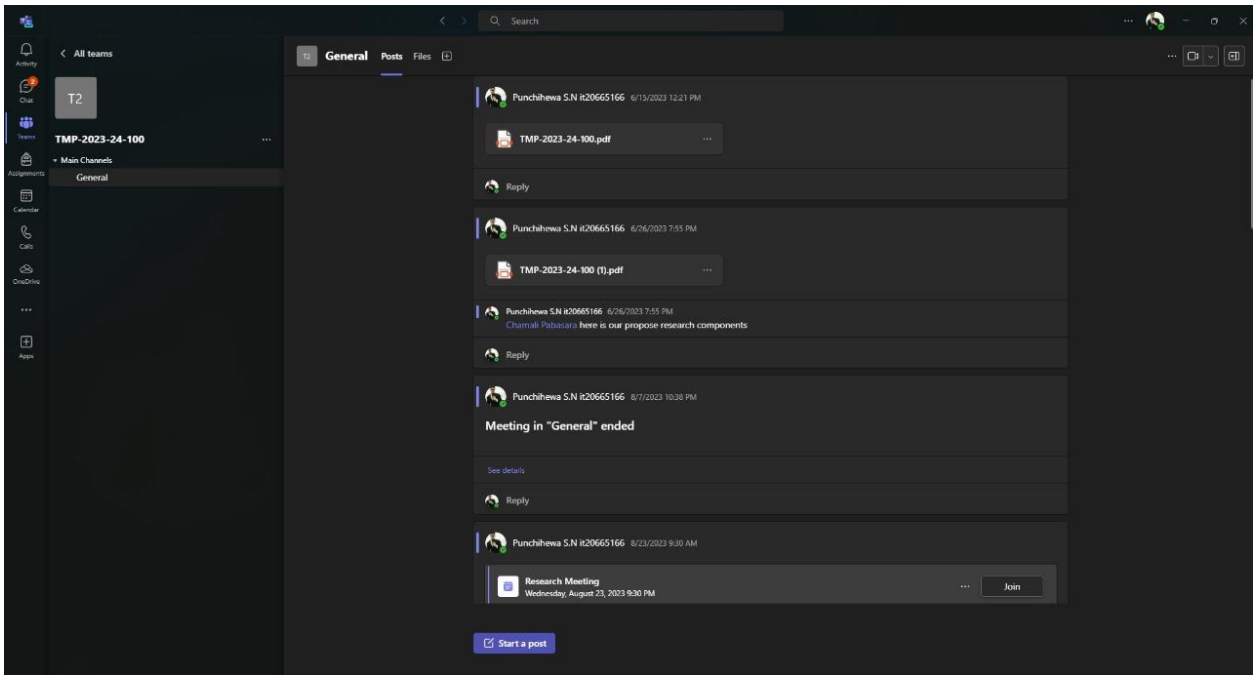

Task Name
Semester 1
Semester 2
June
July
August
September
October
November
December
January
Febuary
March
April
May
Feasibility Study
Topic Selection
Topic Evaluation
Background Study
Background Study and Literature Survey
Proposal Draft
Project Proposal
Proposal Presentation
Proposal Report
Project Initiatation
Data gathering
Selecting technologies
Project Implementation
Set up Blockchain Infrastructure
Develop smart Contracts
Design and Develop a user friendly interface
Machine Learning Integration
Research Paper
Final Implementation
Unit Testing
Evaluating and error fixing
Integrating with other components
Final Stages
System Integration
System Testing
Evaluating and error fixing
Final Report

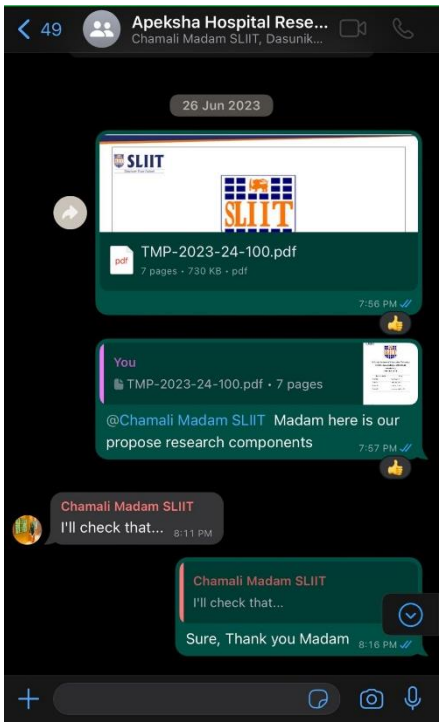
Work Break-Down Structure



Screenshots of meetings and conversations with supervisor



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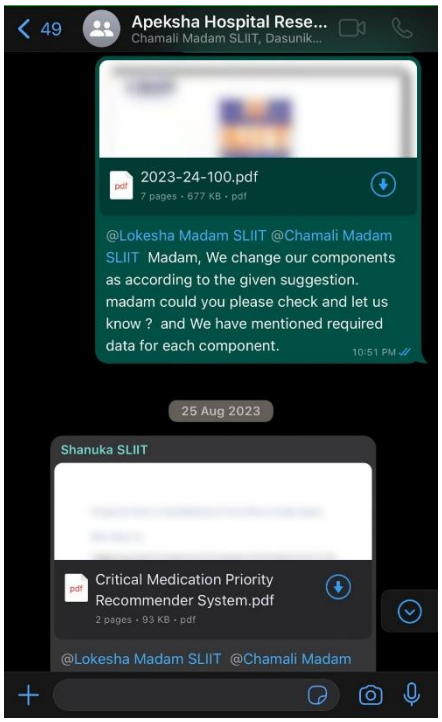
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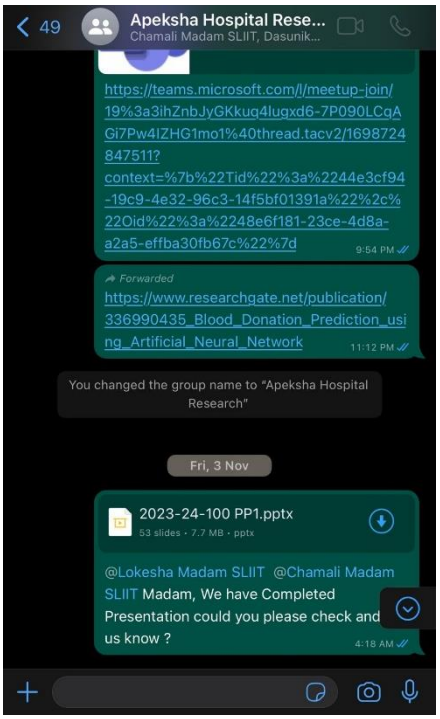
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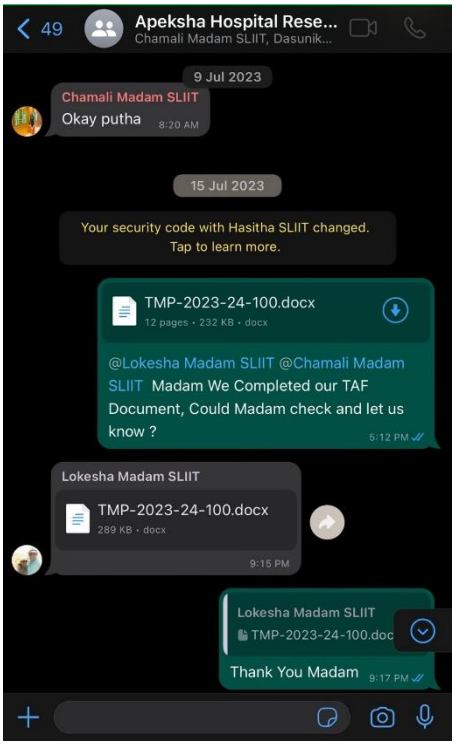
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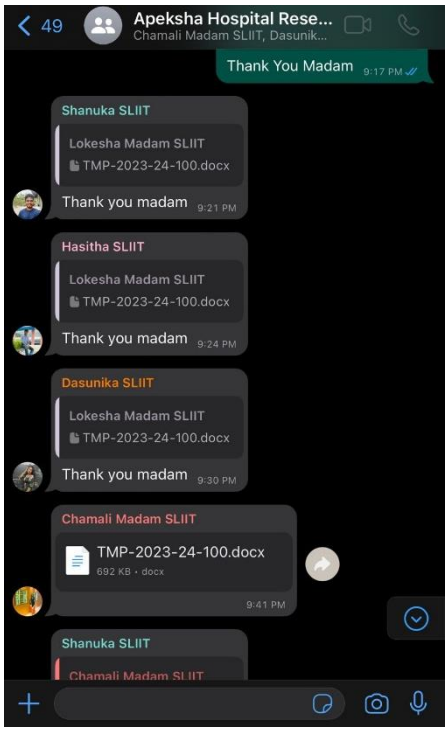
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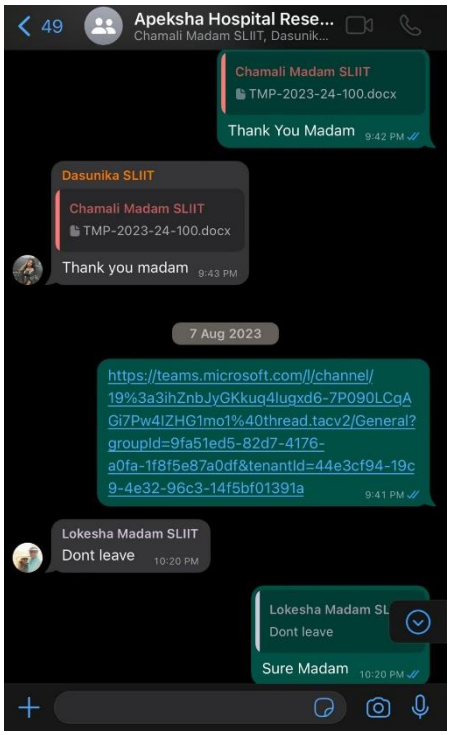
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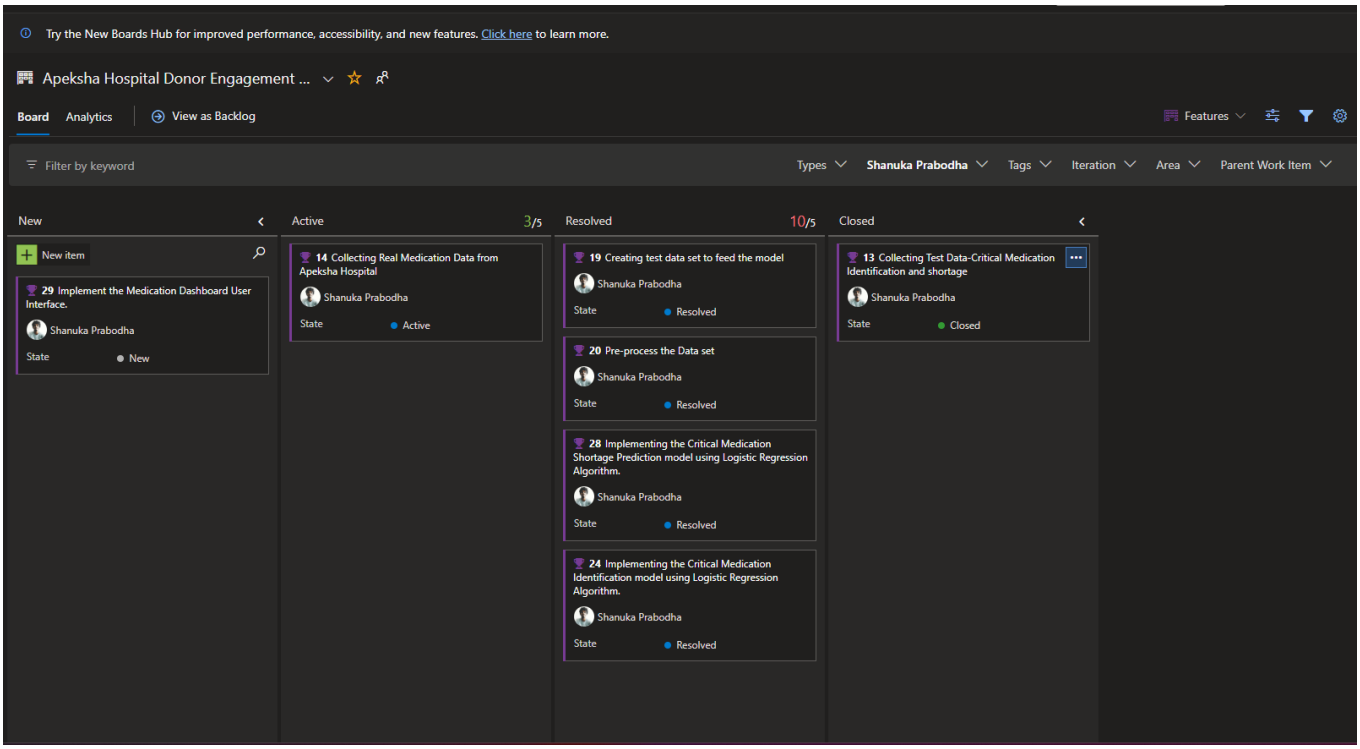
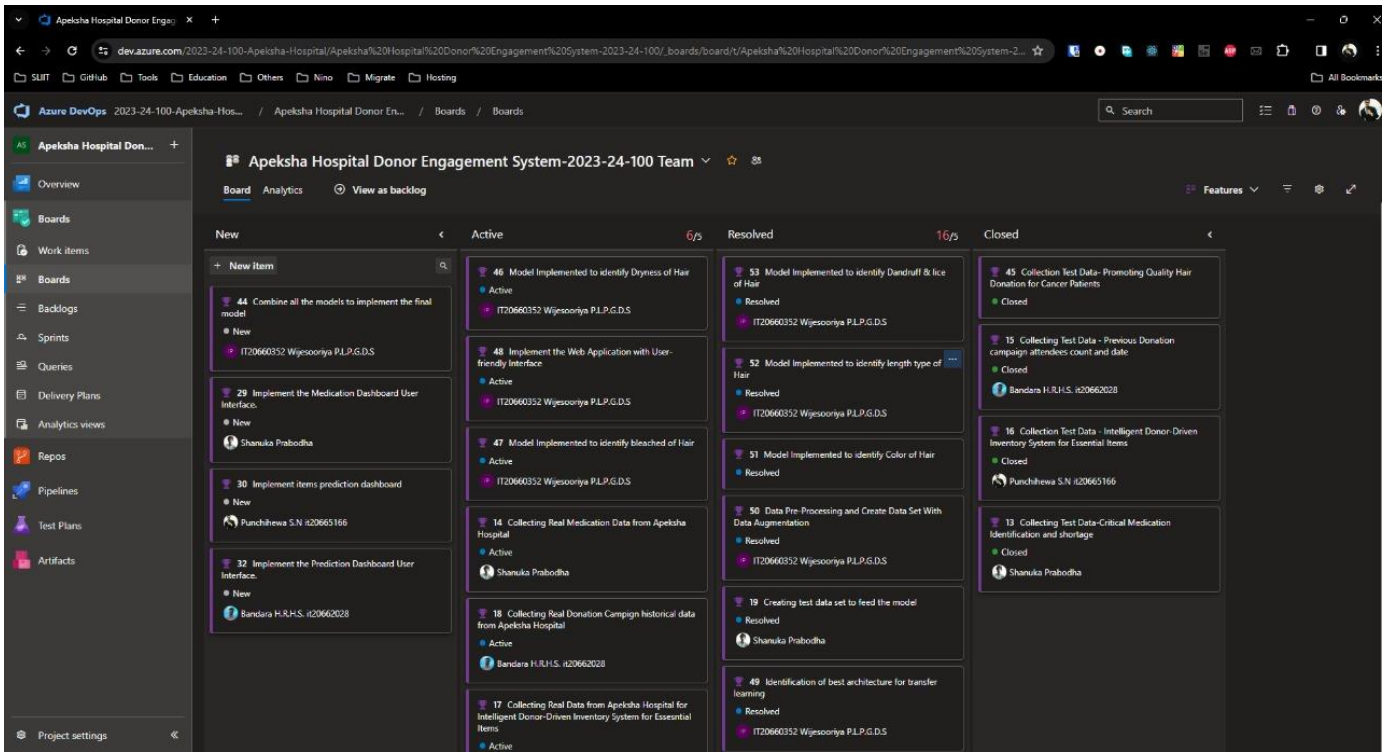
Personal Backlog



Overall Backlog



Implemented Machine Learning Models

Critical Medication Identification Model

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score, classification_report
from sklearn.linear_model import LogisticRegression

# Read the CSV file into a DataFrame
data = pd.read_csv('critical_medication.csv')

data['Shelf_Life'] = pd.to_datetime(data['Shelf_Life'])
data['Shelf_Life_Day'] = data['Shelf_Life'].dt.day
data['Shelf_Life_Month'] = data['Shelf_Life'].dt.month
data['Shelf_Life_Year'] = data['Shelf_Life'].dt.year

data.drop(['Shelf_Life'], axis=1, inplace=True)

# Define the features (predictors) and the target variable
X = data[['Patients', 'Usage','Emergency_Usage','Shelf_Life_Day','Shelf_Life_Month','Shelf_Life_Year']]
y = data['Importance_Level']

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

log_reg=LogisticRegression(random_state=0).fit(X_train,y_train)

log_reg.predict(X_train)
```

Shortage Prediction Model

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LogisticRegression

df=pd.read_csv("shortage_data.csv")

df['Shelf_Life'] = pd.to_datetime(df['Shelf_Life'])
df['Admin_Timestamp'] = pd.to_datetime(df['Admin_Timestamp'])

df['Shelf_Life_Day'] = df['Shelf_Life'].dt.day
df['Shelf_Life_Month'] = df['Shelf_Life'].dt.month
df['Shelf_Life_Year'] = df['Shelf_Life'].dt.year

df['Admin_Day'] = df['Admin_Timestamp'].dt.day
df['Admin_Month'] = df['Admin_Timestamp'].dt.month
df['Admin_Year'] = df['Admin_Timestamp'].dt.year

df.drop(['Shelf_Life', 'Admin_Timestamp'], axis=1, inplace=True)
X=df.drop(columns='Medication Shortage')

y=df['Medication Shortage']
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3,random_state=21)
X_train

scaler=StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled=scaler.transform(X_test)
X_train_scaled

log_reg=LogisticRegression(random_state=0).fit(X_train_scaled,y_train)
log_reg.predict(X_train_scaled)
log_reg.score(X_train_scaled, y_train)
```

Apeksha Hospital Donor Engagement System

2023-24-100

Status Document 1

Bandara H.R.H.S

BSc (Hons) in Information Technology specializing in Software Engineering

Department of Information Technology

Sri Lanka Institute of Information Technology Sri Lanka

August 2023

Predictive Analytics for Donation Campaign Success

2023-24-100

Status Document 1

Bandara H.R.H.S

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Department of Information Technology

Sri Lanka Institute of Information Technology Sri Lanka

August 2023

Declaration of The Candidate & Supervisor

I declare that this is my work, and this proposal does not incorporate without acknowledgment 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 acknowledgment is made in the text.

Name	**Student ID**	**Signature**
Bandara H.R.H.S	IT20662028	

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor: Date:

---------- ----------

Signature of the Co-supervisor: Date:

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Table of Contents

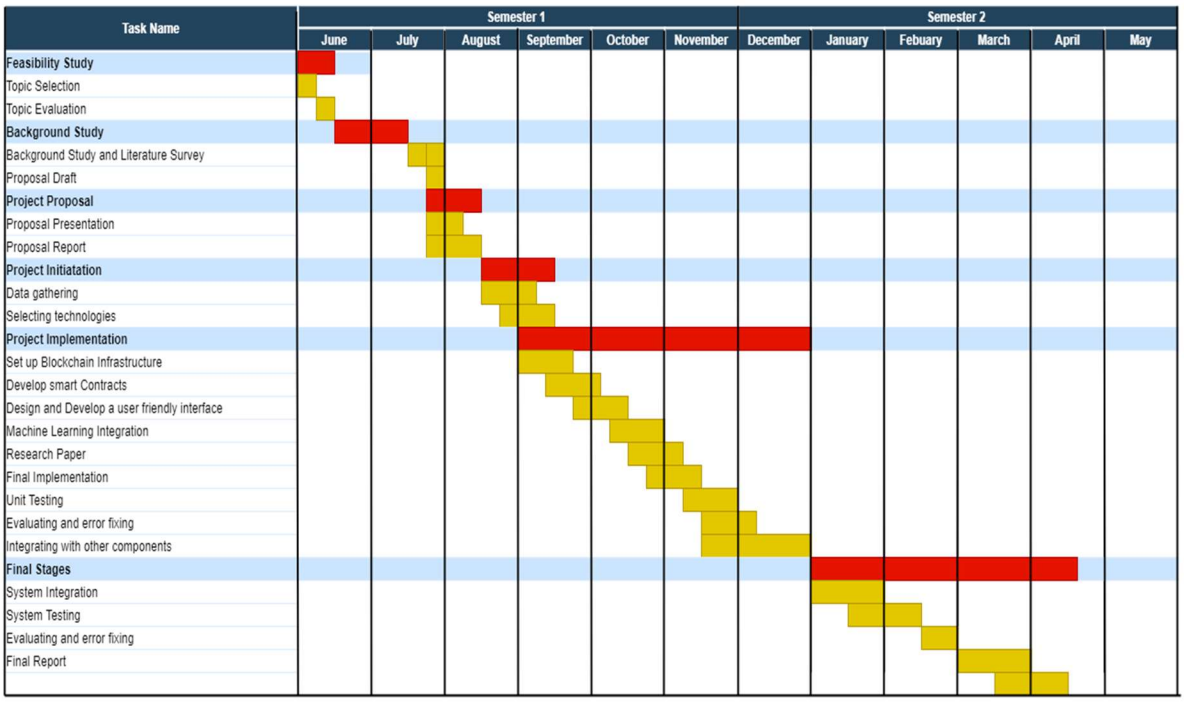
Introduction

Blood holds paramount significance for human well-being, particularly among individuals afflicted with blood-related disorders such as leukemia and blood cancer. The pivotal role of blood in medical treatments, especially within Apeksha hospitals, underscores the constant and heightened need for blood donations. However, blood donation campaigns encounter multifaceted challenges impeding their success. Issues like low donor turnout, resource wastage including food, and insufficient medical equipment such as needles, blood collection bags, blood pressure monitors, and donor beds or chairs, along with inadequate medical staff, contribute to the inefficacy of these campaigns.

To surmount these obstacles and optimize the allocation of resources, this research advocates for the integration of predictive analytics empowered by machine learning. By harnessing historical data, predictive models can be devised to anticipate the likelihood of campaign success. These models would take into account an array of variables, including donor engagement patterns, external factors, and resource availability. By providing insights into donor behavior trends and optimal campaign conditions, machine learning could profoundly refine the strategic planning and execution of blood donation initiatives, leading to resource optimization. This impact is particularly crucial for Apeksha hospitals, where a constant and heightened supply of blood is indispensable.

Keywords: Machine learning, blood donation campaigns, donor turnout, resource optimization, campaign success, predictive analytics.

Gantt chart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March
April
May
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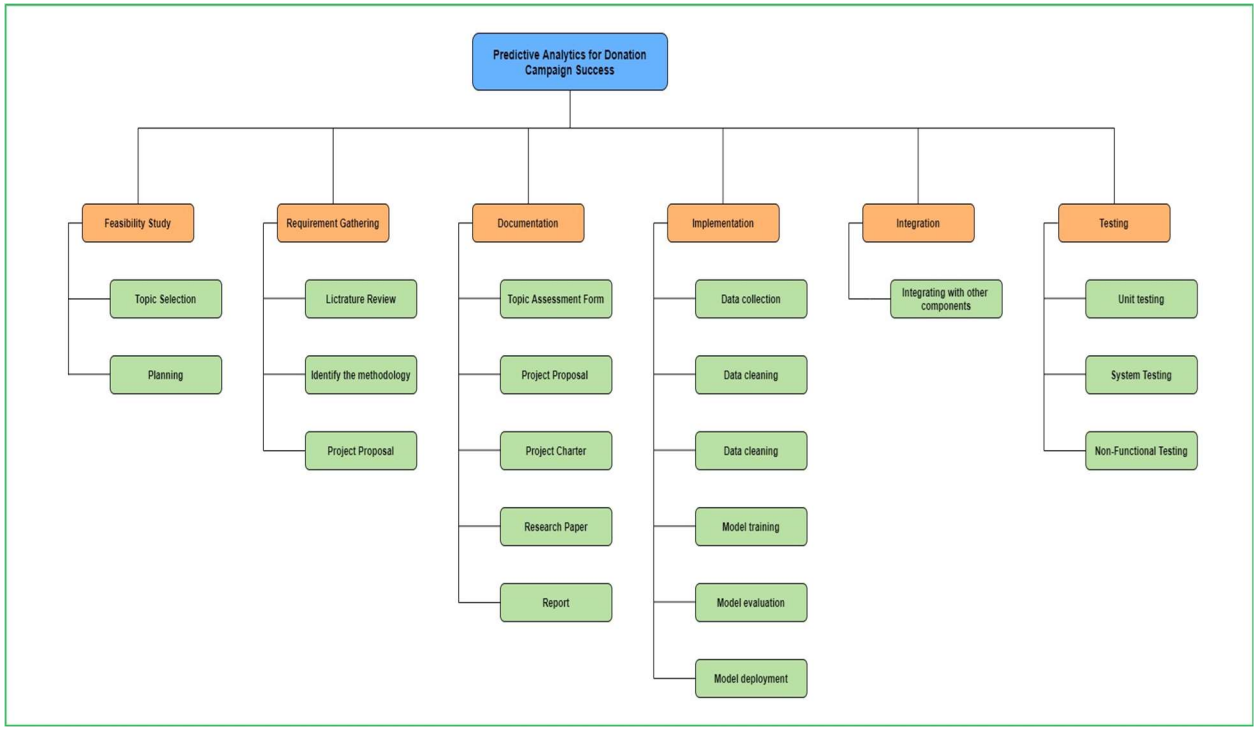
Topic Evaluation
Background Study
Background Study and Literature Survey
Proposal Draft
Project Proposal
Proposal Presentation
Proposal Report
Project Initiatation
Data gathering
Selecting technologies
Project Implementation
Set up Blockchain Infrastructure
Develop smart Contracts
Design and Develop a user friendly interface
Machine Learning Integration
Research Paper
Final Implementation
Unit Testing
Evaluating and error fixing
Integrating with other components
Final Stages
System Integration
System Testing
Evaluating and error fixing
Final Report

Work Break down Chart



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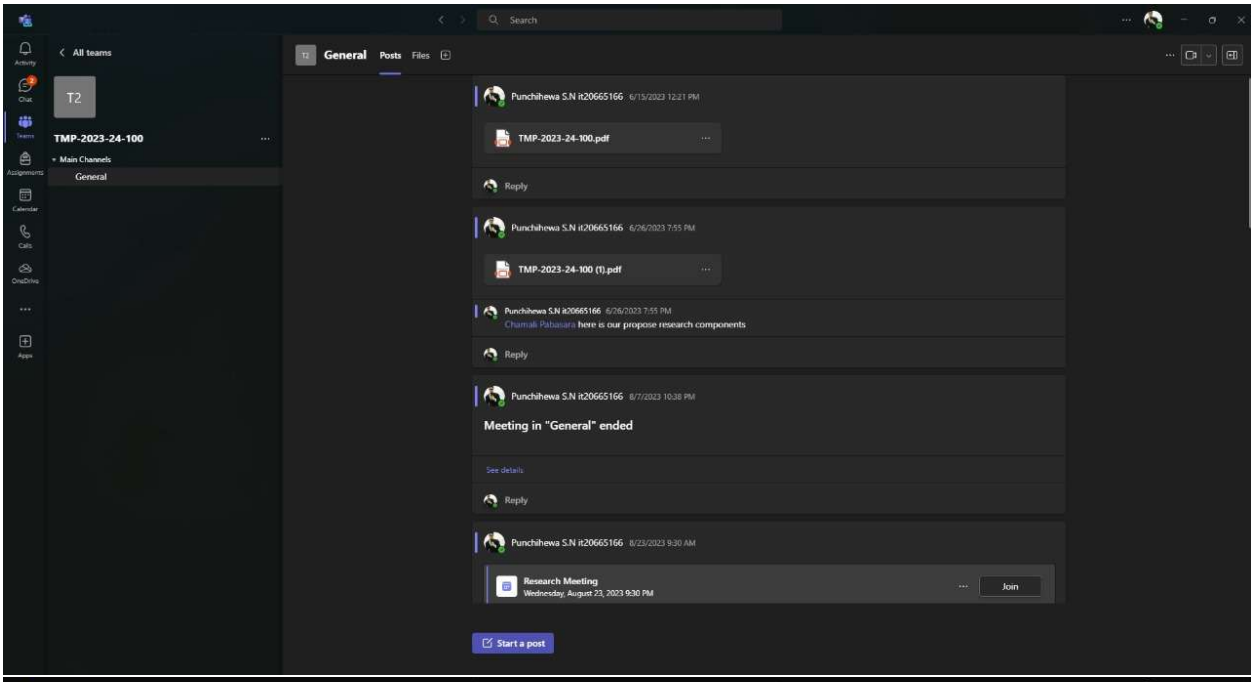

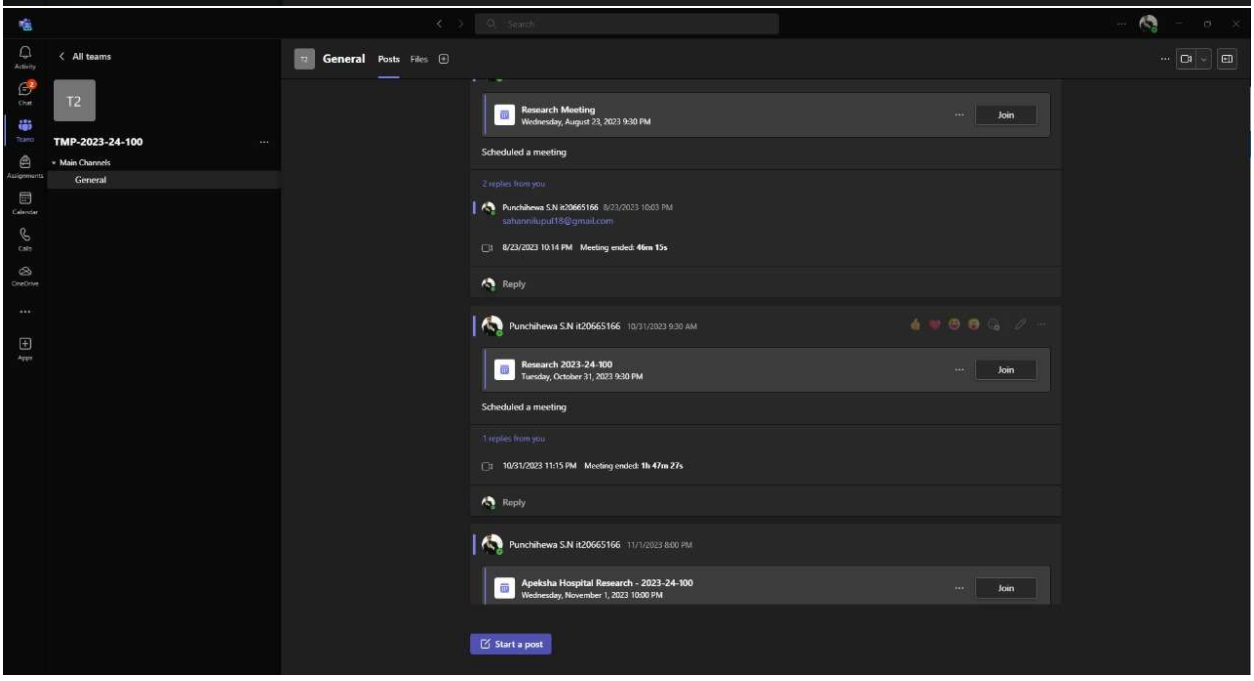

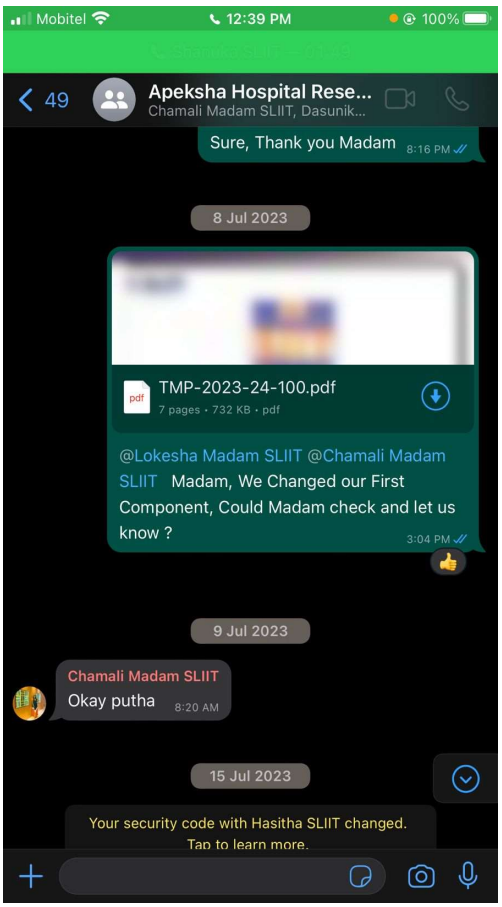
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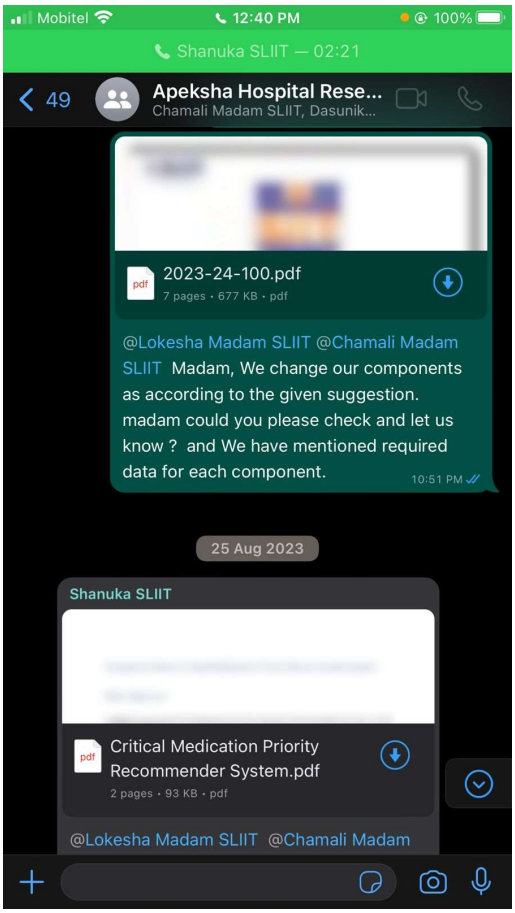
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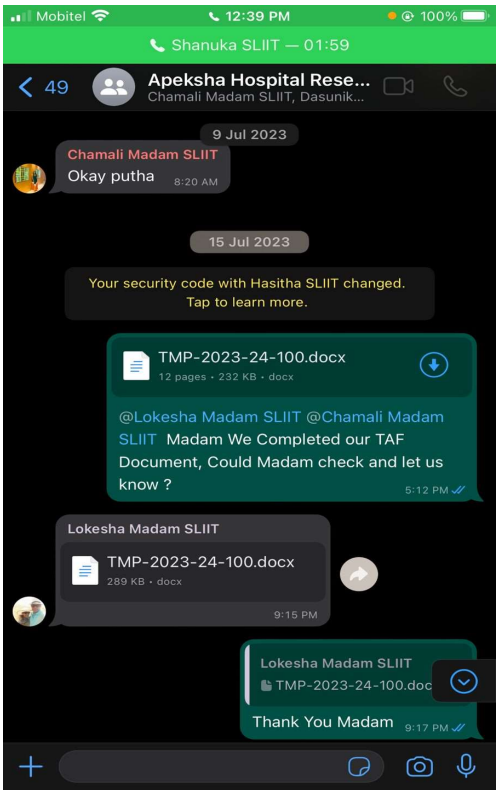
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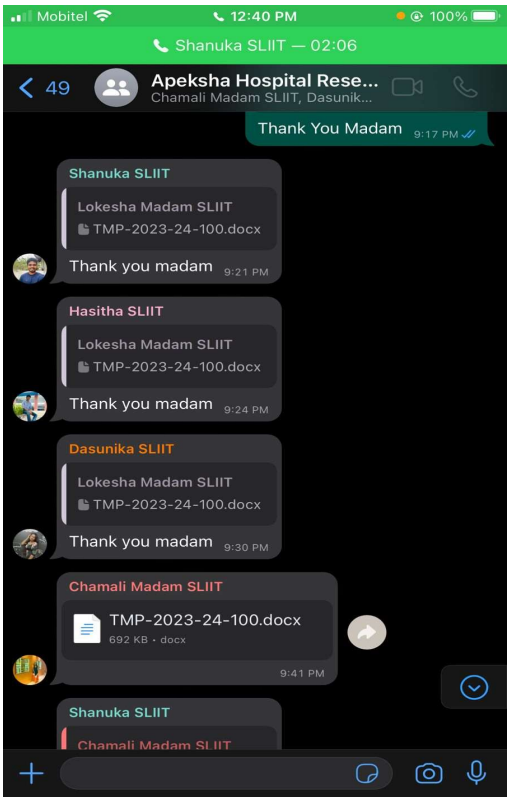
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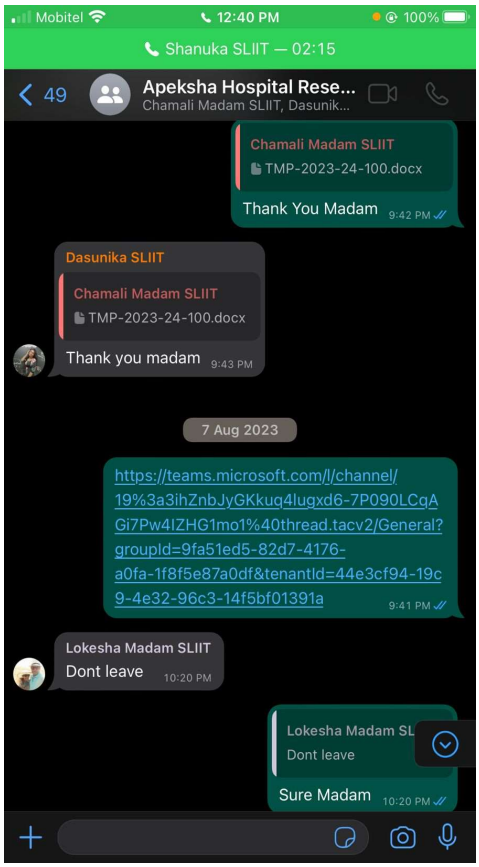
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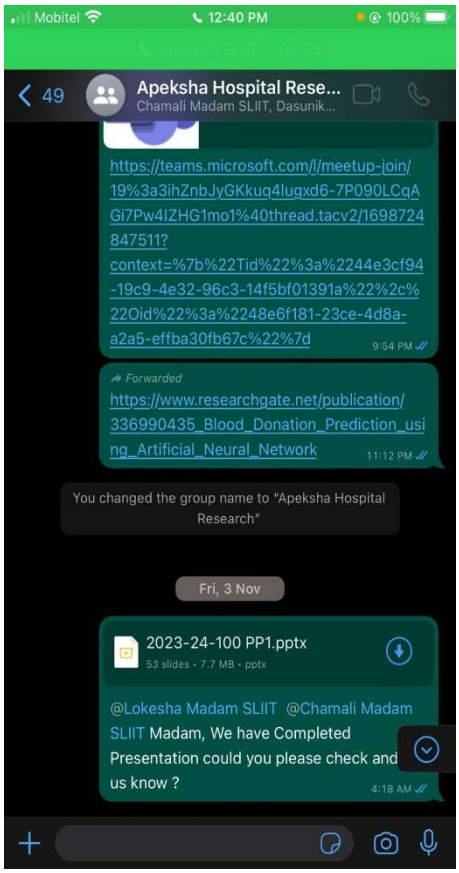
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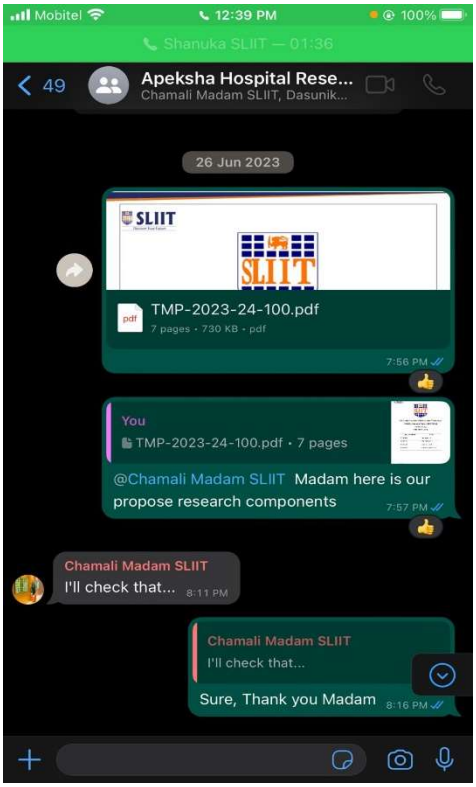
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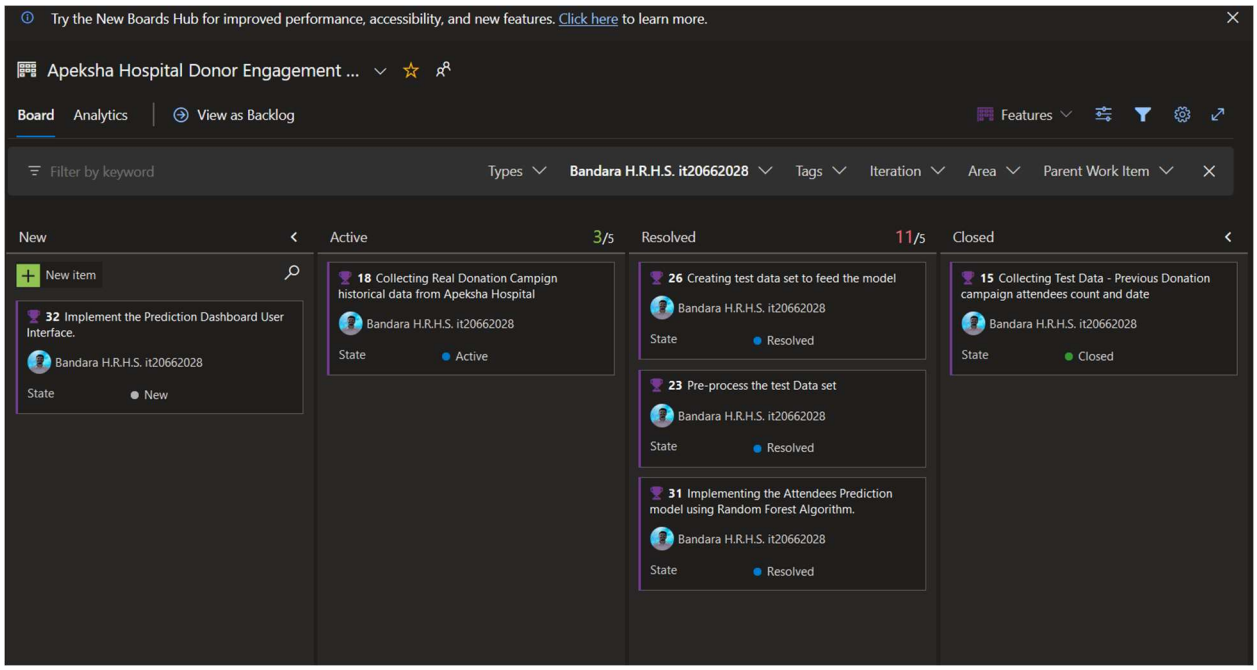

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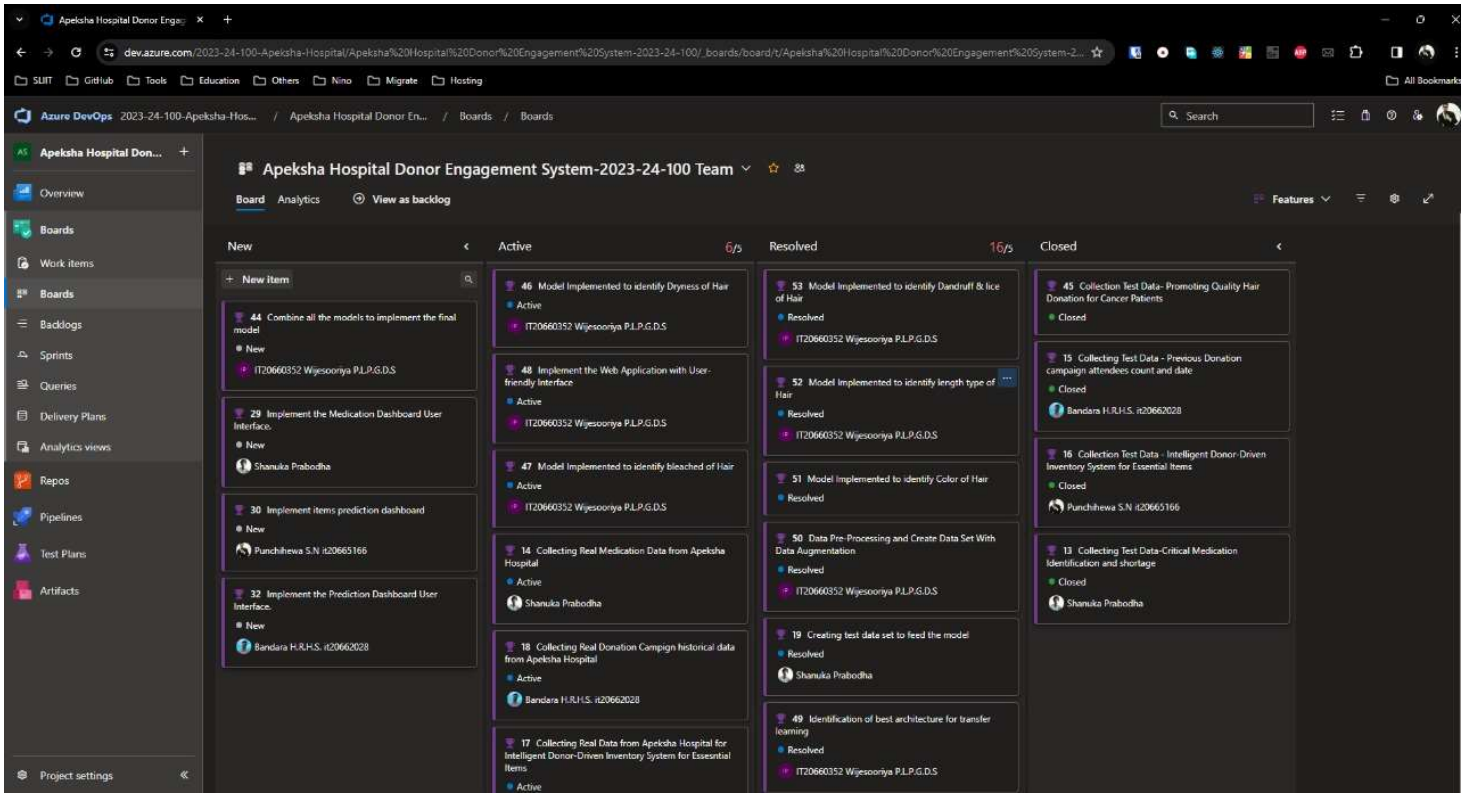

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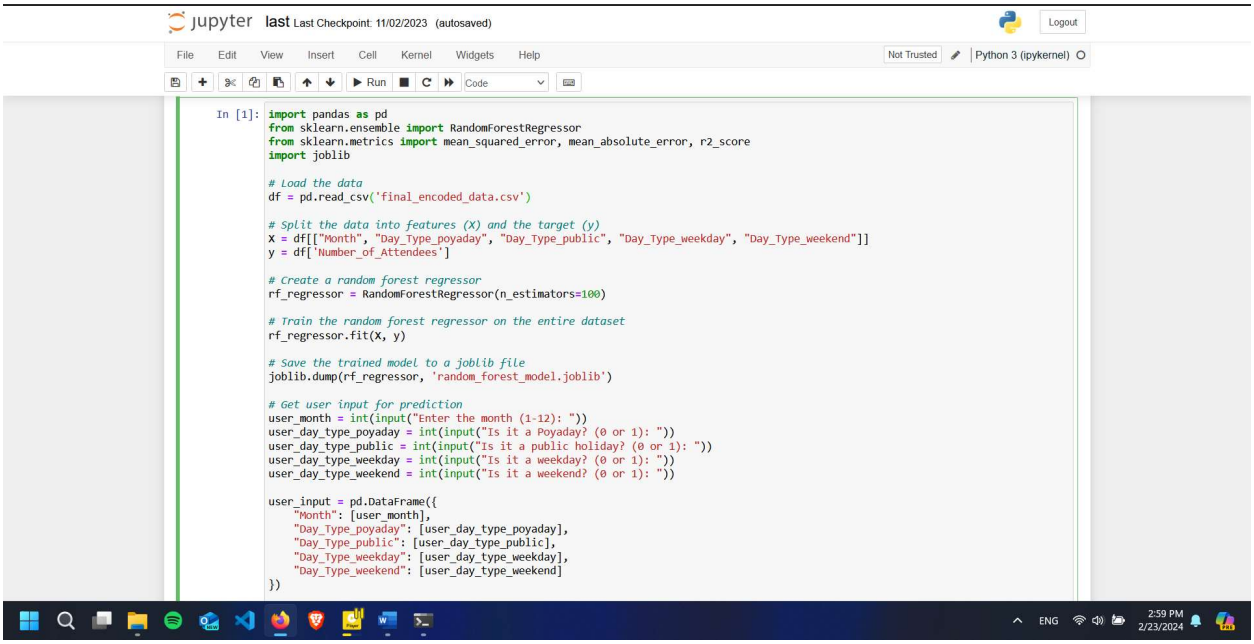

Apeksha Hospital Donor Engagement System

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Wijesooriya PLPGDS

BSc (Hons) in Information Technology specializing in Software Engineering

Department of Information Technology

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August 2023

Promoting Quality Hair Donation for Cancer Patients

2023-24-100

Status Document 1

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Name	**Student ID**	**Signature**
Wijesooriya PLPGDS	IT20660352	

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor: Date:

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Signature of the Co-supervisor: Date:

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Contents

1. Introduction

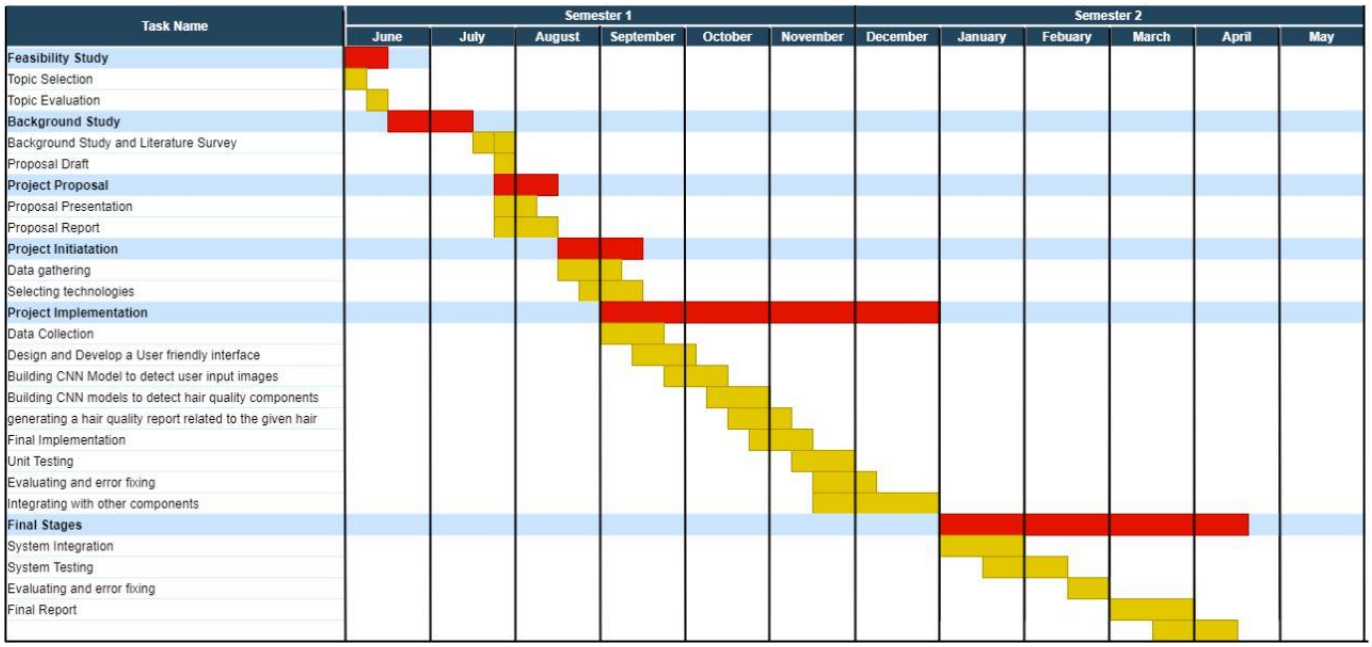
In the realm of cancer care, maintaining a sense of normalcy and confidence is paramount for patients undergoing treatment. One aspect often overlooked yet crucial for their well-being is the provision of high-quality wigs or hairpieces. However, the absence of a structured hair donation program at Apeksha Hospital poses a significant challenge in ensuring the availability of suitable hairpieces for cancer patients. To address this gap, it is imperative to establish a robust framework for assessing and promoting the quality of donated hair.

The research problem at hand revolves around determining whether donated hair meets the stringent standards and qualities mandated by Apeksha Hospital. This entails evaluating various characteristics of donated hair, including length, absence of split ends, and overall condition. Traditional methods of inspection may not suffice in ensuring the requisite quality standards. Therefore, leveraging cutting-edge image processing techniques emerges as a promising avenue to enhance the efficacy and accuracy of hair quality assessment.

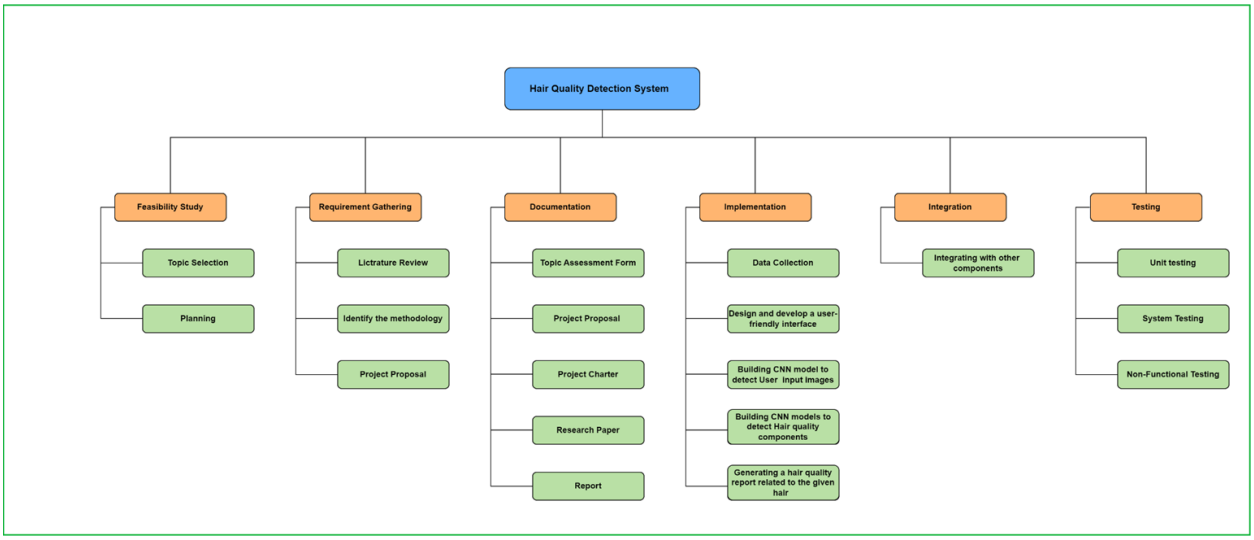
By employing image processing algorithms, donors can meticulously scrutinize donated hair for imperfections such as bleaching, dyeing, dryness, and split ends. This technology-driven approach not only streamlines the screening process but also minimizes the likelihood of substandard hair being utilized for crafting wigs or hairpieces. Moreover, promoting adherence to hospital standards fosters a culture of responsibility and accountability among potential donors, thereby augmenting the overall quality of donated hair.

In essence, this research endeavors to bridge the gap between hair donation and cancer patient care by establishing a comprehensive framework for evaluating and promoting the quality of donated hair. By integrating advanced image processing techniques with stringent quality criteria, Apeksha Hospital can ensure that cancer patients receive superior wigs or hairpieces, thereby enhancing their sense of confidence and well-being throughout the rigors of treatment.

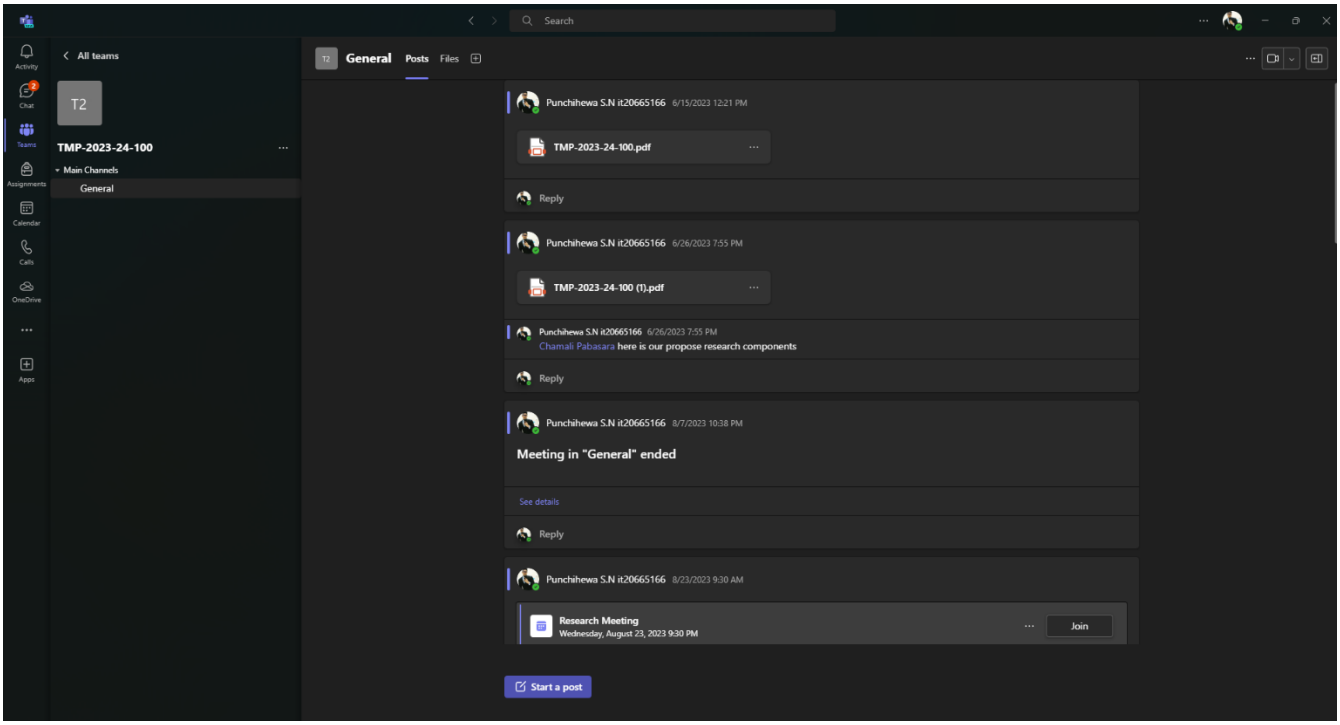
2. Gantt Chart

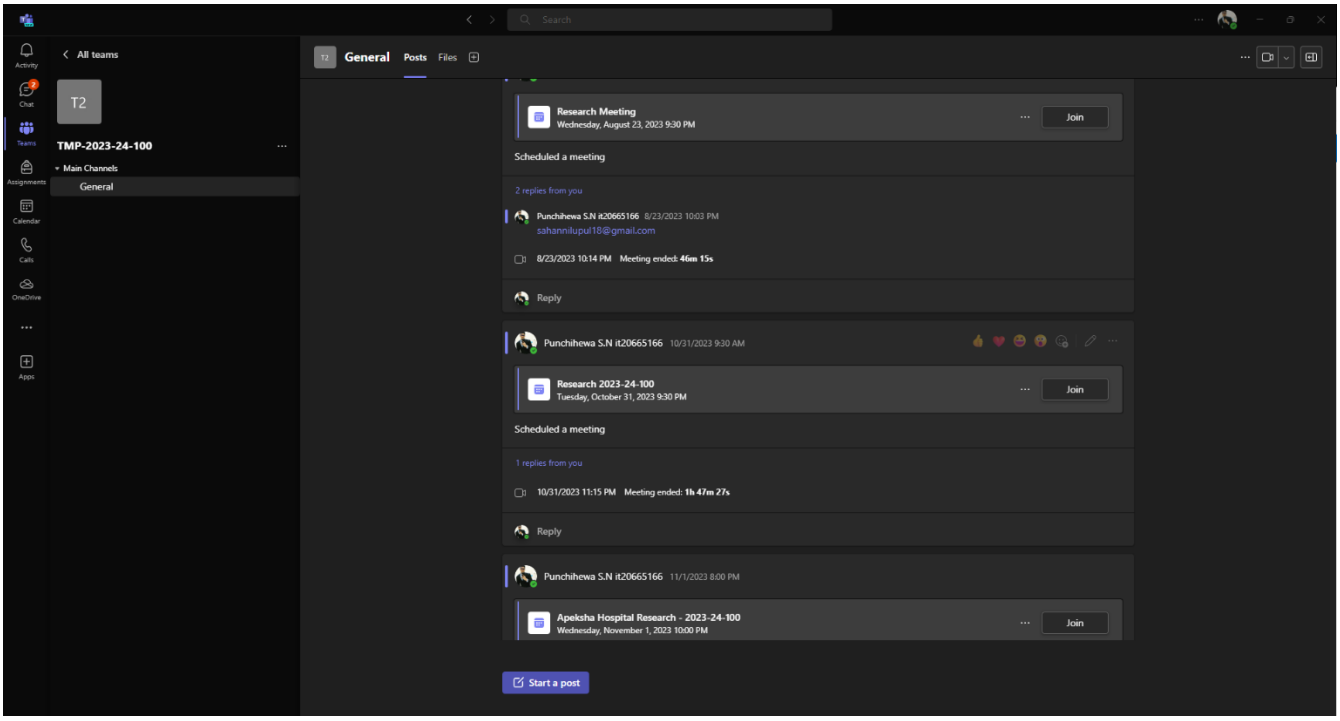


3. Work-Break-Down Chart



4. Screenshot of Meetings and Conversations

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Main Channels
General
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Posts
Files
Research Meeting
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Scheduled a meeting
2 replies from you
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sahannilupul18@gmail.com
8/23/2023 10:14 PM Meeting ended: 46m 15s
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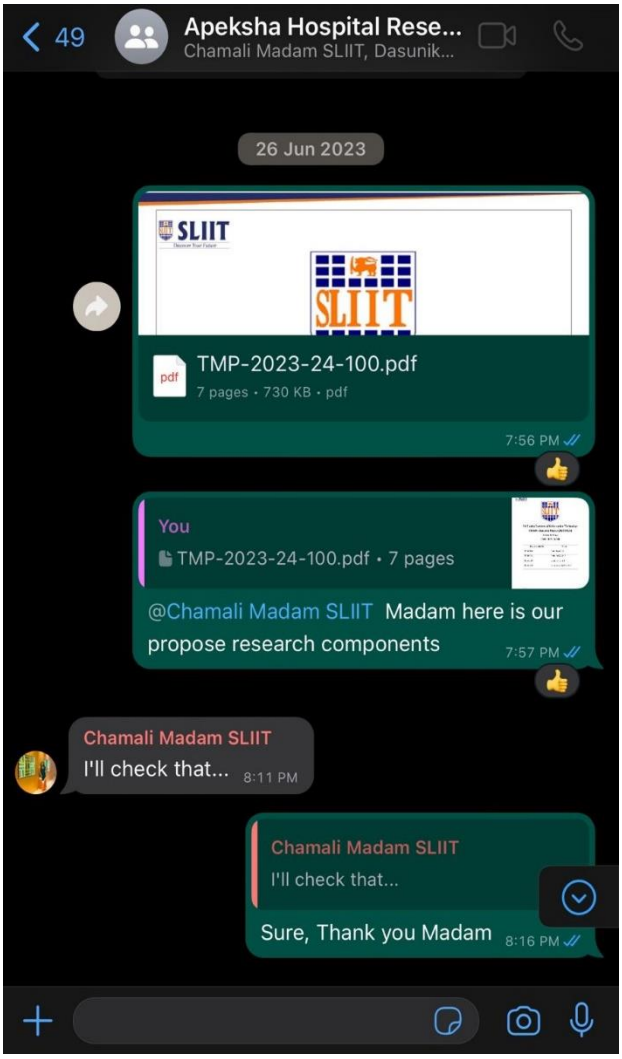
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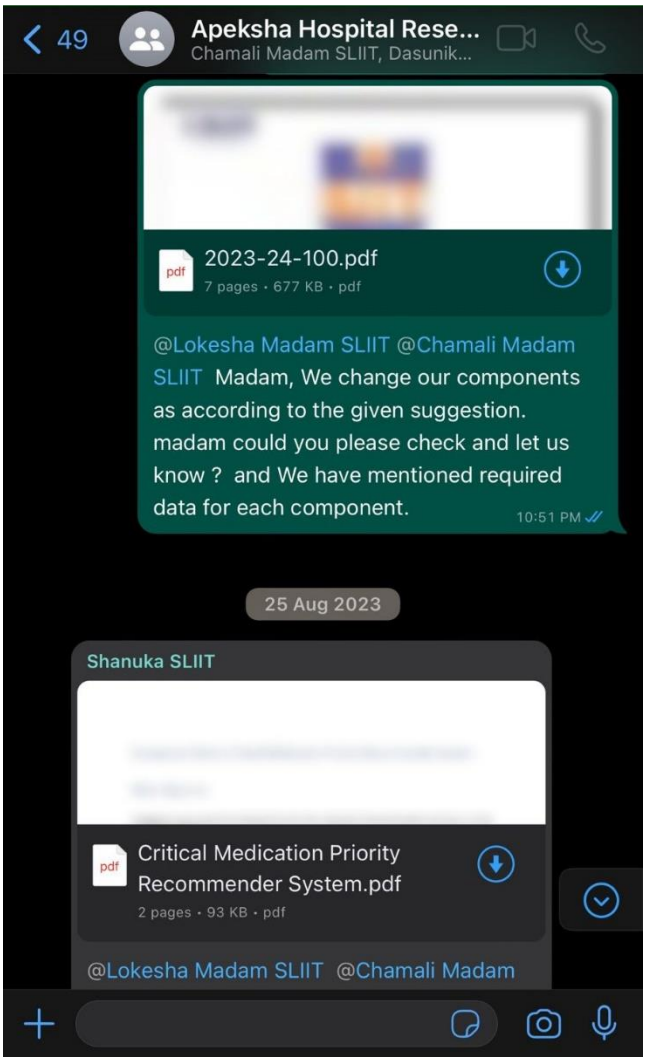
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Critical Medication Priority Recommender System.pdf
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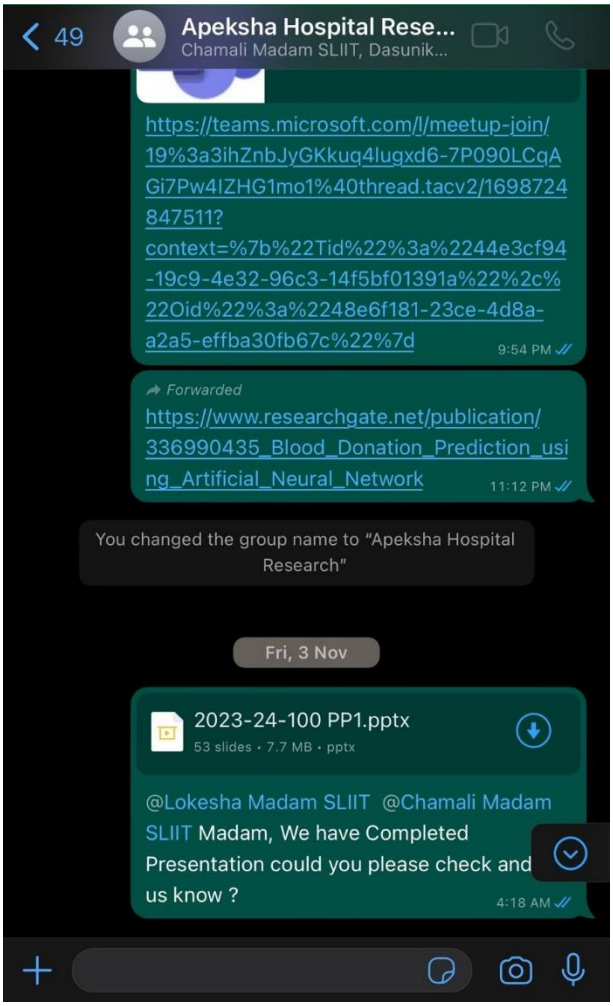
@Lokesha Madam SLIIT @Chamali Madam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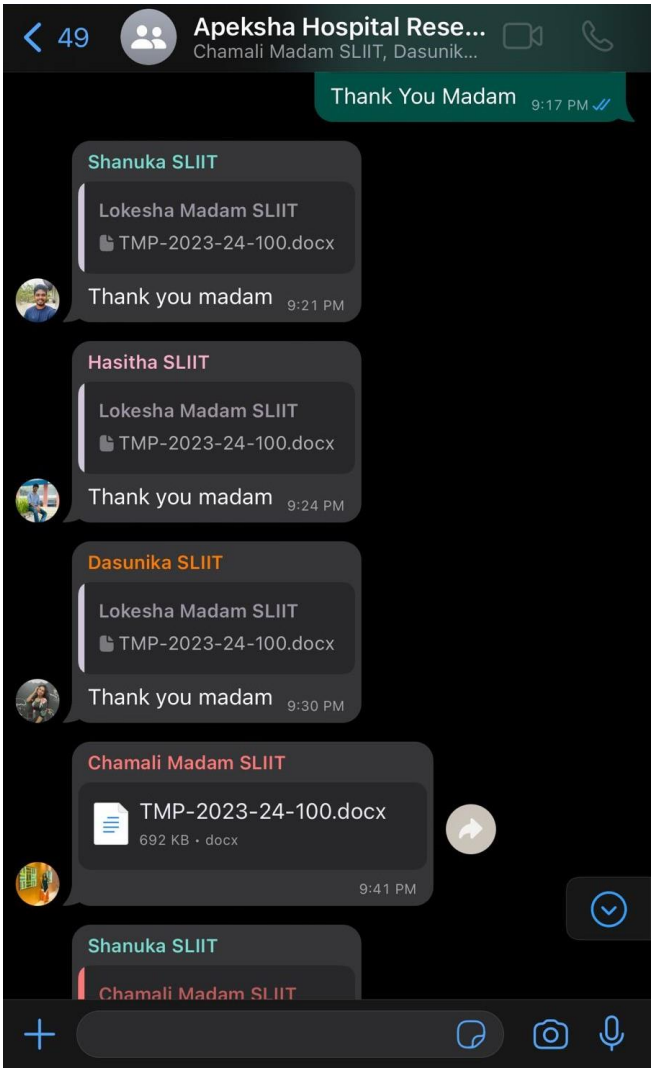
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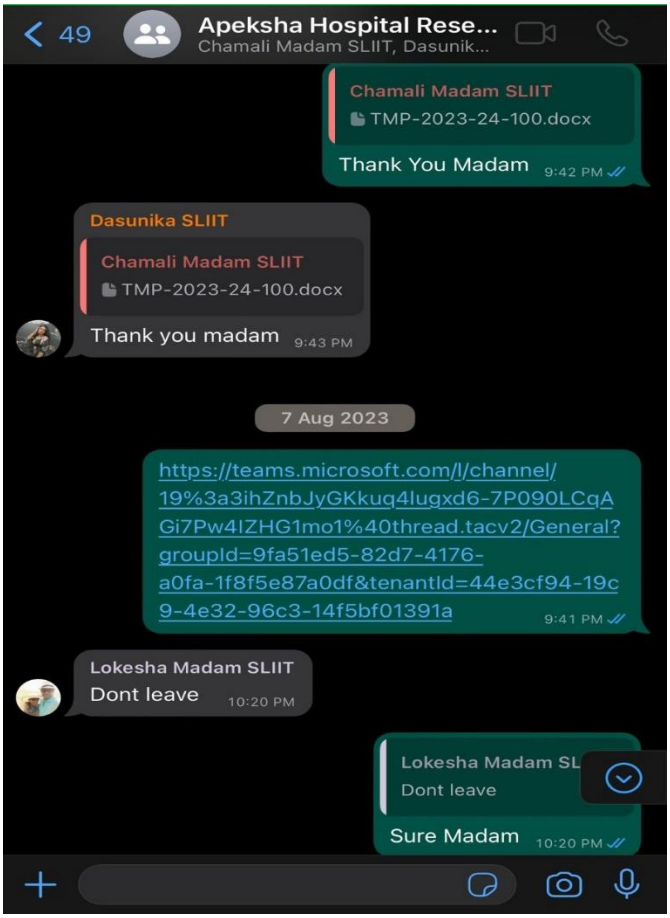
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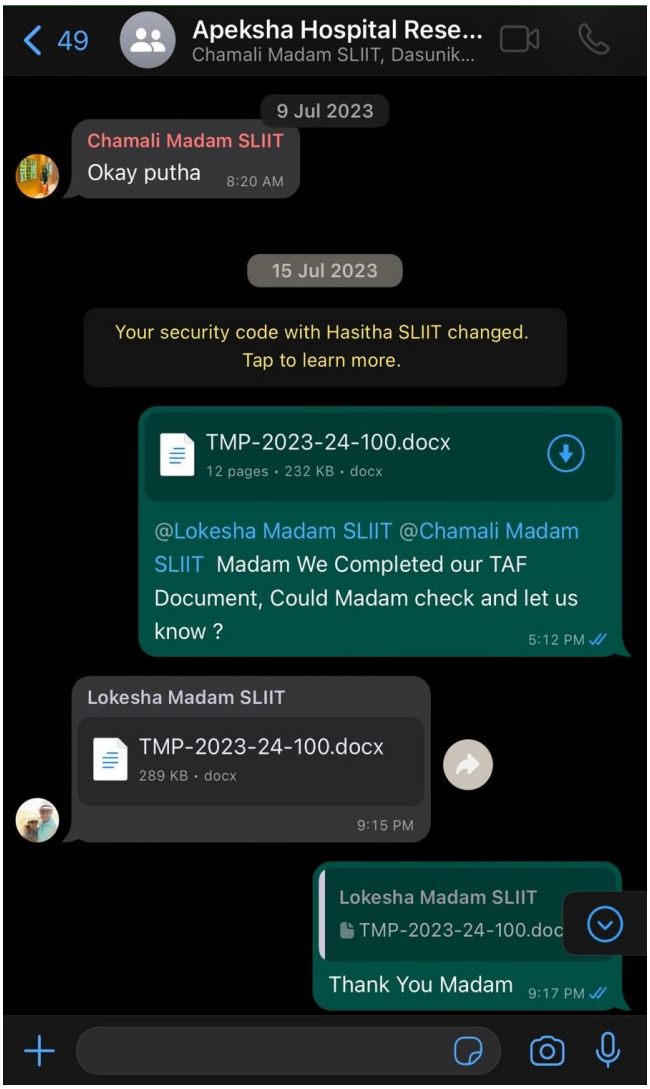
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Tap to learn more.
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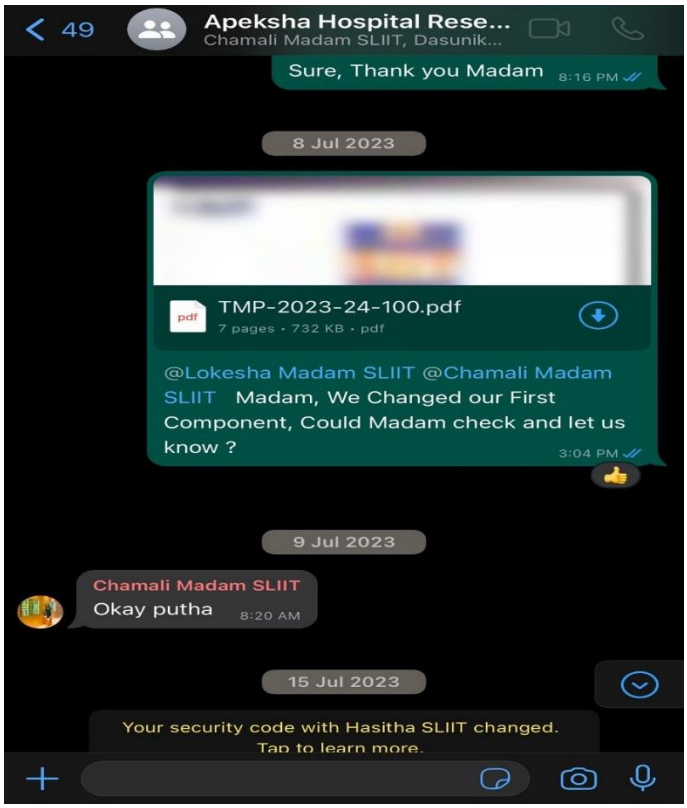
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Chamali Madam SLIIT
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15 Jul 2023
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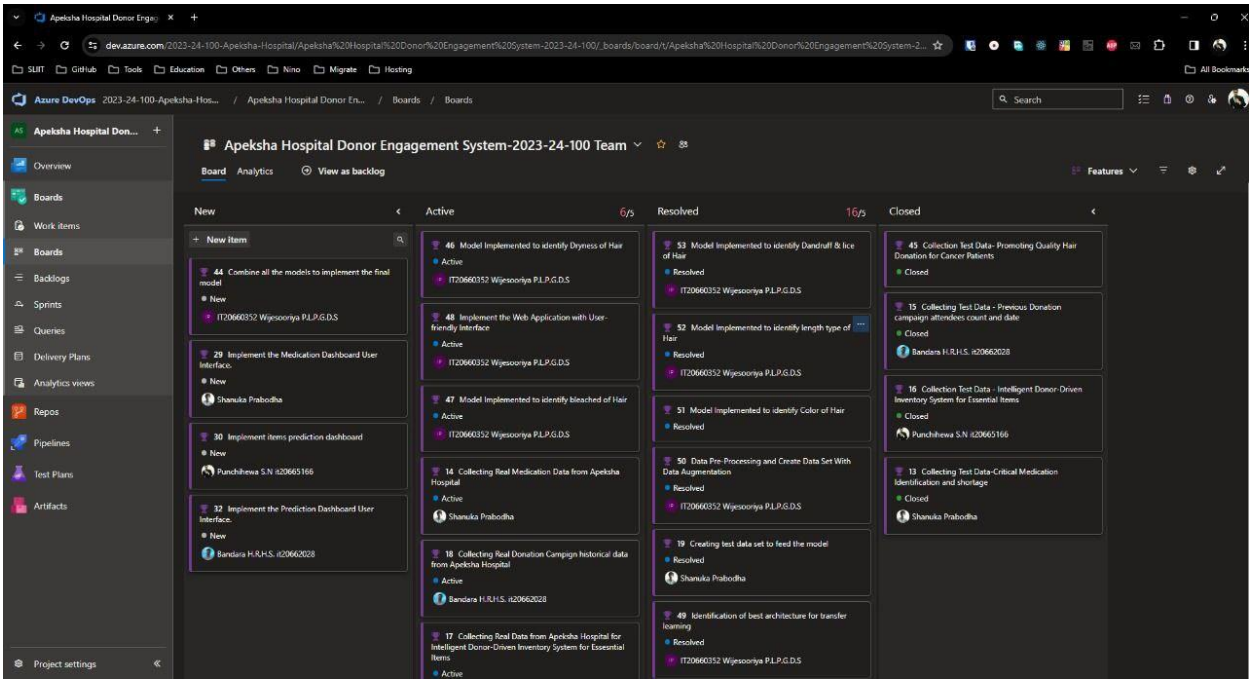
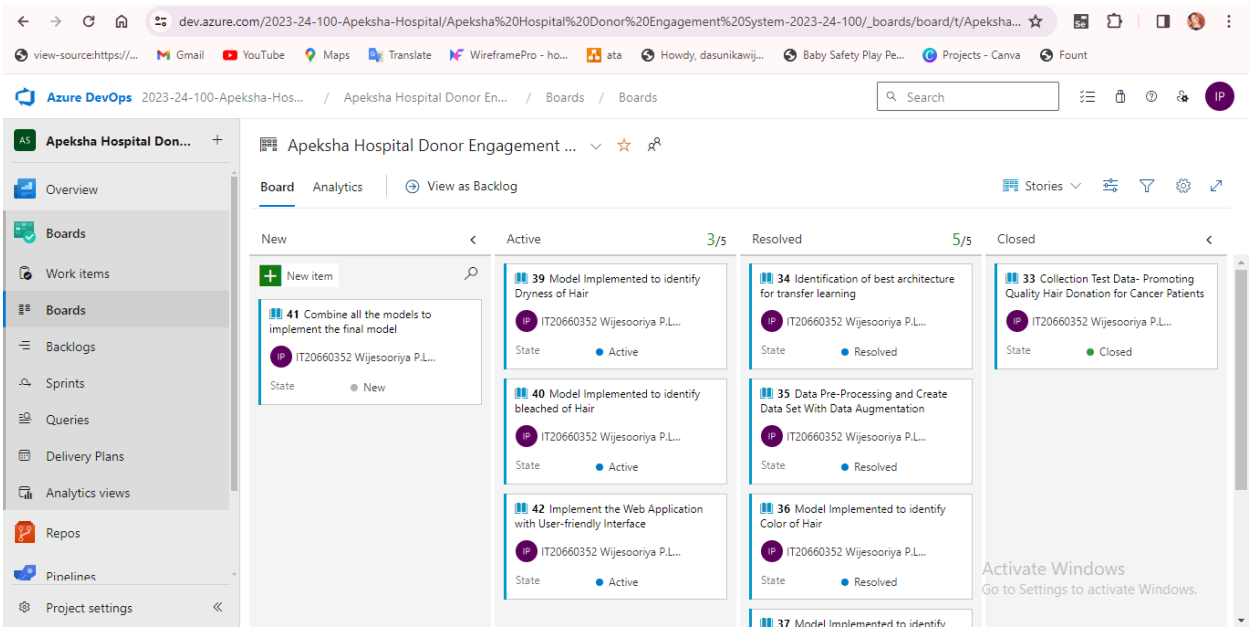
Tap to learn more.

5. Project Management Tools & Screenshot

5.1 Overall Backlog



5.2 Personal Backlog



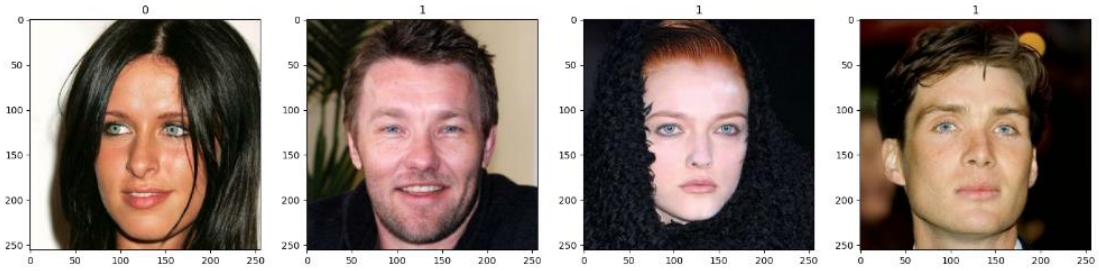
6. Trained Model Screenshot

6.1 Preprocessing for the image data sets

```
In [4]: import cv2
        import imghdr

In [6]: image_exts = ['jpeg','jpg', 'bmp', 'png']

In [7]: data_dir='C:/Users/Ridma/Downloads/Hairs'
        for image_class in os.listdir(data_dir):
            for image in os.listdir(os.path.join(data_dir, image_class)):
                image_path = os.path.join(data_dir, image_class, image)
                try:
                    img = cv2.imread(image_path)
                    tip = imghdr.what(image_path)
                    if tip not in image_exts:
                        print('Image not in ext list {}'.format(image_path))
                        os.remove(image_path)
                except Exception as e:
                    print('Issue with image {}'.format(image_path))
                    # os.remove(image_path)

In [ ]: datagen = preprocessing.image.ImageDataGenerator(
            rescale=1./255,
            validation_split=0.2
```

6.2 Model for the Hair Type Detection

```
In [16]: data_iterator = data.as_numpy_iterator()

In [17]: batch = data_iterator.next()

In [18]: fig, ax = plt.subplots(ncols=4, figsize=(20,20))
         for idx, img in enumerate(batch[0][:4]):
             ax[idx].imshow(img.astype(int))
             ax[idx].title.set_text(batch[1][idx])
```

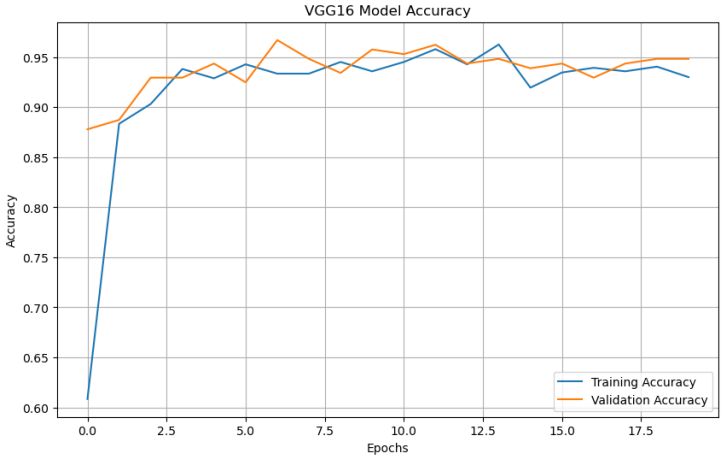


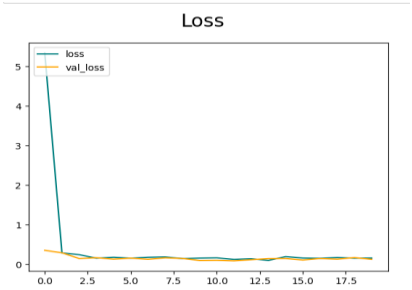
Proposed Model

6.2.1. **CNN Architecture Model- VGG1**

```
In [4]: train_generator = datagen.flow_from_directory(
            'C:/Users/Ridma/Downloads/Hairs',
            target_size=img_size,
            batch_size=batch_size,
            class_mode='categorical',
            subset='training'
        )

Found 858 images belonging to 2 classes.

In [5]: val_generator = datagen.flow_from_directory(
            'C:/Users/Ridma/Downloads/Hairs',
            target_size=img_size,
            batch_size=batch_size,
            class_mode='categorical',
            subset='validation'
        )

Found 213 images belonging to 2 classes.

In [6]: from tensorflow.keras.callbacks import EarlyStopping

        early_stop = EarlyStopping(monitor='val_loss', patience=10, verbose=1, restore_best_weights=True)

In [7]: base_model = VGG16(input_shape=(160, 160, 3), include_top=False, weights='imagenet')
        base_model.trainable = False

        vgg16_model = models.Sequential([
            base_model,
            layers.Flatten(),
            layers.Dense(4096, activation='relu'),
            layers.Dropout(0.5),
            layers.Dense(4096, activation='relu'),
            layers.Dropout(0.5),
            layers.Dense(2, activation='softmax')
        ])

        vgg16_model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])

        history=vgg16_model.fit(train_generator, validation_data=val_generator, epochs=20 , callbacks=[early_stop])

Epoch 1/20
27/27 [==============================] - 163s 6s/step - loss: 5.3365 - accuracy: 0.6084 - val_loss: 0.3546 - val_accuracy: 0.87
```

Evidence of Completion





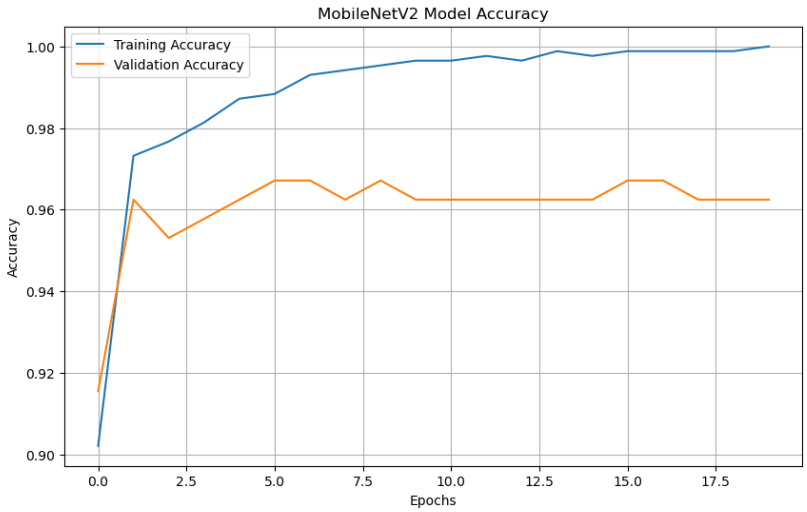
Loss: 0.2021

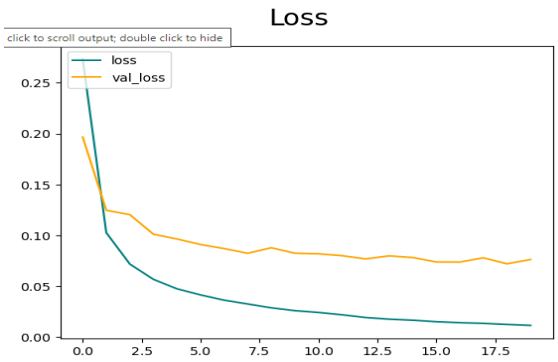
Accuracy: 0.9345

6.2.2. **CNN Architecture Model- MobileNetV2**

```
In [38]: train_generator = datagen.flow_from_directory(
             'C:/Users/Ridma/Downloads/Hairs',
             target_size=img_size,
             batch_size=batch_size,
             class_mode='categorical',
             subset='training'
         )

         Found 858 images belonging to 2 classes.

In [39]: val_generator = datagen.flow_from_directory(
             'C:/Users/Ridma/Downloads/Hairs',
             target_size=img_size,
             batch_size=batch_size,
             class_mode='categorical',
             subset='validation'
         )

         Found 213 images belonging to 2 classes.

In [40]: from tensorflow.keras.callbacks import EarlyStopping

         early_stop = EarlyStopping(monitor='val_loss', patience=10, verbose=1, restore_best_weights=True)

In [10]: base_model = MobileNetV2(input_shape=(160, 160, 3), include_top=False, weights='imagenet')
         base_model.trainable = False

         mobilenet_model = models.Sequential([
             base_model,
             layers.GlobalAveragePooling2D(),
             layers.Dense(2, activation='softmax')
         ])

         mobilenet_model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
         history=mobilenet_model.fit(train_generator, validation_data=val_generator, epochs=20 ,callbacks=[early_stop])

         Epoch 1/20
         14/14 [==============================] - 26s 1s/step - loss: 0.2733 - accuracy: 0.9021 - val_loss: 0.1966 - val_accuracy: 0.915
         5
         Epoch 2/20
         14/14 [==============================] - 16s 1s/step - loss: 0.1027 - accuracy: 0.9732 - val_loss: 0.1247 - val_accuracy: 0.962
         4
```

Evidence of Completion





Loss: 0.0105

Accuracy: 0.9968

6.3 Model for the Hair Color Detection

6.3.1. **CNN Architecture Model- VGG16**

In [6]:
```
train_generator = datagen.flow_from_directory(
    'C:/Users/Ridma/Downloads/newimages',
    target_size=img_size,
    batch_size=batch_size,
    class_mode='categorical',
    subset='training'
)
```

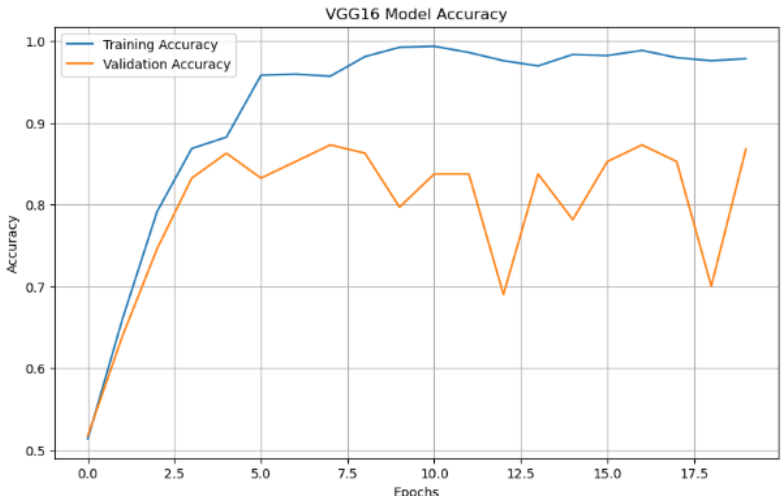
```
Found 792 images belonging to 2 classes.
```

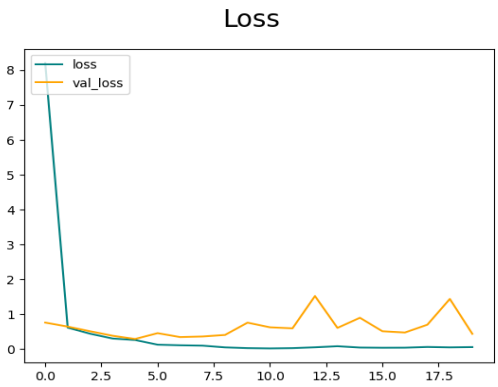
In [7]:
```
val_generator = datagen.flow_from_directory(
    'C:/Users/Ridma/Downloads/newimages',
    target_size=img_size,
    batch_size=batch_size,
    class_mode='categorical',
    subset='validation'
)
```

```
Found 197 images belonging to 2 classes.
```

In [8]:
```
base_model = VGG16(input_shape=(160, 160, 3), include_top=False, weights='imagenet')
base_model.trainable = False

vgg16_model = models.Sequential([
    base_model,
    layers.Flatten(),
    layers.Dense(4096, activation='relu'),
    layers.Dropout(0.5),
    layers.Dense(4096, activation='relu'),
    layers.Dropout(0.5),
    layers.Dense(2, activation='softmax')  # Assuming 2 hair colors
])

vgg16_model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])

history=vgg16_model.fit(train_generator, validation_data=val_generator, epochs=20)
```

```
Epoch 1/20
13/13 [==============================] - 209s 16s/step - loss: 8.1964 - accuracy: 0.5139 - val_loss: 0.7592 - val_accuracy: 0.5
```





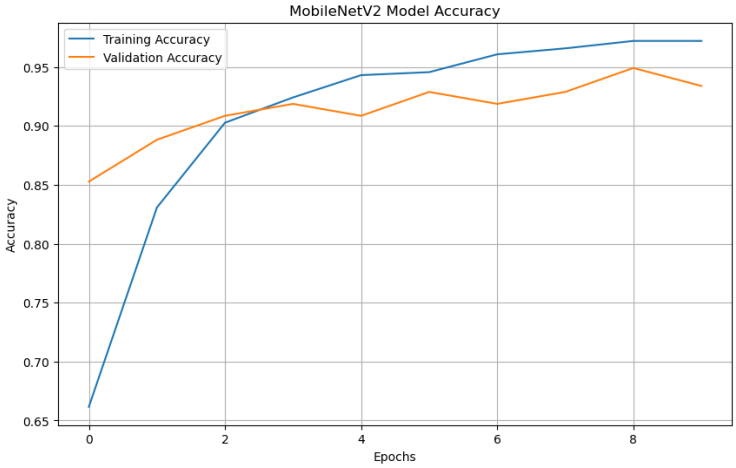
Loss: 0.0576

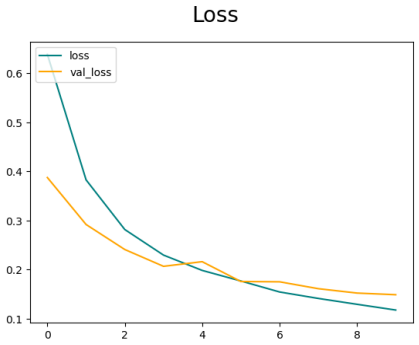
Accuracy: 0.9785

6.3.2. **CNN Architecture Model- MobileNetV2**

```
In [13]: train_generator = datagen.flow_from_directory(
             'C:/Users/Ridma/Downloads/newimages',
             target_size=img_size,
             batch_size=batch_size,
             class_mode='categorical',
             subset='training'
         )

         Found 792 images belonging to 2 classes.

In [14]: val_generator = datagen.flow_from_directory(
             'C:/Users/Ridma/Downloads/newimages',
             target_size=img_size,
             batch_size=batch_size,
             class_mode='categorical',
             subset='validation'
         )

         Found 197 images belonging to 2 classes.

In [15]: base_model = MobileNetV2(input_shape=(160, 160, 3), include_top=False, weights='imagenet')
         base_model.trainable = False

         mobilenet_model = models.Sequential([
             base_model,
             layers.GlobalAveragePooling2D(),
             layers.Dense(2, activation='softmax')  # Assuming 2 hair colors
         ])

         mobilenet_model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
         history=mobilenet_model.fit(train_generator, validation_data=val_generator, epochs=10)

         Epoch 1/10
         13/13 [==============================] - 42s 3s/step - loss: 0.6384 - accuracy: 0.6616 - val_loss: 0.3875 - val_accuracy: 0.852
         8
```

Evidence of Completion





Loss: 0.1177

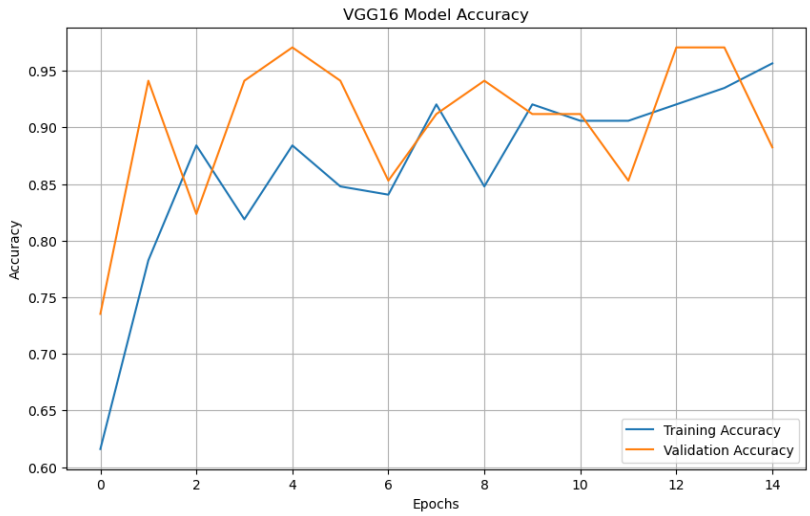
Accuracy: 0.9722

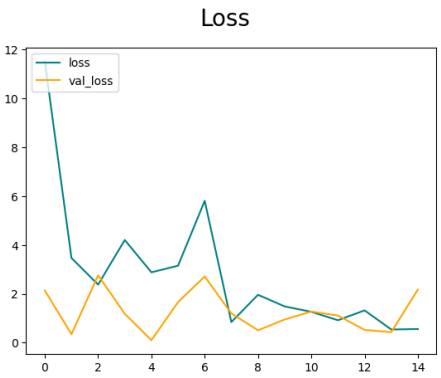
6.4. Model for the Dandruff & Lice Detection

6.4.1. **CNN** Architecture Model- **VGG16**

```
In [5]: train_generator = datagen.flow_from_directory(
            'C:/Users/Ridma/Downloads/Dandruff',
            target_size=img_size,
            batch_size=batch_size,
            class_mode='categorical',
            subset='training'
        )

        Found 138 images belonging to 2 classes.

In [6]: val_generator = datagen.flow_from_directory(
            'C:/Users/Ridma/Downloads/Dandruff',
            target_size=img_size,
            batch_size=batch_size,
            class_mode='categorical',
            subset='validation'
        )

        Found 34 images belonging to 2 classes.

In [7]: from tensorflow.keras.callbacks import EarlyStopping

        early_stop = EarlyStopping(monitor='val_loss', patience=10, verbose=1, restore_best_weights=True)

In [8]: base_model = VGG16(input_shape=(160, 160, 3), include_top=False, weights='imagenet')
        base_model.trainable = False

        vgg16_model = models.Sequential([
            base_model,
            layers.Flatten(),
            layers.Dense(4096, activation='relu'),
            layers.Dropout(0.5),
            layers.Dense(4096, activation='relu'),
            layers.Dropout(0.5),
            layers.Dense(2, activation='softmax')
        ])

        vgg16_model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])

        history=vgg16_model.fit(train_generator, validation_data=val_generator, epochs=20 , callbacks=[early_stop])

        Epoch 1/20
```

Evidence of Completion





Loss: 0.5594

Accuracy: 0.9565

6.4.2. CNN Architecture Model- MobileNetV2

In [25]:
```
train_generator = datagen.flow_from_directory(
    'C:/Users/Ridma/Downloads/Dandruff',
    target_size=img_size,
    batch_size=batch_size,
    class_mode='categorical',
    subset='training'
)
```

```
Found 138 images belonging to 2 classes.
```

In [26]:
```
val_generator = datagen.flow_from_directory(
    'C:/Users/Ridma/Downloads/Dandruff',
    target_size=img_size,
    batch_size=batch_size,
    class_mode='categorical',
    subset='validation'
)
```

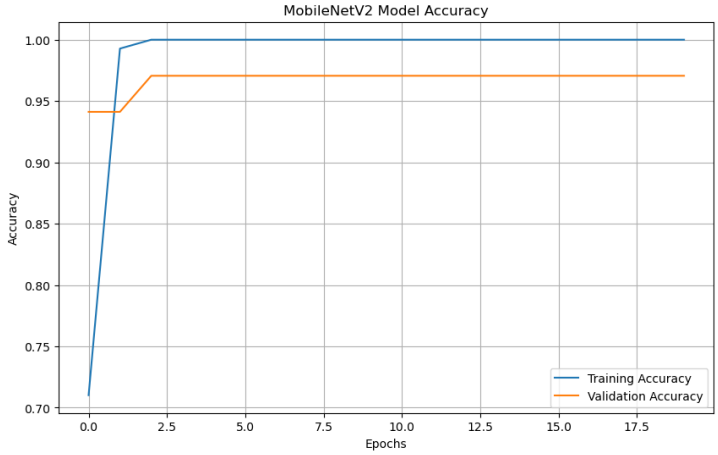
```
Found 34 images belonging to 2 classes.
```

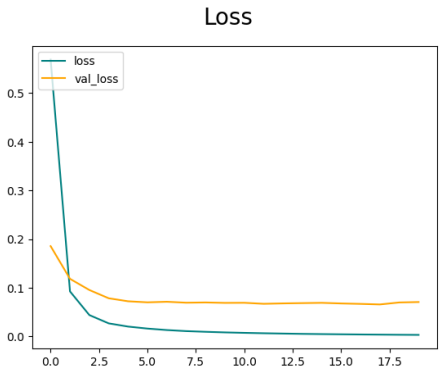
In [27]:
```
from tensorflow.keras.callbacks import EarlyStopping

early_stop = EarlyStopping(monitor='val_loss', patience=10, verbose=1, restore_best_weights=True)
```

In [28]:
```
base_model = MobileNetV2(input_shape=(160, 160, 3), include_top=False, weights='imagenet')
base_model.trainable = False

mobilenet_model = models.Sequential([
    base_model,
    layers.GlobalAveragePooling2D(),
    layers.Dense(2, activation='softmax')
])

mobilenet_model.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
history=mobilenet_model.fit(train_generator, validation_data=val_generator, epochs=20, callbacks=[early_stop])
```

```
Epoch 1/20
18/18 [==============================] - 18s 657ms/step - loss: 0.5687 - accuracy: 0.7101 - val_loss: 0.1855 - val_accuracy: 0.
9412
Epoch 2/20
```

Evidence of Completion





Loss:0.0032

Accuracy: 1.0000