



## FITNESS-RELATED COACHING AND DIET PLANNING MOBILE APPLICATION USING IMAGE PROCESSING AND MACHINE LEARNING

R24-122

Status Document 2

BSc (Hons) in Information Technology Specializing in Information Technology

Department of Information Technology

Sri Lanka Institute of Information Technology

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## 1. Updated Gantt chart of finalize Design & implementation phases



Figure 1 Gantt Chart

## 2. Work Breakdown Structure

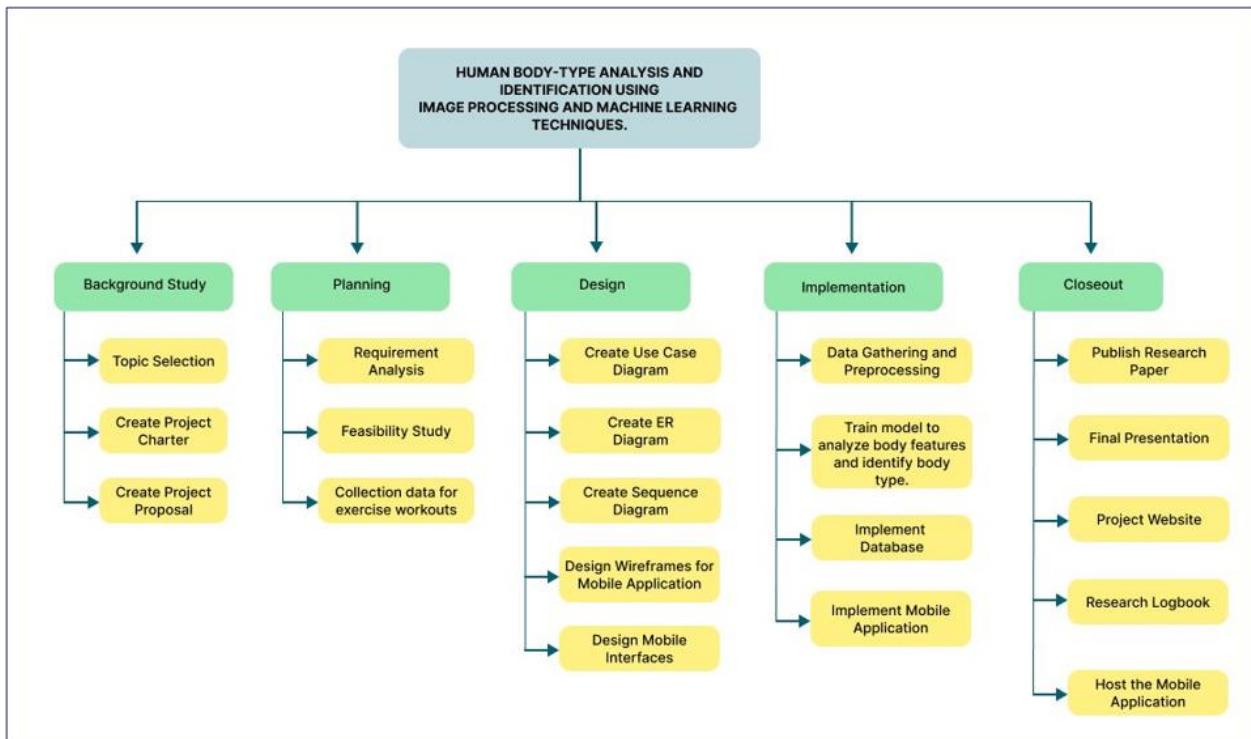


Figure 2 Work Breakdown Structure

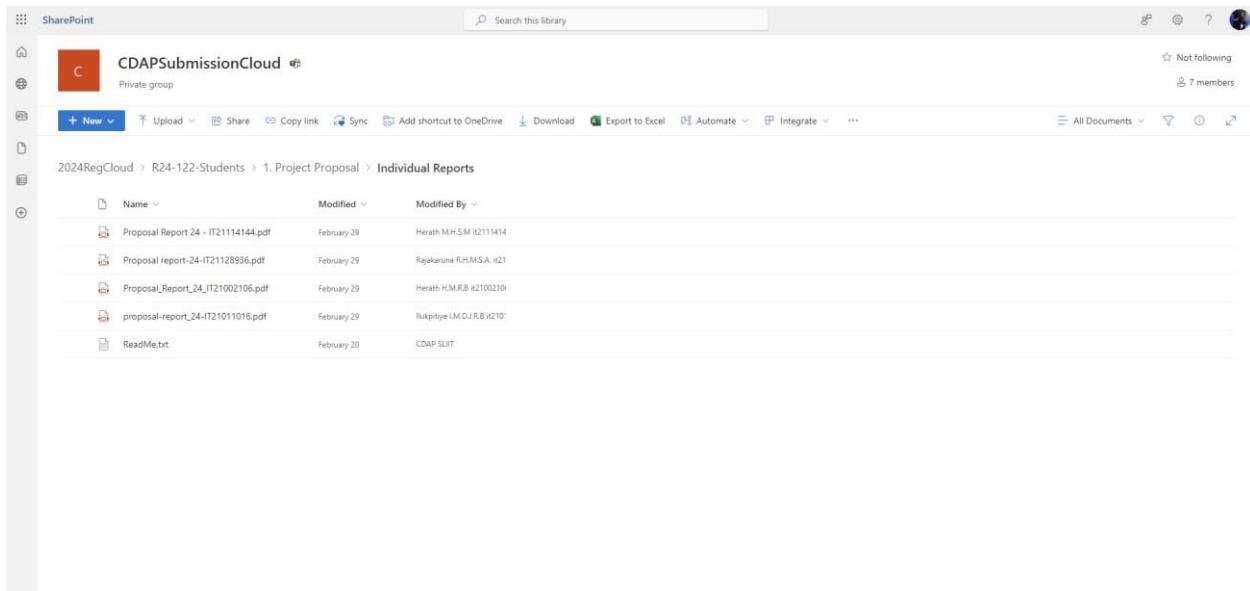
### **3. Completed Individual Component**

- Data Collection
- Develop the logic for each body types using Tensorflow and OpenCV to identify the body type using images.
- Developed Random Forest Regression Algorithm to predict time line for the body goals.
- System testing

### **4. Documentation**

- Proposal Document
- Status Document
- Logbook
- Research paper

### **5. Document Submission**



The screenshot shows a SharePoint document library named 'CDAPSubmissionCloud'. The library is a private group and contains 7 members. The navigation path is '2024RegCloud > R24-122-Students > 1. Project Proposal > Individual Reports'. The list view displays five documents:

Name	Modified	Modified By
Proposal Report 24 - IT211144.pdf	February 29	Herath M.H.S.M.i211144
Proposal report-24-IT21128936.pdf	February 29	Rajakaruna R.H.M.S.A.i21
Proposal_Report_24_IT21002106.pdf	February 29	Herath H.M.R.B.i2100210
proposal-report_24-IT21011016.pdf	February 29	Iluvithya I.M.D.J.R.B.i2101
ReadMe.txt	February 20	CDAP SLIT

*Figure 3 Proposals Submissions*

The screenshot shows a SharePoint library named 'CDAPSubmissionCloud' under the 'Private group' category. The library contains documents related to '2024RegCloud > R24-122-Students > 6. Final Report & Presentation > Final Reports'. The list view displays the following items:

Name	Modified	Modified By
Turnitin reports	February 20	CDAP SUIT
Final Group Report R24-122.pdf	August 23	Herath H.M.R.B #2100210
Final Report 24 - IT21011016.pdf	August 23	Ilukpitiya I.M.D.J.R.B #21011016
Final Report 24 - IT21128936.pdf	August 22	Rajakaruna R.H.S.M.S.A. #21
Final Report IT21114144.pdf	August 23	Herath H.M.R.B #21114144
Final_Report_24_IT21002106.pdf	August 23	Herath H.M.R.B #21002106
ReadMe.txt	February 20	CDAP SUIT

Figure 4 Final reports Submissions

The screenshot shows a SharePoint library named 'CDAPSubmissionCloud' under the 'Private group' category. The library contains documents related to '2024RegCloud > R24-122-Students > 4. Research Paper'. The list view displays the following items:

Name	Modified	Modified By
Publication Details	February 20	CDAP SUIT
Turnitin report	February 20	CDAP SUIT
IEEE Research Paper Template-a4.docx	February 20	CDAP SUIT
R24-122(Progress Of research 02 ).pdf	June 14	Herath H.M.R.B #2100210
R24-122(Progress of research).pdf	May 10	Herath H.M.R.B #2100210
ReadMe.txt	February 20	CDAP SUIT

Figure 5 Research paper Draft version Submissions

## 6. Research Paper Submission

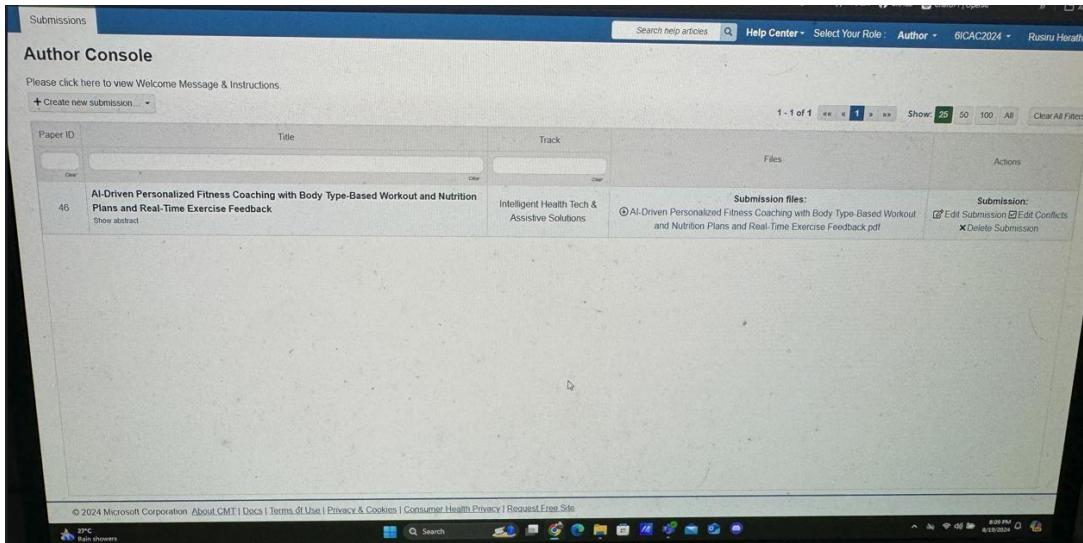


Figure 6 ICAC Research paper Submissions

## 7. Finalize work breakdown structure & allocated resources for each area

### 7.1 Teams task planner (Group)

A screenshot of the Microsoft Teams Task Planner dashboard. The interface is organized into six columns: "To do", "Project Initiation", "Final Report", "Research Paper", "Implementation", and "Closeout". Each column contains a list of tasks with their status (Completed or In Progress) and due dates. For example, under "Project Initiation", there are tasks like "Collect Data for Foods and Create the Dataset" and "Select the 4 Research areas", both completed on 08/11. Under "Implementation", tasks include "Improve UI &amp; UX" and "Integrated All the Function", both completed on 08/24. The "Research Paper" column shows tasks related to literature review, final reports, and methodology, all completed by team members like Herath H.M.R.B. I2... and Rajakaruna R.H.M.... The "Closeout" column lists tasks such as "Testing and Debugging" and "Create API", also completed. The "Implementation" column has the most tasks listed, spanning from 08/11 to 08/16.

Figure 7 Teams task planner Dashboard

Title	Assignment	Start date	Due date	Bucket	Progress	Priority	Labels
Topic Selection			12/29/2023	Project Initiation	Completed	Important	Add label
Select the 4 Research areas			12/30/2023	Project Initiation	Completed	Important	Add label
Collecting Data for exercise-workouts	Bulupitiya I.M.D.J.R.	3/20/2024	Final Report	Completed	Medium	Medium	Add label
Collect Data for body-type identification	Rajakaruna R.H.M.	3/21/2024	Project Initiation	Completed	Medium	Medium	Add label
Collect Data for Foods and Create the Dataset	Herath M.H.S.M.I.G.	3/24/2024	Final Report	Completed	Medium	Medium	Add label
Collect Data for end-user plan and Create-the-Dataset	Bulupitiya I.M.D.J.R.	2/23/2024	Research Paper	Completed	Medium	Medium	Add label
Create User-Case-Diagrams for identify body-type...	Rajakaruna R.H.M.	2/23/2024	Research Paper	Completed	Medium	Medium	Add label
Create the Case-Diagrams for Diet-Sugest Component	Rajakaruna R.H.M.	2/23/2024	Research Paper	Completed	Medium	Medium	Add label
Create the Case-Diagrams for Workout-Plan-Suggest	Herath M.H.S.M.I.G.	2/23/2024	Research Paper	Completed	Medium	Medium	Add label
Create the Case-Diagrams for real-time exercise Com...	Herath M.H.S.M.I.G.	2/23/2024	Research Paper	Completed	Medium	Medium	Add label
Collect Data for Meals and Create the Dataset	Rajakaruna R.H.M.	3/26/2024	Final Report	Completed	Medium	Medium	Add label
Create High-Fidelity-Mobile interface for Diet-Compo...	Rajakaruna R.H.M.	2/25/2024	Research Paper	Completed	Medium	Medium	Add label
Create High-Fidelity-Mobile interface for Workout-Pa...	Herath M.H.S.M.I.G.	2/25/2024	Research Paper	Completed	Medium	Medium	Add label
Create High-Fidelity-Mobile interface for body-identi...	Bulupitiya I.M.D.J.R.	2/25/2024	Research Paper	Completed	Medium	Medium	Add label
Create High-Fidelity-Mobile interface for Real-time ex...	Herath M.H.S.M.I.G.	2/25/2024	Research Paper	Completed	Medium	Medium	Add label
Create the Figma UI for each of your interfaces:	Bulupitiya I.M.D.J.R.	4/26/2024	Research Paper	Completed	Medium	Medium	Add label
Create the Figma UI for home, login, and user-profile:	Bulupitiya I.M.D.J.R.	4/26/2024	Research Paper	Completed	Medium	Medium	Add label
Create the Figma UI for each of your interfaces:	Rajakaruna R.H.M.	4/26/2024	Research Paper	Completed	Medium	Medium	Add label
Create the Figma UI for each of your interfaces:	Bulupitiya I.M.D.J.R.	4/26/2024	Research Paper	Completed	Medium	Medium	Add label
Create the Figma UI for each of your interfaces:	Herath M.H.S.M.I.G.	4/26/2024	Research Paper	Completed	Medium	Medium	Add label
Gather body-imager data and preprocess them:	Bulupitiya I.M.D.J.R.	3/29/2024	Implementation	Completed	Medium	Medium	Add label
Exercise movements data collection and preprocessing	Herath H.M.R.B.I2...	3/29/2024	Implementation	Completed	Medium	Medium	Add label
Collection emoji-feedback-dataset and preprocessing...	Herath M.H.S.M.I.G.	3/29/2024	Implementation	Completed	Medium	Medium	Add label
Collecting food-nutritious datasets and preprocessing...	Rajakaruna R.H.M.	3/29/2024	Implementation	Completed	Medium	Medium	Add label
Create Presentation-Slides for Methodology-Evidence:	Herath M.H.S.M.I.G.	4/30/2024	To do	Completed	Medium	Medium	Add label
Create Presentation-Slides for Methodology-Evidence:	Herath H.M.R.B.I2...	4/30/2024	To do	Completed	Medium	Medium	Add label
Create Presentation-Slides for Methodology-Evidence:	Bulupitiya I.M.D.J.R.	4/30/2024	To do	Completed	Medium	Medium	Add label
Create Presentation-Slides for Methodology-Evidence:	Rajakaruna R.H.M.	4/30/2024	To do	Completed	Medium	Medium	Add label
Train model to analyze body-features and identify bo...	Bulupitiya I.M.D.J.R.	4/16/2024	Implementation	Completed	Medium	Medium	Add label
Train model to identify real-time exercise movement...	Herath H.M.R.B.I2...	4/16/2024	Implementation	Completed	Medium	Medium	Add label
Train-to-model to identify real-time exercise movement...	Rajakaruna R.H.M.	4/16/2024	Implementation	Completed	Medium	Medium	Add label

Figure 8 Teams task planner Grid View

## 7.2 Teams task planner (Individual)

The screenshot shows the Microsoft Teams Project Plan dashboard. The interface is organized into several columns representing different project phases or buckets:

- To do:** Contains tasks like "Create the Status 02 Doc" and "Create the Status 01 doc".
- Project Initiation:** Contains tasks like "Select the 4 Research areas".
- Final Report:** Contains tasks like "Create the Group-Final report".
- Research Paper:** Contains tasks like "Create Individual-Final Report".
- Implementation:** Contains tasks like "To modify the suggestions given by Kolya Sir for research-paper-literature review".
- Closed:** Contains tasks like "Improve UI & UX", "Integrated All the Function", and "Testing and Debugging".

Each task card includes a small profile picture, the task name, and the assignee. The "Implementation" section is currently expanded, showing a list of completed tasks with their due dates and assignees.

Figure 9 Teams task planner Dashboard

Title	Assignment	Start date	Due date	Bucket	Progress	Priority	Labels
Select the 4 Research areas	Harith H.M.R.B it2	12/30/2023	Project Initiation	Completed	Important		Add label
Collecting Data for exercise workouts	Harith H.M.R.B it2	3/20/2024	Final Report	Completed	Important		Add label
Create the Case Diagrams for Realtime exercise Com...	Harith H.M.R.B it2	2/23/2024	Research Paper	Completed	Medium		Add label
Create High-Fidelity Mobile Interface for Real time ex...	Harith H.M.R.B it2	2/25/2024	Research Paper	Completed	Medium		Add label
Create the Figma UI for each of your interfaces-	Harith H.M.R.B it2	4/28/2024	Research Paper	Completed	Medium		Add label
Exercise movements data collection and preprocessing	Harith H.M.R.B it2	3/20/2024	Implementation	Completed	Important		Add label
Create Presentation Slides for Methodology Evidence -	Harith H.M.R.B it2	4/30/2024	To do	Completed	Medium		Add label
Train model to identify real-time exercise movement	Harith H.M.R.B it2	4/16/2024	Implementation	Completed	Medium		Add label
Write the research paper Abstract	Harith H.M.R.B it2	5/10/2024	To do	Completed	Medium		Add label
Create the Status 01 doc	Harith H.M.R.B it2	5/6/2024	To do	Completed	Medium		Add label
Enter API	Harith H.M.R.B it2	5/30/2024	Implementation	Completed	Medium		Add label
Fine-Tune Exercise Identification Model and Exercise L...	Harith H.M.R.B it2	6/13/2024	Implementation	Completed	Medium		Add label
Write Research paper Literature review	Harith H.M.R.B it2	5/10/2024	Research Paper	Completed	Medium		Add label
Write Research Paper methodology of Exercise Move...	Harith H.M.R.B it2	6/4/2024	Research Paper	Completed	Medium		Add label
Write the Results and discussion of Exercise Moveme...	Harith H.M.R.B it2	8/1/2024	Research Paper	Completed	Medium		Add label
To modify the suggestions given by Koala AI for res...	Harith H.M.R.B it2	8/8/2024	Research Paper	Completed	Medium		Add label
Integrate real-time audio feedback with the computer...	Harith H.M.R.B it2	7/31/2024	Implementation	Completed	Medium		Add label
Design and implement the UI for the movement track...	Harith H.M.R.B it2	8/10/2024	Implementation	Completed	Medium		Add label
Integrate WebRTC for real-time video feed in the mobi...	Harith H.M.R.B it2	8/17/2024	Implementation	Completed	Medium		Add label
Integrate the audio feedback mechanism with the We...	Harith H.M.R.B it2	8/22/2024	Implementation	Completed	Medium		Add label
Testing and Debugging	Harith H.M.R.B it2	9/16/2024	Implementation	In progress	Medium		Add label
Add more Exercises	Harith H.M.R.B it2	9/30/2024	Implementation	In progress	Medium		Add label
Create the Status 02 Doc	Harith H.M.R.B it2	9/11/2024	To do	In progress	Medium		Add label
Create Individual Final Report	Harith H.M.R.B it2	8/20/2024	Final Report	Completed	Medium		Add label
Create the Group Final report	Harith H.M.R.B it2	8/21/2024	Final Report	Completed	Medium		Add label

Figure 10 Teams task planner Grid View

## 8. Teams Planner Charts

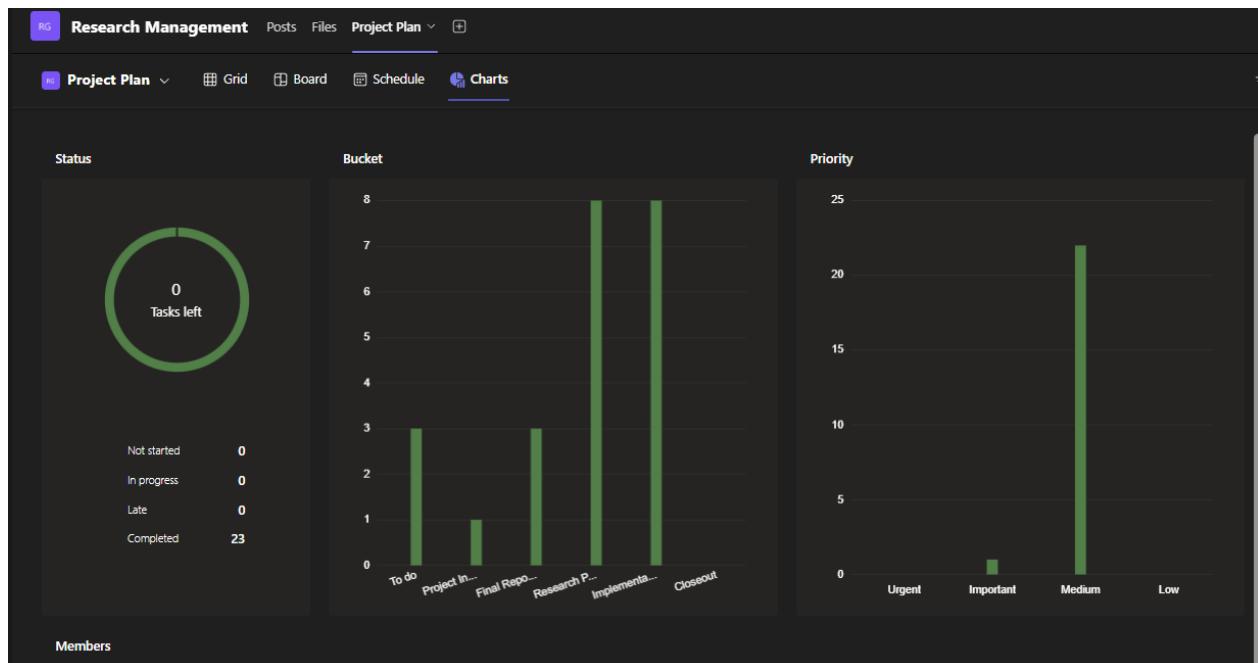


Figure 11 Teams' planner chart – IT21011016

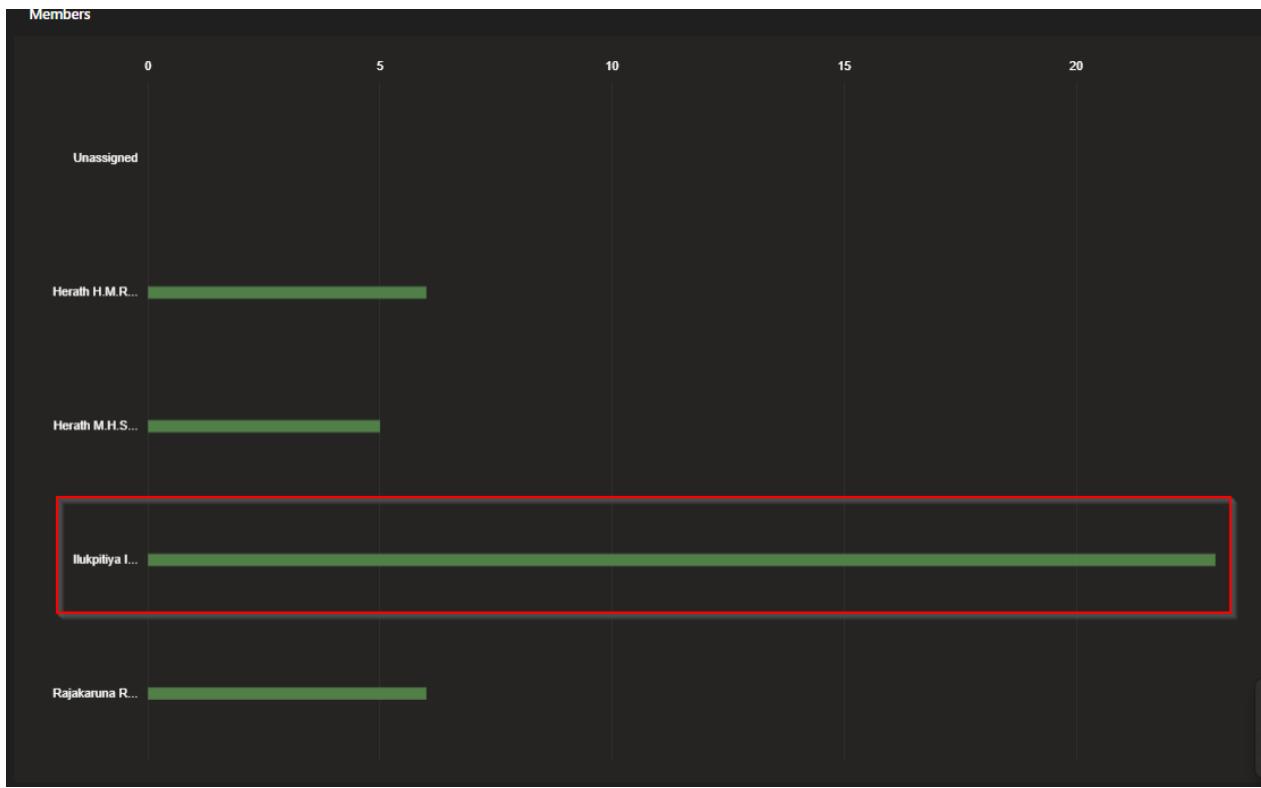


Figure 12 Teams' planner chart – IT21011016

## 9. Test Results

### 9.1 Test Cases and Results

Table 1 Test Case correct Body-type identification

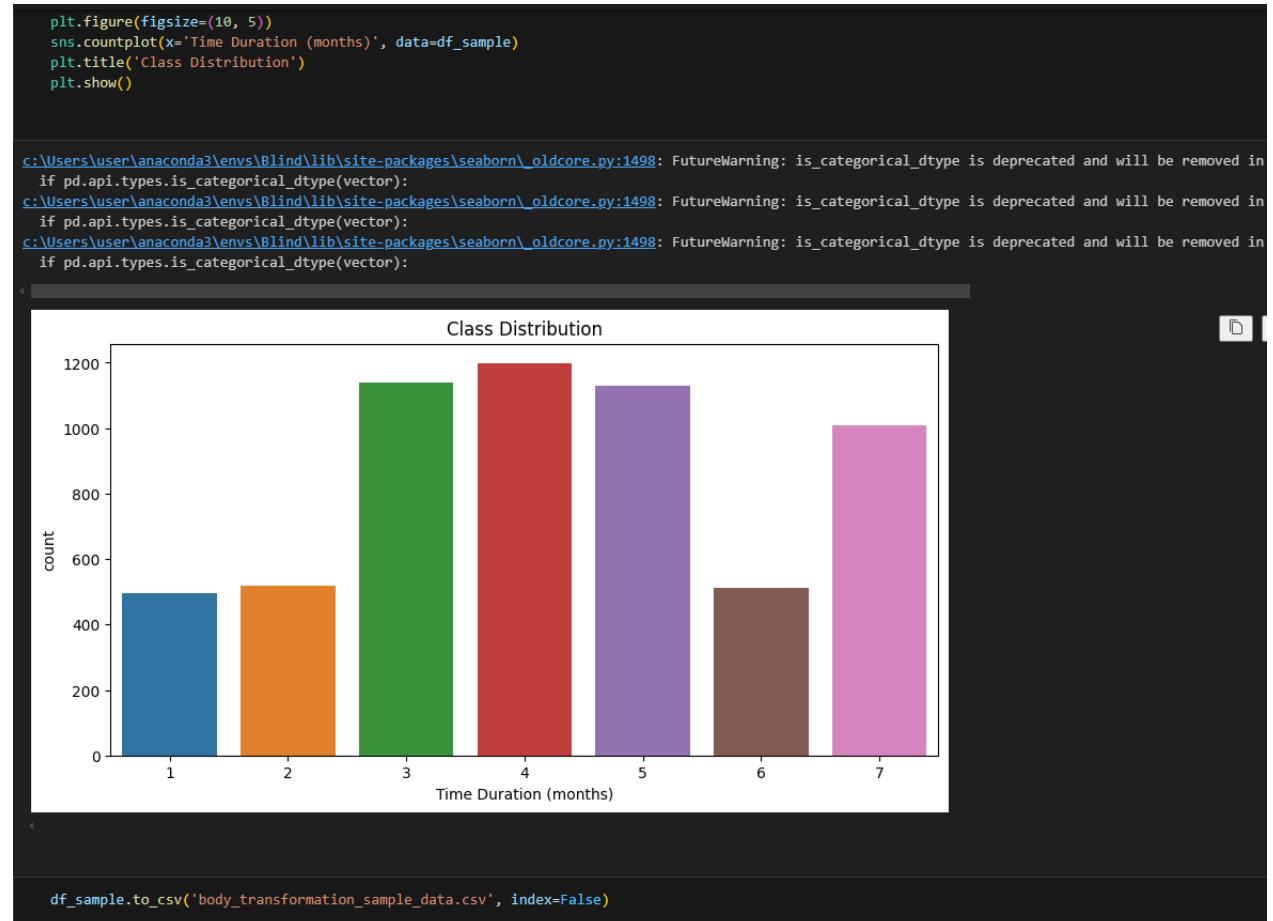
Test Case ID	01
Test Scenario	Ensure the system correctly identifies the body-type.
Precondition	User should insert/upload a required body image The system is active and analyse the image.
Input Data	User's height, weight and the full body picture of the user.

Expected Outcome	The system should detect correct body type and display it.
Actual Outcome	The system correctly provided correct body type.
Status (Pass/Fail)	Pass

Table 2 Test case for timeline prediction

Test Case ID	02
Test Scenario	Verify that the system accurately predict the timeline for selected body goal.
Precondition	Select a body goal for personal choice.
Input Data	User's height weight, body type and the body goal.
Expected Outcome	The system should correctly predict how long will it take to user to achieve the body goal

## 9.2 Results Individual (Body type identification and timeline prediction of the body goal)



```
Mean Absolute Error: 0.8817819740675991
Root Mean Squared Error: 1.061084999316954
Predicted Time Duration (months): 2.913797619047619
c:\Users\user\anaconda3\envs\Interior_v2\lib\site-packages\sklearn\metrics\_regression.py:483: FutureWarning: 'squared' is deprecated in version 1.4 and will b
warnings.warn(
predicted_duration[0]
2.913797619047619

predicted_duration_rounded = round(predicted_duration[0])
print(f'Predicted Time Duration (months): {predicted_duration_rounded}')
Predicted Time Duration (months): 3

import joblib
# After training the model
model.fit(X_train, y_train)

# Save the trained model to a file
joblib.dump(model, 'body_transformation_model_3.pkl')
['body_transformation_model_3.pkl']
```

13:08 Mon, 9 Sept

87%



## Body Type Identifier



- ⚠ Use a single image (not a collage)
- ⚠ Use a clear and quality image
- ⚠ Make sure to import a full-body image (head to toe)



Choose File

Identify



13:08 Mon, 9 Sept

87%



## Body Type Identifier



**Your Body-Type is Mesomorph Male**

**What is Your Body Goal ?**

Choose an option

**BULK**

**RIPPED**

Skip





# Getting Bulk ?

Timeframe



Most Probably takes 7 months

Proceed



### 9.3 Results of the Mobile Application (Common)

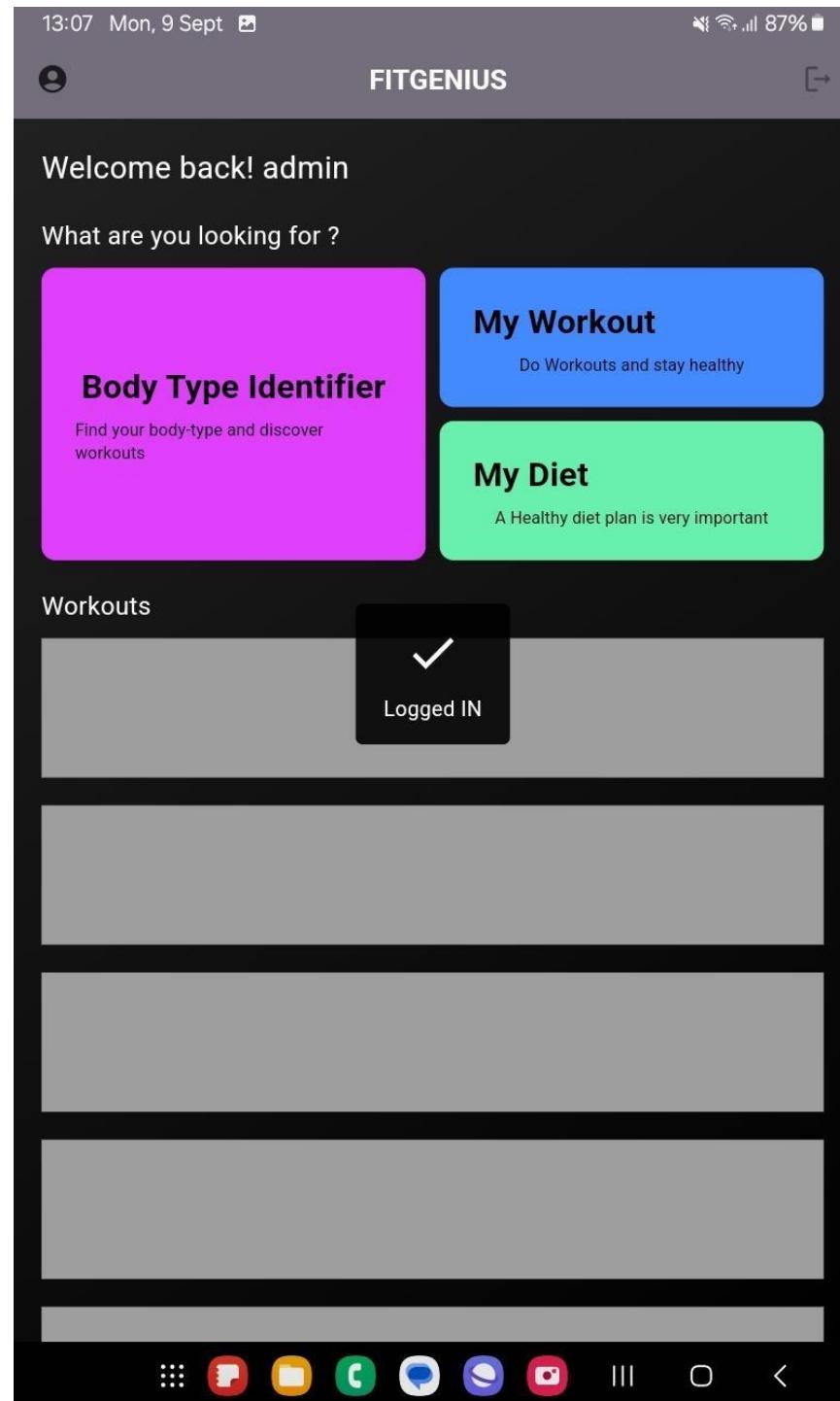


Figure 19 Home Page of the Mobile Application

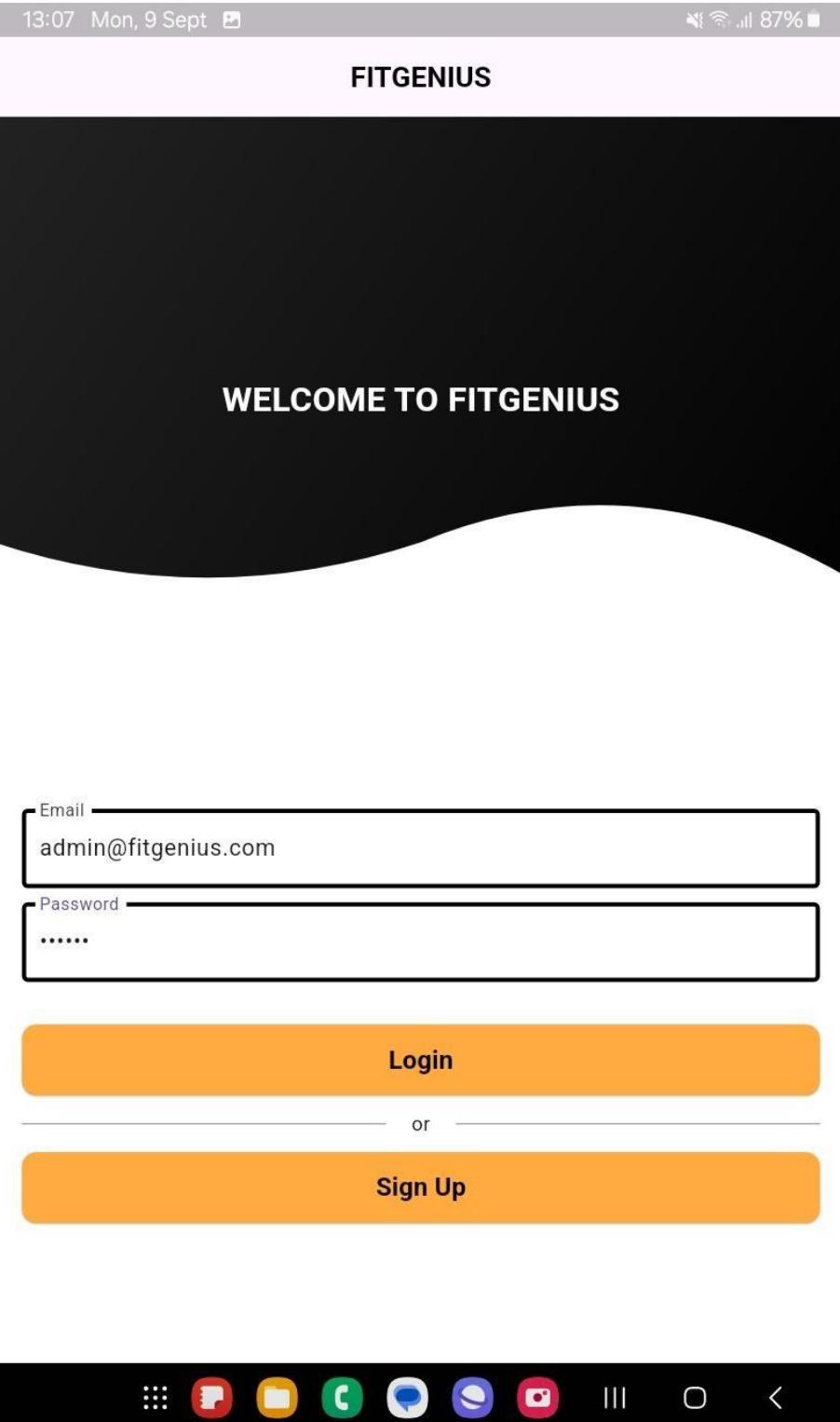


Figure 20 Login page of the Mobile Application

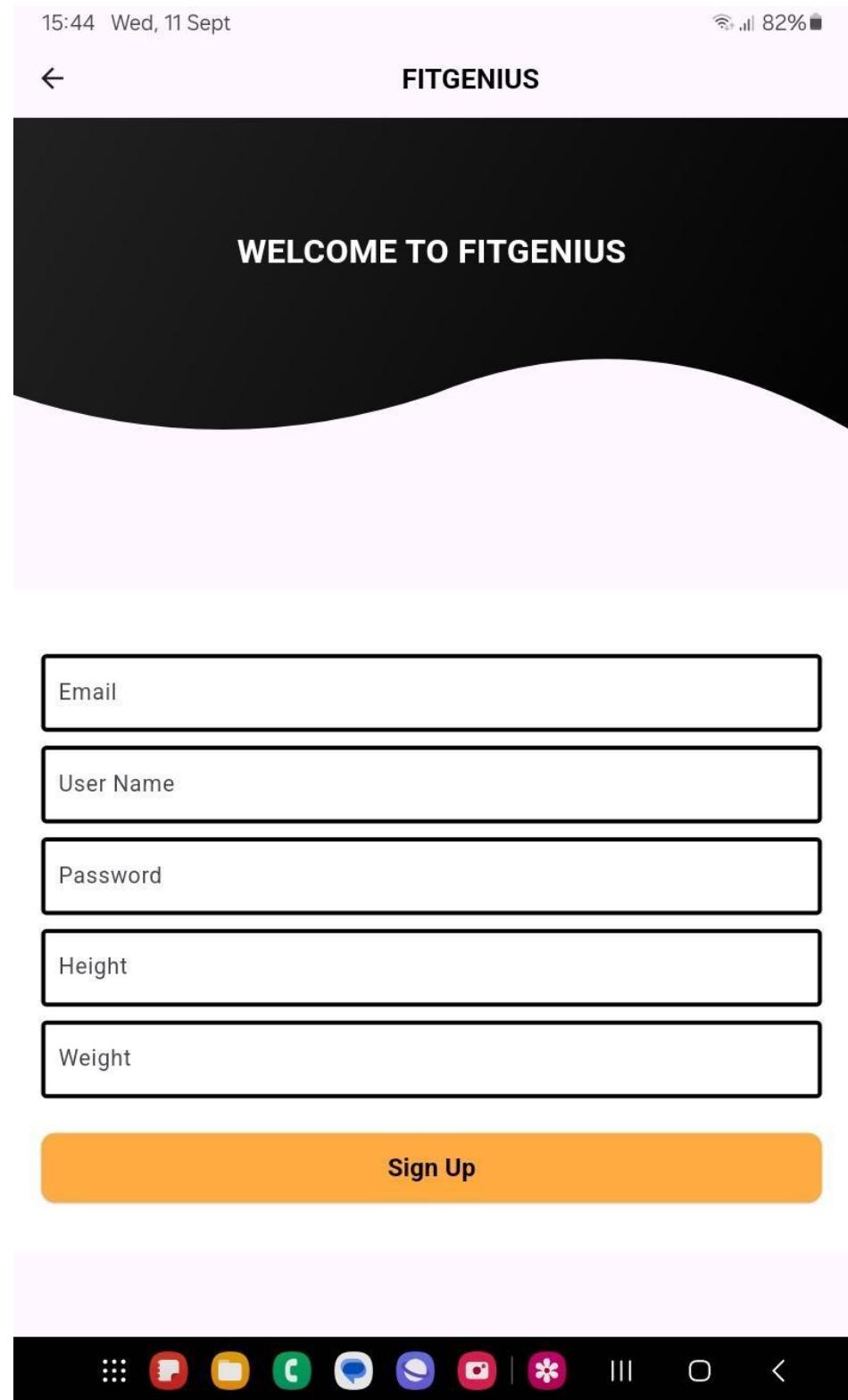


Figure 21 Sign of the Mobile Application

## 10. Emails

We reached out to a professor via email, asking them to take the position of our project co-supervisor.

The screenshot shows an email client interface with the following details:

**From:** Rusuru Bandara <rusurubandaraherath65@gmail.com>  
**To:** jenny.k <jenny.k>

**Date:** Sat, 25 Nov 2023, 01:42

**Subject:** Invitation to Join as Co-Supervisor for Research Group

**Email Content:**

Dear Ms. Jenny Krishara,

I hope this email finds you well. I am reaching out to you on behalf of our research group under the supervision of Prof. Koliya Pulasinghe at SLIIT. We are currently engaged in an IT specialization research project that we believe aligns closely with your expertise and research interests.

Our research group consists of dedicated students pursuing IT specialization, and we are eager to enhance our project through the valuable guidance of a co-supervisor.

The students in our research group are as follows:

1.Herath H.M.R.B - IT21002106  
2.Illukpitiya I.M.D.J.R.B - IT21011016  
3.Herath M.H.S.M - IT21114144  
4.Rajakaruna R.H.M.S.A - IT21128936

Please let us know a time that suits you, and we will ensure to accommodate your schedule accordingly.

Thank you for considering our invitation, and we eagerly anticipate the possibility of your positive response.

**Buttons:** Reply, Forward, Print

Figure 22 Email 01

We got permission from our supervisor to submit the research paper to ICAC

The screenshot shows two emails exchanged between the student and the supervisor.

**Email 1 (Student to Supervisor):**

**From:** Herath H.M.R.B IT21002106  
**To:** Koliya Pulasinghe  
**Cc:** Jenny Krishara; Illukpitiya I.M.D.J.R.B IT21011016; Rajakaruna R.H.M.S.A. IT21128936; Herath M.H.S.M IT21114144

**Subject:** Final Research Paper - RP24 ...

**Date:** Fri 8/16/2024 11:51 PM

**Email Content:**

Hi Koliya Sir,

I am writing to kindly request your approval for the submission of our research paper to the ICAC organized by SLIIT.

The final version of the paper is attached for your review. I would appreciate it if you could verify the following:

1. The quality of the proposed conference (ICAC SLIIT).  
2. The quality of the paper is adequate for submission.  
3. The names and affiliations of all supervisors are correctly mentioned.  
4. The affiliation for student authors is correct.

We look forward to your feedback and approval as soon as possible. The submission deadline for ICAC is August 20th.

Thank you for your guidance and support throughout this process.

Best regards,  
Rusuru Bandara Herath

**Email 2 (Supervisor to Student):**

**From:** Koliya Pulasinghe <koliya.p@slit.lk>  
**To:** Herath H.M.R.B IT21002106  
**Cc:** Jenny Krishara; Illukpitiya I.M.D.J.R.B IT21011016; Rajakaruna R.H.M.S.A. IT21128936; Herath M.H.S.M IT21114144

**Subject:** [EXTERNAL EMAIL] This email has been received from an external source – please review before actioning, clicking on links, or opening attachments.

**Date:** Sun 8/18/2024 9:35 PM

**Email Content:**

Dear Students,

This has resolved the issues I raised and is ready for submission. I can approve this for the ICAC, but please continuously improve this research work until you get the acceptance.

Kind Regards,  
Koliya

Figure 23 Email 02

## 11. Physical Meeting



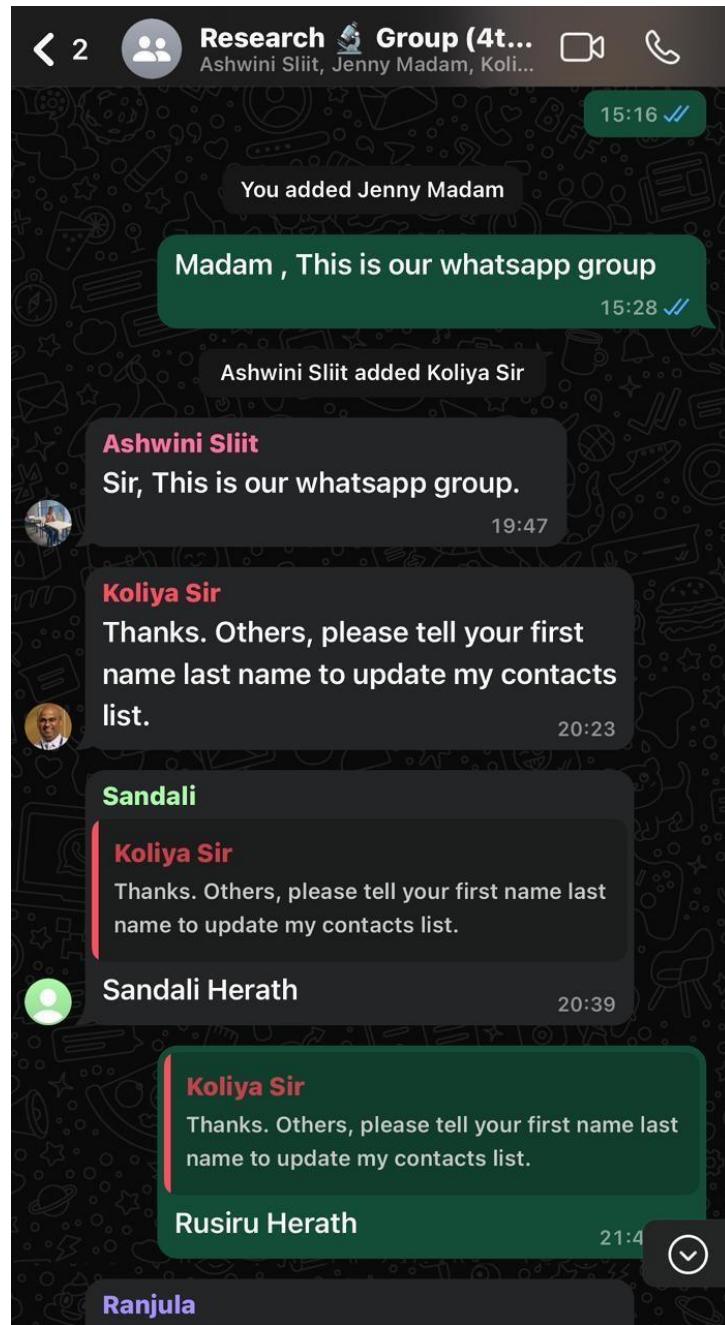
Figure 24 physical meeting with the supervisor – 23.02.2024



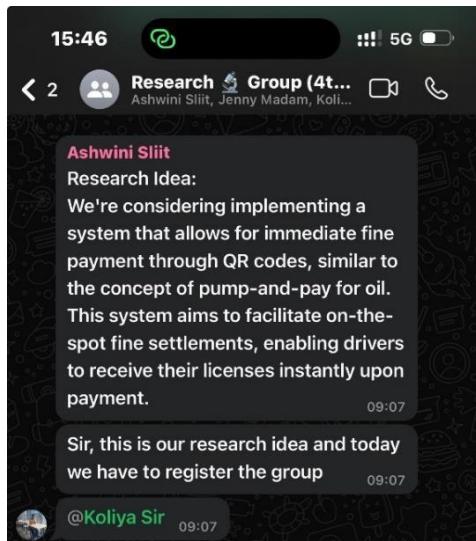
Figure 25 Physical Meeting with group members for progressing the research work

## 12. WhatsApp chats discussing research details

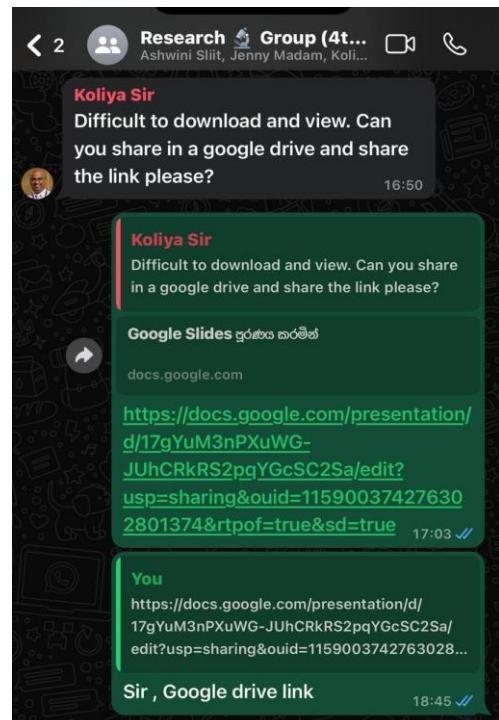
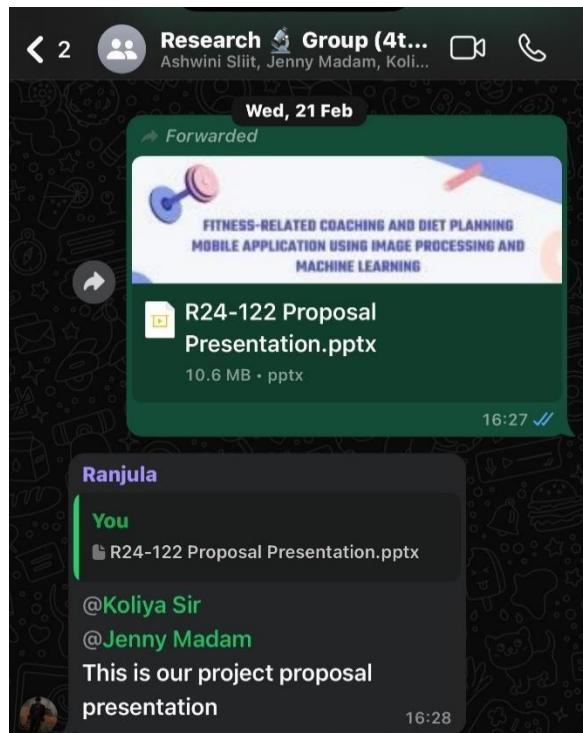
### 12.1 Proof of acknowledgment from both the supervisor and co-supervisor



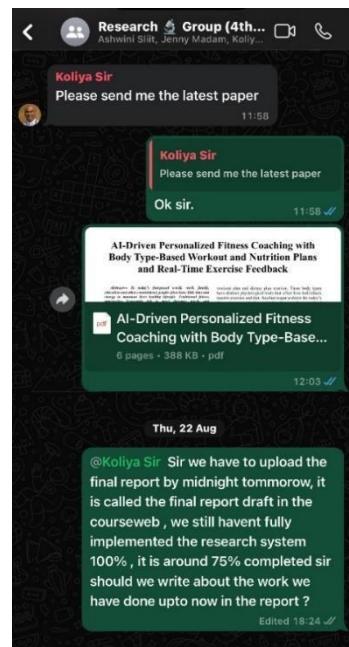
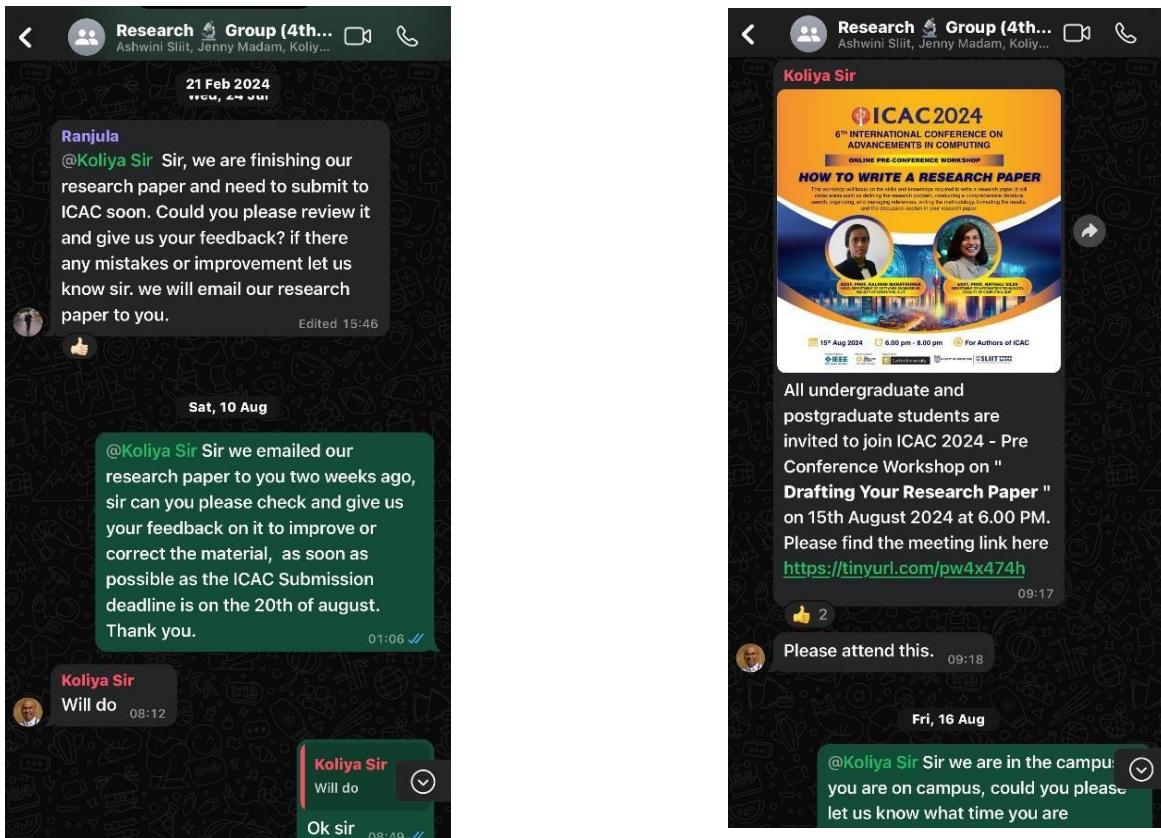
## 12.2 Confirmation of one of our conceptual hypotheses



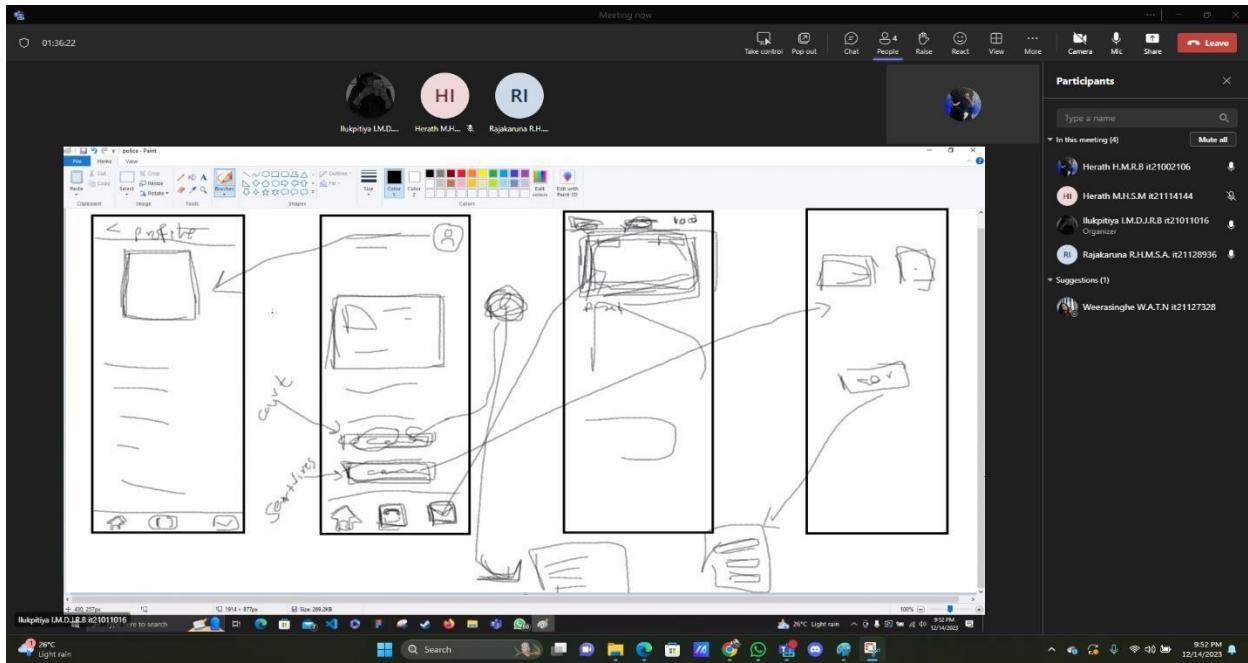
## 12.3 Reviewing our proposal report with both the supervisor and co supervisor for feedback.



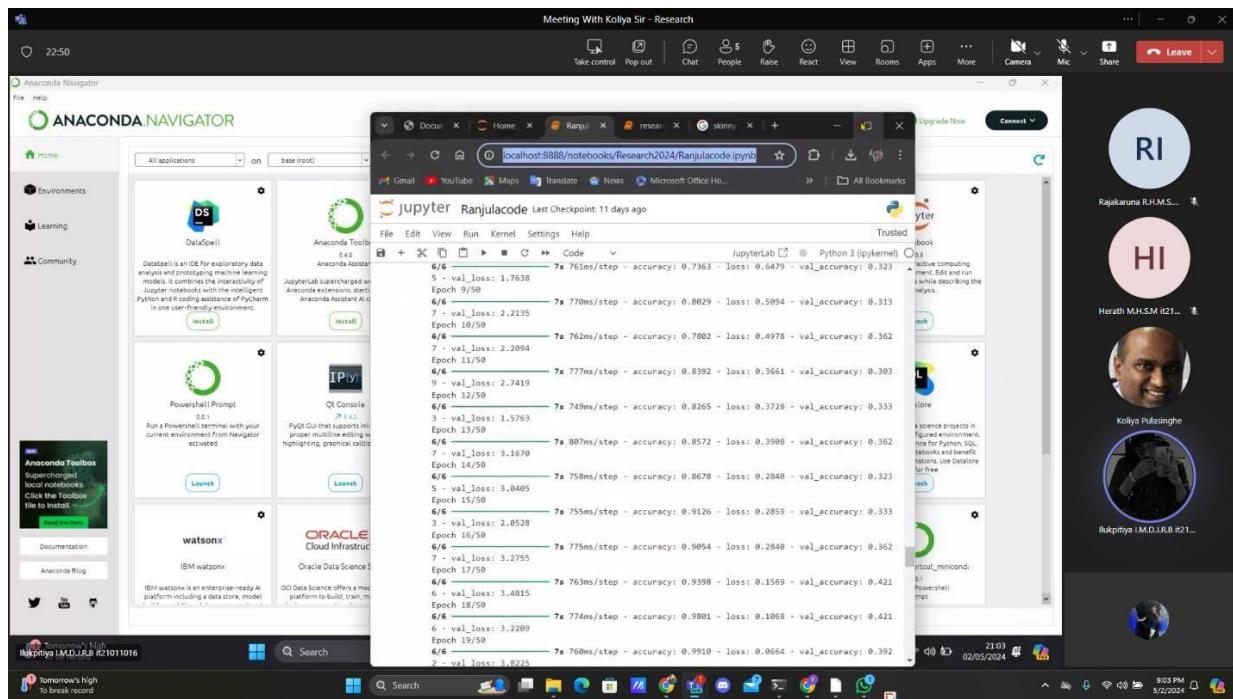
## 12.4 Research paper writing and review with supervisors' guidance



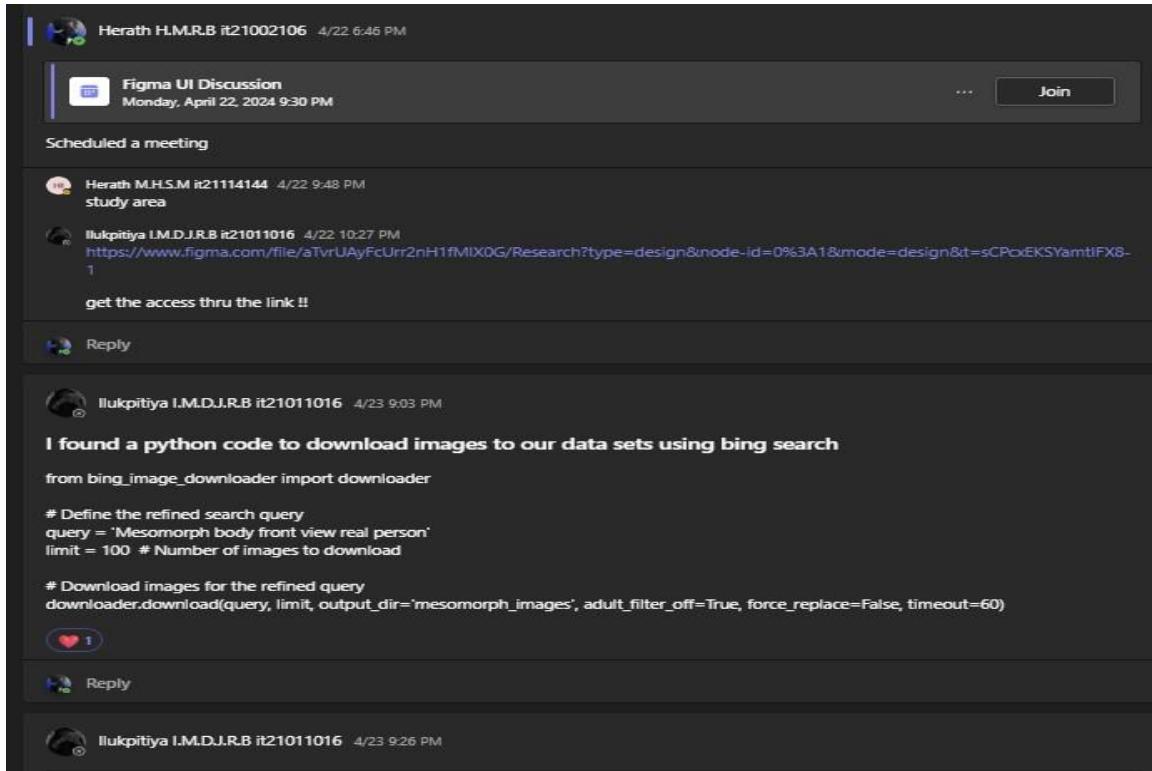
## 13. Screenshots in MS Teams & WhatsApp



*explaining the system with scratch to my team members*



*Online Meeting with the Supervisor*



*Chats in the MS Teams*

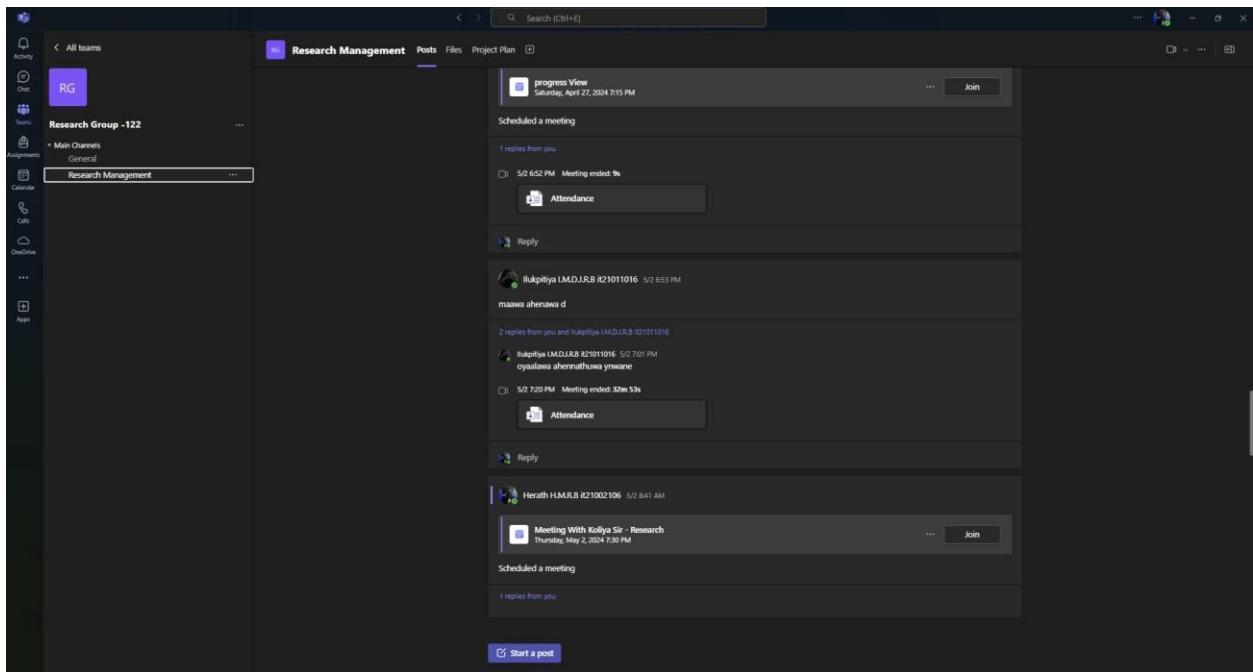


Figure 33 Chats in the MS Teams

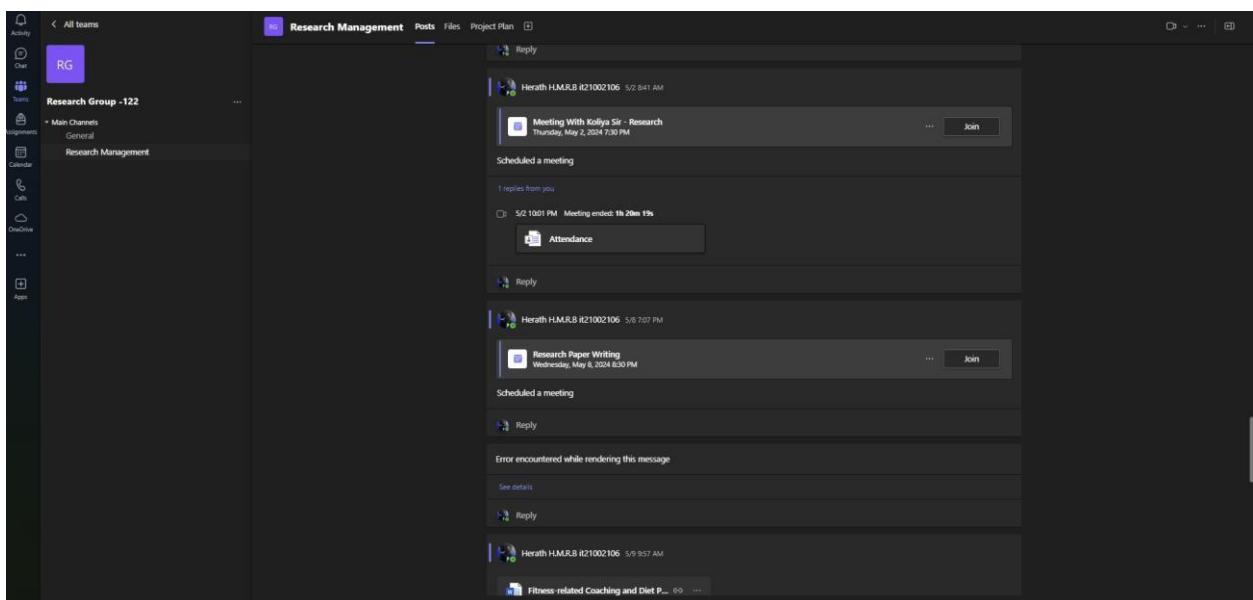
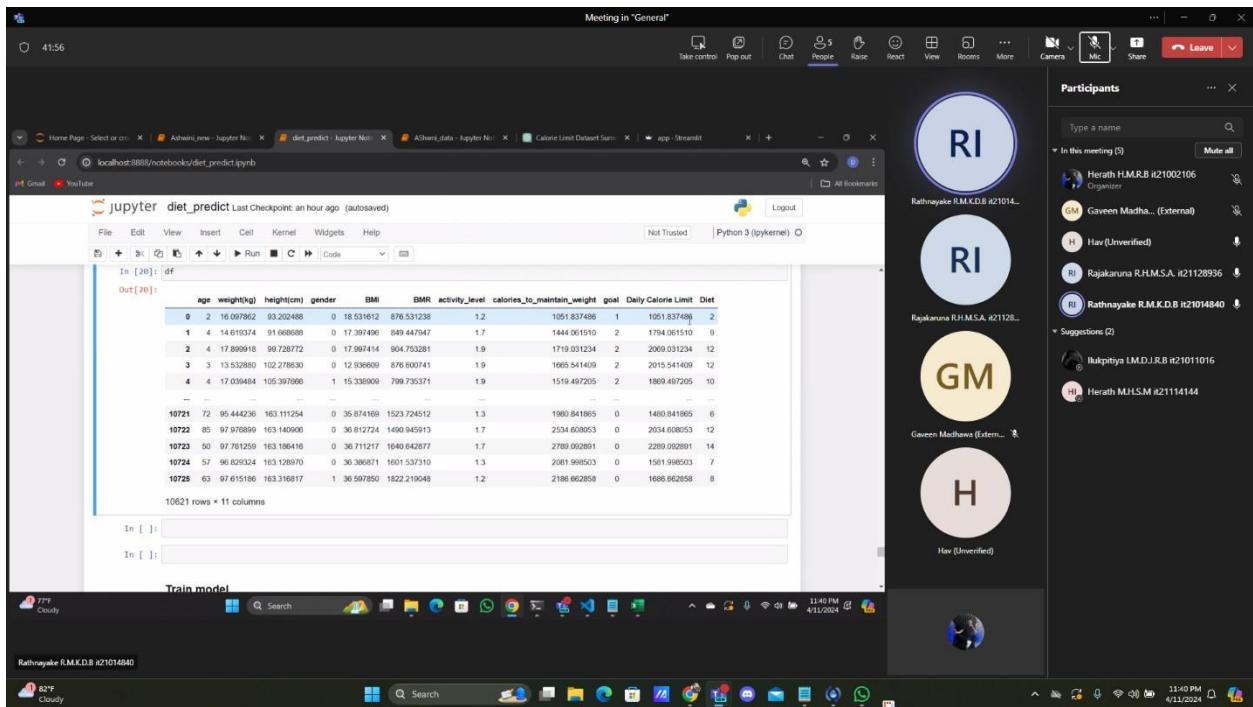
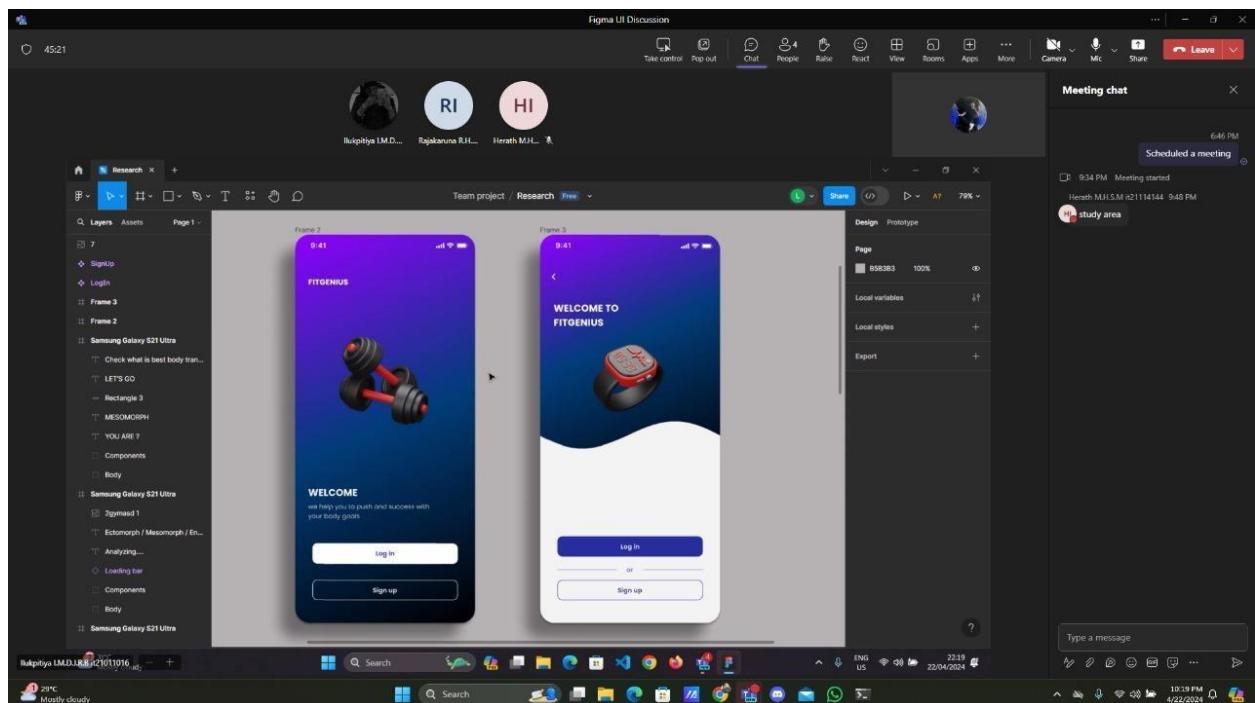


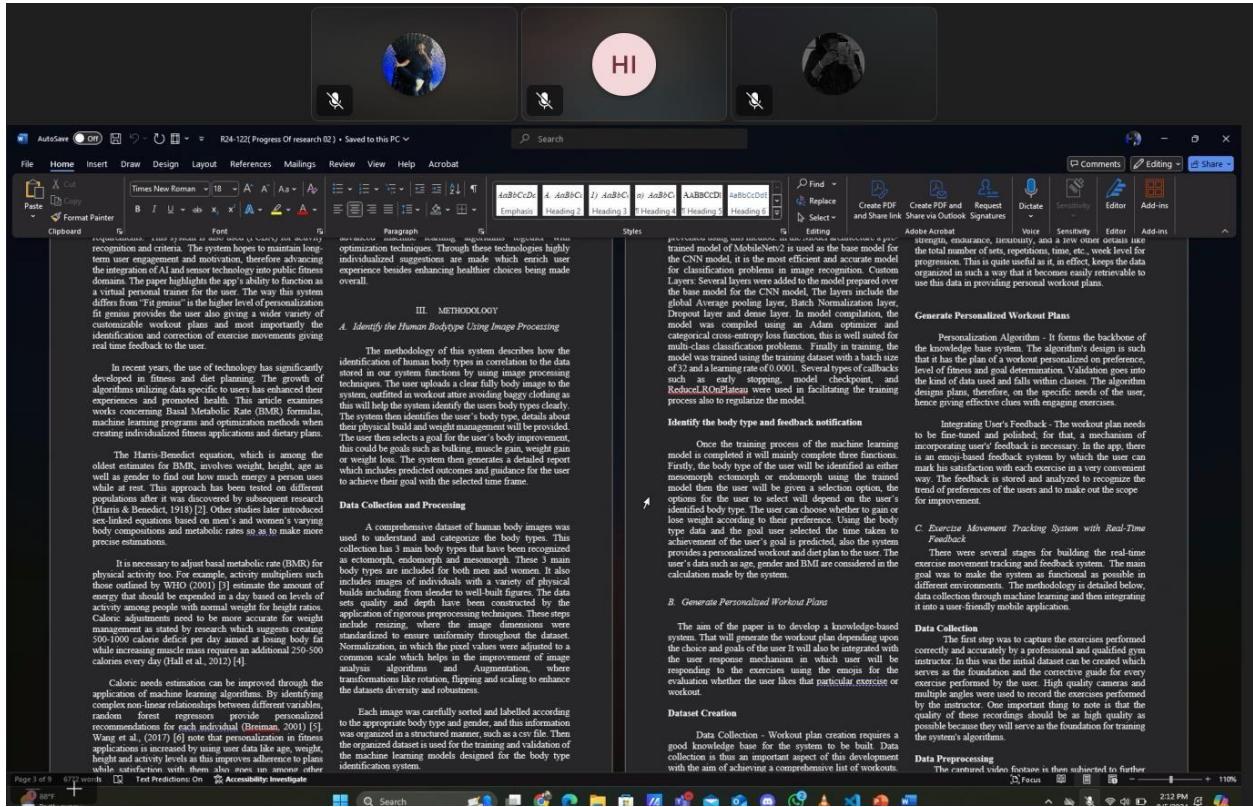
Figure 34 Chats in the MS Teams



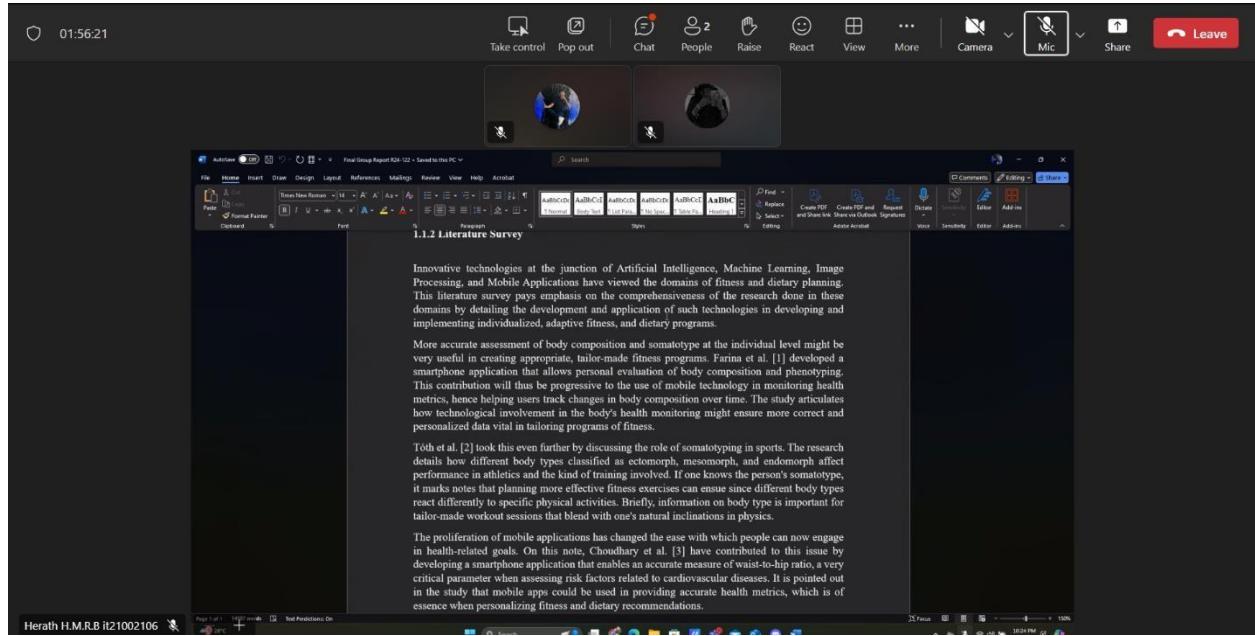
*Meeting with a senior graduate - 11.04.2024.*



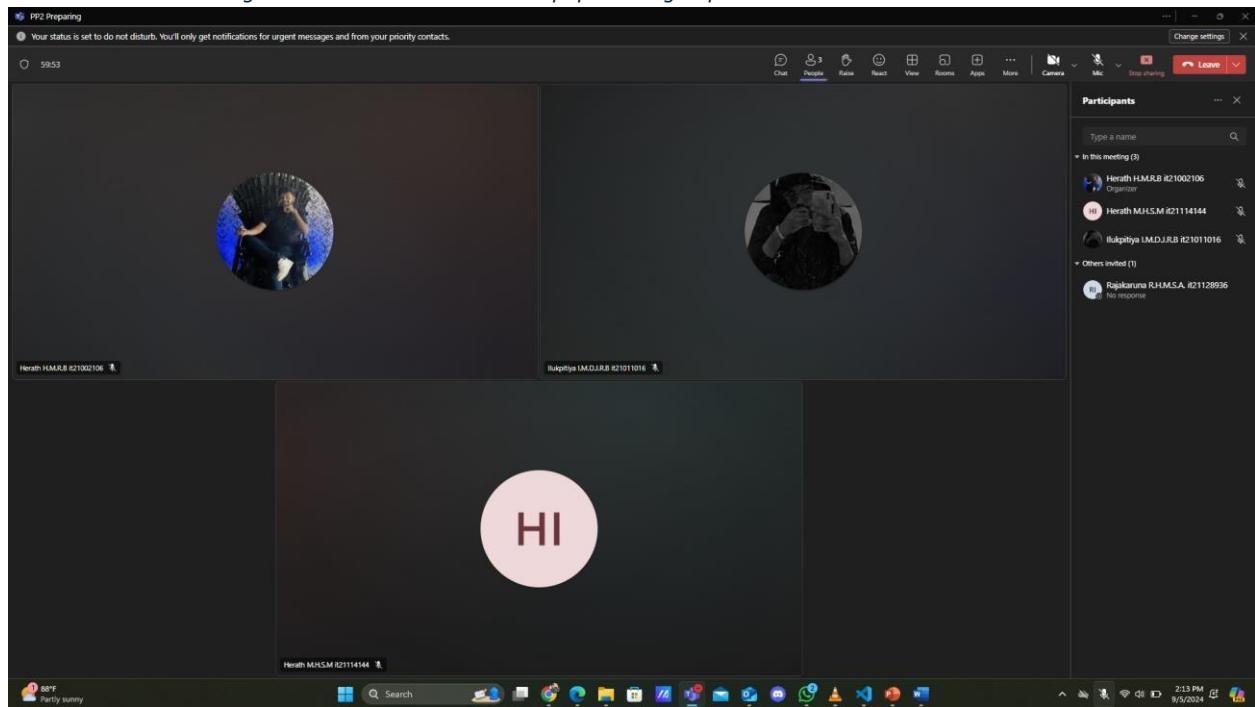
## Online Meeting with team members through Microsoft Teams 22.04.2022.



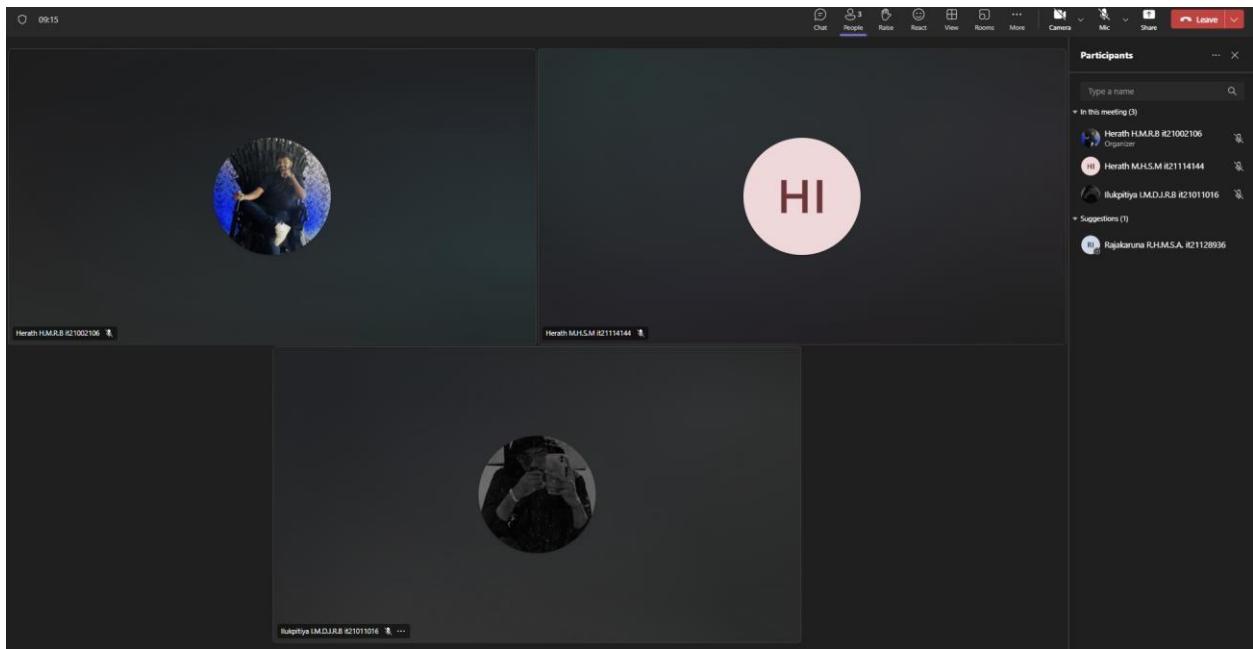
*Meeting to write and edit the research paper with group members*



*Meeting to write and edit the research paper with group members – 16.08.2024*



*Meeting with the Group members to prepare PP2*



*Meeting with the Group members to prepare PP2*

unique facts factors including age, weight, peak, and hobby requirement. The random forest regressor is especially effective due to the fact it can manage non-linear relationships and interactions between capabilities, thus improving the accuracy of the calorie estimates.

In addition to the caloric necessities, the methodology involves gathering customers' food alternatives and dietary requirements. This information series step is critical for generating customized meal plans which can be tailored to man or woman tastes and dietary needs. By incorporating person preferences, the meal plans are more likely to be popular and observed, for that reason enhancing consumer pride and adherence to the weight loss plan.

The era of meal plans makes use of Linear Programming, a mathematical optimization approach that enables finding the high-quality feasible outcome within a given set of constraints. Linear Programming is used to optimize the meal plans to meet each day calorie restrict even as respecting person possibilities and dietary suggestions. The meal plans consist of balanced options for breakfast, lunch, and dinner,

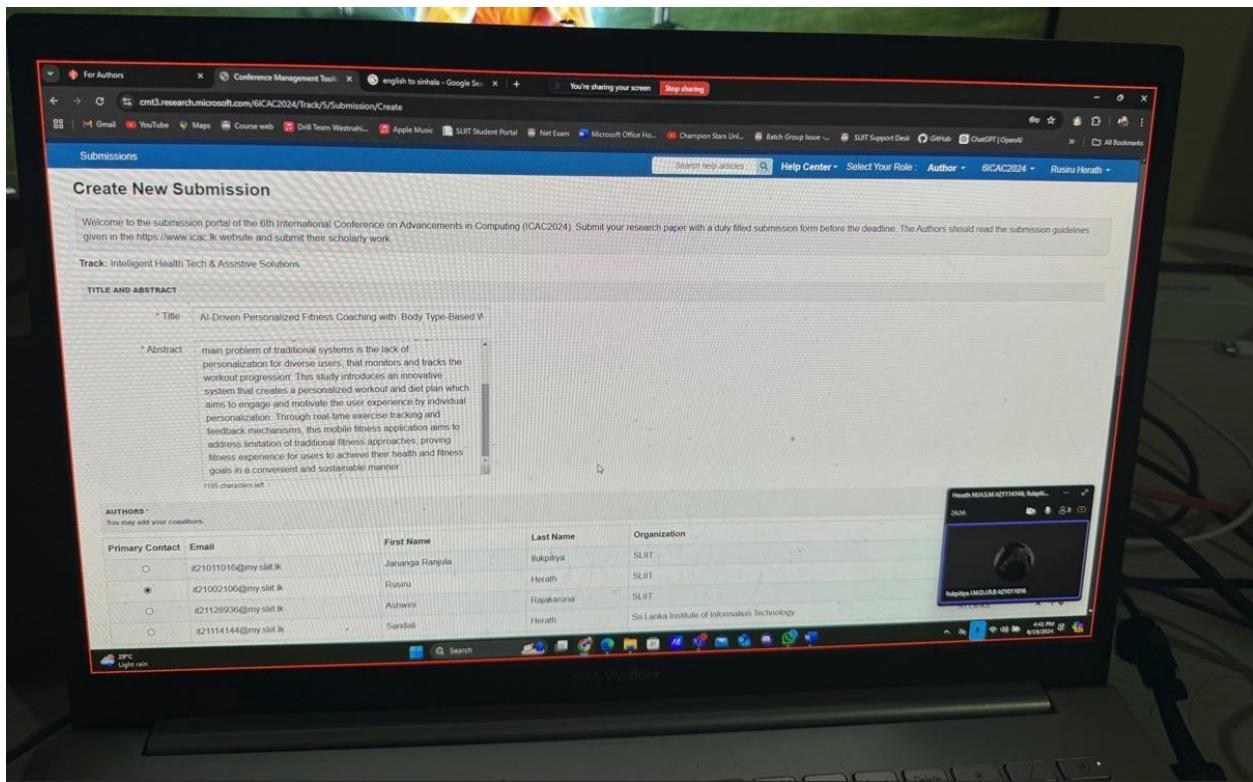
Figure XXX illustrates the confusion matrices which help to evaluate the performance of the trained CNN model.

Figure X

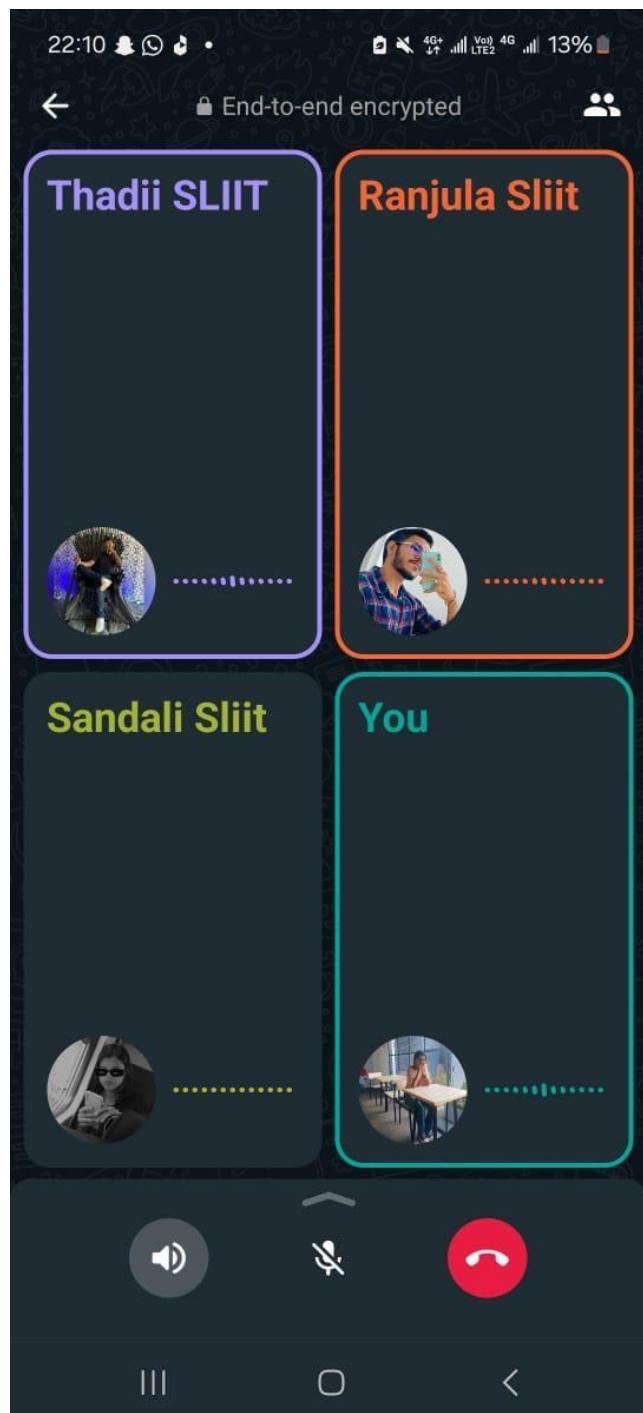
The test was performed on users with diverse body types. When the users uploaded their pictures, the system accurately identified whether their body type is an ectomorph, endomorph, or mesomorph, also the body characteristics were identified, then the user was prompted to choose a body goal of their choosing. A user-friendly UI is provided for the user to input their weight and height goal. Then the identified body type was passed on to generate the workout plan. The system predicts the time taken to achieve desired body goal based on their choice.

Based on user to user the result is different, if an obese user uses the system, then the system identifies them properly and gives a specific catered workout plan for them. A cardio and a diet plan will be included for certain, and the user will be allowed to choose the intensity and the specifics of the plan according to their preference.

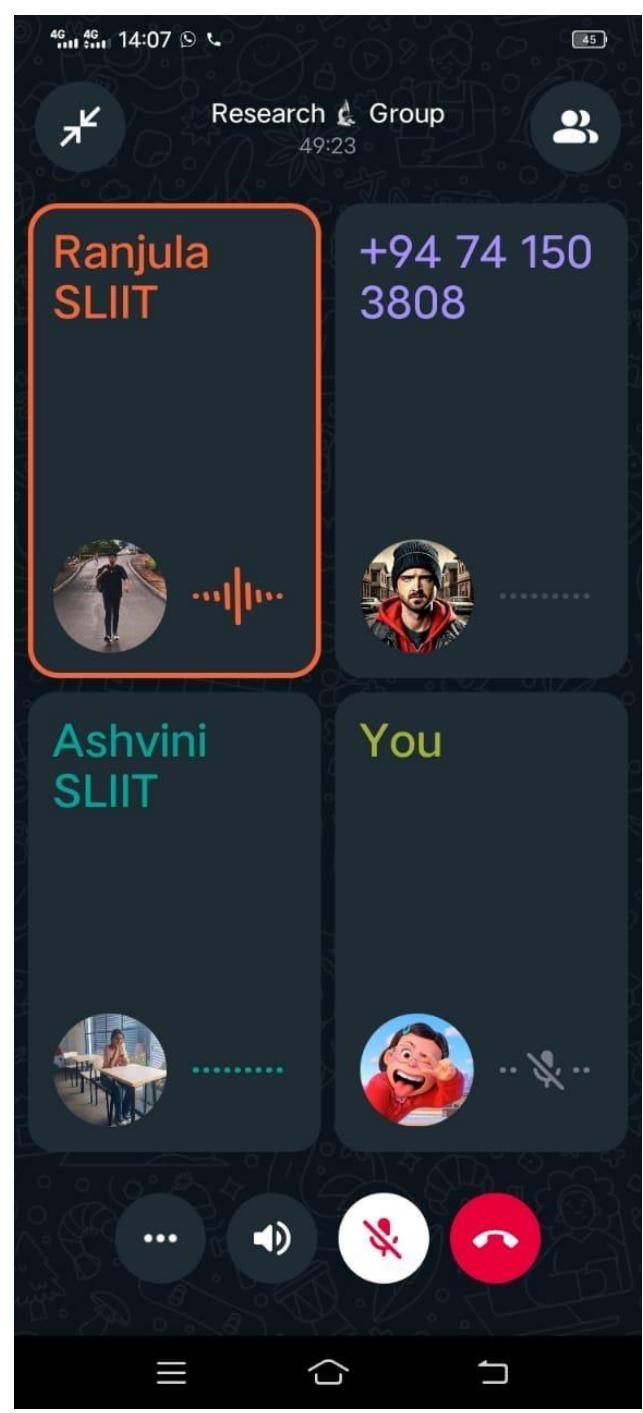
*English proof reading with an external editor*



*Meeting taken prior to the ICAC research paper submission*



WhatsApp call 1 with group members



WhatsApp call 2 with group members

#### 14. Field visit for data collection





CS Power fitness center – Pittugala to Gathering intel from gym instructor to create the dataset,

## 15. Project Completion Criteria

### 1. **Proposal Presentation**

Date: 21st February 2024

### 2. **Proposal Report**

Date: 29th February 2024

### 3. **Progress Presentation I** Date: 6th

May 2024 4. **Status Document I**

Date: 6th May 2024

**5. Final Report**

Date: 23rd August 2024

**6. Research Paper**

Date: 31st August 2024

**7. Progress Presentation II**

Date: 9th September 2024

**8. Status Document II**

Date: 11th September 2024

**9. Project Website**

Date: 21st October 2024

**10. Final Presentation & Viva** Date:

October 2024

**11. Research Logbook Submission** Date:

20th November 2024