



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

Sri Lanka

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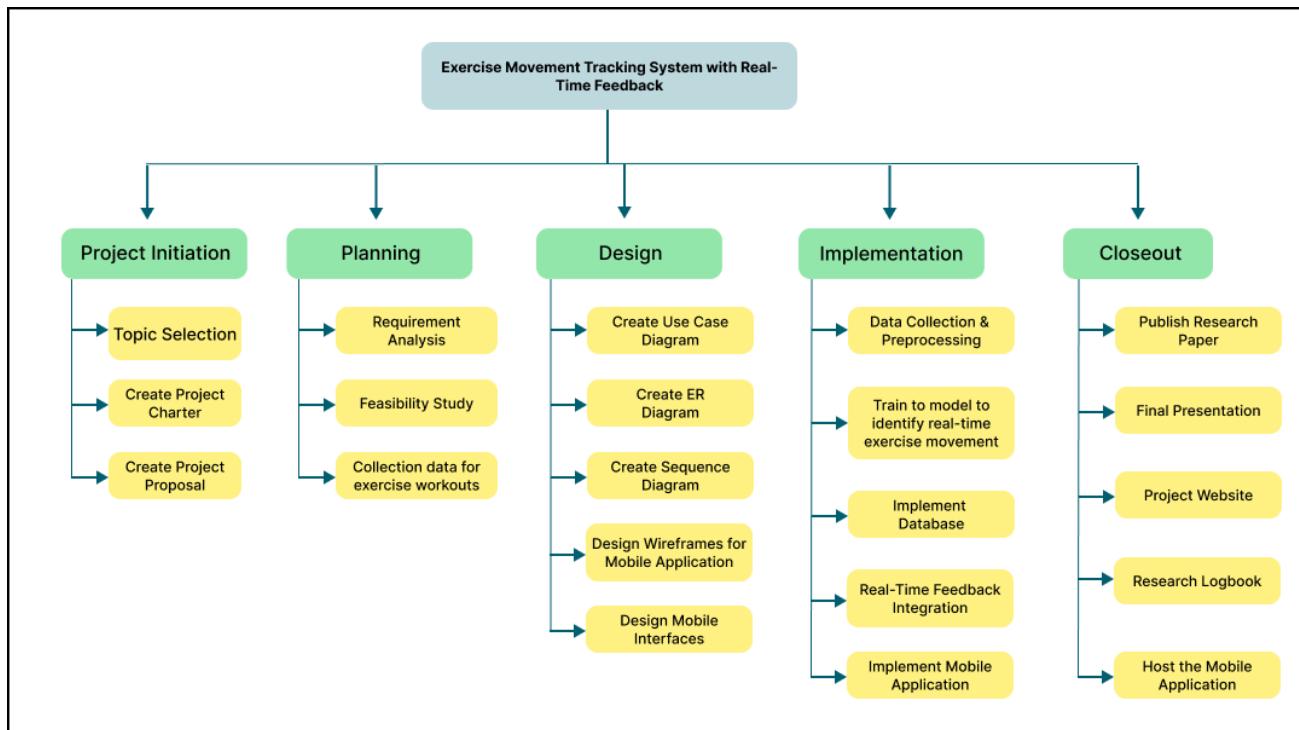
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1. Updated Gantt chart of finalize Design & implementation phases



Gantt Chart

2. Work Breakdown Structure



Work Breakdown Structure

3. Completed Individual Component

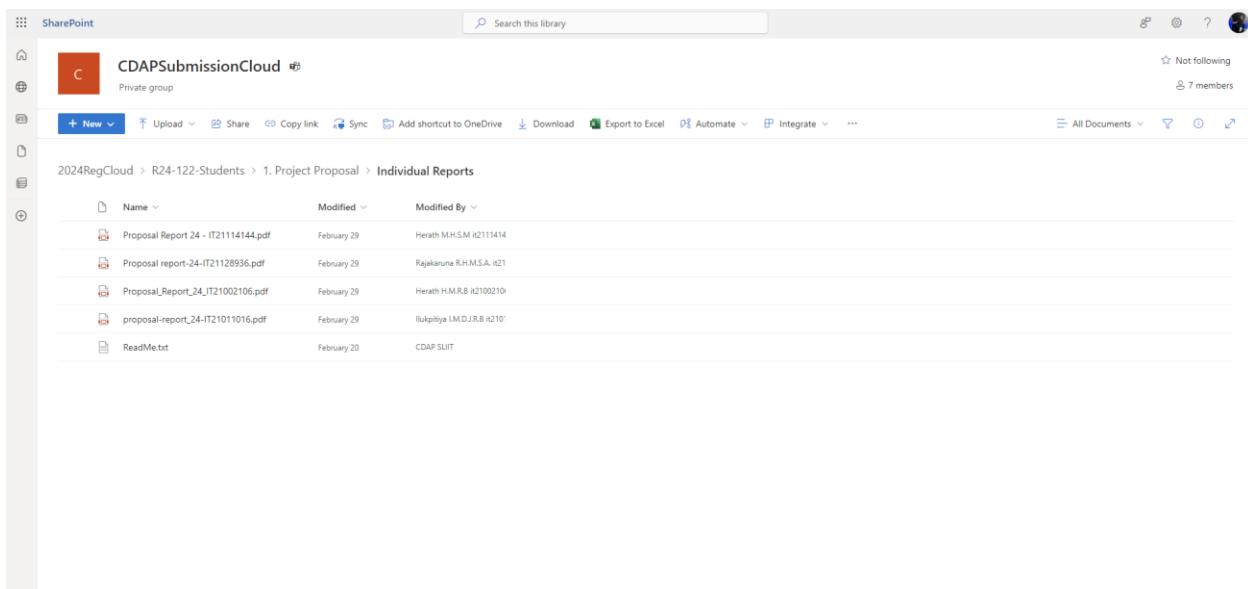
- Data Collection
- Implement the Algorithms for Daily Calorie limit calculation and Diet Plans
- Frontend Implementation
- Testing

4. Documentation

- Proposal Document
- Status Document
- Logbook
- Research paper
- Draft Final Report

5. Document Submission

5.1 Proposal Document Submission



The screenshot shows a SharePoint document library named "CDAPSubmissionCloud". The library is a private group and contains several documents related to a project proposal. The documents listed are:

Name	Modified	Modified By
Proposal Report 24 - IT21114144.pdf	February 29	Herath M.H.S.M i2111414
Proposal report-24-IT21128936.pdf	February 29	Rajakaruna R.H.M.S.A. i221
Proposal_Report_24_IT21002106.pdf	February 29	Herath H.M.R.B i2100210
proposal-report_24-IT210111016.pdf	February 29	Ilukptiya I.M.D.J.R.B i2101
ReadMe.txt	February 20	CDAP SLIT

5.2 Status Document 1 Submission

The screenshot shows a SharePoint library named 'CDAPSubmissionCloud' which is a private group. The library contains a folder structure: '2024RegCloud > R24-122-Students > 2. Status Document 1'. The list view displays five items:

Name	Modified	Modified By
ReadMe.txt	February 20	CDAP SLIIT
Status Document 01 - 24 - IT2111414.pdf	May 6	Herath M.H.S.M it2111414
Status_Document_01_24-IT2100210.pdf	May 6	Herath H.M.R.B it2100210
Status_Document_01_24-IT21128936.pdf	May 6	Rajakaruna R.H.M.S.A. it21
Status-Document-24-IT21011016.pdf	May 6	Ilukpitiya I.M.D.J.R.B it2101

5.3 Research Paper (draft) Submission

The screenshot shows a SharePoint library named 'CDAPSubmissionCloud' which is a private group. The library contains a folder structure: '2024RegCloud > R24-122-Students > 4. Research Paper'. The list view displays six items:

Name	Modified	Modified By
Publication Details	February 20	CDAP SLIIT
Turnitin report	February 20	CDAP SLIIT
IEEE Research Paper Template-a4.docx	February 20	CDAP SLIIT
R24-122(Progress Of research 02).pdf	June 14	Herath H.M.R.B it2100210
R24-122(Progress Of research).pdf	May 10	Herath H.M.R.B it2100210
ReadMe.txt	February 20	CDAP SLIIT

5.4 Final Report (draft) Submission

The screenshot shows a SharePoint library named 'CDAPSubmissionCloud' (Private group). The library contains a list of documents under the path '2024RegCloud > R24-122-Students > 6. Final Report & Presentation > Final Reports'. The list includes the following items:

Name	Modified	Modified By
Turnitin reports	February 20	CDAP SLUIT
Final Group Report R24-122.pdf	August 23	Herath H.M.R.B it2100210
Final Report 24 - IT21011016.pdf	August 23	Ilukpitiya I.M.D.J.R.B it2101
Final Report 24 - IT21128936.pdf	August 22	Rajakaruna R.H.M.S.A. it21
Final Report IT211144.pdf	August 23	Herath M.H.S.M it2111414
Final_Report_24_IT21002106.pdf	August 23	Herath H.M.R.B it2100210
ReadMe.txt	February 20	CDAP SLUIT

6. Research Paper Submission

6.1 ICAC Research paper Submissions

The screenshot shows the 'Author Console' interface for the ICAC 2024 conference. A research paper titled 'AI-Driven Personalized Fitness Coaching with Body Type-Based Workout and Nutrition Plans and Real-Time Exercise Feedback' has been submitted by 'Intelligent Health Tech & Assistive Solutions'. The submission file is a PDF titled 'AI-Driven Personalized Fitness Coaching with Body Type-Based Workout and Nutrition Plans and Real-Time Exercise Feedback.pdf'. The submission status is 'Show details'.

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

7.1 Teams task planner (Group)

7.1.1 Teams Task Planner Dashboard

The screenshot shows the Microsoft Planner dashboard for a Research Group. The interface is organized into several columns representing different project areas:

- To do:** Contains three tasks, all due on 09/11, including "Create the Status 02 Doc".
- Project Initiation:** Contains three tasks, all completed by Rajakaruna R.H.M., including "Collect Data for Foods and Create the Dataset".
- Final Report:** Contains three tasks, all completed by Herath H.M.R.B., including "Create the Group Final report".
- Research Paper:** Contains 27 completed tasks, mostly by Koliya Sir, including "To modify the suggestions given by Koliya Sir for research paper Literature review".
- Implementation:** Contains three tasks, all completed by Herath H.M.R.B., including "Write the Results and discussion-of Personalized Dietary Plan Recommendation".

On the left, there's a sidebar with navigation icons and a search bar. At the top right, there are filters for "Members", "Filter (0)", and "Group by Bucket".

7.1.2 Teams Task Planner Grid View

The screenshot shows the Microsoft Planner grid view for a "Project Plan" linked plan. The tasks are listed in rows with the following details:

Title	Assignment	Start date	Due date	Bucket	Progress	Priority	Labels
Topic Selection	RG, HI, RI, RJ	12/20/2023		Project Initiation	Completed	! Important	Add label
Select the 4 Research areas	RG, HI, RI, RJ	12/30/2023		Project Initiation	Completed	! Important	Add label
Collecting Data for exercise workouts	Herath H.M.R.B it2	3/20/2024		Final Report	Completed	! Important	Add label
Collect Data for body type identification	Ilukpitiya I.M.D.J.R.	3/31/2024		Final Report	Completed	• Medium	Add label
Collect Data for Foods and Create the Dataset	Rajakaruna R.H.M.!	3/22/2024		Project Initiation	Completed	! Important	Add label
Collect Data for workout plan and Create the Dataset	Herath M.H.S.M it2	3/24/2024		Final Report	Completed	! Important	Add label
Create User Case Diagrams for identify body type co...	Ilukpitiya I.M.D.J.R.	2/23/2024		Research Paper	Completed	• Medium	Add label
Create the Case Diagrams for Diet Suggest Component	Rajakaruna R.H.M.!	2/23/2024		Research Paper	Completed	• Medium	Add label
Create the Case Diagrams for Workout Plan Suggest E...	Herath M.H.S.M it2	2/23/2024		Research Paper	Completed	• Medium	Add label
Create the Case Diagrams for Real-time exercise Com...	Herath H.M.R.B it2	2/23/2024		Research Paper	Completed	• Medium	Add label
Collect Data for Meals and Create the Dataset	Rajakaruna R.H.M.!	3/28/2024		Final Report	Completed	• Medium	Add label
Create High Fidelity Mobile interface for Diet Compon...	Rajakaruna R.H.M.!	2/25/2024		Research Paper	Completed	• Medium	Add label
Create High Fidelity Mobile interface for Workout Pla...	Herath M.H.S.M it2	2/25/2024		Research Paper	Completed	• Medium	Add label

At the bottom, there's a button to "Add new task". On the left, there's a sidebar with navigation icons and a search bar. At the top right, there are filters for "Members", "Filter (0)", and "Group by Bucket".

7.2 Teams task planner (Individual)

7.2.1 Teams Task Planner Dashboard – IT21128936

The screenshot shows the Microsoft Teams Task Planner in Board view. The interface is organized into five main columns:

- Project Initiation:** Contains tasks like "Create the Status 02 Doc" and "Collect Data for Foods and Create the Dataset".
- Final Report:** Contains tasks like "Create the Group Final report" and "Create Individual Final Report".
- Research Paper:** Contains tasks like "To modify the suggestions given by Koilya Sir for research paper Literature review" and "Write the Results and discussion of Personalized Dietary Plan Recommendation".
- Implementation:** Contains tasks like "Improve UI & UX" and "Testing the Functionality".

Each task card includes a summary, due date, assignee, and a progress bar indicating completion status.

7.2.2 Teams Task Planner Grid View – IT21128936

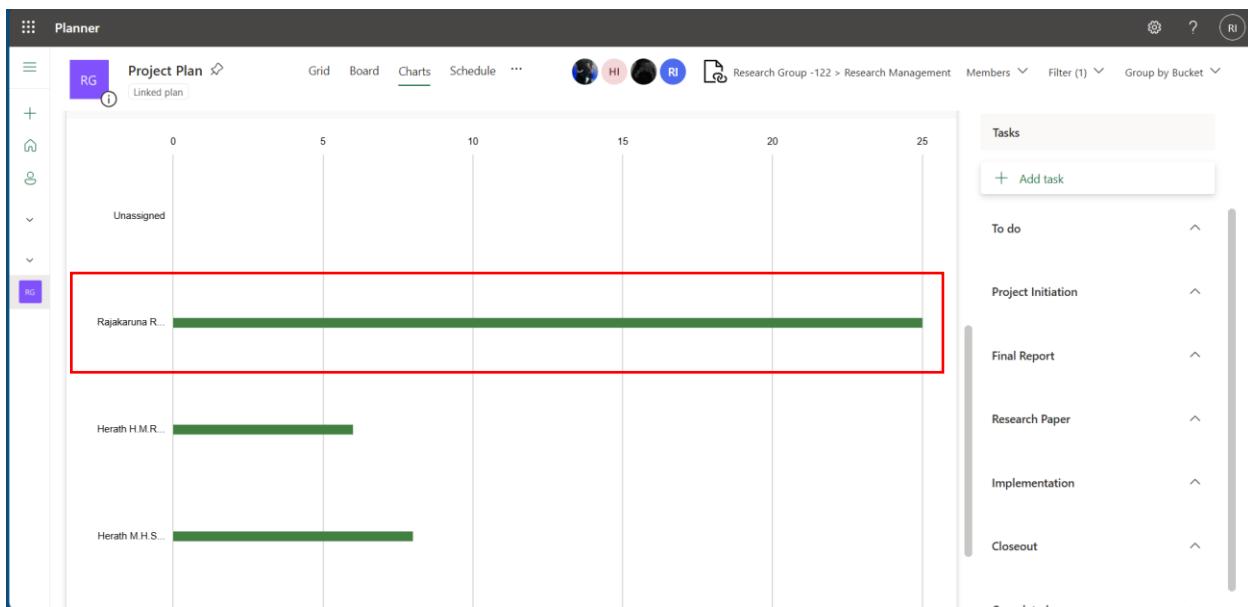
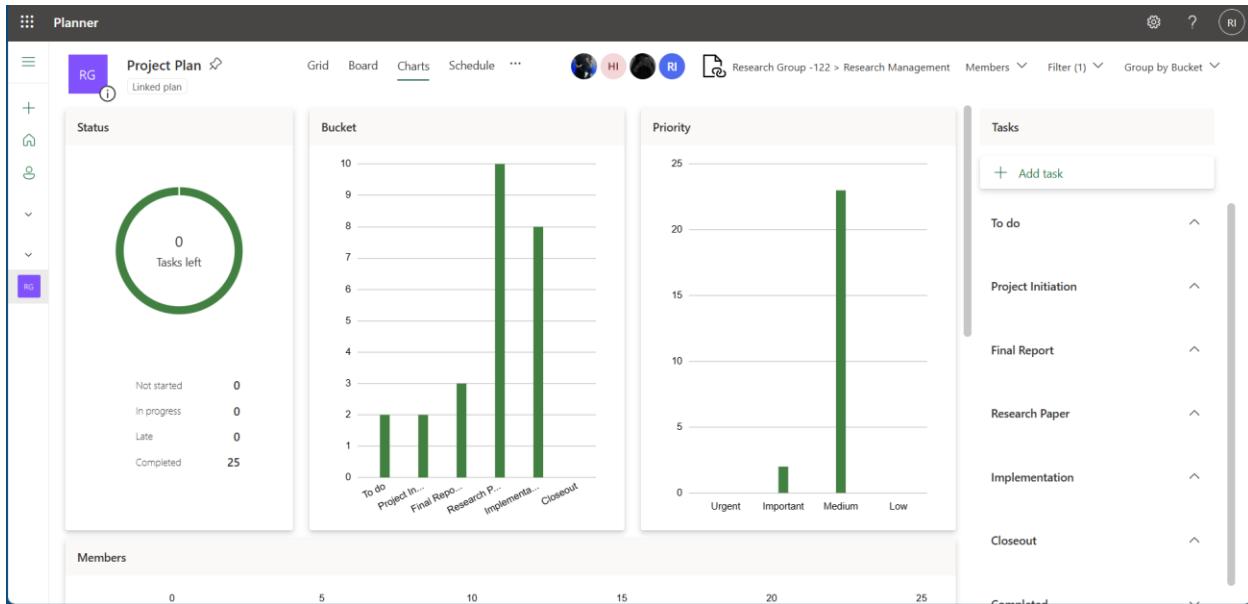
The screenshot shows the Microsoft Teams Task Planner in Grid view. The tasks are listed in a table format:

Title	Assignment	Start date	Due date	Bucket	Progress	Priority	Labels
Select the 4 Research areas	Rajakaruna R.H.M.		12/30/2023	Project Initiation	Completed	! Important	Add label
Collect Data for Foods and Create the Dataset	Rajakaruna R.H.M.		3/22/2024	Project Initiation	Completed	! Important	Add label
Create the Case Diagrams for Diet Suggest Component	Rajakaruna R.H.M.		2/23/2024	Research Paper	Completed	• Medium	Add label
Collect Data for Meals and Create the Dataset	Rajakaruna R.H.M.		3/28/2024	Final Report	Completed	• Medium	Add label
Create High Fidelity Mobile interface for Diet Compon...	Rajakaruna R.H.M.		2/25/2024	Research Paper	Completed	• Medium	Add label
Create the Figma UI for each of your interfaces-	Rajakaruna R.H.M.		4/28/2024	Research Paper	Completed	• Medium	Add label
Collecting food nutritious datasets and preprocessing...	Rajakaruna R.H.M.		3/20/2024	Implementation	Completed	• Medium	Add label
Create Presentation Slides for Methodology Evidence...	Rajakaruna R.H.M.		4/30/2024	To do	Completed	• Medium	Add label
Train-to-model to identify real-time exercise movement	Rajakaruna R.H.M.		4/16/2024	Implementation	Completed	• Medium	Add label
Fine-Tune Regressor Model and Linear Programming...	Rajakaruna R.H.M.		6/13/2024	Implementation	Completed	• Medium	Add label
Write Research Paper Introduction	Rajakaruna R.H.M.		5/9/2024	Research Paper	Completed	• Medium	Add label
Write Research Paper Abstract	Rajakaruna R.H.M.		5/9/2024	Research Paper	Completed	• Medium	Add label
Write Research paper Literature review	Rajakaruna R.H.M.		5/10/2024	Research Paper	Completed	• Medium	Add label

The "Assignment" column lists team members, and the "Labels" column indicates if a task has been assigned a specific label.

8. Teams Planner Charts

8.1 Teams Planner Charts – IT21128936



9. Test Results

9.1 Test Cases and Results

Test Case 1: User Data Collection Accuracy

- Objective: Make sure that the system is able to correctly collect user data like age, gender, weight, height, and dietary preferences and health goals.
- Steps:
 1. Fill in the correct user data (age: 30, gender: female, weight: 65kg, height: 165cm, dietary preference: vegetarian). Submit the information. Ensure the database is checked for whether the data is rightly entered.
 2. Enter valid user data (age: 30, gender: female, weight: 65kg, height: 165cm, dietary preference: vegetarian).
 3. Submit the data.
 4. Ensure the database is checked for whether the data is rightly entered.
- Expected Result: The information of the user should be saved correctly, and the database must include it appropriately.
- Actual Result: The data saved in database accurately.
- Pass / Fail status: Passed

Test Case 2: Calorie Limit Calculation

- Objective: Make sure that the system tells the user's daily calorie limit based on the BMR formula and activity level correctly.
- Test Input: Age: 28 Gender: Male Weight: 75 height: 180cm. Activity Level: Moderately Active (1.55 multiplier)
- Steps:
 1. User provides the data for the above profile. The system calculates the Basal Metabolic Rate (BMR) using the formula for men: $BMR=88.362+(13.397\times75)+(4.799\times180)-(5.677\times28)$ Next, the system adds the BMR and the activity multiplier to find out the daily calorie limit.
 2. User provides the data for the above profile.
 3. The system calculates the Basal Metabolic Rate (BMR) using the formula for men: $BMR=88.362+(13.397\times75)+(4.799\times180)-(5.677\times28)$

4. Next, the system adds the BMR and the activity multiplier to find out the daily calorie limit.
- Expected Output Calculation: $BMR=88.362+(13.397\times75)+(4.799\times180)-(5.677\times28)$
 $=1764.97 \text{ Cal/day}$
 - Daily Calorie Limit Calculation: Daily Calorie Limit= $1764.97\times1.55=2735.70 \text{ Cal/day}$
 - Actual Output: 2735.70 Cal/day
 - Pass / Fail status: Passed

Test Case 3: Personalized Meal Plan Generation

- Objective: It is imperative that the system generates a customized meal plan that is in line with the user's dietary preferences and daily calorie limit.
- Steps:
 1. The user should first register their profile and provide their dietary choices (e.g., vegan) and a daily calorie intake limit of 2000 calories that has been calculated. The next step is to activate the meal planner. Finally, check if the meal plan corresponds to the user's food preferences and ensures the 2000-calorie limit.
 2. Enter the desired user's profile along with the user's specific dietary preferences such as vegan or vegetarian and also the daily calorie limit of 2000 calories.
 3. Choose the meal plan generation feature enabled.
 4. Crosscheck if the meal plan is in line with the user's preferences and also, whether the 2000-calorie limit is maintained.
- Expected Result: The meal plan that was created will consist of meals that fall within the user's dietary preferences and the 2000-calorie limit.
- Actual result: Meal Plan:

Breakfast:

 - Name: mashed potatoes (cup), tea (cup), banana (piece)
 - Calories: 528 kcal
 - Fat: 18.36 %
 - Protein: 51.01 %
 - Carbohydrates: 84.03 %

Lunch:

- Name: scrambled eggs (1 piece), whole wheat bread (1 piece), fruit smoothie (glass)
- Calories: 738 kcal
- Fat: 7.64 %
- Protein: 15.61 %
- Carbohydrates: 28.41 %

Dinner:

- Name: egg (100g), sandwich (50g), pork ribs (1 cup), stir fry (plate), spinach (2 slices)
- Calories: 565 kcal
- Fat: 41.67 %
- Protein: 33.69 %
- Carbohydrates: 95.92 %
- Pass/ Fail status: Passed

9.2 Results Individual (Calorie limit calculation)

```
# Calculate evaluation metrics
mae = metrics.mean_absolute_error(y_test, y_pred)
mse = metrics.mean_squared_error(y_test, y_pred)
rmse = np.sqrt(mse)

# Print evaluation metrics
print('Mean Absolute Error:', mae)
print('Mean Squared Error:', mse)
print('Root Mean Squared Error:', rmse)

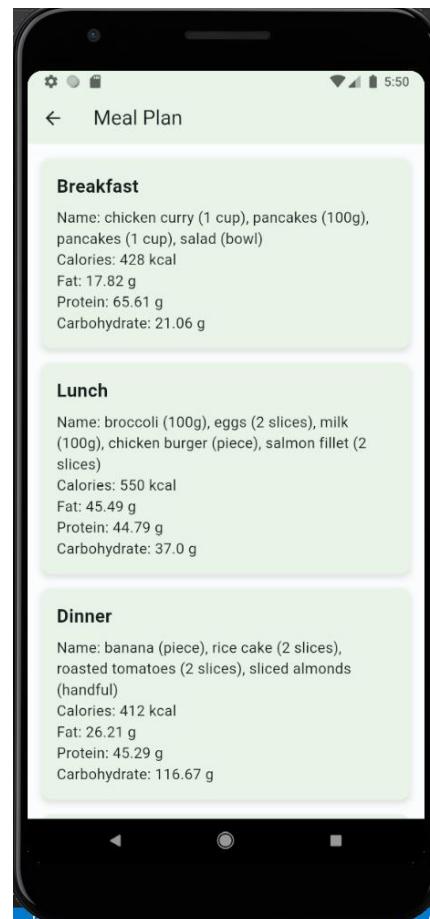
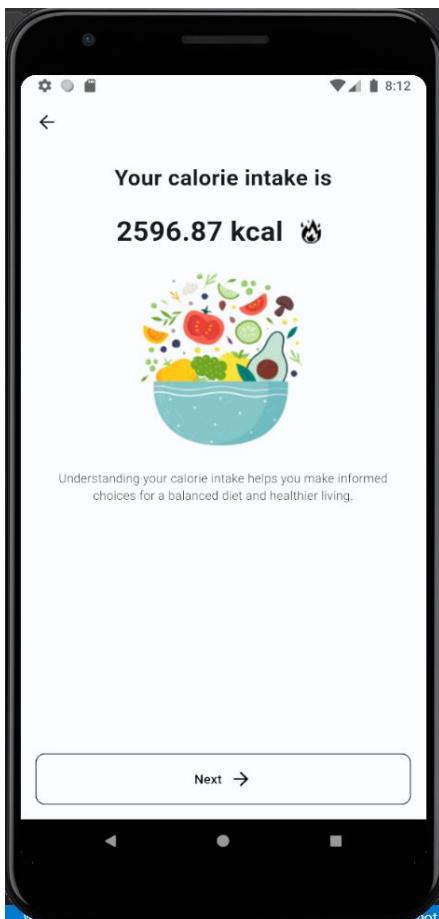
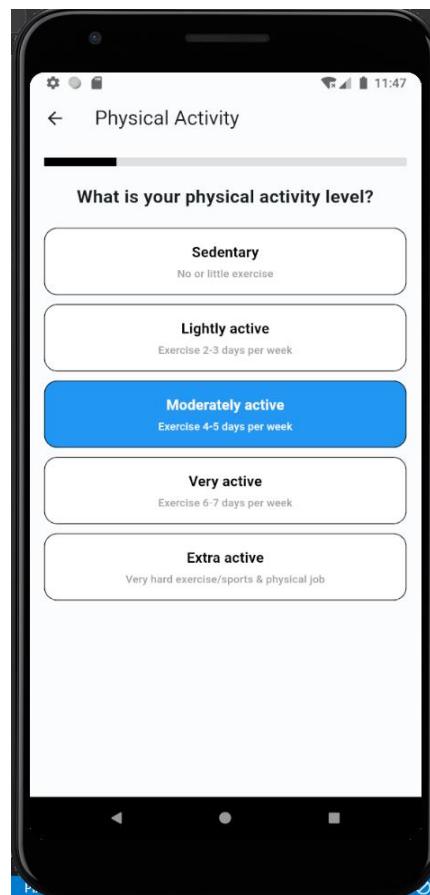
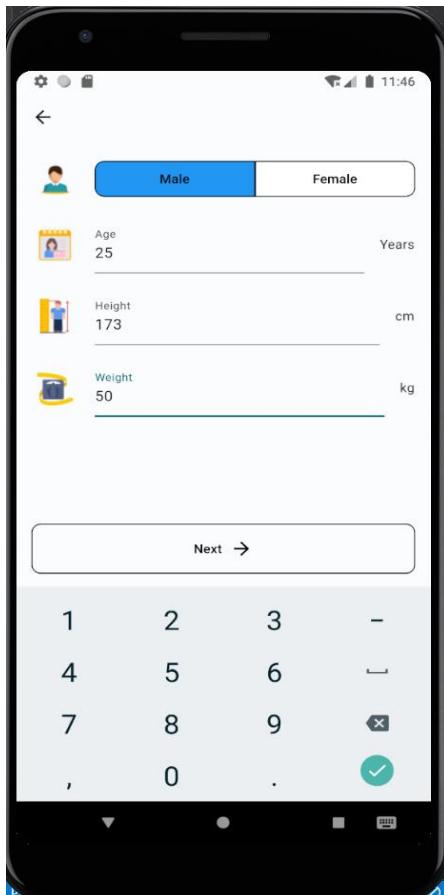
Mean Absolute Error: 82.41954872634642
Mean Squared Error: 12751.028414891945
Root Mean Squared Error: 112.92045171222061

# Calculate and print model accuracy

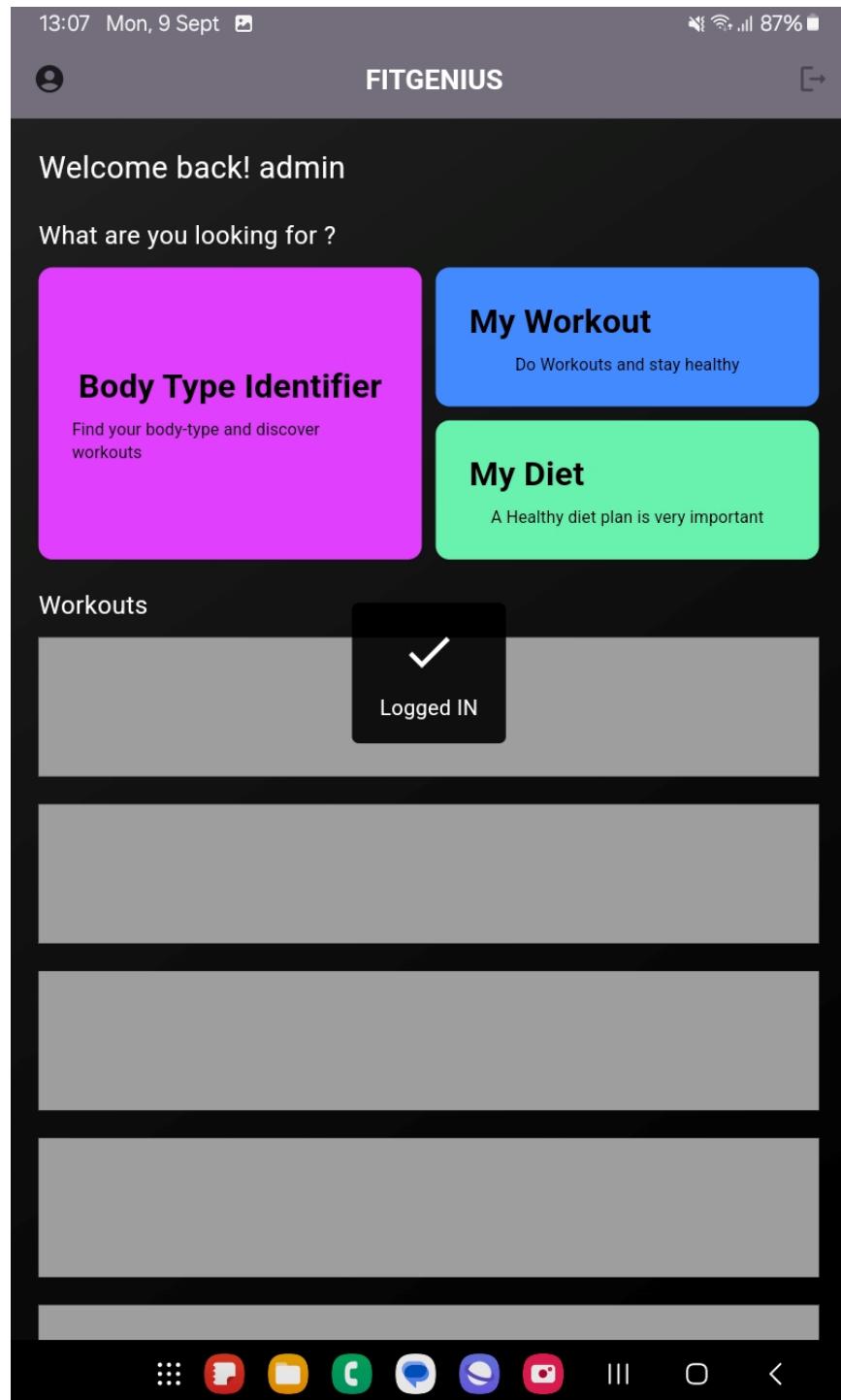
accuracy = regressor.score(X_test, y_test)
print("Model Accuracy: {:.2f}%".format(accuracy * 100))

Model Accuracy: 85.32%
```

Accuracy



9.3 Results of the Mobile Application (Common)



Home Page of the Mobile Application

13:07 Mon, 9 Sept

87%

FITGENIUS

WELCOME TO FITGENIUS

Email —

admin@fitgenius.com

Password —

.....

Login

or

Sign Up



Login page of the Mobile Application

15:44 Wed, 11 Sept

82%



FITGENIUS

WELCOME TO FITGENIUS

Email

User Name

Password

Height

Weight

Sign Up



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 interface with the subject "Invitation to Join as Co-Supervisor for Research Group". The sender is Rusuru Bandara <rusurubandaraherath65@gmail.com> and the recipient is Jenny Krishara. The email body starts with a greeting and expresses hope that the email finds the recipient well. It mentions a research project under Prof. Koliya Pulasinghe at SLIIT and the involvement of dedicated students pursuing IT specialization. The students listed are Herath H.M.R.B - IT21002106, Ilukpitiya I.M.D.J.R.B - IT21011016, Rajakaruna R.H.M.S.A - IT21128936, and Herath M.H.S.M - IT21114144. The email asks for a suitable time and expresses appreciation for considering the invitation. At the bottom, there are standard email interaction buttons: Reply, Forward, and Print.

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

The screenshot shows an email from Herath H.M.R.B IT21002106 to Koliya Pulasinghe. The email body begins with a greeting and a request for approval to submit a research paper to the ICAC organized by SLIIT. It attaches a file named "Final Research Paper - RP24 ..." (611 KB). The email continues with a list of points for verification, an expression of gratitude for feedback, and a closing note. The recipient's response is shown in a separate message at the bottom, indicating that the issues have been resolved and the work is ready for submission.

11. Physical Meeting



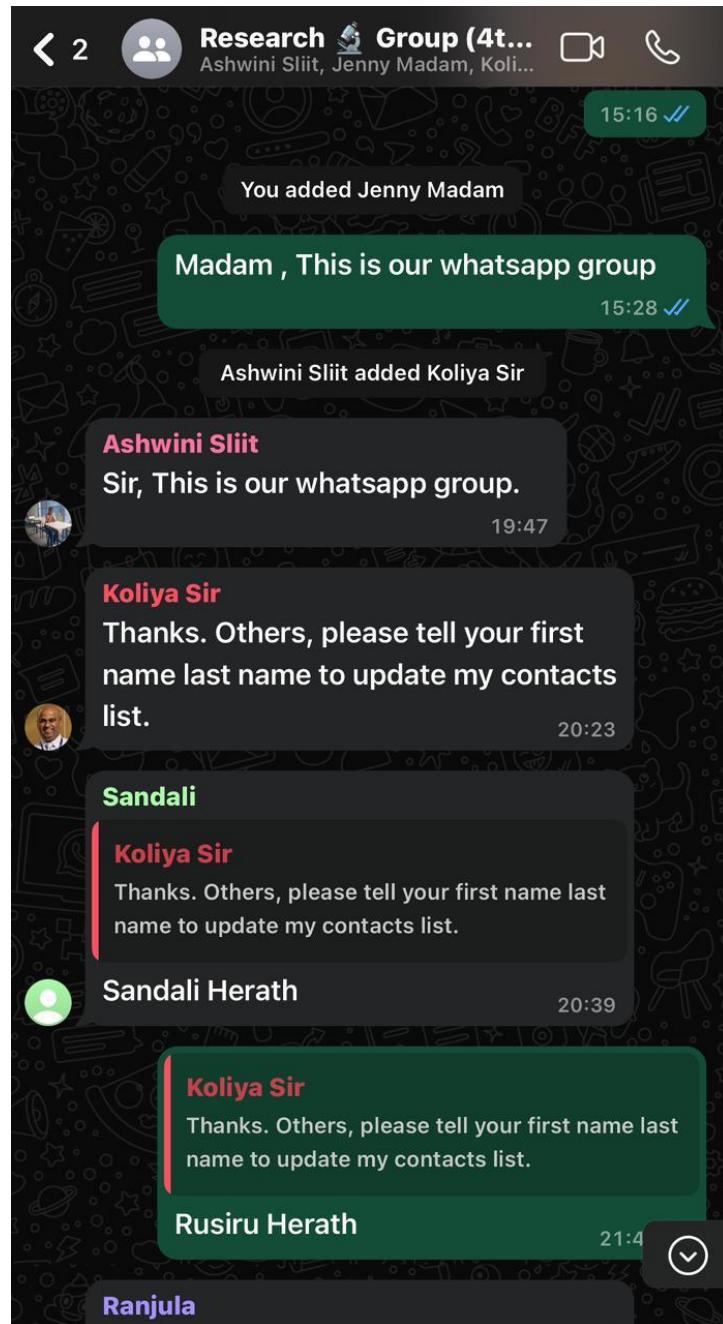
Physical meeting with the supervisor – 23.02.2024



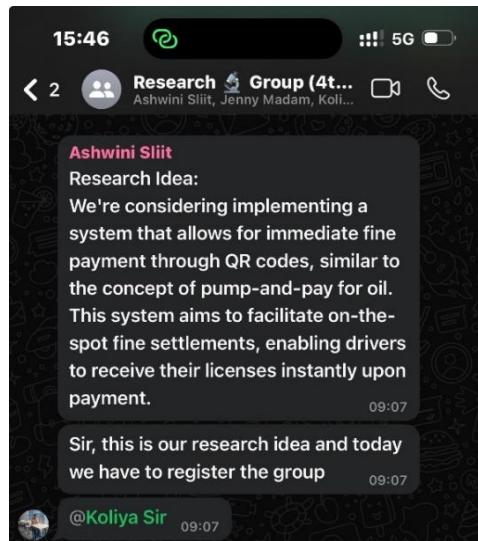
Physical Meeting with group members for progressing the research work

12. WhatsApp chats discussing research details

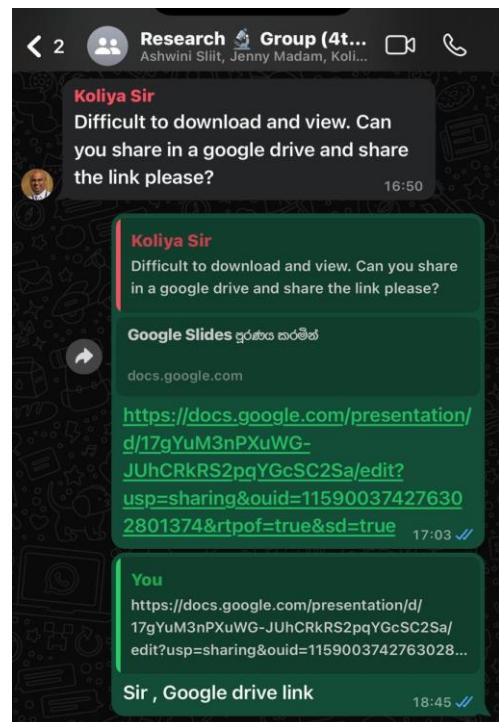
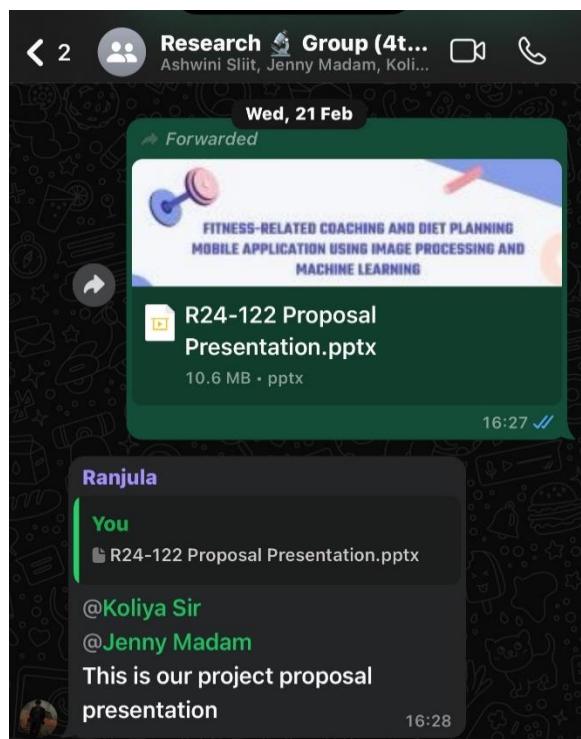
12.1 Proof of acknowledgment from both the supervisor and co-supervisor



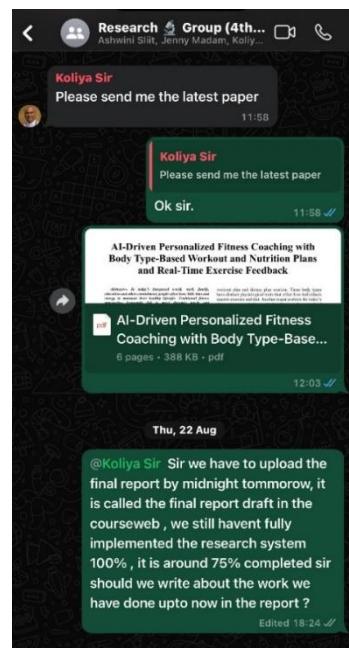
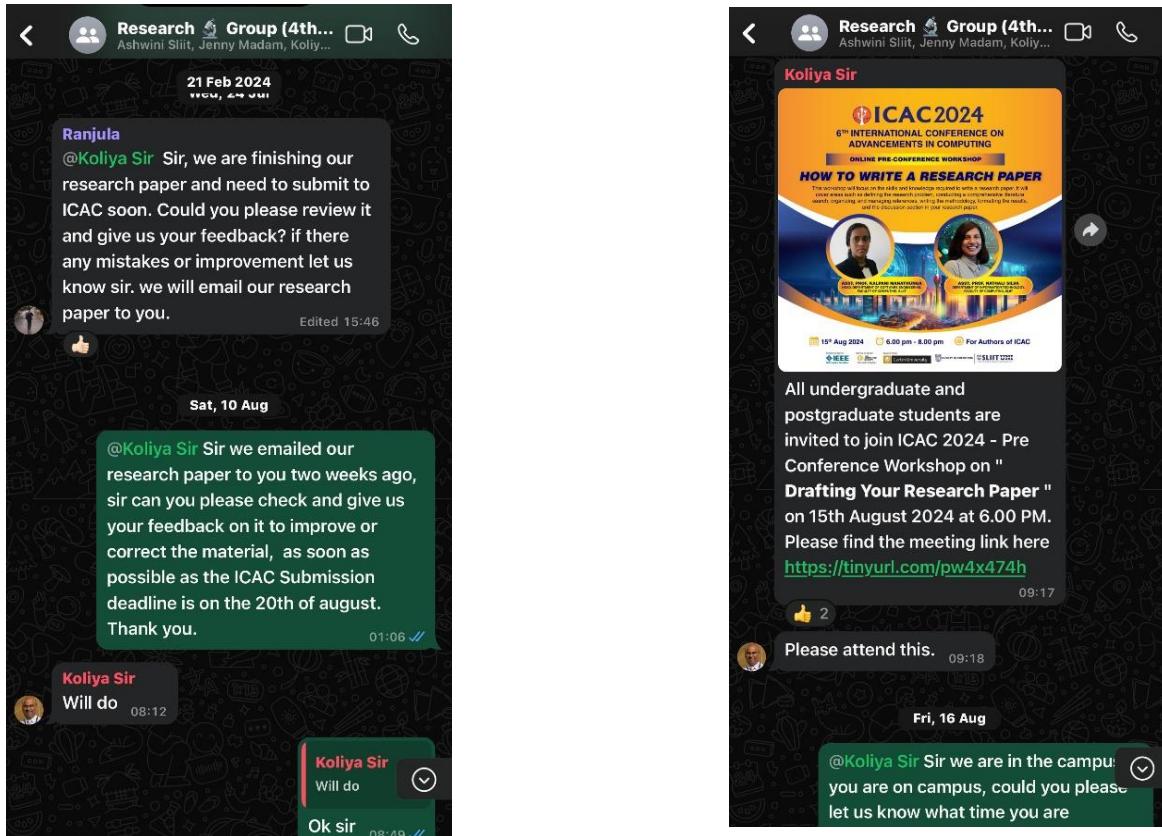
12.2 Confirmation of one of our conceptual hypotheses



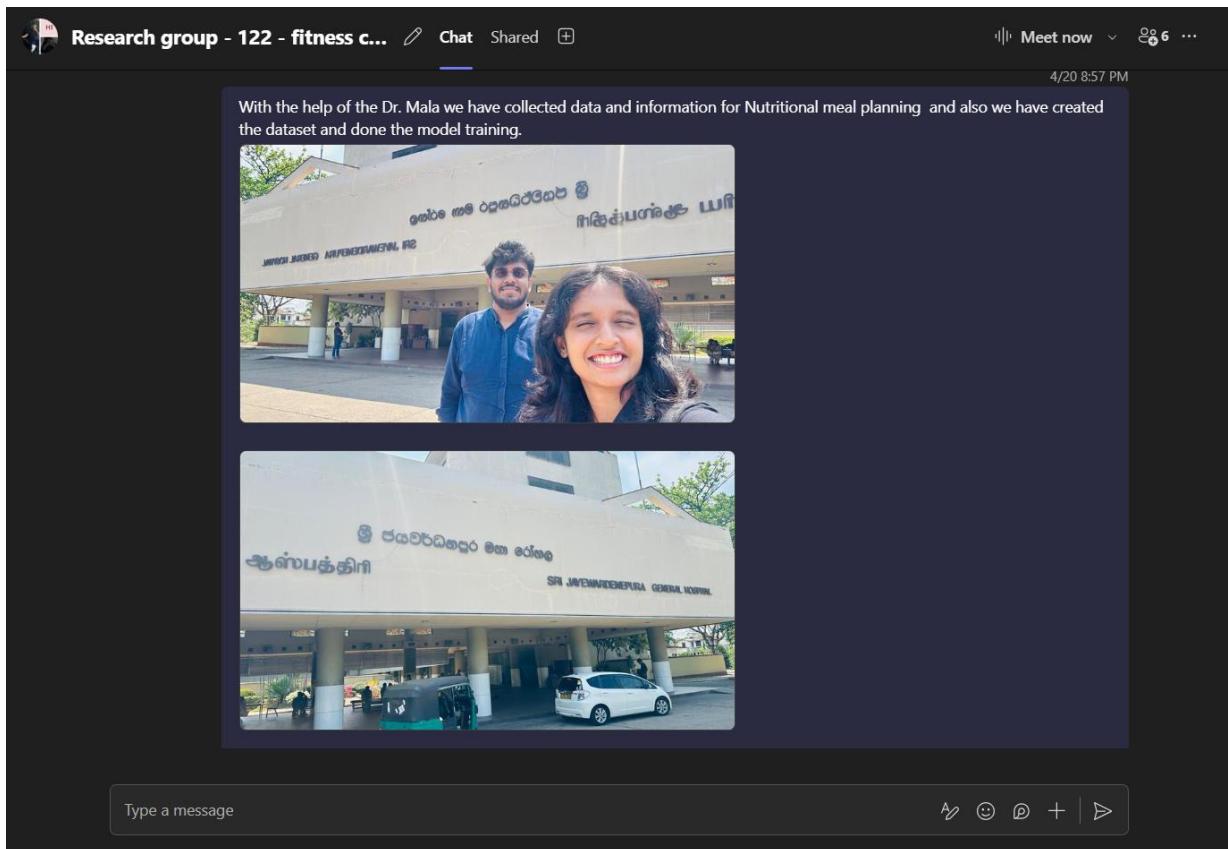
12.3 Reviewing our proposal report with both the supervisor and co supervisor for feedback.



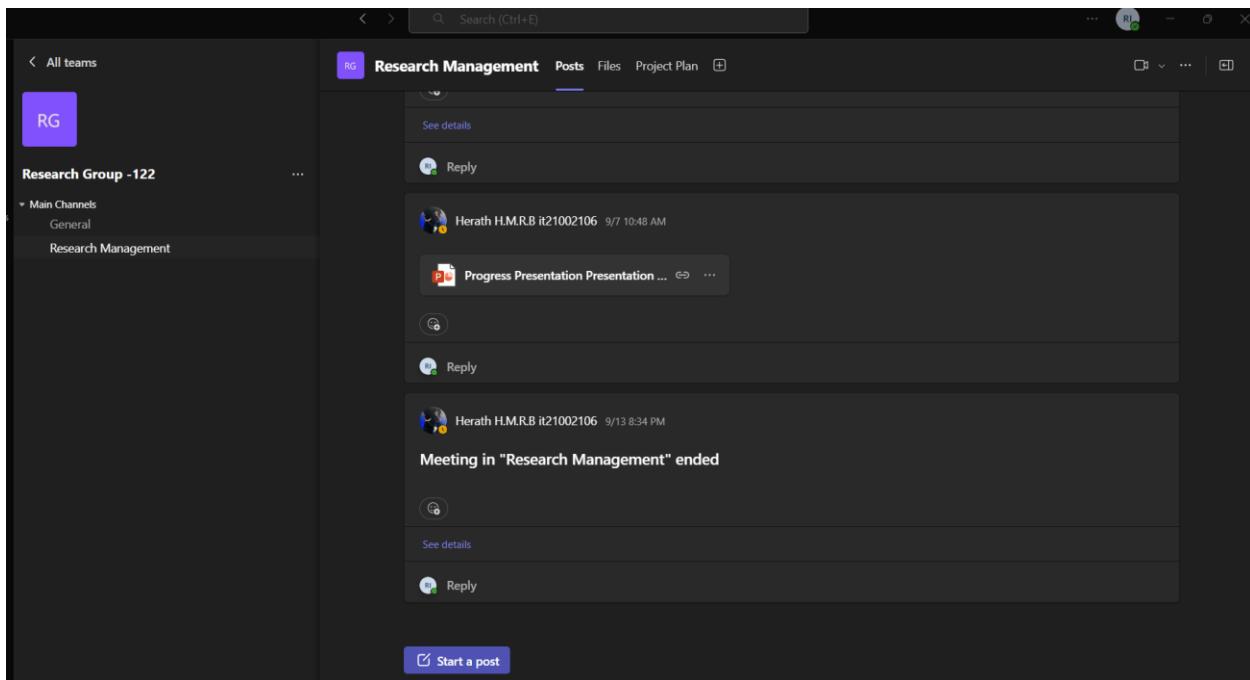
12.4 Research paper writing and review with supervisors' guidance



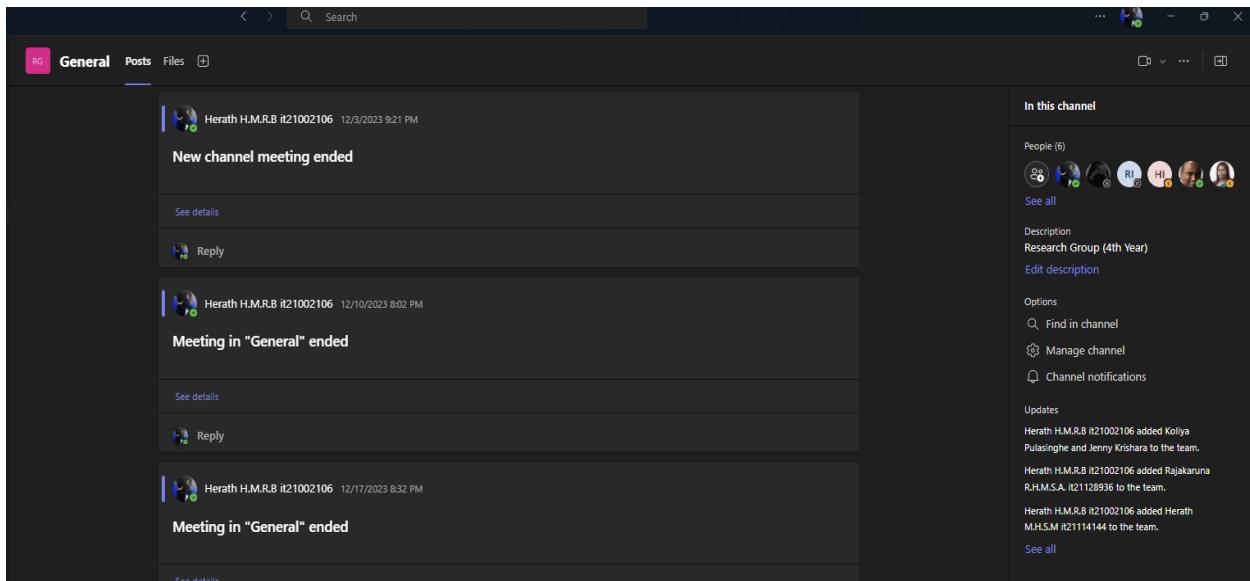
13. Screenshots of the chats in MS Teams



Informing the supervisor about collection data.



Team Channel in the MS Team



Chats in the MS Teams

RG General Posts Files +

See details

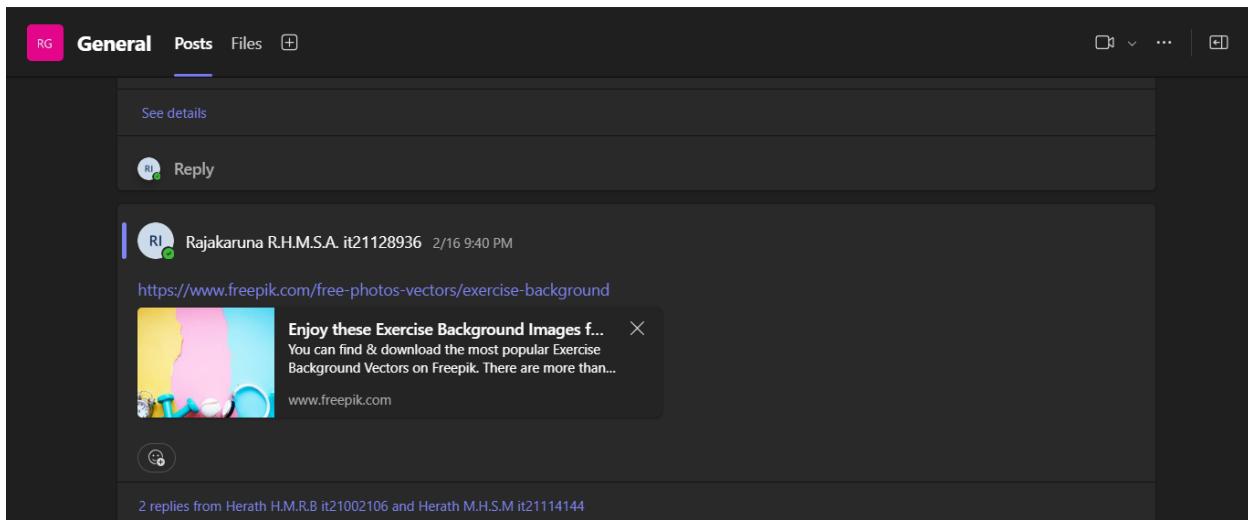
Reply

Rajakaruna R.H.M.S.A. it21128936 2/16 9:40 PM

<https://www.freepik.com/free-photos-vectors/exercise-background>

Enjoy these Exercise Background Images f...
You can find & download the most popular Exercise Background Vectors on Freepik. There are more than...
www.freepik.com

2 replies from Herath H.M.R.B it21002106 and Herath M.H.S.M it21114144

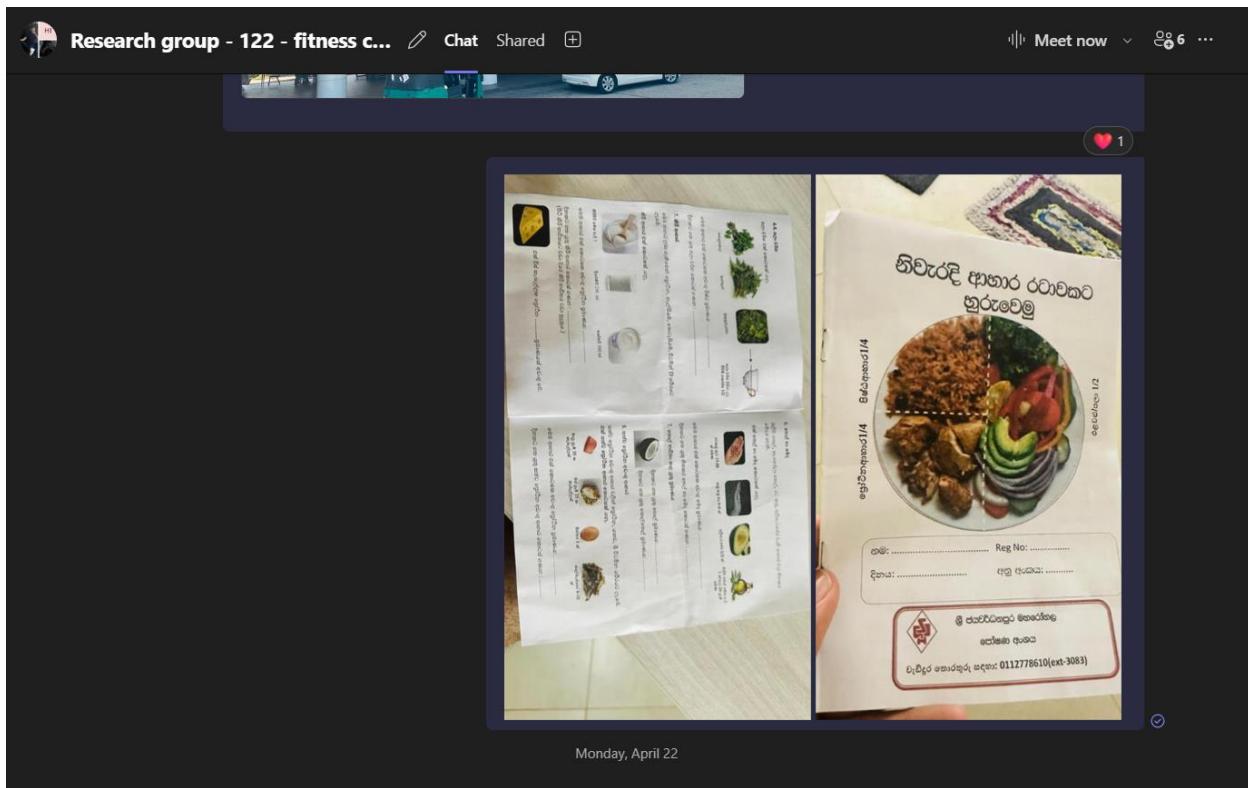


Chats in the MS Teams

Research group - 122 - fitness c... Chat Shared +

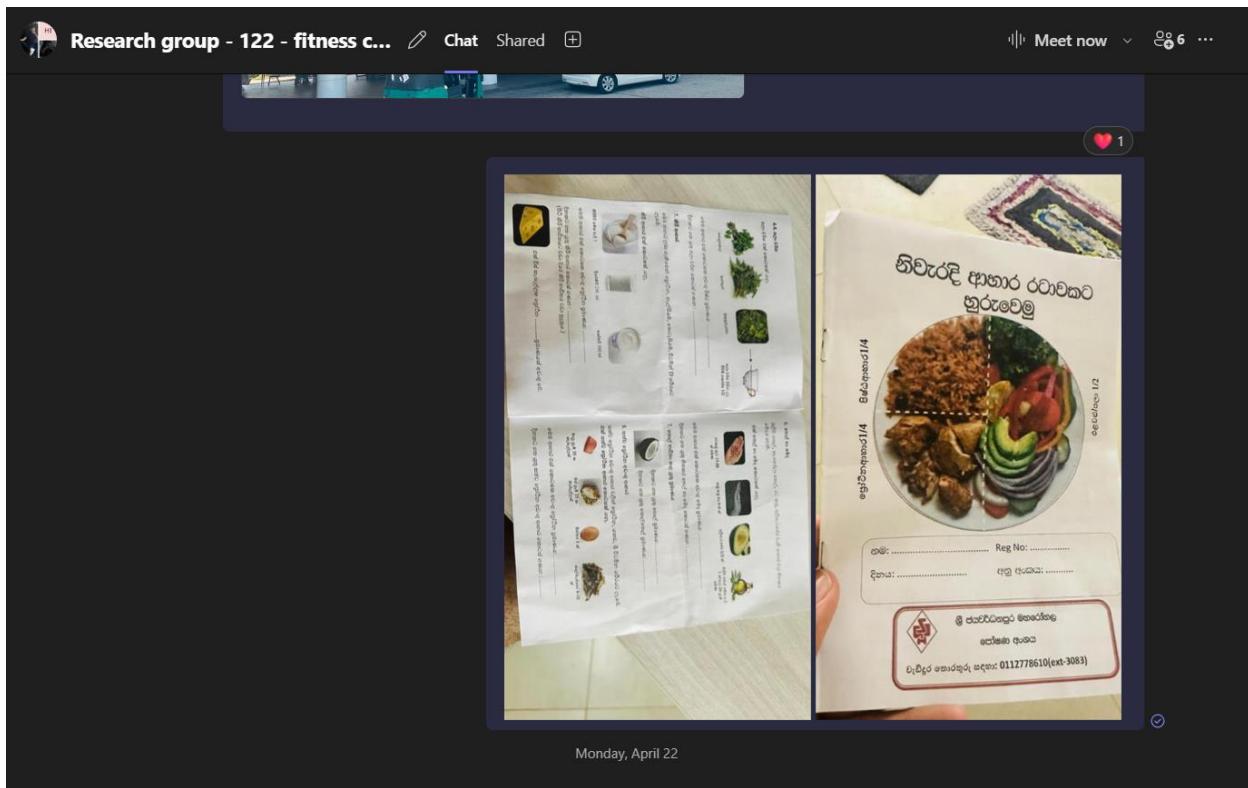
Meet now 6 ...

1



The image shows a meal consisting of rice, meat, and vegetables, with a side of fruit. Below the meal is a menu page with text in Sinhala and English, listing various food items and their descriptions.

Monday, April 22



Chats in the MS Teams

The screenshot shows a Microsoft Teams chat window titled "Research Management". The message history includes:

- A message from "Herath H.M.R.B it21002106" at 5/10 10:32 PM: "FITNESS-RELATED COACHING AND DIET PLANNING MOBILE APPLICATION USING IMAGE PROCESSING AND MACHINE LEARNING".
- A reply from "Rajakaruna R.H.M.S.A. it21128936" at 5/10 10:48 PM:
 1. Harris, J. A., & Benedict, F. G. (1918). A biometric study of human basal metabolism. *Proceedings of the National Academy of Sciences*, 4(12), 370-373.
 2. World Health Organization (WHO). (2001). Human energy requirements: Report of a Joint FAO/WHO/UNU Expert Consultation.

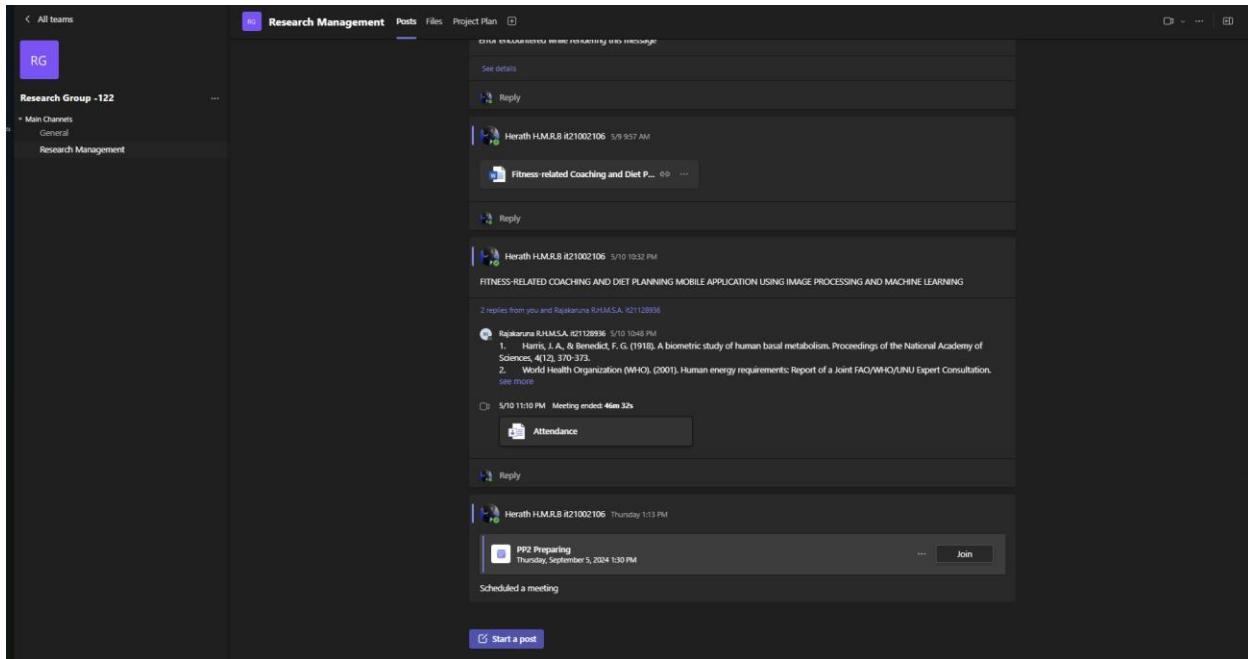
[see more](#)
- A timestamp at 5/10 11:10 PM: "Meeting ended: 46m 32s"

Chats in the MS Teams

The screenshot shows a Microsoft Teams chat window titled "Research Management". The message history includes:

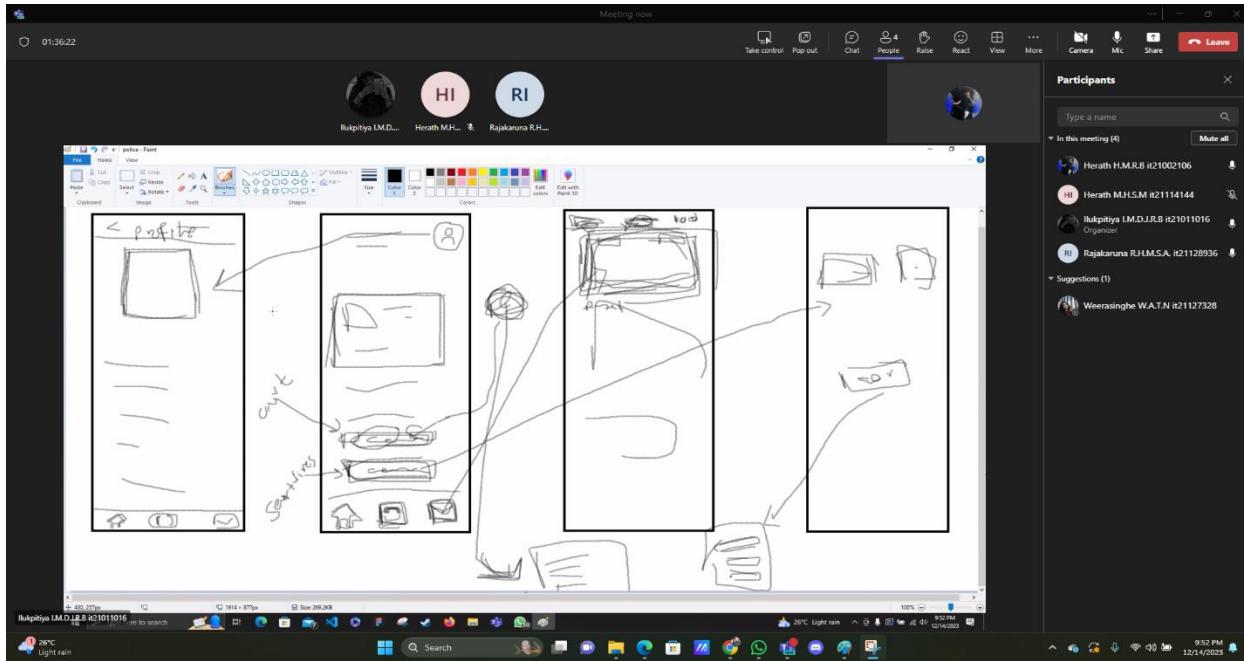
- A message from "Herath H.M.R.B it21002106" at 4/30 10:31 PM: "Herath M.H.S.M it21114144llukpitiya I.M.D.J.R.B it21011016Rajakaruna R.H.M.S.A. it21128936 Modify these presentation slides to be related to the PP1 presentation."
- A file attachment: "R24-122 Proposal Presentation.pptx" with a download icon and three dots.
- Interaction icons: a thumbs up icon with "1", a reply icon, and a red notification dot with an '@' symbol.
- A reply button at the bottom: "Reply"

Chats in the MS Teams

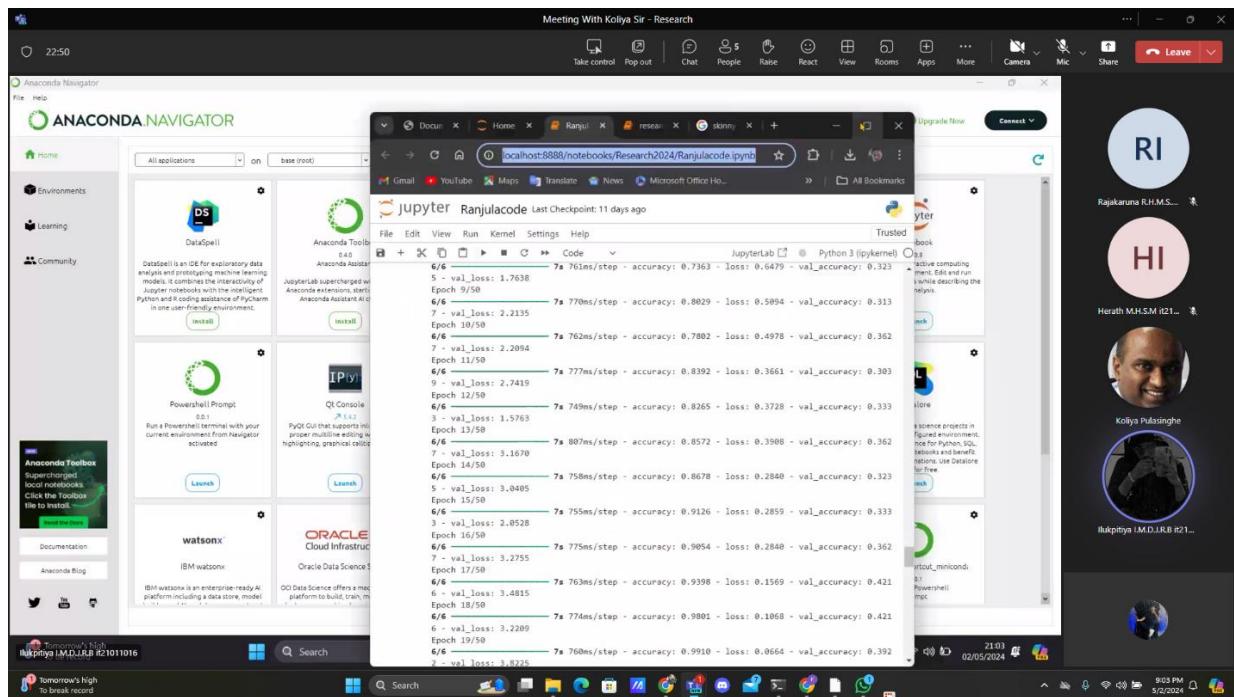


Chats in the MS Teams

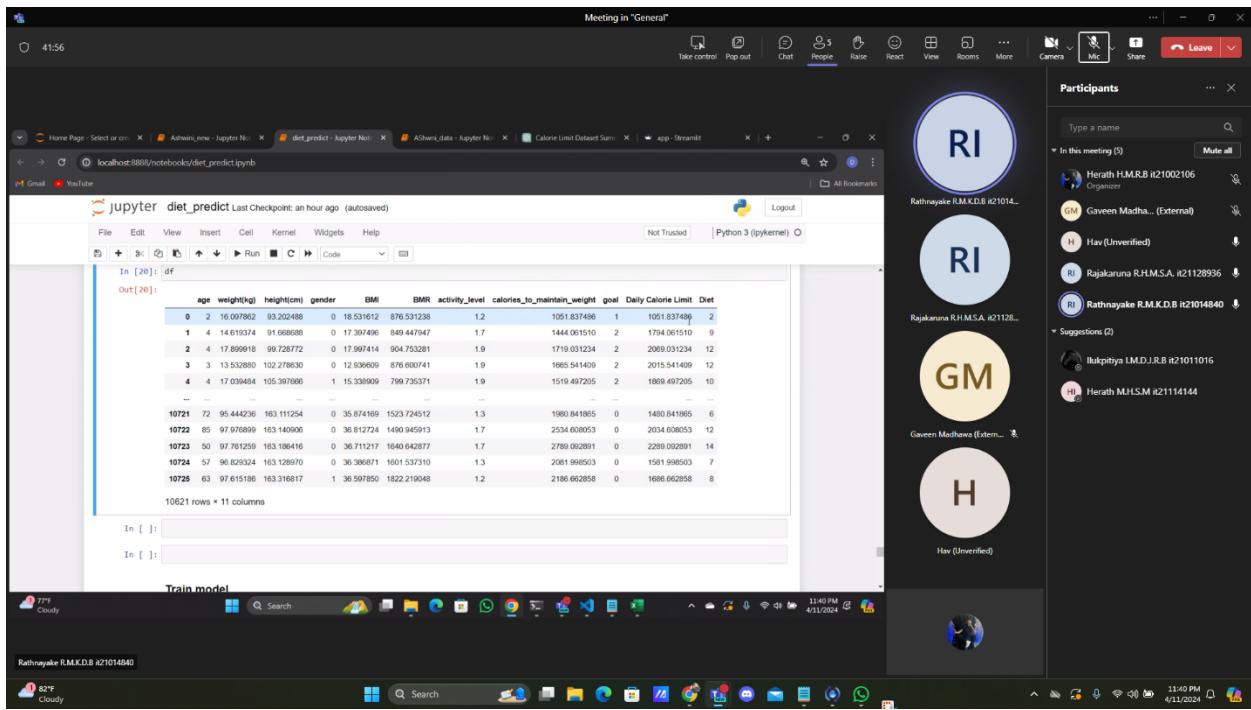
14. Screenshots of the calls in MS Teams & WhatsApp



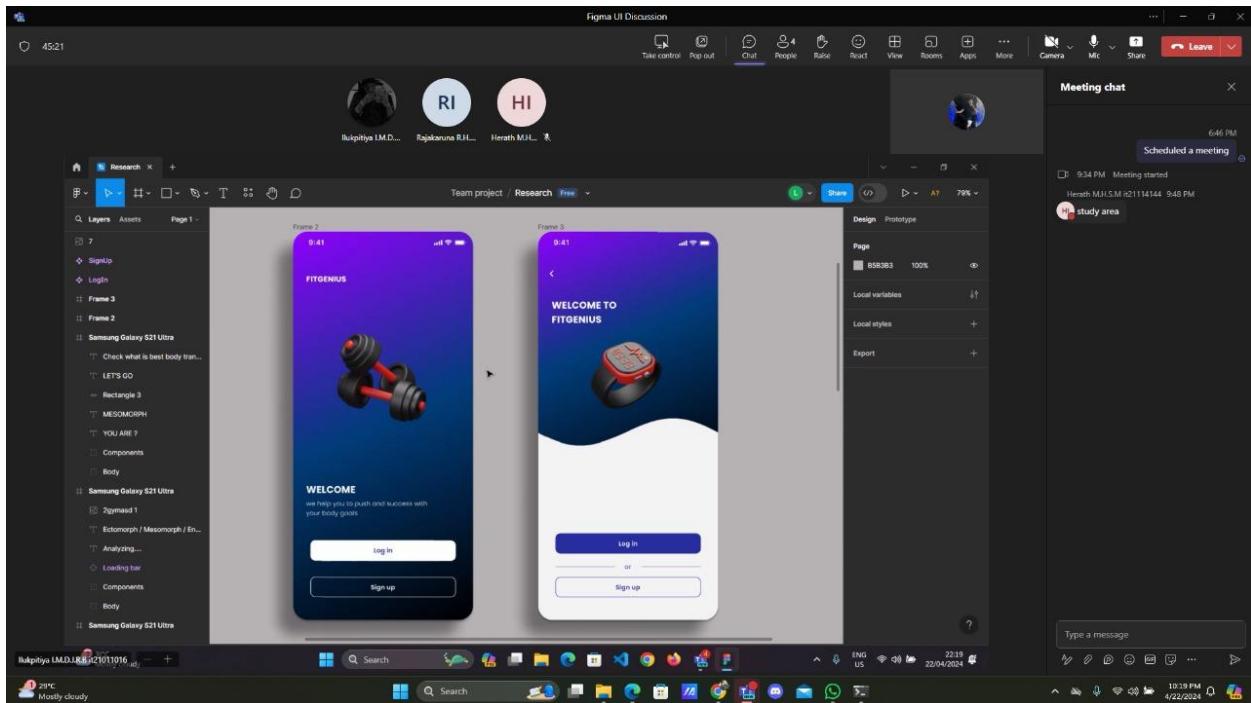
Online Meeting with team members through Microsoft Teams - 14.12.2023.



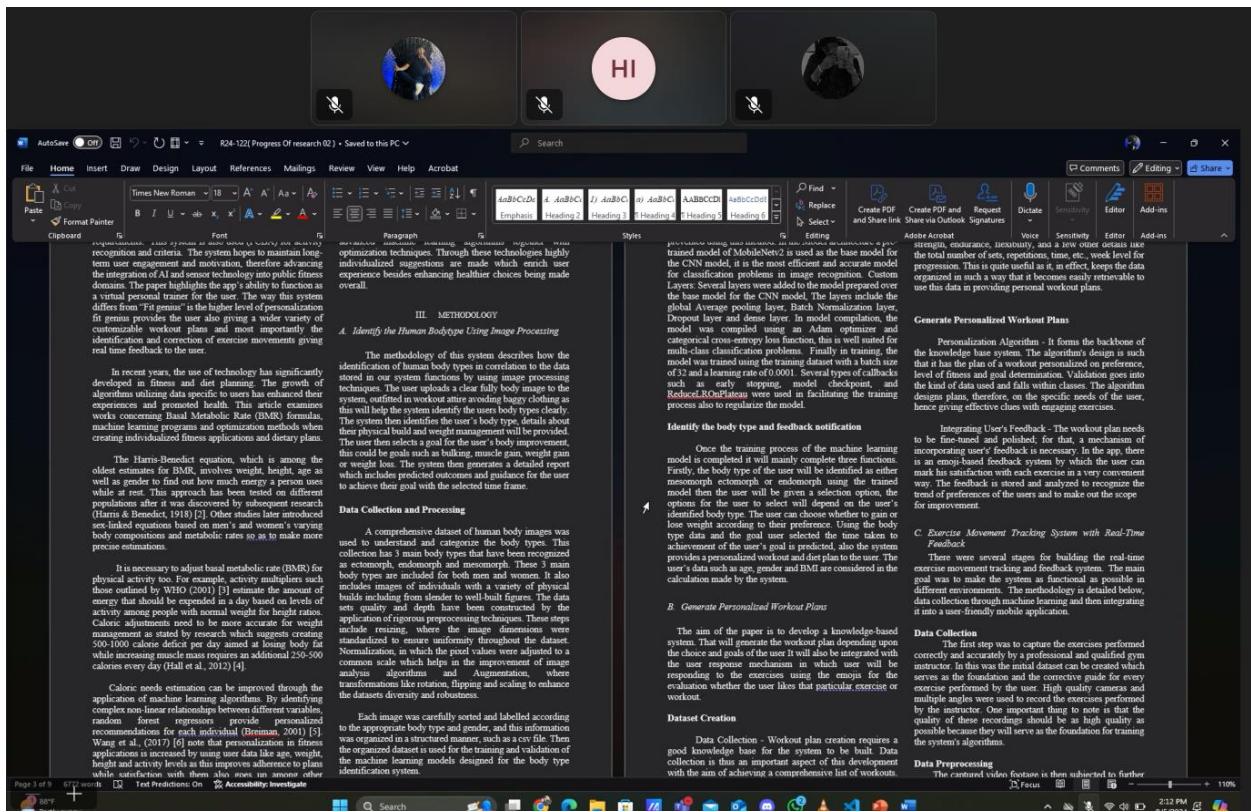
Online Meeting with the Supervisor



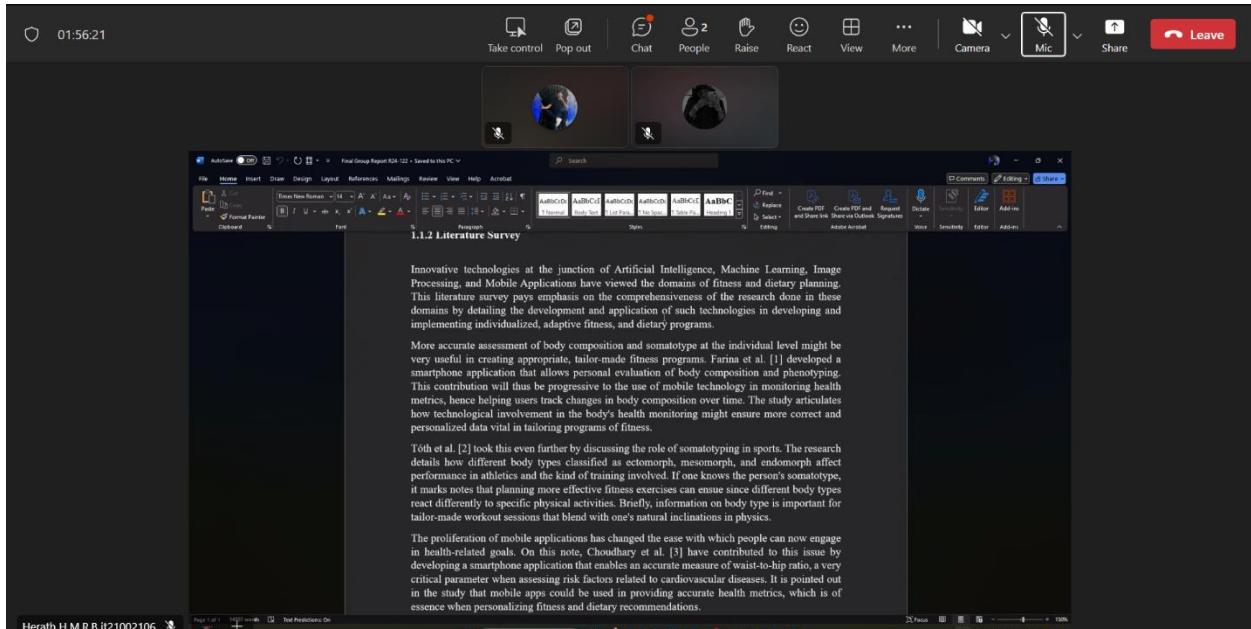
Meeting with a senior graduate - 11.04.2024.



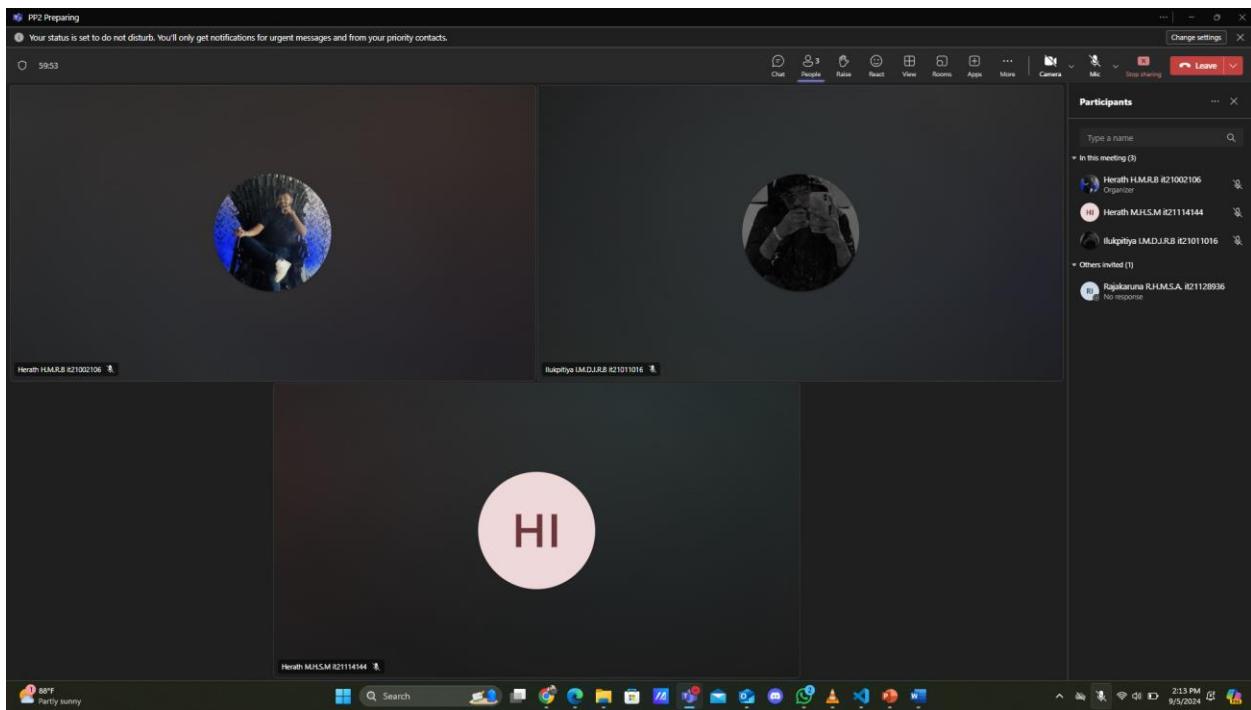
Online Meating with team members through Microsoft Teams 22.04.2022.



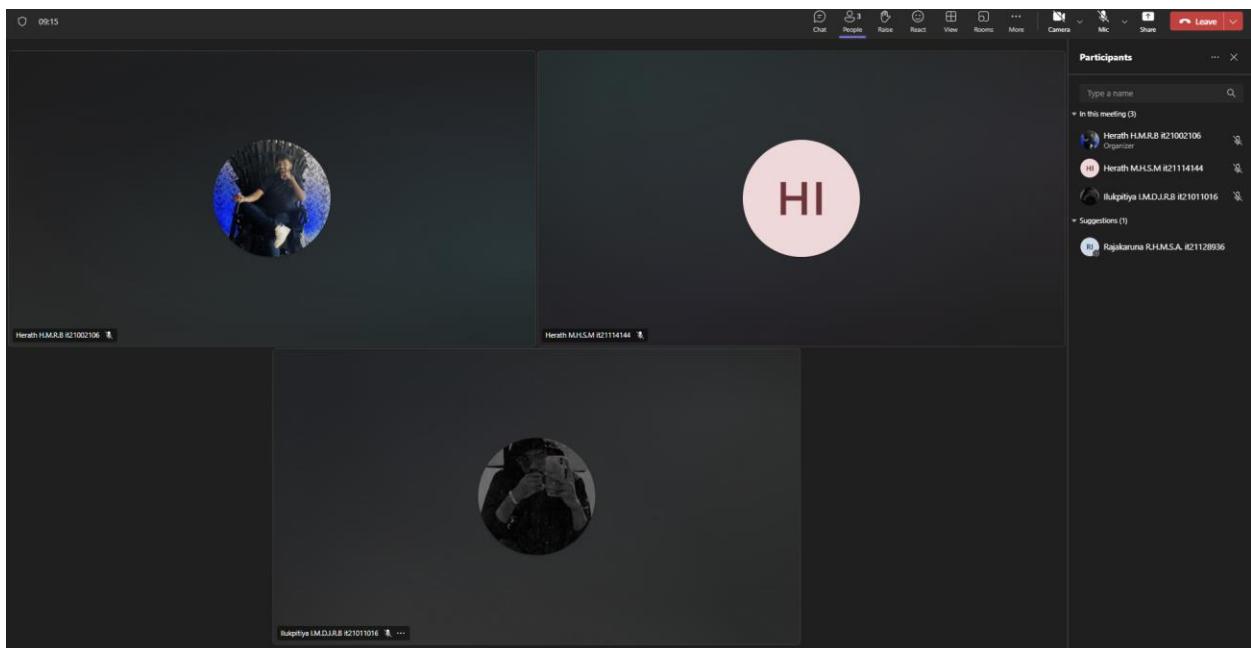
Meeting to write and edit the research paper with group members



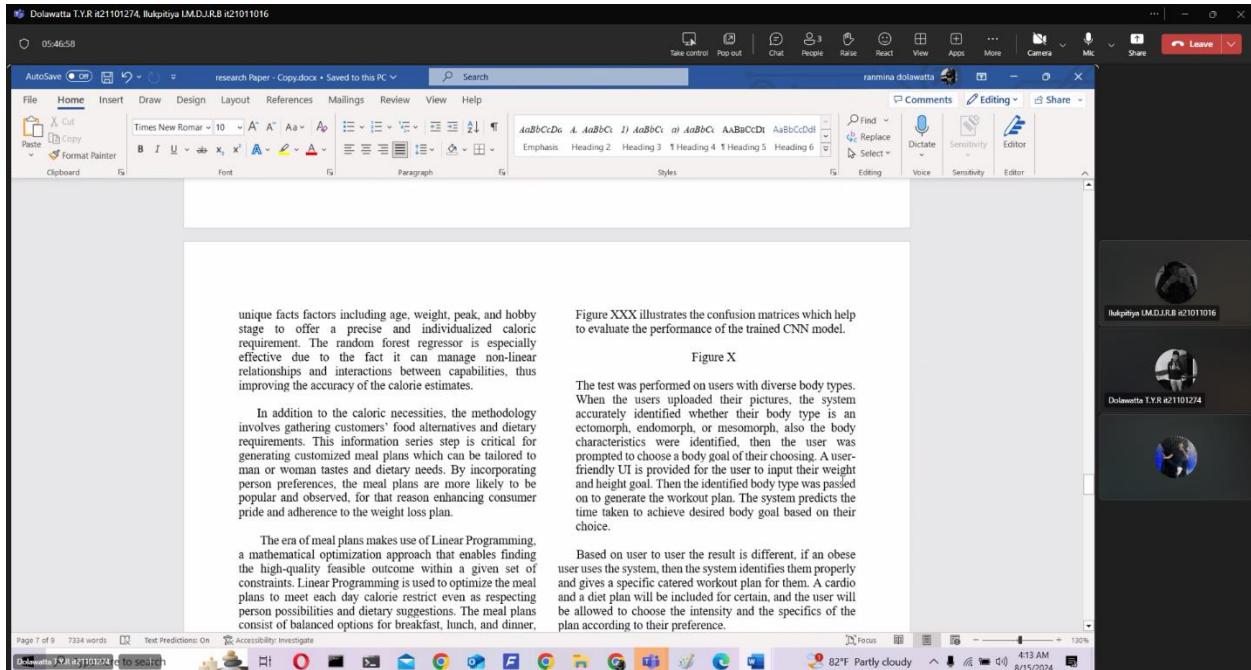
Meeting to write and edit the research paper with group members – 16.08.2024



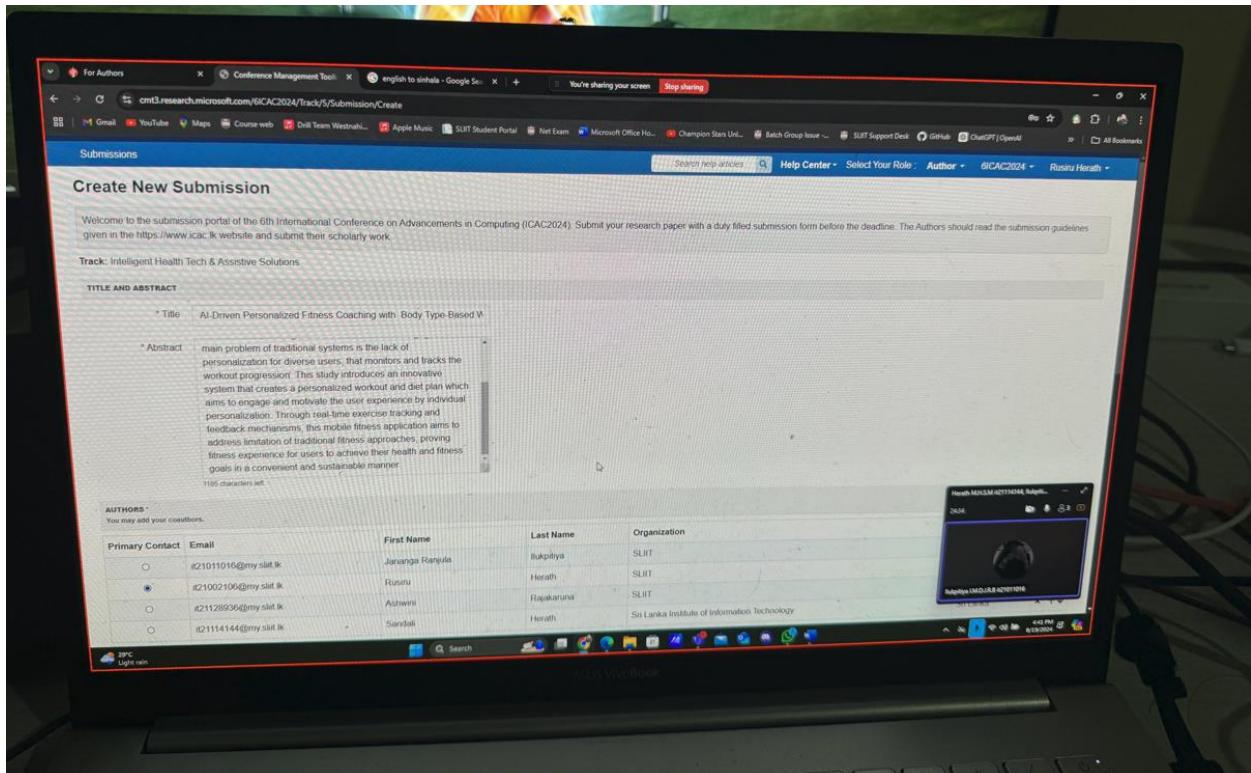
Meeting with the Group members to prepare PP2



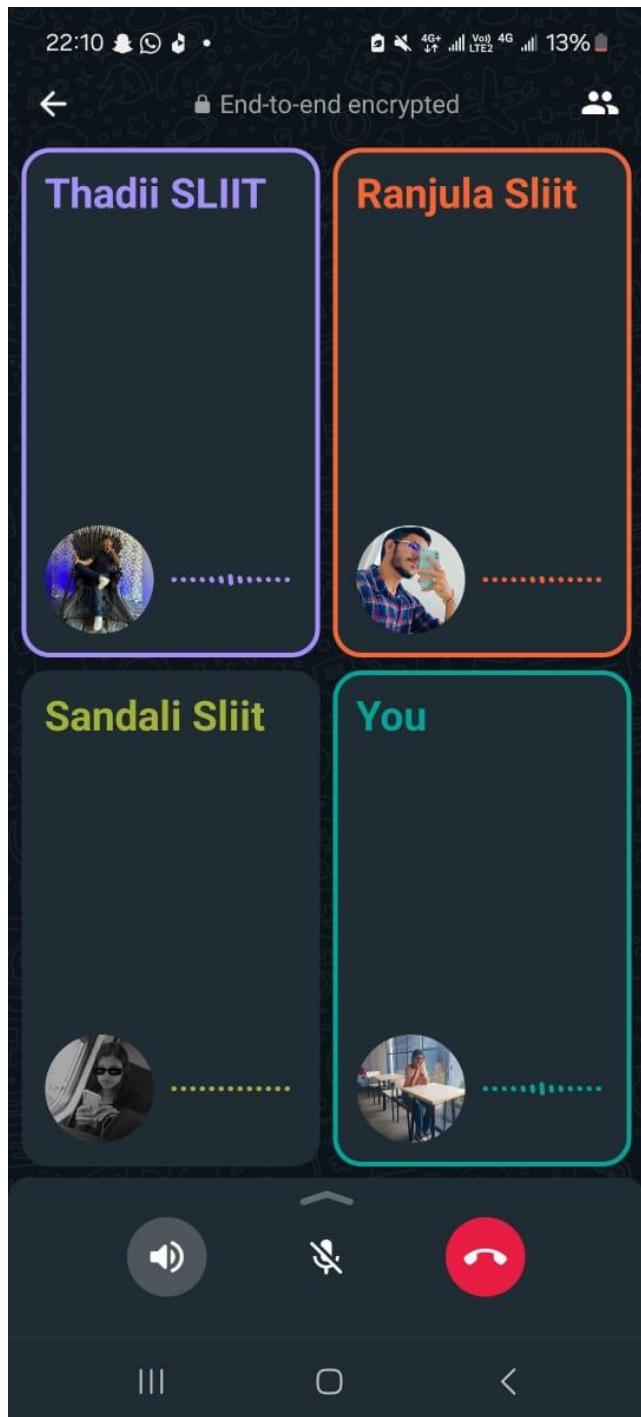
Meeting with the Group members to prepare PP2



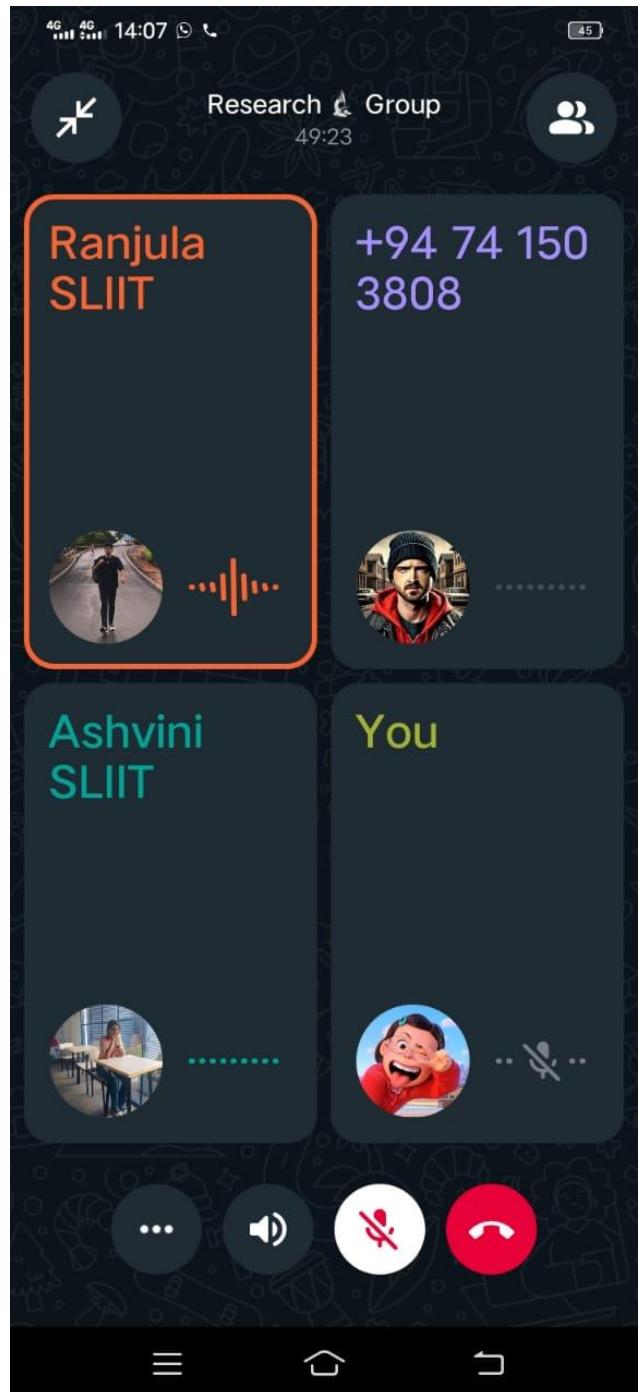
English proof reading with an external editor



Meeting taken prior to the ICAC research paper submission



WhatsApp call 1 with group member



WhatsApp call 2 with group member

15. Field visit for data collection

Visiting Dr. Mala Abeygunawardhana – Nutritionist at Sri Jayawardhanapura Hospital



16. 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: 28th October 2024

- 11. Research Logbook Submission**

Date: 20th November 2024