



**Research Project  
(Comprehensive Design and Analysis Project) - IT4010  
[2025/FEB]**

**Logbook**

**An Intelligent Electricity Management Unit: AI-Driven Power Forecasting and  
Personalized Consumption Insights with Application Integration**

**Group ID: R25-065**

**Pivithuru N.H.A.S. – IT21389160**

**BSc (Hons) in Information Technology Specializing in Information Technology  
Department of Information Technology**

**Submitted to:**

**Sri Lanka Institute of Information Technology  
Sri Lanka**

**-25 October 2025-**

<b>Date</b>	<b>Description</b>	<b>Remarks</b>	<b>Supervisor's Signature</b>
16/10/2024 to 30/10/2024	1. Held meetings with supervisor & co-supervisor to discuss the research scope. 2. Discussed & finalized the research scope. 3. Studied research papers related to Home Energy Management. 4. Outlined the research methodology including the key components.	Figure 1 - Meeting with Supervisor and Co – Supervisor	
31/10/2025 to 14/11/2024	1. Divide research components and study each member's novelty. 2. Discussed roles and responsibilities within the research team. 3. Explored existing projects of Home Energy Management System.		
15/11/2025 to 30/11/2024	1. TAF form submission preparation. 2. Held meeting with supervisor to get instructions regarding TAF submission. 3. Get instructions from co-supervisor to build the IoT hardware device.	Figure 2 - Meeting with Co – supervisor	
01/12/2024 to 15/12/2024	1. Gathered feedback & refined research questions based on discussions. 2. Got supervisors' & co-supervisor's signature after meeting them. 3. Got clear out the questions regarding the TAF submission. 4. Submitted the final TAF to the course web after getting the approval for supervision.	Figure 3 - Meeting with Teammates	
16/12/2024 to 30/12/2024	1. TAF evaluation was conducted, and TAF results were submitted. 2. Held meetings with supervisor & co supervisor to plan future plans.	Figure 4 - Meeting with Teammates	

31/12/2024 to 14/01/2025	<p>1. Preparation of project charter &amp; got signatures from supervisor &amp; co-supervisor.</p> <p>2. Participated in the research project meetings conducted by SLIIT.</p> <p>3. Preparation of draft proposal report by collecting information related to the previous studied research papers.</p>	Figure 5 - Meeting with Teammates	
15/01/2025 to 31/01/2025	<p>1. Made the original proposal report with clear problem definition, objectives &amp; methodologies.</p> <p>2. Made presentation slides to present the proposal presentation.</p> <p>3. Final project proposal reports were submitted &amp; final proposal presentation was conducted.</p>	Figure 6 - Meeting with Teammates	
01/02/2025 to 14/02/2025	<p>1. Researched IoT based energy monitoring web applications &amp; studied about WIFI based unit discovery methods for IoT devices.</p> <p>2. Met supervisor &amp; get clear idea about the steps ready to the Progress Presentation 01.</p>	Figure 7 - Meeting with Teammates	
15/02/2025 to 28/02/2025	<p>1. Analyzed best practices for integrating React frontend with Laravel backend.</p> <p>2. Search API requirements for IoT unit integration, registration, data retrieval &amp; limit management.</p> <p>3. Studied data visualization techniques &amp; libraries for energy insights.</p>	Figure 8 - Meeting with Teammates	
01/03/2025 to 14/03/2025	<p>1. Reading 20 research papers related to my component and clearly identified the research gap.</p> <p>2. Started developing the web application with Laravel backend and React frontend.</p> <p>3. Had several meetings with the team members &amp; discussed the progress of our project.</p>	Figure 9 - Meeting with Supervisor	

15/03/2025 to 31/03/2025	<p>1. Implemented the main functions of the web application required to be presented for Progress Presentation 01.</p> <p>2. Held some meetings with team members to discuss the progress of each component.</p> <p>3. Created presentation slides for Progress Presentation 01.</p>	Figure 10 - Meeting with Teammates to prepare for PP1	
01/04/2025 to 14/04/2025	<p>1. Completed the required part of my component from Progress Presentation 01.</p> <p>2. Completed the presentation slides prepared for the Progress Presentation 01.</p> <p>3. Did the Progress Presentation 01.</p>		
15/04/2025 to 30/04/2025	<p>1. Studied about color themes techniques &amp; data visualization techniques in React.js.</p> <p>2. Met the supervisor and discussed our project progress and future work.</p> <p>3. Had a meeting with co supervisor and discussed about our project progress and get suggestions.</p>	Figure 11 - Meeting with Supervisor	
01/05/2025 to 14/05/2025	<p>1. Conducted literature review on malware and AI for optional modules while continuing project research.</p> <p>2. Studied data visualization optimization methods for large-scale IoT data.</p> <p>3. Integrated historical energy usage charts (current and power vs. time) using Recharts in React.</p> <p>4. Met supervisor to discuss progress and finalize structure for Progress Presentation 02.</p>		
15/05/2025 to 31/05/2025	<p>1. Enhanced frontend responsiveness using Tailwind CSS for mobile and tablet viewports.</p> <p>2. Conducted team meeting to discuss integration between IoT unit data and cloud backend.</p>	Figure 12 - Meeting with Supervisor	

01/06/2025 to 14/06/2025	<p>1. Began implementation of real-time energy data fetching via AWS WebSockets.</p> <p>2. Debugged data synchronization issues between local MySQL and AWS DynamoDB.</p> <p>3. Designed and documented the architecture for device–cloud–frontend communication.</p> <p>4. Met supervisor to review real-time data visualization progress and received suggestions.</p>		
15/06/2025 to 30/06/2025	<p>1. Completed stable WebSocket integration for real-time device data updates.</p> <p>2. Tested real-time gauge chart updates for current and power readings.</p> <p>3. Implemented threshold display and notification logic in React for each device.</p> <p>3. Conducted internal testing session with group members and discussed UI/UX feedback.</p>	Figure 13 - Meeting with Teammates	
01/07/2025 to 14/07/2025	<p>1. Developed and styled the DeviceDetails.jsx page with real-time gauges and charts.</p> <p>2. Implemented energy threshold setting and resetting features using Laravel API endpoints.</p> <p>3. Added monthly energy usage summary (based on e_tot) near the threshold section.</p> <p>3. Reviewed and refined UI design for clarity and performance.</p>		
15/07/2025 to 31/07/2025	<p>1. Met supervisor and co-supervisor to demonstrate the updated DeviceDetails page.</p> <p>2. Integrated FastAPI backend for energy-saving suggestion generation.</p>		

	3. Fixed chart rendering issues and improved data update frequency handling.		
01/08/2025 to 14/08/2025	<p>1. Implemented color-blind accessibility (Protanopia &amp; Deuteranopia) in the web dashboard.</p> <p>2. Modified user profile settings to store and manage color blindness preferences.</p> <p>3. Applied conditional Tailwind styling using data-color-blindness attributes.</p> <p>4. Tested gauge and chart color adaptations for accessibility compliance.</p>		
15/08/2025 to 31/08/2025	<p>1. Improved color contrast and readability based on accessibility test results.</p> <p>2. Optimized WebSocket event handling for improved performance.</p> <p>3. Prepared Research Paper and Final theses reports for submission.</p>		
01/09/2025 to 14/09/2025	<p>1. Visualized model results and accuracy metrics for analysis.</p> <p>2. Met supervisor to present forecasting progress and receive suggestions.</p> <p>3. Prepared the Progress Presentation 02 slides highlighting implemented components and data flow.</p> <p>4. Submitted the Research Paper for some conferences.</p>	Figure 14 - Meeting with Supervisor	
15/09/2025 to 30/09/2025	<p>1. Presented Progress Presentation 02 successfully and gathered feedback for improvements.</p> <p>2. Integrated forecast results with dashboard backend for future energy usage insights.</p> <p>3. Designed UI section for displaying predicted monthly cost and trends.</p> <p>4. Conducted testing on different device datasets to validate model accuracy.</p>		

	5. Started preparing final report sections related to implementation and evaluation.		
01/10/2025 to 14/10/2025	1. Finalized documentation for backend and frontend modules.  2. Conducted overall system integration testing and bug fixing.  3. Prepared content for the final presentation and system demonstration.  4. Met with supervisor to review the report draft and finalize improvements.		
15/10/2025 to 31/10/2025	1. Finalized and formatted the final research report with appendices and references.  2. Prepared and rehearsed the final presentation and demo with team members.  3. Presented Final Presentation and Website evaluation VIVA.  4. Created a static website for project commercialization.  5. Uploaded all project documents and presentation slides to the course web.		

## Figures (Meeting Screenshots)

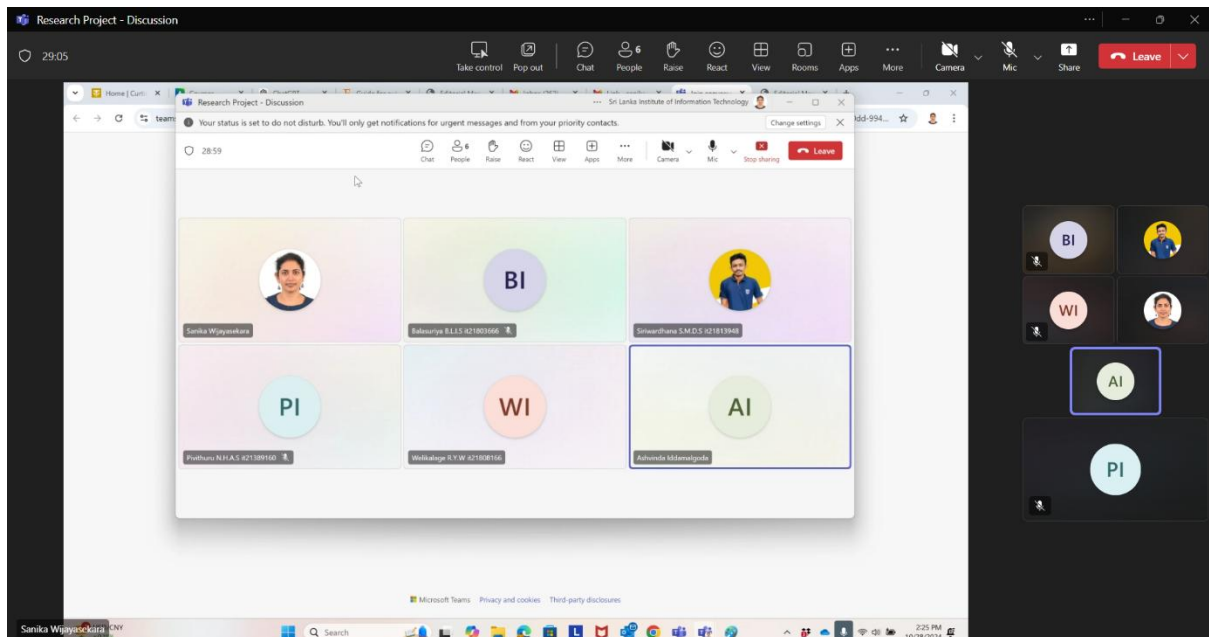


Figure 1 - Meeting with Supervisor and Co – Supervisor

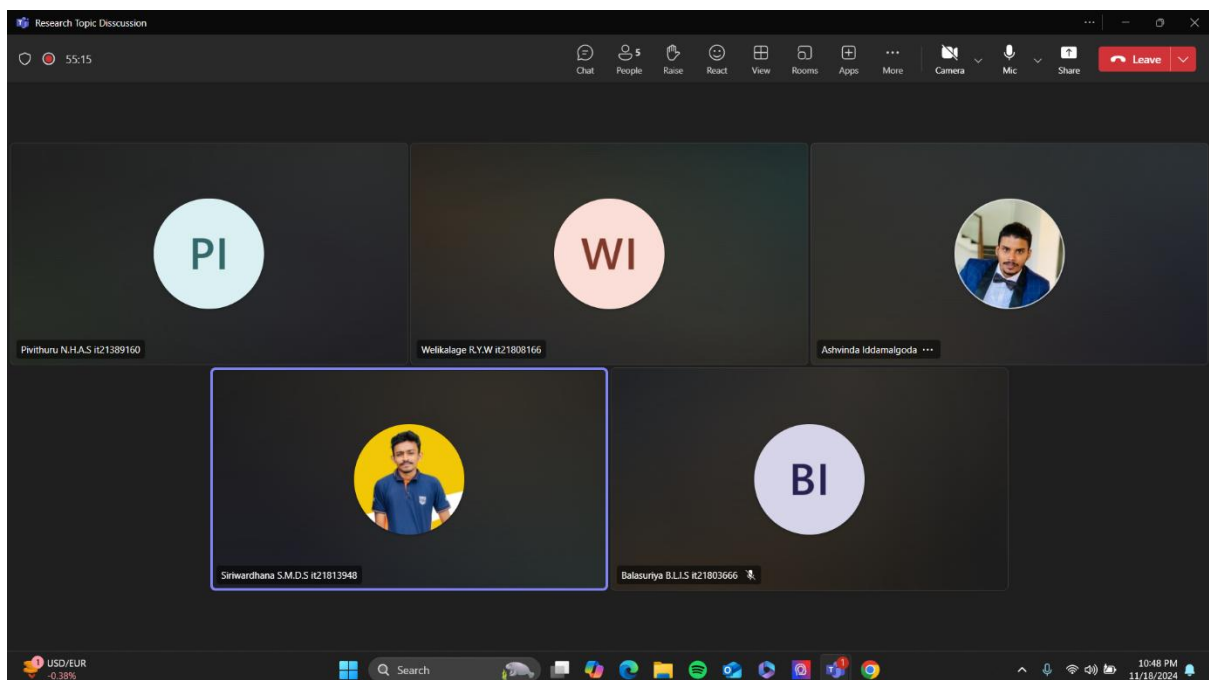


Figure 2 - Meeting with Co – supervisor



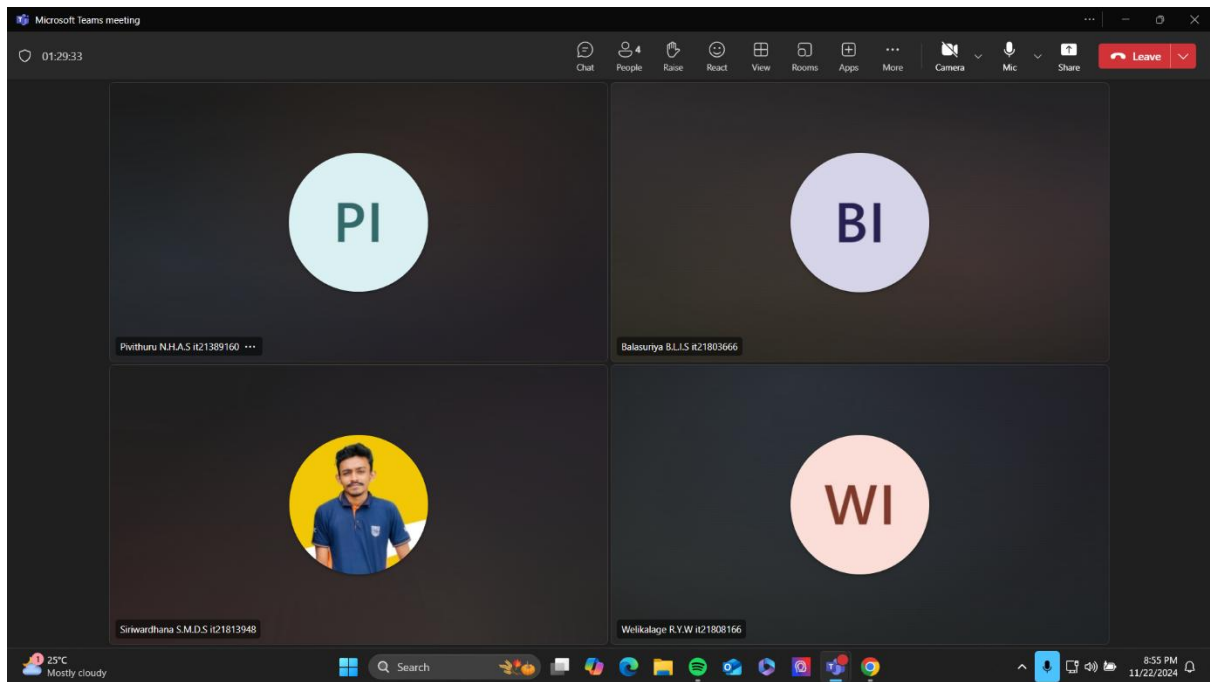


Figure 3 - Meeting with Teammates

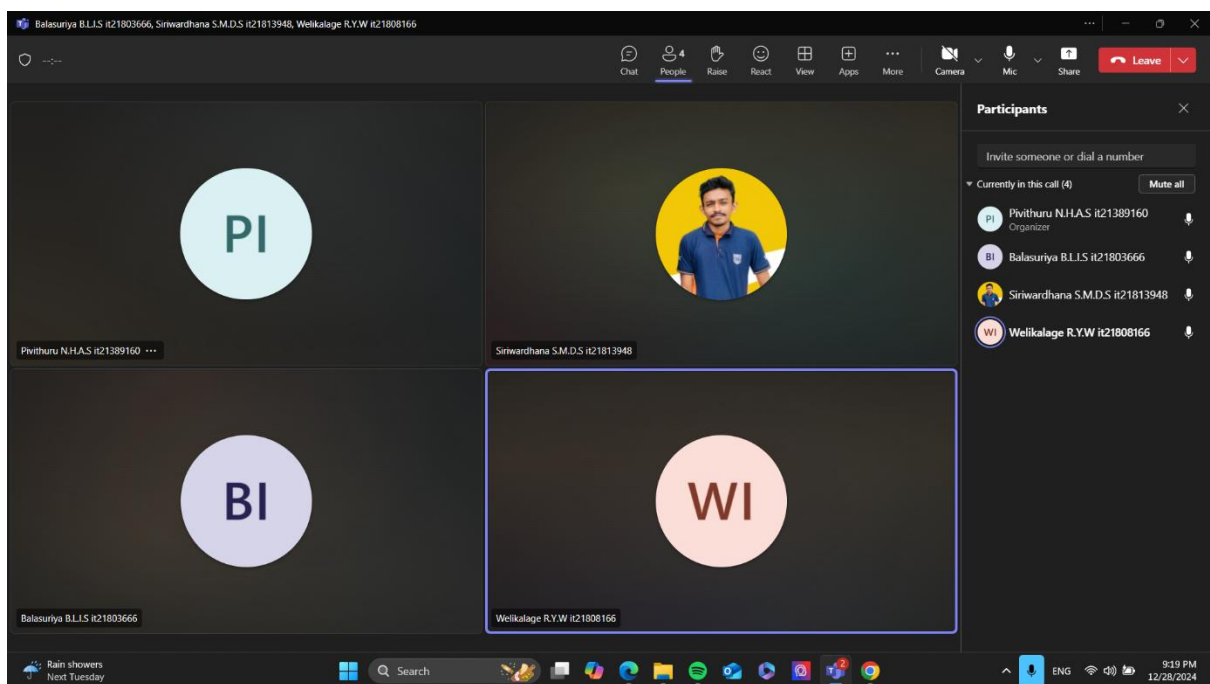


Figure 4 - Meeting with Teammates

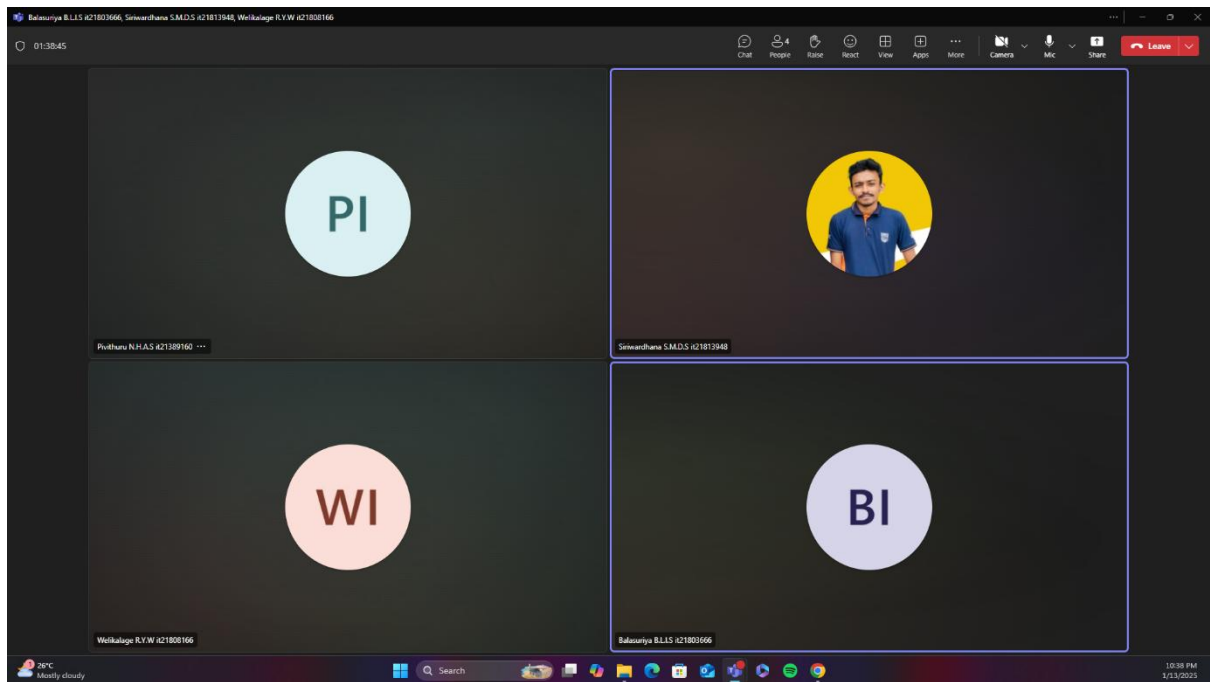


Figure 5 - Meeting with Teammates

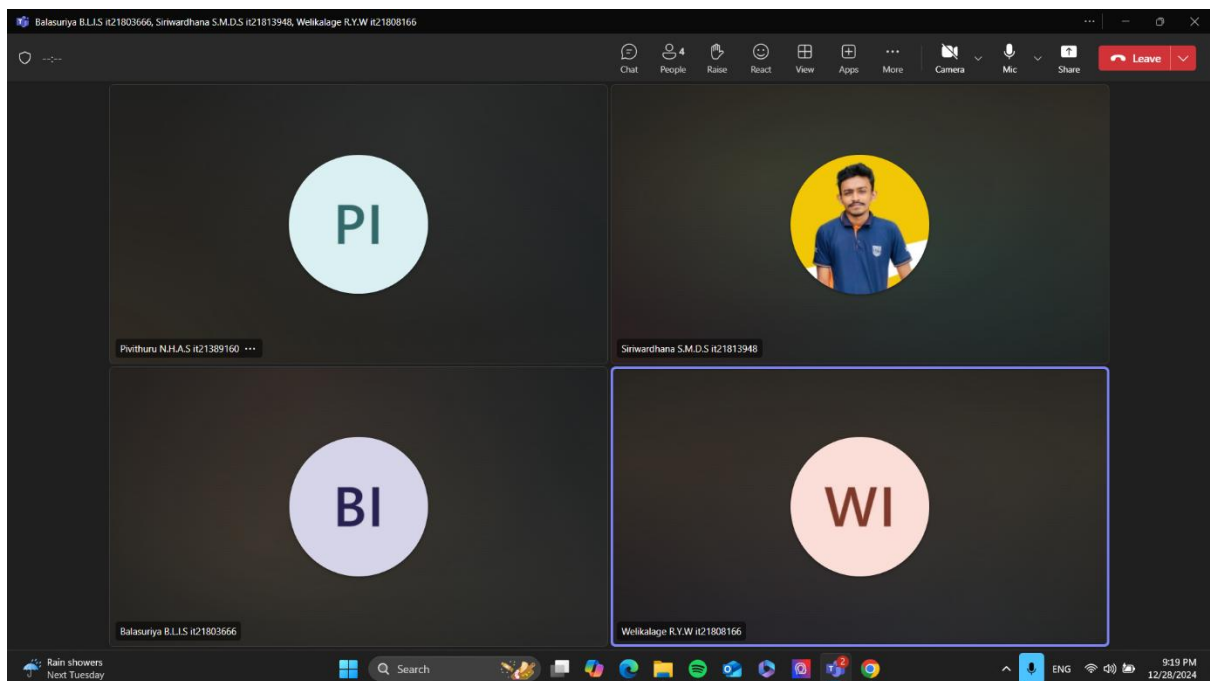


Figure 6 - Meeting with Teammates

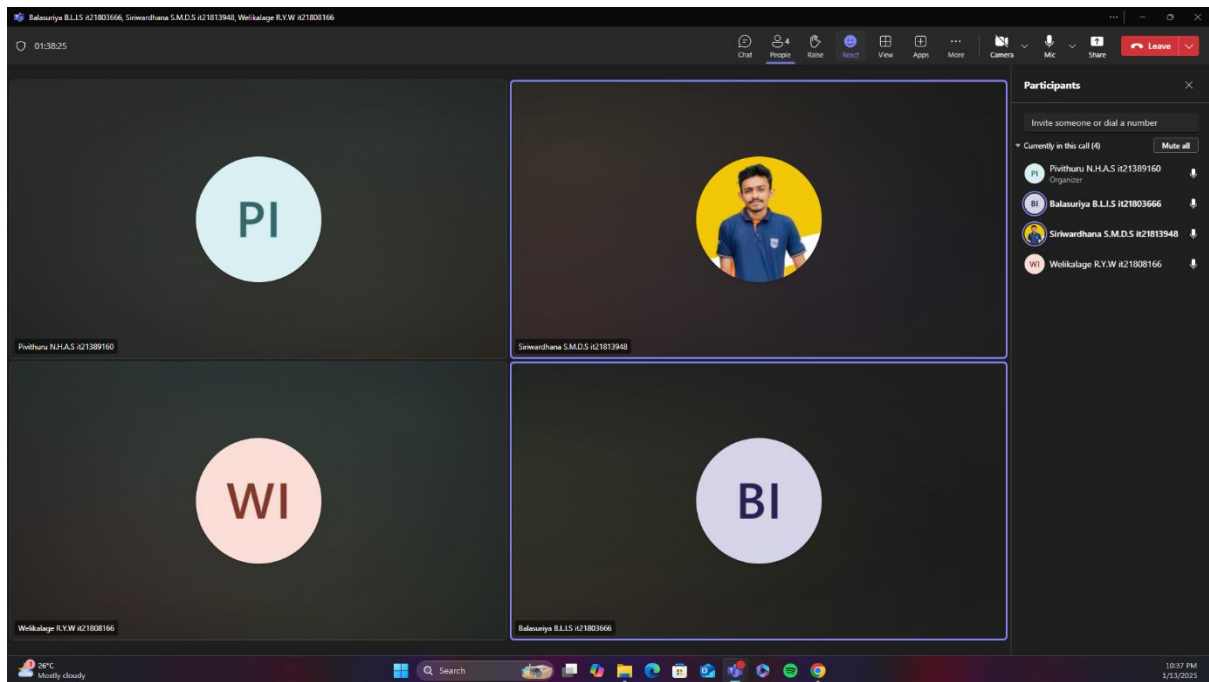


Figure 7 - Meeting with Teammates

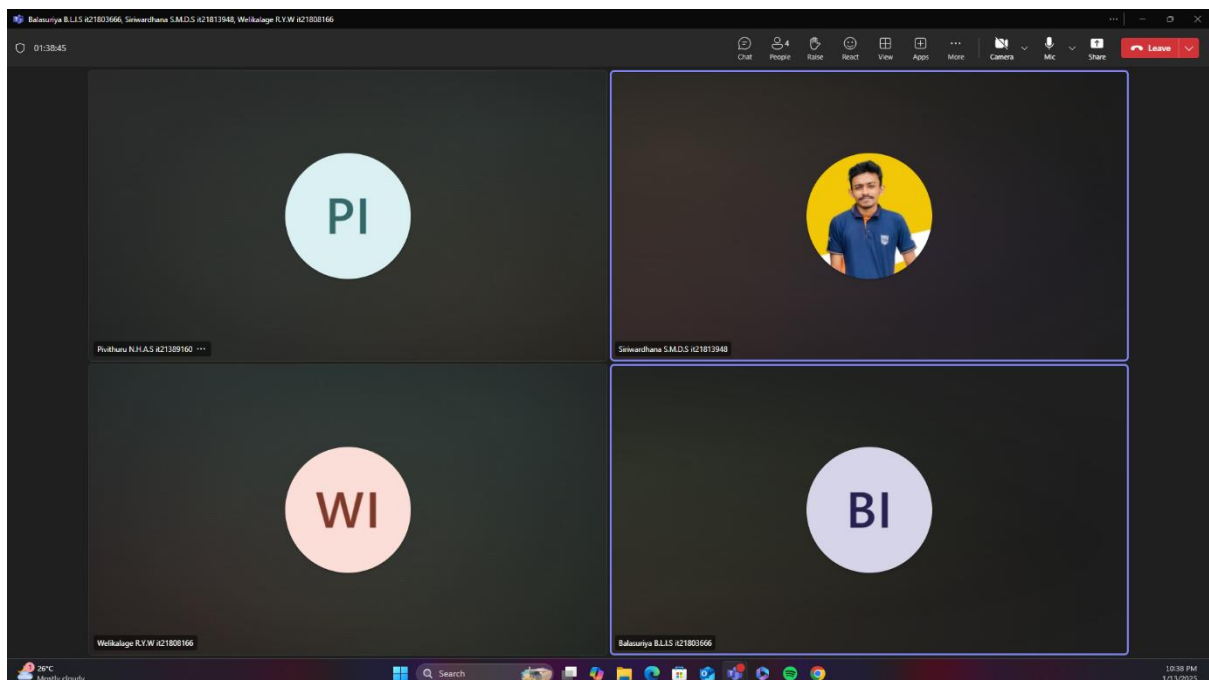


Figure 8 - Meeting with Teammates

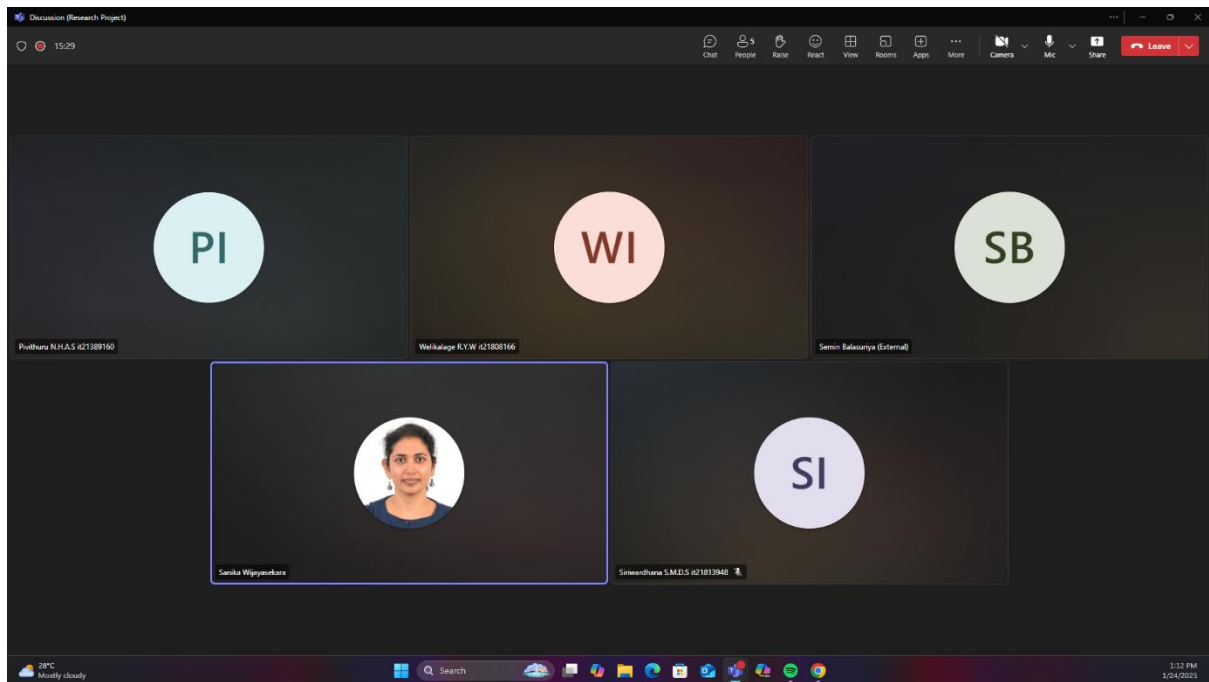


Figure 9 - Meeting with Supervisor

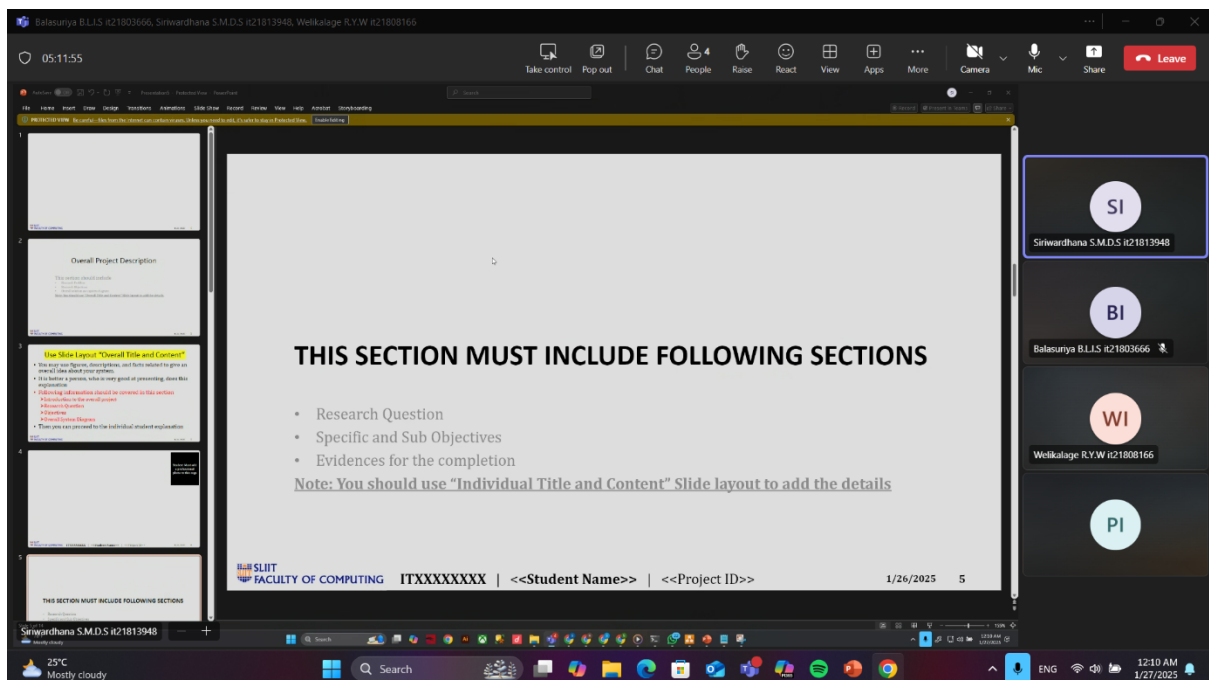


Figure 10 - Meeting with Teammates to prepare for PP1

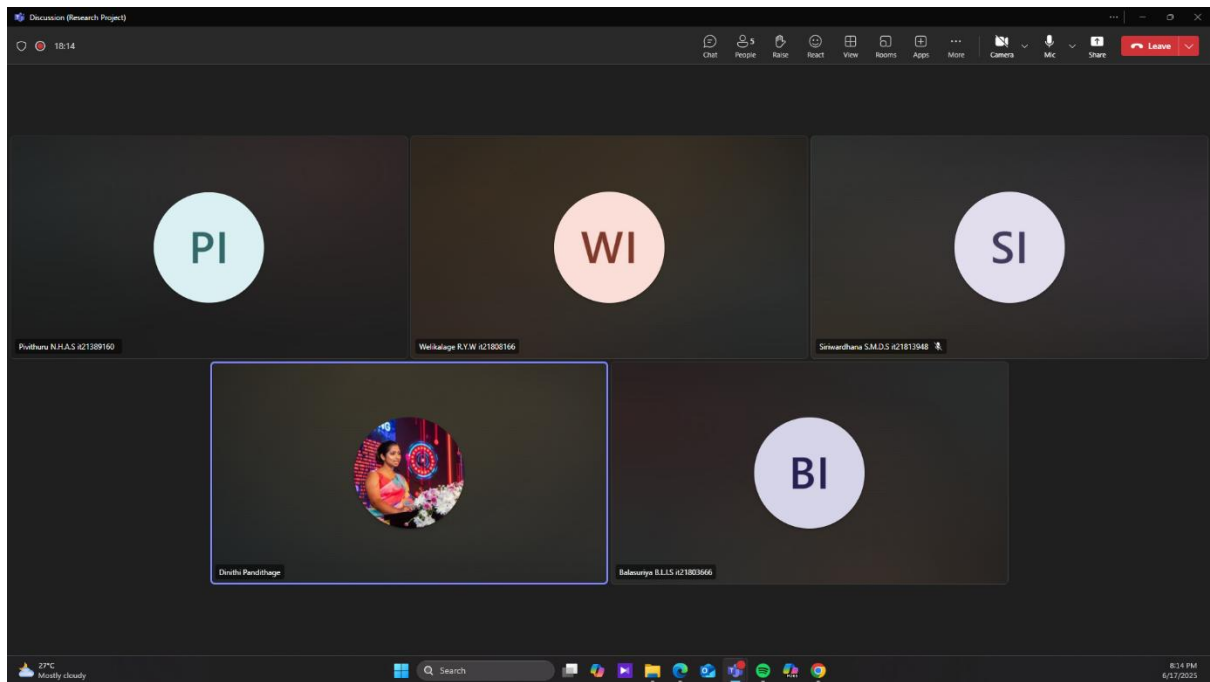


Figure 11 - Meeting with Supervisor

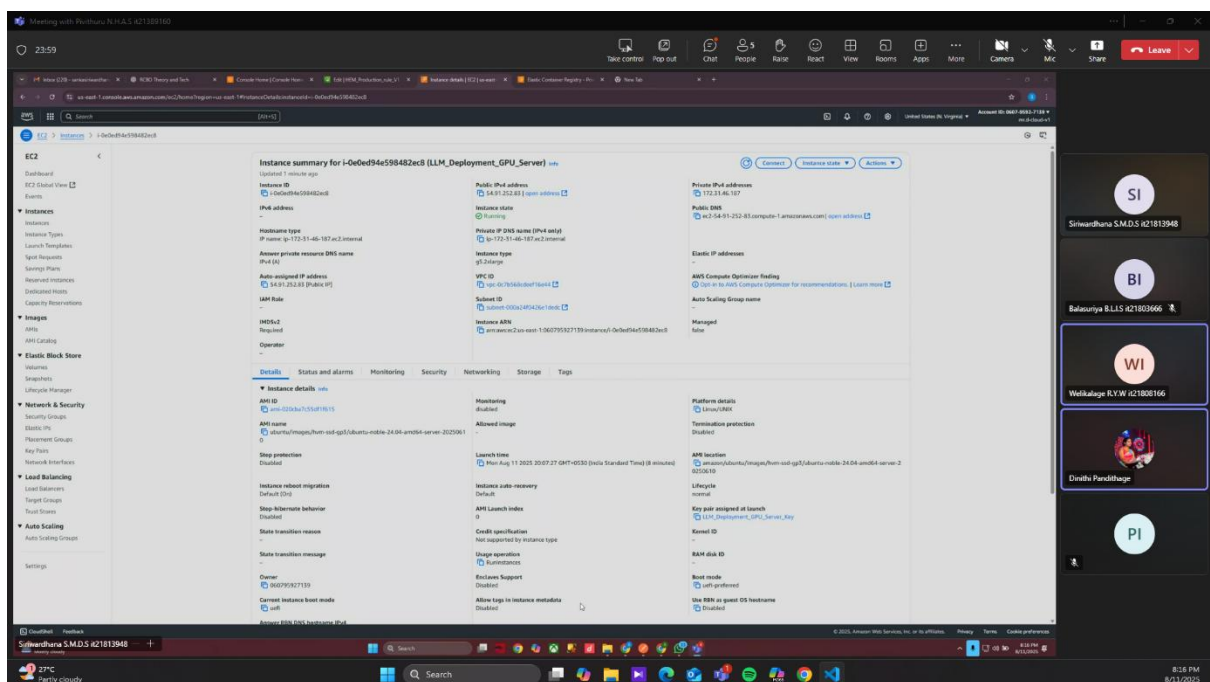


Figure 12 - Meeting with Supervisor

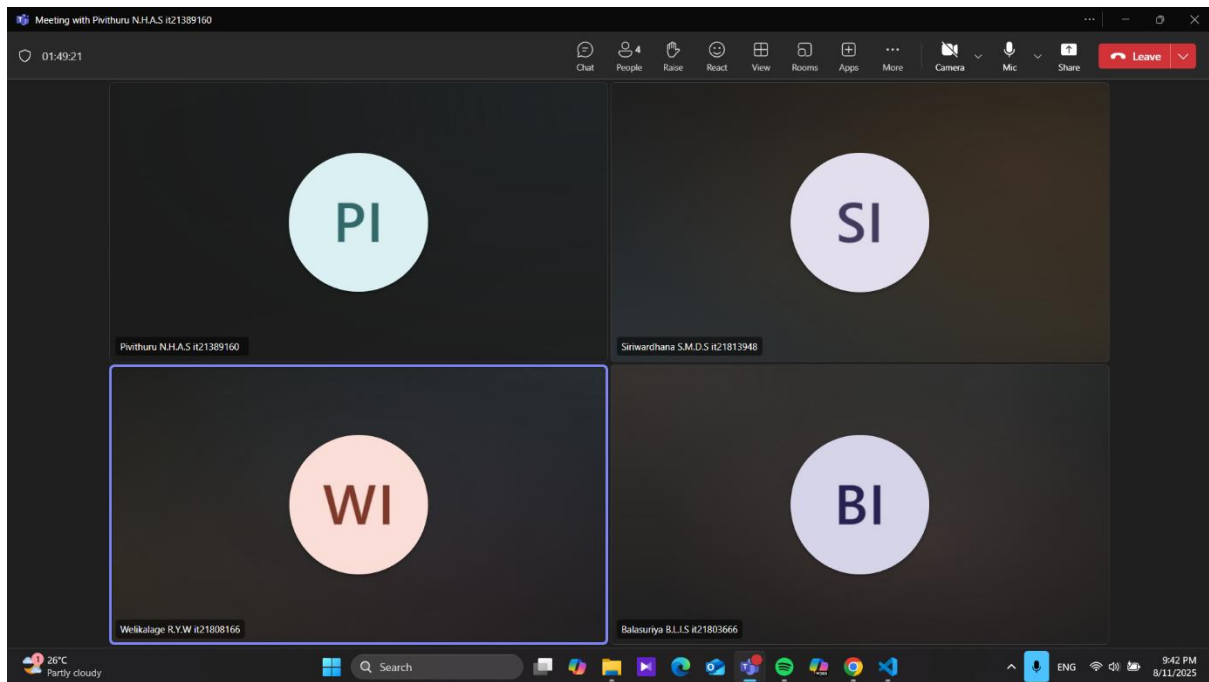


Figure 13 - Meeting with Teammates

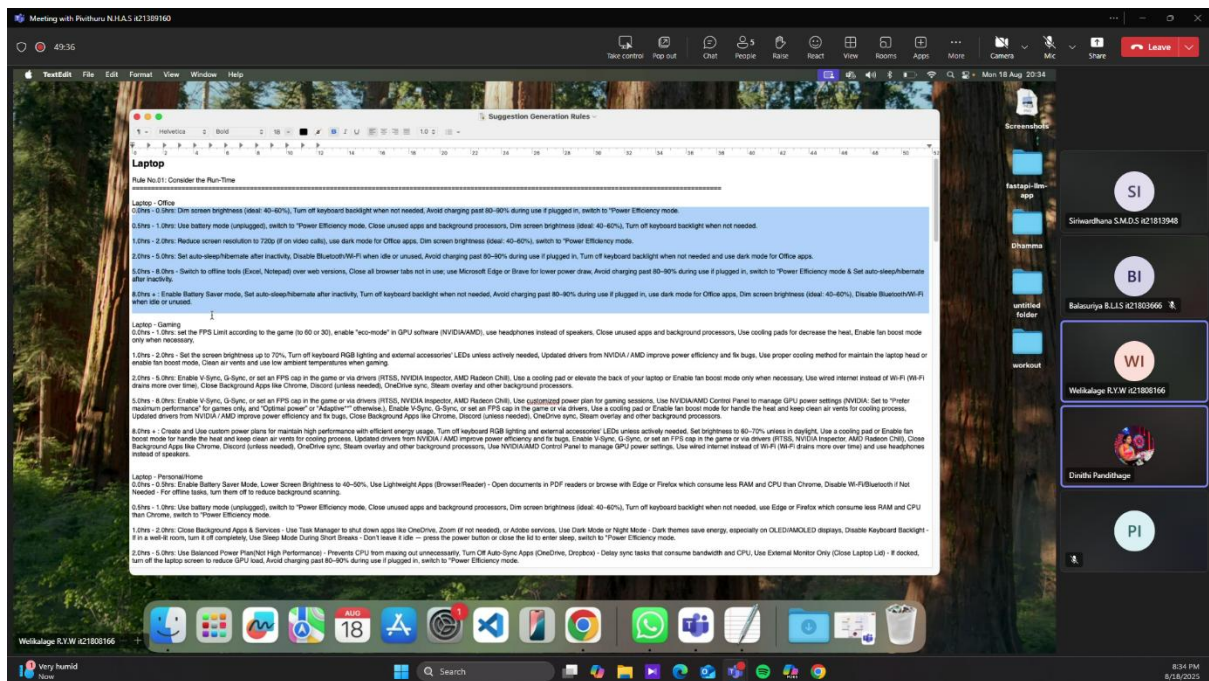


Figure 14 - Meeting with Supervisor