IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 6, June 2026
Impact Factor: 8.2

Smart Online Academic Project Management System with AI-Driven Supervision and Real-Time Collaboration

Manisha Navale[1], Abhijeet Bhosale[2], Aniket Chandan[3], Pratham Dhakate[4], Rajendra Patil[5]
Professor, Computer Engineering[1]
Students, Computer Engineering[2-5]
NBN Sinhgad Technical Institutes Campus, Pune, India

Abstract: *This research paper presents the implementation of a Smart Online Academic Project Management System with Intelligent Guide Allocation and Real-Time Collaboration using the MERN Stack (MongoDB, Express.js, React.js, and Node.js). Educational institutions often face challenges such as manual group formation, inefficient guide allocation, fragmented communication, paper-based reviews, and limited project tracking. To address these issues, the proposed system provides a centralized web-based platform with secure role-based access for students, guides, and coordinators. The system incorporates controlled user onboarding, automated and domain-based group formation, intelligent guide allocation based on expertise and workload, project proposal management, Formal Technical Review (FTR) tracking, attendance management, document submission, and automated report generation. Real-time collaboration is enabled through Socket.IO-based communication channels and notification services, while AI-assisted topic similarity detection helps minimize project duplication. The platform also includes analytics dashboards for monitoring project progress and academic performance. Experimental results demonstrate improved transparency, reduced administrative workload, enhanced collaboration, and more efficient project supervision. Future enhancements such as AI-powered academic assistants, predictive project analytics, automated report evaluation, and multi-institution deployment are also discussed.*

Keywords: Academic Project Management System, Intelligent Guide Allocation, Real-Time Collaboration, MERN Stack, Project Supervision, Artificial Intelligence, Educational Technology

I. INTRODUCTION

1.1 Background

Academic projects play a crucial role in higher education by enabling students to apply theoretical concepts, develop problem-solving abilities, and gain practical experience in their respective domains. However, project management in many educational institutions is still carried out through manual processes involving spreadsheets, paperwork, physical attendance records, and fragmented communication channels. These traditional methods often result in inefficiencies, delayed supervision, poor documentation management, and lack of transparency throughout the project lifecycle.

The increasing number of student projects and the growing need for effective supervision have placed significant administrative pressure on coordinators and faculty guides. Without a centralized project management platform, institutions face challenges such as:

- Inefficient group formation and management.
- Uneven distribution of project guides and supervisor workload.
- Difficulty in tracking project progress and milestone completion.
- Lack of centralized communication between students, guides, and coordinators.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 6, June 2026 Impact Factor: 8.2

- Manual maintenance of attendance, evaluations, and project records.
- Increased chances of project topic duplication and documentation errors.

With the rapid adoption of digital technologies in education, there is a growing demand for intelligent and automated systems that can streamline project supervision, improve collaboration, and enhance transparency. A Smart Online Academic Project Management System aims to address these challenges through automation, real-time communication, and centralized project monitoring.

1.2 Problem Statement

Traditional academic project management processes suffer from several limitations that affect students, faculty members, and academic coordinators.

Common challenges include:

- Manual group formation and guide allocation processes.
- Lack of centralized project monitoring and progress tracking.
- Delayed communication between students and supervisors.
- Difficulty maintaining attendance and review records.

A centralized academic project management system can provide an effective solution by automating project workflows, enabling real-time collaboration, improving project visibility, and ensuring efficient supervision throughout the project lifecycle.

1.3 Objectives

The objectives of this research are:

- To develop a Smart Online Academic Project Management System using the MERN Stack and modern web technologies.
- To provide secure role-based access for students, guides, and coordinators.
- To automate student group formation and guide allocation based on domain preferences and faculty expertise.
- To facilitate project proposal submission, approval, and progress tracking.
- To implement real-time communication and notification mechanisms for effective collaboration.
- To digitize Formal Technical Reviews (FTRs), attendance management, and evaluation processes.
- To generate automated reports and analytics for academic monitoring and decision-making.
- To integrate AI-assisted topic similarity detection for reducing project duplication and improving project quality.
- To improve transparency, accountability, and efficiency in academic project supervision.

II. LITERATURE REVIEW

A review of existing academic project management systems shows that many institutions still rely on manual processes, spreadsheets, and fragmented communication methods. These approaches often lead to inefficient project tracking, delayed feedback, and increased administrative workload.

Several systems such as Academic Project Information Management System and Online Project Evaluation and Supervision System (oPENs) provide centralized project submission and evaluation facilities. However, they offer limited support for intelligent guide allocation, automated group formation, and real-time collaboration.

Recent studies have highlighted the use of Artificial Intelligence and analytics in educational management to improve decision-making and project supervision. Despite these advancements, many existing solutions lack integrated communication tools and complete project lifecycle management.

The proposed Smart Online Academic Project Management System (SOAPMS) addresses these limitations by integrating intelligent guide allocation, automated group formation, real-time communication, digital FTR management, and AI-assisted topic similarity detection into a single centralized platform.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 6, June 2026
Impact Factor: 8.2

Table 1: Comparison of Existing Systems vs Proposed Solution

Feature	Existing IoT Systems	Proposed Web-Based System
Project Proposal Management	Partial	Yes
Real-Time Communication	Limited	Yes
Intelligent Guide Allocation	No	Yes
FTR Management	No	Yes
Centralized Project Monitoring	Partial	Yes

III. SYSTEM DESIGN

3.1 System Architecture

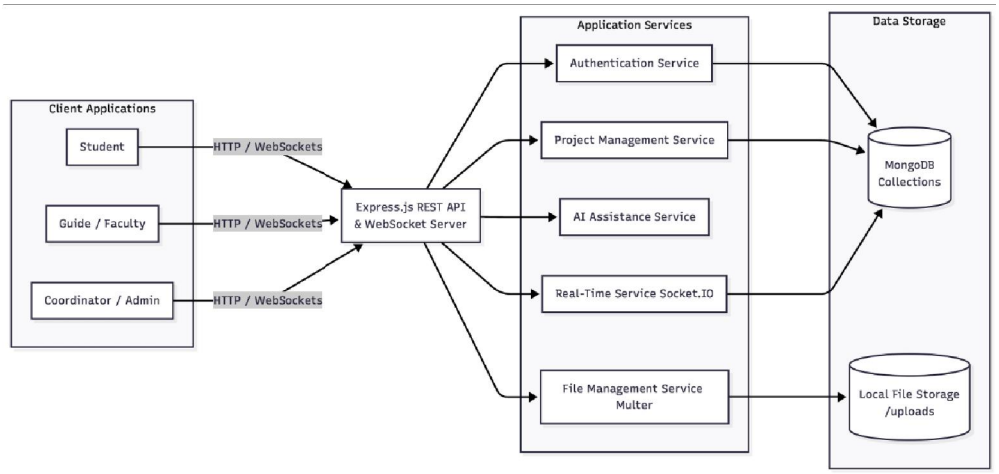
The Smart Online Academic Project Management System (SOAPMS) is designed using a three-tier architecture:

- Frontend: Developed using React.js and Tailwind CSS to provide a responsive and user-friendly interface.
- Backend: Built using Node.js and Express.js to handle authentication, project management, guide allocation, and system operations.
- Database: MongoDB is used to store user data, project information, submissions, evaluations, and reports.

The system follows a modular architecture consisting of:

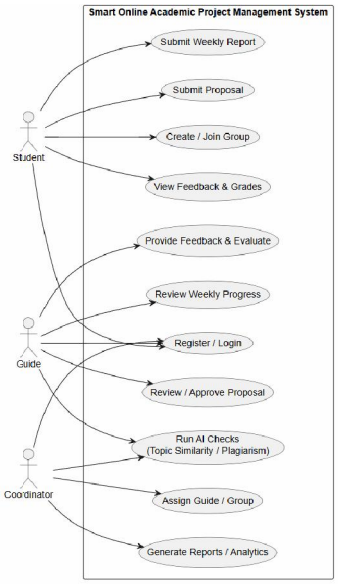
- User Module: Manages student, guide, and coordinator accounts.
- Group & Guide Management Module: Handles group formation and guide allocation.
- Project Management Module: Supports proposal submission, project tracking, and document uploads.
- Communication Module: Provides real-time chat and notifications.
- Evaluation Module: Manages FTRs, attendance, feedback, and marks.
- Reporting Module: Generates reports and analytics for academic monitoring.

Figure 1: System Architecture Diagram



IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 6, June 2026
Impact Factor: 8.2

Figure 2: Usecase Diagram



3.2 Technologies Used

- React.js: Used for developing the frontend user interface and managing application components.
- Tailwind CSS: Provides responsive and modern styling for the web application.
- Node.js: Handles server-side processing and business logic.
- Express.js: Manages RESTful APIs and communication between the frontend and backend.
- MongoDB: Stores user information, project details, submissions, evaluations, and reports.
- Mongoose: Provides schema-based data modeling and database validation.
- Socket.IO: Enables real-time communication, notifications, and chat functionality.
- JWT & Bcrypt.js: Ensure secure authentication, authorization, and password encryption.

IV. IMPLEMENTATION

4.1 Frontend Development

User Interface: The frontend provides dedicated dashboards for Students, Guides, and Coordinators. Key features include user authentication, group management, project proposal submission, project tracking, notifications, and real-time communication.

UI Framework: Tailwind CSS is used to create a responsive and user-friendly interface across different devices.

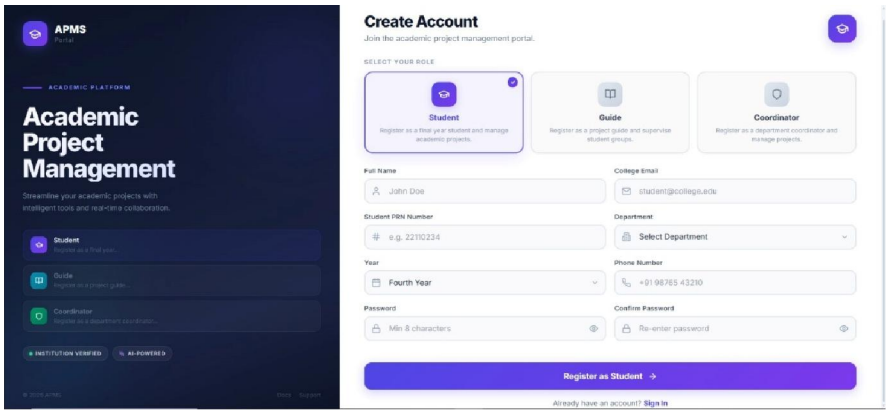
Client-Side Validation: React.js validations ensure accurate and secure user input during registration, proposal submission, document uploads, and evaluation processes.

Real-Time Features: Socket.IO Client enables instant notifications, live chat, and real-time project updates.

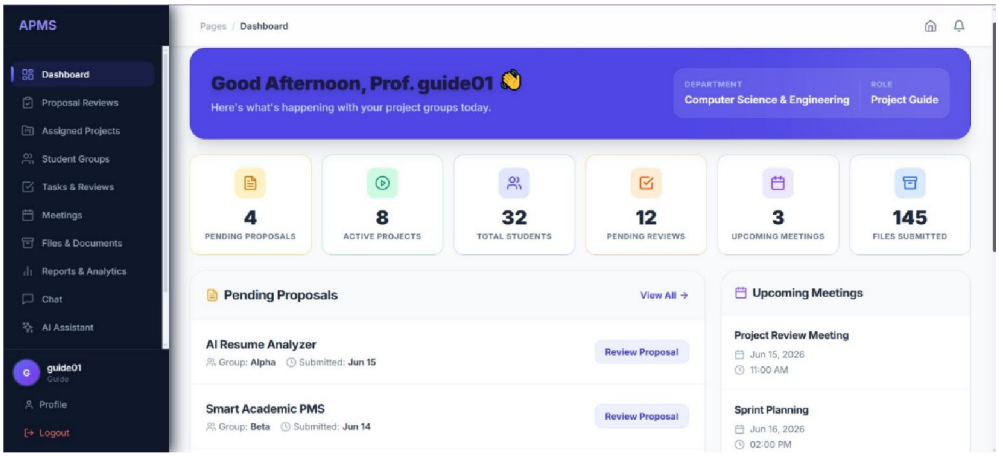
DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 6, June 2026
Impact Factor: 8.2

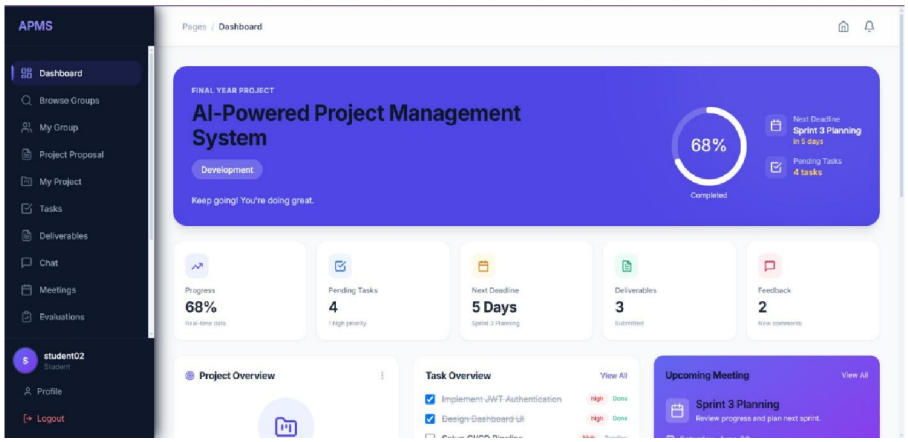
Screenshot 1: Registration Page



Screenshot 2: Student Dashboard

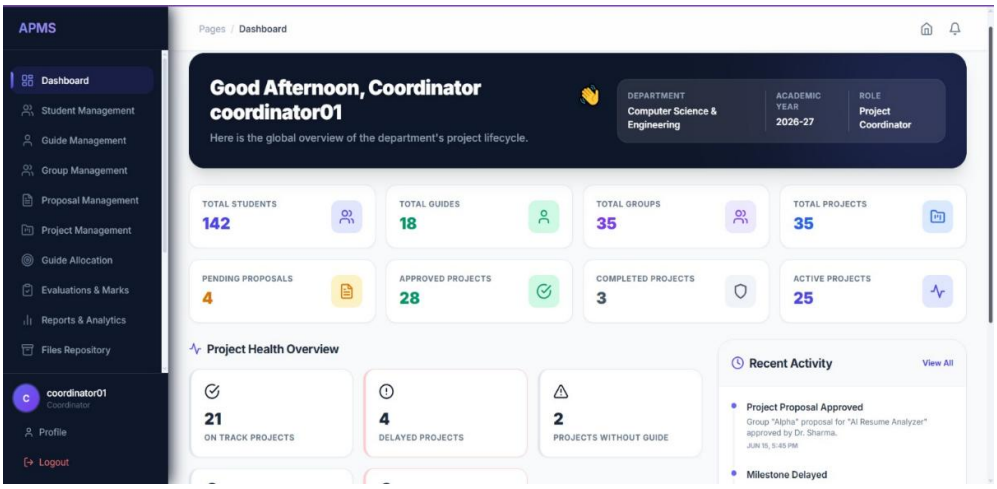


Screenshot 3: Guide Dashboard



IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 6, June 2026
Impact Factor: 8.2

Screenshot 4: Coordinator Dashboard



4.2 Backend Development

Node.js and Express.js manage client requests and server responses. RESTful APIs facilitate communication between the frontend and backend while handling authentication, project management, guide allocation, evaluations, and report generation.

Authentication & Security: JWT-based authentication and role-based access control ensure secure access for Students, Guides, and Coordinators.

Real-Time Communication: Socket.IO enables instant messaging, notifications, and live updates across the platform.

File Management: Multer is used for secure upload and storage of project proposals, reports, and supporting documents.

4.3 Database Design

User Collection: Stores details of Students, Guides, and Coordinators.

Group Collection: Maintains group information, members, leaders, and join keys.

Project Collection: Stores project titles, domains, status, and assigned guides.

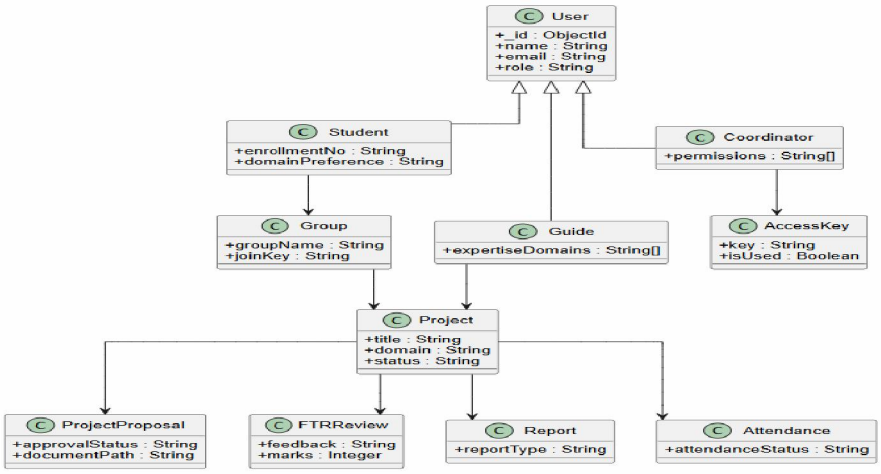
Proposal Collection: Manages project proposals, approval status, and uploaded documents.

Review Collection: Records FTR reviews, feedback, attendance, and evaluation marks.

Notification Collection: Stores announcements, alerts, and system notifications.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 6, June 2026
Impact Factor: 8.2

Figure 3: Class Diagram



V. RELATED WORK

Several academic project management systems have been developed to support project submission, evaluation, and supervision. However, many existing solutions lack features such as intelligent guide allocation, automated group formation, and real-time collaboration. As a result, project management in many institutions still relies on manual coordination and communication.

Recent studies highlight the importance of centralized platforms for improving project tracking and academic supervision. The proposed Smart Online Academic Project Management System addresses these limitations by integrating guide allocation, project monitoring, real-time communication, and digital evaluation within a single platform, thereby improving efficiency and transparency in academic project management.

VI. RESULT & DISCUSSION

The proposed Smart Online Academic Project Management System was tested using simulated academic project workflows involving students, guides, and coordinators. The results indicate significant improvements in project monitoring, communication efficiency, and administrative management.

Key observations include:

- Reduced time required for guide allocation through automated recommendation mechanisms.
- Improved communication through centralized notifications and real-time messaging.
- Faster project tracking and evaluation compared to traditional manual methods.
- Enhanced transparency in attendance, reviews, and project progress monitoring.

Table 2: Impact of SOAPMS on Academic Project Management

Metric	Before System Implementation	After System Implementation
Communication Method	Multiple Platforms	Centralized
Report Generation	Time Consuming	Automated
User Satisfaction	Moderate	High

6.1 System Testing Observations

The developed system was tested using multiple project management scenarios involving student registration, group formation, guide allocation, proposal submission, and project evaluation workflows. Testing confirmed that the system successfully automated several manual processes and provided centralized project monitoring capabilities.

The implementation demonstrated:

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 6, June 2026 Impact Factor: 8.2

- Successful role-based access for Students, Guides, and Coordinators.
- Accurate project proposal submission and approval workflow.
- Effective real-time communication through notifications and messaging.
- Automated guide allocation based on predefined criteria.
- Reliable report generation and project tracking functionalities.

VII. CONCLUSION & FUTURE SCOPE

7.1 Conclusion

The proposed Smart Online Academic Project Management System provides a centralized platform for managing the complete academic project lifecycle. The system successfully automates group formation, guide allocation, project monitoring, communication, and evaluation processes. By integrating real-time collaboration, digital reviews, and automated reporting, the platform improves transparency, reduces administrative workload, and enhances coordination among students, guides, and coordinators.

7.2 Future Enhancements

- Integration of AI-powered academic assistants for project guidance and query resolution.
- Automated project report evaluation and feedback generation using Artificial Intelligence.
- Mobile application support for improved accessibility and user engagement.
- Advanced analytics and predictive monitoring for identifying project risks and delays.
- Integration with Learning Management Systems (LMS) and institutional ERP platforms.
- Multi-institution deployment to support project management across different colleges and universities.

REFERENCES

[1] J. Wang, "*A Web-based Innovation and Entrepreneurship Project Management System Design for College Students*," *2024 International Conference on Distributed Computing and Electrical Circuits and Electronics (ICDCECE)*, IEEE, 2024, DOI: 10.1109/ICDSCNC62492.2024.10939838

[2] R. Qi, Y. Qi, and H. Tang, "*Analysis of Multi-Objective Integrated Management System of Engineering Project Based on Ant Colony Algorithm*," *2023 International Conference on Distributed Systems, Computer Networks and Cybersecurity (ICDSCNC)*, 2023, DOI: 10.1109/ICDCECE57866.2023.10150990.

[3] V. Arumugam, M. Shankar, and A. B. Aslam, "*Academic Project Information Management System*," *2021 IEEE International Conference on Computer Communication and Informatics (ICCCI)*, Coimbatore, India, 2021, DOI: 10.1109/ICCCI50826.2021.9402561.

[4] S. I. Ismail, S. N. Sulaiman, and N. N. Ismail, "*Online Project Evaluation and Supervision System (oPENs),*" *2017 IEEE 9th International Conference on Engineering Education (ICEED)*, Kanazawa, Japan, 2017, pp. 99–104, DOI: 10.1109/ICEED.2017.8251185.

[5] Feng Wang, Ji Wang, Hao Cai, Gang Yang,"*Research and Application of Visual Engineering Project Management and Control System Based on Multimodal Information*,"2024 16th IEEE International Conference on Computational Intelligence and Communication Networks (CICN), DOI: 10.1109/CICN.2024.188,IEEE, pp. 1136–1140, 2024.

[6] Liubava Chernova, Serhii Chernov, Iryna Zhuravel, Lyudmila Chernova, Anatoliy Zubarev, Kateryna Kolesnikova,"*Structural Analysis in the Methodology of Building an IT Project Model*,"2024 IEEE 4th International Conference on Smart Information Systems and Technologies (SIST),Astana, Kazakhstan, May 15–17, 024, DOI:10.1109/SIST61555.2024.10629514.

[7]A. A. Santoso, M. Y. S. A. Winata, M. L. A. Cahyadi, and I. R. Murmanto, "*Approval System Development in Information System for Project Management in a Retail Company*," in *Proc. 2024 International Conference on*

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 6, June 2026
Impact Factor: 8.2

Intelligent Cybernetics Technology & Applications (ICICyTA), pp. 401–406, IEEE, 2024. DOI: 10.1109/ICICYTA64807.2024.10912934.

[8] A. Tripathi and K. T. V. Reddy, "*Development of an Intelligent System for Predictive Analysis of Student Academic Performance using Machine Learning Techniques*," in *Proc. 2025 International Conference on Inventive Computation Technologies (ICICT)*, IEEE, pp. 1110–1117, DOI: 10.1109/ICICT64420.2025.11005033, ISBN: 979-8-3315-1224-8.

APPENDICES

Appendix A: Data flow Diagrams

Figure 4: Data Flow diagram DFD0

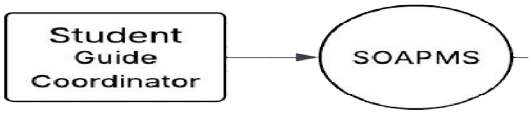


Figure 5: Data Flow diagram DFD1

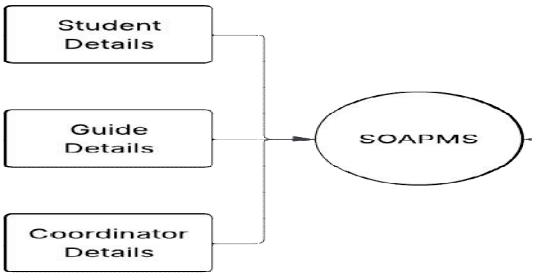
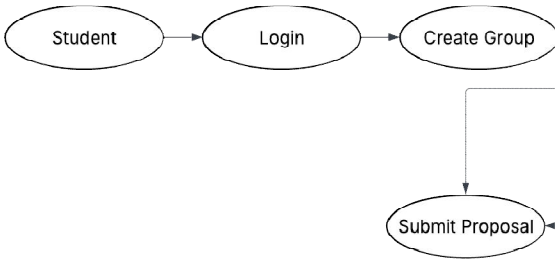


Figure 6: Data Flow diagram DFD2



IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 6, June 2026
Impact Factor: 8.2

APPENDIX B: OVERALL DESIGN

Figure 7.1: Activity Diagram (Student Activity)

Figure 7.2: Activity Diagram (Guide Activity)

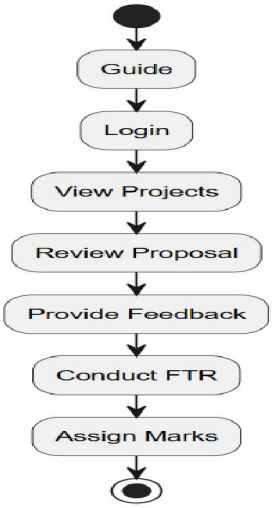
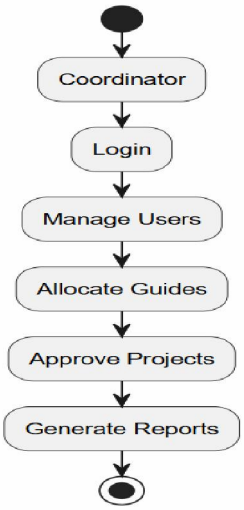


Figure 7.3: Activity Diagram (Coordinator Activity)



APPENDIX C: TABLE DEFINITIONS

User Table	Group Table	Project Table
user_id (PK)	group_id (PK)	project_id (PK)
name	group_name	title
email	leader_id (FK)	domain
password	join_key	status
role	member_ids	guide_id (FK)

Proposal Table	FTR Review Table	Notification Table
proposal_id (PK)	review_id (PK)	notification_id (PK)
project_id (FK)	project_id (FK)	user_id (FK)
document_path	feedback	title
approval_status	marks	message
submission_date	review_date	created_at

DOI: 10.48175/568