Department of Computer Science and Information Technology

CT-499 Final Year Design Project

Proposal for the Final Year Design Project

Title	Development of an Interactive Online Application for Real-Time Audience Engagement and Smart Assessment (MindSync)

Domain	Domain 1 Front End Development	Domain 2 Back End Development	Domain 3 Real-Time Data Processing and management	Domain 4 Cloud Deployment	Domain 5	Domain 6

1. Nature of Project [Tick all that applicable]

☒ New Project OR ☐ Extension of Existing Project	☒ Industrial Collaboration	☐ Funded
☐ Other Department Collaboration (If yes) Department Name_____	☐ Other Academic Institution Collaboration (If yes) Institution Name_____	

2. Brief Outline (*Problem Identification and Significance*)

Background:
In modern educational settings, corporate environments, and public events, audience engagement is often limited by traditional presentation methods. These methods are typically one-directional, leading to a passive audience. As the need for interactive and engaging presentations grows, there is a demand for platforms that allow real-time interaction, feedback, and assessment.

Problem Statement:
Existing solutions like Mentimeter and Kahoot provide certain features but lack a comprehensive, customizable platform that integrates various interactive elements with detailed analytics and smart assessment tools. Furthermore, these platforms often require users to switch between different applications, leading to a fragmented experience. The problem lies in the absence of a single, cohesive platform that provides seamless integration of interactive features with robust back-end support for real-time data processing, security, and scalability.

Project Significance:
The proposed project will fill this gap by developing an all-in-one web application that not only incorporates various interactive elements but also offers smart assessment features with comprehensive analytics. This application will enhance the overall engagement and effectiveness of presentations, making it a valuable tool for educators, corporate trainers, and event organizers. By providing real-time interaction and feedback, the platform aims to transform traditional presentations into dynamic, interactive experiences that foster better learning and understanding

3. Objectives

User Interface Development:

Objective: Design and implement an intuitive, user-friendly interface for presenters and participants.

Details: The interface will be built using Next.js to ensure responsiveness and ease of use. It will include customizable templates for various types of presentations and interactive elements.

Outcome: A clean, modern interface that facilitates easy navigation and interaction for users on various devices.

Integration of Interactive Elements:

Objective: Develop and integrate interactive features such as polls, quizzes, word clouds, and Q&A sessions into presentations.

Details: These elements will be dynamically generated and managed via a real-time database. Presenters can choose from a library of interactive components to include in their presentations.

Outcome: A set of interactive tools that can be seamlessly integrated into any presentation, enhancing audience participation.

Real-Time Data Processing:

Objective: Implement robust real-time data processing to support smooth audience interaction.

Details: Utilizing WebSockets and other real-time frameworks, the application will handle multiple concurrent connections, process data in real-time, and provide immediate feedback to participants.

Outcome: A system capable of processing high volumes of data in real-time without latency, ensuring a smooth user experience.

Smart Assessment and Analytics:

Objective: Incorporate smart assessment features that include timed quizzes, instant feedback, scoring, leaderboards, and detailed analytics.

Details: The assessment tools will be designed to measure audience understanding and engagement effectively. The system will generate real-time reports and analytics that can be exported for further analysis.

Outcome: A comprehensive assessment system that provides immediate feedback and detailed analytics, aiding presenters in evaluating audience performance.

Scalability and Reliability:

Objective: Ensure the application is scalable and reliable, capable of supporting large audiences.

Details: The application will be deployed on a cloud platform (AWS or Azure) to ensure high availability, scalability, and fault tolerance. Load balancing and auto-scaling features will be implemented to manage varying audience sizes.

Outcome: A robust, scalable application that performs consistently under different loads, ensuring reliability in various scenarios..

4. Scope

Target Users

Educators: Enhance classroom engagement with interactive lectures and assessments.
Corporate Trainers: Improve corporate training sessions by making them more interactive and insightful.
Event Organizers: Increase participation and engagement in public events or seminars.

Platforms

Web-Based Application: Accessible via web browsers on desktops, laptops, tablets, and smartphones. The responsive design ensures optimal performance on all devices.
Cross-Platform Compatibility: The application will be built to function across different operating systems (Windows, macOS, iOS, Android) ensuring widespread usability.

Usage Scenarios

Educational Settings: Use in classrooms for interactive lectures, quizzes, and feedback sessions.
Corporate Environments: Utilize in training programs, team meetings, and corporate events for real-time feedback and assessment.
Public Events: Engage large audiences during conferences, seminars, and workshops through live polls, Q&A, and interactive activities.

Scalability

Support for Large Audiences: The system will be designed to handle small to large-scale events with thousands of participants simultaneously.
Real-Time Feedback: Ensure real-time processing and feedback for all participants without latency.

5. Proposed Methodology

Requirement Analysis

Objective: Gather detailed requirements from potential users (educators, corporate trainers, event organizers).
Activities: Conduct interviews, surveys, and focus groups to understand the needs and pain points of target users.
Outcome: A detailed requirements document that outlines the features and functionalities needed in the application.

UI/UX Design

Objective: Design a user-friendly and visually appealing interface that enhances user

experience.
Tools: Figma, Adobe XD for wireframing, prototyping, and design.
Activities:
Develop wireframes and prototypes based on the requirements analysis.
Conduct usability testing to refine the interface and improve user experience.
Collaborate with front-end developers to ensure accurate implementation of the design.
Outcome: A well-designed, user-centric interface that is both visually appealing and easy to use, improving overall user experience.

Frontend Development

Objective: Build a responsive and interactive user interface.
Tools: Next.js for front-end development, Bootstrap for responsive design.
Activities:
Design wireframes and prototypes based on user requirements.
Implement UI components, navigation, and interaction patterns.
Ensure cross-browser compatibility and responsive design.
Outcome: A user-friendly, responsive front-end interface that is easy to navigate and use.

Backend Development

Objective: Develop a robust server-side application to handle real-time data processing and user management.
Tools: Node.js, Express.js, Django, WebSockets for real-time communication and AI features.
Activities:
Set up a server to manage user sessions, handle real-time interactions, and process data.
Implement authentication and authorization mechanisms.
Develop APIs for data retrieval, storage, and processing.
Outcome: A powerful backend system capable of handling multiple users and real-time data efficiently.

Database Management

Objective: Implement a scalable database solution to store user data, quiz results, and analytics.
Tools: PostgreSQL for relational data, MongoDB for NoSQL data.
Activities:
Design the database schema based on application requirements.
Implement data storage, retrieval, and management functionalities.
Ensure data security and integrity.
Outcome: A secure and scalable database capable of handling large volumes of data efficiently.

Cloud Deployment

Objective: Deploy the application on a cloud platform to ensure high availability and

scalability.
Tools: AWS or Azure for cloud deployment, Docker for containerization.
Activities:
Set up cloud infrastructure and deploy the application.
Implement load balancing, auto-scaling, and backup solutions.
Monitor application performance and optimize for cost and efficiency.
Outcome: A highly available and scalable application hosted on a reliable cloud platform.

Testing and Quality Assurance

Objective: Ensure the application is bug-free and performs well under different conditions.
Tools: Jest for unit testing, Postman for API testing, Cypress for automated UI testing, JMeter for performance testing.
Activities:
Conduct unit testing, integration testing, and system testing.
Perform stress testing to ensure the application can handle high loads.
Collect and analyze feedback from beta users.
Outcome: A thoroughly tested application that meets quality standards and performs reliably under various conditions.

Final Review and Deployment

Objective: Review the application with stakeholders and prepare for the final launch.
Activities:
Conduct a final review with the project team and stakeholders.
Make necessary adjustments based on feedback.
Deploy the final version of the application and conduct a launch event.
Outcome: A polished, fully functional application ready for use by the target audience.

Functional Features

1. **User Authentication and Authorization: Roles:** Admin, Presenter, Participant.
2. **Interactive Presentation Creation:** Customization options for themes, layout, and question types.
3. **Real-Time Audience Participation:** Supported interactions: Polls, quizzes, word clouds, Q&A sessions.
4. **Smart Assessment and Scoring:** Features: Timed quizzes, instant feedback, leaderboards.
5. **Data Analytics and Reporting:** Analytics on participant responses, engagement rates, and quiz scores.
6. **Presentation Management: Features:** Save, edit, and manage presentations; version control and export options.
7. **Cloud-Based Deployment:** Web-based access via various devices.
8. **Multimedia Integration:** Supports images, videos, and links.
9. **Notifications and Alerts:** Real-time notifications via email and in-app alerts.

10. Admin Dashboard: User management, session monitoring, and system health checks.

Non-Functional Features

1. Scalability: Supports up to 10,000 concurrent users.

2. Performance: Target response time under 2 seconds.

3. Reliability and Availability: 99.9% uptime, with redundant servers and failover systems.

4. Usability: User satisfaction target of 85% or higher.

5. Compatibility: Cross-device and cross-browser support.

6. Maintainability: Modular architecture with well-documented code.

7. Localization and Internationalization: Multilingual support, adaptable for different regions.

8. Data Backup and Recovery: Daily automated backups with a 30-day retention period.

6. Resources Involved

Full Stack Development Tools

UI/UX: Figma and Adobe XD: For creating wireframes, prototypes, final UI designs and including interaction design.

Frontend: Next.js, Bootstrap, HTML5, CSS3, JavaScript.

Backend: Node.js, Express.js, Django, WebSockets.

Database: PostgreSQL, MongoDB.

Cloud Services: AWS or Azure for deployment, Docker for containerization.

Real-Time Data Processing Frameworks

WebSockets: For real-time communication between clients and servers.

Socket.io: For handling real-time event-based communication.

Testing Tools

Jest: For unit testing JavaScript code.

Cypress: For automated testing of the user interface.

Postman: For API testing

Jmeter: For performance and load testing.

Additional Resources

Design Tools: Figma for UI/UX design and wireframing.

Project Management: Jira or Trello for task management and collaboration.

Collaboration Tools: GitHub for version control and team collaboration.

7. Description of Industrial Support (If any)

Gaditek

8. SDGs (If Applicable)

☐ No Poverty	☐ Zero Hunger
☐ Good Health and Well-Being	☒Quality Education
☐ Gender Equality	☐ Clean water and Sanitation
☐ Affordable and Clean Energy	☐ Decent Work and Economic growth
☒ Industry, Innovations and Infrastructure	☐ Reduced Inequalities
☐ Sustainable Cities and Communities	☐ Responsible Consumption and Production
☐ Climate action	☐ Life Below Water
☐ Life on Land	☐ Peace, Justice and Strong Institutions
☐ Partnerships	

9. Gantt Chart

Tasks	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month	7th Month	8th Month	9th Month	10th Month	11th Month	12th Month
Project planning	✓											
Scope and Identifying Features	✓											
Creating wireframe	✓											
Setting up the project tools including development, testing, ui UX design	✓											
Database Designing including ERD's		✓	✓									
Creating Apis for auth		✓	✓	✓								
Frontend for the auth apis			✓	✓								

Static screens	✓	✓									
Features		✓	✓	✓							
Deploying on Vercel and Testing simultaneously					✓	✓	✓	✓	✓	✓	
Bug Fixing		✓	✓	✓	✓	✓	✓	✓	✓	✓	
Integrating and Testing AI features					✓	✓	✓	✓			
Deployment on AWS											✓

10. Details of Project Team

i. Students

No.	Name	Seat No.	Signature (s)
1	Muhammad Affan	CT-21027	
2	Syed Mudassir Hussain	CT-21022	
3	Junaid Hussain	CT-21028	
4	Pir Salman Shah	CT-21036	

ii. Supervisors / Advisors

	Name	Designation & Department	Address & Contact	Signature(s
Supervisor	Dr. Muhammad Mubashir	Chairman BCIT Department	Department of Computer Science & Information Technology NEDUET main campus 02199261261	
Co-Supervisor (If any)	Dr. Usman Amjad	Assistant Professor BCIT Department	Department of Computer Science & Information Technology NEDUET main usmanamjad@neduet.edu.pk campus 9221-99261261	

Industrial Advisor (If any)				

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Project Serial No.: _____ Dated: _____	Signature Convener Steering Committee	Signature FYP Coordinator

☐ Proposal Approved	☐ Not Approved	☐ Returned for Clarification / Modification

Comments: (if any)	

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(Signature of Chairperson)

Date: _____