Academic Task: REPORT FOR PROJECT SUBMISSION

Course Code: INT 222, INT 252

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TITLE:- **Virtual Classroom**

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to **Lovely Professional University (LPU), Phagwara, Punjab**, for providing me with the opportunity, academic environment, and infrastructure required to successfully complete this project. I am deeply indebted to my faculty guide for their continuous guidance, valuable suggestions, constructive feedback, and encouragement at every stage of this project. Their expertise and insights played a crucial role in shaping the direction and quality of this work.

I would also like to thank the Head of the Department and all faculty members for their cooperation and support throughout the course duration. I extend my sincere appreciation to my classmates and friends for their discussions, suggestions, and moral support. Finally, I express my heartfelt gratitude to my parents and family members for their constant motivation, patience, and encouragement, without which this project would not have been possible.

This project has been a valuable learning experience for me, as it provided an opportunity to practically apply the theoretical concepts studied during the course. While working on this project, I developed a better understanding of research, analysis, and systematic problem-solving. The process involved continuous learning, self-improvement, and overcoming various challenges, which helped me build confidence and responsibility. This work has not only enhanced my technical skills but has also contributed significantly to my overall academic and personal development.

DECLARATION

I hereby declare that the project entitled **“Design and Development of a Virtual Classroom System Using MERN Stack”** is an original and authentic work carried out by me under the guidance of the faculty of Lovely Professional University, Phagwara, Punjab. This project has not been submitted earlier, either in part or in full, to any other university or institution for the award of any degree, diploma, or certification.

All the information, data, design, development, and results presented in this report are based on my own work and study. Wherever secondary sources of information have been used, they have been duly acknowledged. I further declare that this work complies with the academic integrity and ethical standards prescribed by the university.

I also affirm that this project was completed during the prescribed academic period and under the supervision of the concerned faculty. The work presented reflects my sincere efforts, and any resemblance to existing systems is purely coincidental. I take full responsibility for the authenticity of the implementation, functionality, and conclusions drawn in this project. This report follows all the rules and regulations set by Lovely Professional University regarding project work and academic conduct.

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INTRODUCTION

With the rapid advancement of digital technology, the education sector has witnessed a significant shift towards online and virtual learning platforms. Traditional classroom-based education is increasingly being complemented or replaced by virtual classrooms that enable learning beyond physical boundaries. Virtual classrooms provide flexibility, accessibility, and real-time interaction between teachers and students.

A virtual classroom system allows educators to create online classes, manage students, and communicate effectively using digital tools. Students can join classes remotely, interact with teachers, and participate in academic discussions. Such systems became especially important during times when physical classrooms were inaccessible, highlighting the need for reliable and interactive online learning solutions.

This project focuses on the design and development of a **Virtual Classroom System using the MERN stack**, which supports role-based access for teachers and students. The system aims to create a structured online learning environment where teachers can create and manage classes, and students can join classes using a unique class ID and interact with teachers through messaging features.

PROJECT OVERVIEW

The objective of this project is to develop a full-stack **Virtual Classroom web application** that enables effective interaction between teachers and students in an online environment. The system provides two types of users: **Teacher** and **Student**, each having a dedicated dashboard with specific functionalities.

Teachers can create virtual classes by generating a unique class ID, which can be shared with students. Students can join a class using this class ID and communicate with the teacher through messaging features. The application ensures secure authentication and smooth navigation based on user roles.

The project aims to simplify online classroom management, promote real-time communication, and provide a structured platform for virtual learning. By leveraging the MERN stack, the system ensures scalability, responsiveness, and efficient data handling.

MODULES

1. USER AUTHENTICATION MODULE

The User Authentication Module manages user registration and login functionality. It supports two roles: **Teacher** and **Student**. Based on the selected role during login, users are redirected to their respective dashboards.

This module ensures secure access using authentication mechanisms and prevents unauthorized users from accessing restricted features.

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2. TEACHER DASHBOARD MODULE

The Teacher Dashboard Module provides functionalities exclusive to teachers. Teachers can create new virtual classes by generating a unique **Class ID**. This Class ID is shared with students to allow them to join the class.

Teachers can also view enrolled students and interact with them through messaging. This module enables teachers to manage their classes efficiently in a virtual environment.

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3. STUDENT DASHBOARD MODULE

The Student Dashboard Module allows students to join a virtual class using the Class ID provided by the teacher. Once joined, students can view class details and communicate with the teacher through messages.

This module ensures that students can easily access their classes and participate in academic interactions.

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4. CLASS MANAGEMENT MODULE

The Class Management Module handles the creation, joining, and storage of class-related information. It maintains records of class IDs, teachers associated with classes, and enrolled students.

This module ensures that only valid users can join a class using the correct Class ID and maintains the integrity of class data.

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5. COMMUNICATION MODULE

The Communication Module enables interaction between teachers and students through messaging. It supports real-time or near real-time communication within a class environment.

This module enhances engagement and allows students to clarify doubts and teachers to provide guidance effectively.

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6. DATABASE MANAGEMENT MODULE

The Database Management Module stores user details, class information, and messages securely. MongoDB is used to manage data efficiently and support scalability.

Proper data validation and storage mechanisms are implemented to ensure data consistency and security.

TOOLS USED

• **MongoDB**: Used as the database to store user information, class details, and messages.
• **Express.js**: Used to build RESTful APIs and manage server-side routing.
• **React.js**: Used to create an interactive and responsive user interface.
• **Node.js**: Used for backend development and handling server-side logic.
• **Postman**: Used for testing APIs during development.
• **VS Code**: Used as the primary code editor for development.

These tools collectively support the development of a robust and scalable virtual classroom system.

PROGRAMMING LANGUAGES USED

• **JavaScript**: Used as the core programming language for both frontend and backend development.
• **ReactJS**: Used for building the frontend interface, dashboards, and user interactions.
• **Node.js**: Used for backend logic, authentication, and API handling.
• **HTML**: Used to structure the web pages and layout of the application.

• **CSS**: Used for styling the application and creating a responsive and user-friendly interface.

Together, these technologies form the **MERN stack**, enabling the development of a complete full-stack Virtual Classroom application

GitHub Link:-

https://github.com/am12j/virtualclassroomfronted.git

LinkedIn Link:-

https://www.linkedin.com/feed/update/urn:li:activity:7408546829681721344/?originTrackingId=IYW4Y2JxR%2F6CY6sGveQ8UQ%3D%3D