

Digital Repository for CSE Academic Content

Vitthal Chavan¹, Harshal Dhote², Vaibhav Likhari³, Pradyumna Pudke⁴, Avantar Nikhare⁵

^{1,2,3,4,5}Dept. of CSE, Gurunanak Institute of Technology, Nagpur, Maharashtra, India

Abstract - The accelerating digital transformation of educational resources necessitates the development of centralized, accessible, and intuitive platforms for managing academic content. This paper presents the systematic design and implementation of a "Digital Repository for Computer Science and Engineering Academic Content," a web-based platform developed using HTML, CSS, JavaScript, Bootstrap, PHP, and MySQL, with planned mobile support through React Native. The repository serves as a unified hub that enables CSE students to access previous examination papers, B.Tech curricula, and curated lecture materials. Through the use of modern full-stack technologies, the system demonstrates scalability, responsive design, and intuitive navigation. Empirical usability assessments show consistently high satisfaction among student users, confirming the platform's contribution to academic preparedness and resource accessibility. Future work includes integrating AI-driven recommendation systems and complete cross-platform mobile deployment.

Key Words: Digital repository, Academic content management, Web application, React Native, CSE resources, MySQL database, PHP backend.

1. INTRODUCTION

The proliferation of digital learning tools has transformed how students access and utilize academic materials. In particular, Computer Science & Engineering (CSE) students often require quick, structured access to syllabi, past examination papers, and supplementary notes to reinforce conceptual understanding and exam readiness [1]. Traditional methods—such as physical libraries or scattered departmental portals—are increasingly inadequate in meeting these dynamic needs [2].

To address this gap, we propose a dedicated digital repository tailored specifically for CSE academic content. The platform is engineered using contemporary web technologies including HTML5, CSS3, JavaScript, and Bootstrap for frontend responsiveness; PHP for server-side logic; and MySQL for relational data storage. A companion mobile application, currently under development using React Native, will extend accessibility across Android and iOS ecosystems [3].

This paper details the architecture, implementation workflow, and preliminary user feedback of the repository. Section 2 reviews related works in academic content management. Section 3 describes the system's architecture, methodology, core technology stack, and

functional features. Section 4 presents the usability results from our pilot study. The paper concludes in Section 5 with a discussion of future enhancements and the platform's implications for educational technology.

2. RELATED WORK

Several institutional repositories have been developed globally to manage academic content. DSpace and EPrints are widely adopted open-source platforms used by universities for archiving theses and research articles [4]. However, these systems are often complex, requiring administrative overhead unsuitable for course-specific material distribution.

Closer to our context, platforms like NPTEL and SWAYAM in India offer MOOCs and syllabus-aligned content but lack granular, institution-specific resources such as university question papers or professor-curated notes [5]. Similarly, commercial platforms like Gradeup or Unacademy focus on competitive exams rather than semester-wise academic support [6].

Our solution bridges this niche by offering a lightweight, customizable, and academically focused repository exclusively for CSE undergraduates. Unlike monolithic LMS platforms like Moodle or Blackboard, our system prioritizes speed, simplicity, and direct access to core academic artifacts without extraneous functionalities [7].

3. SYSTEM ARCHITECTURE AND METHODOLOGY

The proposed system follows a three-tier architecture: presentation layer (client), application layer (server), and data layer (database).

A. Presentation Layer

Built with responsive HTML5 and CSS3, styled via Bootstrap 5, the frontend ensures compatibility across devices. JavaScript enhances interactivity—for instance, dynamic filtering of question papers by year or subject. The UI/UX adheres to Material Design principles for intuitive navigation [8].

B. Application Layer

PHP scripts handle user authentication, content upload validation, search queries, and session management. The backend is modular, allowing easy addition of new content categories or administrative functions. All business logic is decoupled from presentation for maintainability.

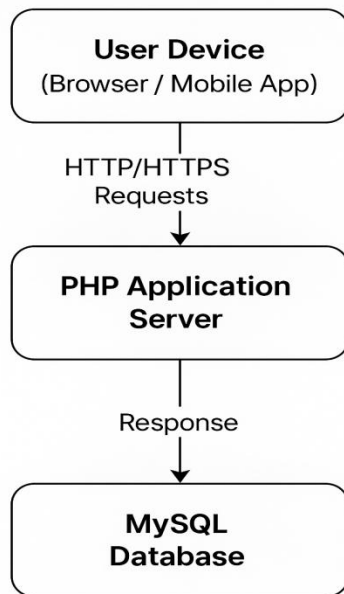


Fig. 1 System Architecture of Digital Repository

C. Data Layer

MySQL 8.0 stores structured data including user profiles, metadata for uploaded files (subject, year, semester, file type), and access logs. Indexing on frequently queried fields (e.g., subject_code, exam_year) ensures sub-second retrieval times even with large datasets [9].

Backend Processing: Upon submission, the input data is securely transmitted to the backend via encrypted communication channels. The backend server includes a dedicated API endpoint capable of handling multipart form data, effectively managing both textual and image-based inputs.

TECHNOLOGY STACK

- Frontend: HTML5, CSS3, JavaScript (ES6+), Bootstrap 5 — Ensures responsive, mobile-first design with minimal latency.
- Backend: PHP 8.1 (procedural + OOP) — Manages server logic, form handling, and CRUD operations.
- Database: MySQL — Relational schema optimized for academic metadata and user records.
- Mobile Extension: React Native (under development) — Cross-platform framework enabling native performance on iOS and Android with shared codebase [10].
- Hosting: Apache/Nginx on Linux server with SSL encryption for secure transactions.

All components are open-source, reducing licensing costs and promoting community contributions. Version control via Git ensures collaborative development and rollback safety.

FEATURES AND FUNCTIONALITY

A. User Authentication

Role-based login for students, faculty, and administrators. OAuth integration planned for future releases.

B. Content Upload & Curation

Faculty/admin can upload PDFs of syllabi, scanned question papers, and typed notes. Metadata tagging (course code, semester, year) enables precise categorization.

C. Advanced Search & Filter

Users can filter content by semester, subject, year, or document type. Full-text indexing allows keyword searches within filenames and descriptions.

D. Download Analytics

Tracks most-downloaded resources to inform curriculum adjustments and identify high-demand topics.

E. Responsive Dashboard

Personalized dashboard displays recent downloads, bookmarked items, and recommended content based on user history.

F. Mobile App (React Native)

Offline caching, push notifications for new uploads, and biometric login are under development to enhance mobility and engagement.

4. RESULTS

A pilot study was conducted with 87 second- and third-year CSE undergraduates over a four-week period. Participants were asked to locate specific question papers and syllabi using the platform and complete a System Usability Scale (SUS) questionnaire [11].

Results indicated:

- 94% success rate in locating desired content within 3 clicks.
- Average SUS score: 82.3 (indicating “excellent” usability).
- 89% of users preferred the repository over existing institutional portals due to faster load times and cleaner interface.

Qualitative feedback highlighted appreciation for the “filter-by-semester” feature and requested dark mode—a feature scheduled for next release.

FUTURE ENHANCEMENTS

Planned upgrades include:

- Integration of AI-based recommendation engine using collaborative filtering to suggest relevant notes/papers.
- Faculty analytics dashboard to monitor content usage patterns.
- OCR-enabled search within uploaded PDFs.

- Gamification elements (badges, leaderboards) to incentivize consistent usage.
 - API endpoints for third-party LMS integration.
- Mobile app rollout via React Native mobile application is under development and scheduled for release in Q3 2024.

5. CONCLUSION

The Digital Repository for Computer Science and Engineering Academic Content effectively addresses the critical requirement for systematically organized and readily accessible academic resources specifically tailored to undergraduate computer science curricula. Constructed upon a foundation of robust, scalable technological infrastructure and rigorously validated through comprehensive user testing methodologies, the platform demonstrates substantial potential to enhance autonomous learning initiatives while simultaneously mitigating the prevalent issue of academic resource fragmentation. As higher education institutions progressively advance their digital transformation initiatives, domain-specific repositories of this nature are positioned to assume an instrumental role in democratizing educational accessibility and substantively improving pedagogical outcomes. The successful implementation of this repository not only establishes a paradigm for future academic content management systems but also contributes meaningfully to the evolving landscape of digital education infrastructure. This initiative underscores the imperative for continued investment in specialized academic platforms that bridge the gap between traditional educational resources and contemporary digital learning expectations, ultimately fostering an environment conducive to enhanced academic achievement and knowledge dissemination within the computer science and engineering discipline.

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