



An Intelligent Learning Path Dashboard for Enhancing Skills Through Personalized Learning

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ABSTRACT- *This project presents SkillAura, an intelligent and gamified Learning Path Dashboard designed to enhance the technical and professional skills of students, graduates, and working professionals. The system addresses the common problem of unstructured online learning, where learners fall into “tutorial hell” due to the absence of a clear, sequential learning roadmap. SkillAura organizes technical domains into structured learning paths consisting of modules, quizzes, and practical projects, allowing users to track completion, earn experience points, and monitor their overall skill development through an interactive dashboard. The platform is built using a full-stack architecture with React.js for the frontend, Flask for the backend REST APIs, MongoDB Atlas as the cloud database, Tailwind CSS for styling, and JWT-based authentication for secure access. An Admin Command Center is also provided, functioning as a complete content management system for managing users, learning paths, quizzes,*

projects, and platform analytics. Traditional learning platforms rely on scattered courses and manual tracking, resulting in reduced motivation and inconsistent progress. SkillAura overcomes these limitations by combining personalized roadmaps, gamification, and progress analytics into a single, centralized, and learner-centric platform.

KEYWORDS: *Learning Path Dashboard, Skill Enhancement, Gamification, Personalized Learning, MERN/Flask Stack, Progress Tracking, Learning Management System.*

INTRODUCTION

Continuous learning and skill development have become essential for students and professionals to remain competitive in a fast-changing technology landscape. While numerous online learning platforms exist, learners often struggle with unstructured content, lack of personalized guidance, and difficulty tracking their progress across multiple courses.



SkillAura addresses these challenges by combining structured learning roadmaps with gamified elements such as experience points, streaks, and achievements. The proposed system not only organizes learning content but also motivates users through an engaging, dashboard-driven experience that visualizes progress and guides them from foundational concepts to advanced, career-relevant skills.

LITERATURE SURVEY

Learning management and skill development have become significant research areas due to the growing demand for continuous, technology-driven education. A Learning Management System (LMS) is generally defined as a software platform that enables the creation, delivery, and monitoring of educational content, providing learners with structured access to courses, assessments, and progress records. The core concept behind modern learning dashboards revolves around organizing scattered educational resources into a systematic, trackable, and personalized learning journey.

RELATED WORK

Several researchers and platforms have contributed to the evolution of online learning systems with the goal of improving accessibility, personalization, and learner engagement. Early learning management systems focused primarily on content delivery through video lectures and

static course catalogs, offering little support for structured sequencing or progress visualization.

Popular platforms such as Coursera, Udemy, LinkedIn Learning, and edX later introduced certification tracking and course recommendations, but they continue to operate largely as independent silos, leaving learners to manually consolidate their progress across platforms. Recent research has explored integrating Artificial Intelligence and Machine Learning into learning systems to generate personalized recommendations based on user history and interests, motivating the design of SkillAura's structured and analytics-driven approach.

EXISTING SYSTEM

Existing learning platforms mostly depend on individual, standalone courses without a systematic learning sequence, often leading learners into “tutorial hell,” where they consume large amounts of content without practical understanding.

Course records, certifications, and progress remain scattered across multiple applications, making it difficult for users to monitor their overall skill development. Most platforms provide limited personalization, minimal visualization of learning progress, and no unified mechanism for managing learning activities,



certifications, and future recommendations. As a result, learners frequently lose motivation and struggle to translate theoretical knowledge into real-world skills.

PROPOSED SYSTEM

The proposed system, SkillAura, implements a centralized Learning Path Dashboard that organizes technical domains into structured roadmaps composed of sequential modules, interactive quizzes, and practical projects. Users register and log in securely using JWT-based authentication, select their areas of interest, and are guided through a personalized learning path from beginner to advanced levels. The dashboard visualizes progress through completion percentages, experience points, and achievement badges, encouraging consistency and motivation. An Admin Command Center allows administrators to manage users, learning paths, skills, quizzes, projects, announcements, and platform analytics without requiring direct database access, significantly simplifying content management and keeping the platform continuously up to date.

SYSTEM ARCHITECTURE



Fig 1: System Architecture of SkillAura

The architecture of SkillAura consists of a React.js frontend, a Flask-based REST API backend, and a MongoDB Atlas cloud database, connected through secure JWT-authenticated HTTP requests. The User Management Module handles registration, login, and profile management. The Learning Path Module organizes courses into structured roadmaps based on user interests and skill level. The Course and Progress Tracking Modules manage enrollment, completion status, and generate visual progress reports, while the Dashboard and Recommendation Module presents a consolidated summary of achievements and personalized suggestions. Administrators interact with the system through a dedicated Command Center that manages all educational content and platform-wide analytics.

METHODOLOGY DESCRIPTION

The methodology of SkillAura follows a structured full-stack development approach



comprising requirement analysis, database design, module implementation, and testing. The frontend, built with React.js and Tailwind CSS, communicates with the Flask backend through RESTful APIs secured using Flask-JWT-Extended. User and learning-path data is stored in MongoDB Atlas, enabling scalable, cloud-based data management. The development process included designing the database schema, implementing authentication and authorization, building learning-path and progress-tracking modules, developing the Admin Command Center, and finally performing functional testing to ensure secure, reliable, and responsive operation across all modules.

RESULTS AND DISCUSSION

The implemented SkillAura platform successfully provides a responsive, secure, and engaging learning experience. The dashboard presents users with clear visual indicators of ongoing and completed learning paths, while the underlying Flask APIs ensure reliable communication with the MongoDB Atlas database. Testing confirmed accurate progress tracking, functional authentication, and smooth navigation across learner and admin interfaces.

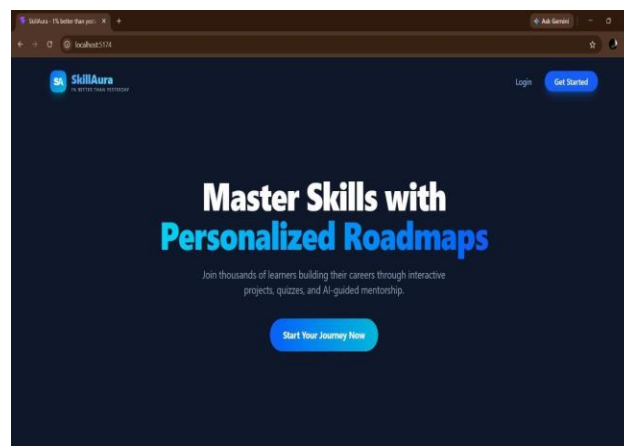


Fig 2: SkillAura Welcome Page

The learning dashboard shown above serves as the primary interface through which learners view their enrolled learning paths, track completion progress, and access personalized recommendations, providing a simple and motivating overview of their learning journey.

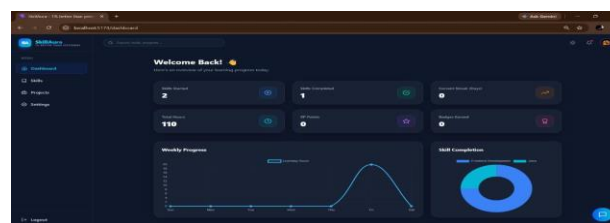


Fig 3: User Command Center

The Learning Path module presents technical domains as structured, sequential roadmaps, guiding learners from foundational to advanced topics through modules, quizzes, and projects, helping avoid unstructured, disorganized learning.

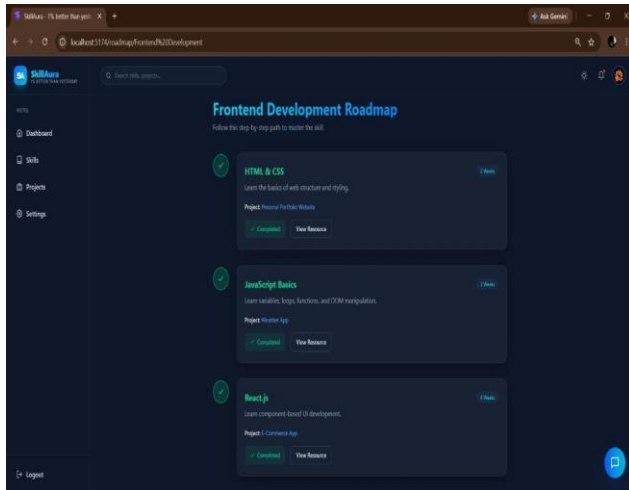


Fig 4: Learning Path / Roadmap Module

The Admin Command Center enables administrators to manage users, learning paths, quizzes, and platform analytics through an intuitive interface, allowing educational content to be updated dynamically without manual database intervention.

CONCLUSION

SkillAura -- Learning Path Dashboard for Enhancing Skills successfully addresses the common challenges of unstructured online learning by providing a centralized, personalized, and gamified platform. By combining structured learning roadmaps, progress tracking, and an administrative content management system, SkillAura enables learners to remain consistent, motivated, and career-focused while simplifying content management for administrators, resulting in a secure, scalable, and learner-centric educational solution.

FUTURE SCOPE

The current implementation of SkillAura can be further enhanced by integrating an AI-based personal learning mentor capable of monitoring learner progress and recommending personalized study plans. Adaptive learning algorithms can dynamically adjust roadmap sequencing based on quiz performance and learning speed, while a machine-learning-powered recommendation engine can suggest relevant skills, projects, and certifications. Additionally, a voice-based learning assistant and an AI chatbot can be incorporated to improve accessibility and provide instant, round-the-clock support for learners navigating the platform.

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