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Research Paper

Student Research Paper on

ELEVATE: AN AI-BASED PERSONALIZED CAREER AND SKILL DEVELOPMENT PLATFORM FOR STUDENTS

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Abstract

Engineering students often complete their academic curriculum without receiving a structured, personalized plan for developing industry-relevant skills. Students in particular have to choose among coding languages , CAD, CAE, manufacturing, automation, automobile, energy and other career paths, while also managing academic performance, projects, internships and placement requirements. ELEVATE is proposed as a student career and skill development platform that provides a personalized, semester-wise roadmap from first year to final year. The platform collects student information such as interests, career preferences, current semester, academic performance and skill level, and uses rule-based and AI-assisted recommendations to suggest suitable skills, courses, projects, internships and career opportunities. Unlike a conventional platform that displays the complete roadmap at once, ELEVATE provides stage-wise guidance so that students receive relevant actions at the appropriate academic level. The proposed system also adapts recommendations when academic performance, backlogs or career interests change. This paper presents the problem, proposed methodology, system workflow, major modules, expected outcomes, advantages, limitations and future scope of ELEVATE.

Keywords

Engineering; Career Guidance; Skill Development; Artificial Intelligence; Personalized Learning; Student Roadmap; Employability; Industry Readiness

1. Introduction

The transition from engineering education to employment requires more than academic knowledge. Students need technical skills, practical exposure, projects, internships, communication ability and awareness of industry requirements. However, many students do not know which skills to learn, when to learn them, which software or certification is relevant to their intended career, or how to prepare progressively for placements.

Mechanical engineering offers a wide range of career directions including mechanical design, manufacturing, automobile engineering, CAD/CAE, production, quality, robotics, thermal engineering and related multidisciplinary fields. Because of this variety, a common career plan may not be suitable for every student. Students also have different interests, academic performance and access to learning resources.

ELEVATE is proposed to address this gap through a structured digital platform that begins with student profiling and then generates personalized guidance. The central concept is to provide the right guidance at the right stage instead of overwhelming a first-year student with a complete four-year roadmap.

2. Problem Statement

The major problem addressed by this research is the lack of continuous, personalized and stage-wise career and skill guidance for students. Existing academic systems generally focus on curriculum completion, while students independently search for courses, software tutorials, projects, internships and placement preparation. This can lead to random skill selection, delayed preparation and a mismatch between student skills and career goals.

Therefore, there is a need for a platform that can understand an individual student's profile, recommend an appropriate learning path, monitor progress and dynamically modify the roadmap according to academic performance, interests and career objectives.

3. Objectives

- To provide personalized career and skill guidance to students.
- To create a semester-wise roadmap from first year to final year.
- To recommend relevant technical skills, software, courses, projects and internships.
- To adapt recommendations according to interests, CGPA, backlogs and progress.
- To improve career awareness, practical skill development and placement readiness.
- To connect students with suitable learning resources and expert/teacher guidance.

4. Proposed System / Methodology

ELEVATE follows a student-centric workflow. A student registers on the platform and creates a profile containing academic information, interests, preferred career areas, existing skills and career goals. The recommendation engine analyzes this information and generates a suitable action plan for the student's current semester.

The platform does not release the entire roadmap at once. Instead, it follows progressive guidance. For example, a first-year student may receive foundational guidance such as engineering basics, communication, introductory CAD exposure and small projects. In later semesters, the system can progressively recommend advanced software, domain-specific projects, internships, aptitude preparation and placement activities.

The recommendation engine can combine predefined academic rules with AI-assisted personalization. If a student's CGPA decreases, a backlog occurs, or the student changes career preference, the system can modify the next set of recommendations and suggest alternative pathways. This makes the roadmap dynamic rather than static.

5. System Architecture and Working

The proposed system consists of the following major modules:

- Student Registration and Profile Module – stores semester, CGPA, interests, skills, career preference and progress.
- Career Interest Analysis Module – identifies suitable engineering career domains from student inputs.
- Personalized Roadmap Module – generates semester-wise tasks, skills and milestones.
- Learning Resource Recommendation Module – suggests relevant courses, tutorials, books and external learning resources.
- Project and Internship Guidance Module – recommends practical projects and internship preparation according to the student's selected domain.

- Academic Performance Module – uses CGPA/backlog information to adjust recommendations and suggest alternative plans.
- AI Guidance Module – provides conversational support for career, skill and learning-related questions.
- Progress Tracking Module – records completed skills, courses, projects and milestones.

6. Proposed Working Flow

Student Registration → Profile Creation → Interest & Skill Assessment → Career-Domain Identification → Current Semester Analysis → Personalized Roadmap Generation → Recommended Skills/Courses/Projects → Progress Tracking → Performance Review → Roadmap Update.

The system is designed as a continuous feedback loop. Student progress becomes new input for the recommendation process. Thus, the next recommendation can depend on what the student has already completed instead of repeatedly providing generic suggestions.

7. Results and Discussion

As a proposed platform, ELEVATE is evaluated conceptually using expected performance indicators rather than claiming completed experimental results. The primary expected outcome is improved clarity about what a student should learn at each stage of the degree. A personalized roadmap is expected to reduce random course selection and help students focus on skills relevant to their chosen career direction.

The platform can also support students who face academic difficulties. Instead of treating a backlog or low CGPA as the end of the roadmap, the system can recommend an alternative skill-building and career strategy based on the student's remaining opportunities. Similarly, a student who changes from design to manufacturing can receive a revised pathway without restarting the entire process.

For future validation, the system can be tested with a group of students. Metrics such as roadmap completion rate, skill acquisition, student satisfaction, career clarity, internship participation and placement-readiness scores can be compared before and after using the platform.

8. Advantages

- Personalized rather than one-size-fits-all career guidance.
- Semester-wise recommendations prevent information overload.
- Dynamic roadmap can respond to academic and career changes.
- Integrates skills, courses, projects, internships and placement preparation.
- Can direct students toward appropriate external learning resources.
- Supports continuous progress tracking throughout engineering education.
- Can be extended to other engineering branches in the future.

9. Social and Educational Impact

ELEVATE aims to reduce the gap between academic education and employability by encouraging students to build practical skills throughout their degree. Early and continuous guidance may help students make better decisions about software, projects, internships and career domains. The platform can be particularly useful for students who do not have access to continuous personal career mentoring.

10. Limitations

The quality of recommendations depends on the accuracy of student information, the quality of the recommendation rules, available learning resources and the AI model used. Career requirements also change with industry trends, so the

platform would require periodic updating. Recommendations should support, rather than replace, academic teachers, career counselors and informed student decision-making.

11. Future Scope

Future development can include real-time job-market skill analysis, integration with internship and job portals, mentor interaction, verified course recommendations, skill assessments, resume analysis, interview preparation and placement analytics. The system can also be expanded beyond engineering after validating the model with sufficient student data. A mobile application and multilingual support can improve accessibility for a larger student population.

12. Conclusion

ELEVATE presents a proposed approach for improving career and skill development among students through personalized, semester-wise guidance. The platform addresses a common gap between academic curriculum and practical career preparation by combining student profiling, career-domain analysis, progressive roadmap generation, learning-resource recommendations, project and internship guidance, progress tracking and AI-assisted support. Its key feature is dynamic and stage-wise guidance rather than providing a fixed four-year plan at the beginning. With proper validation and continuous improvement, ELEVATE has the potential to become a useful digital career-development ecosystem for engineering students.

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