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Education Portal for Education Transformation (AIStellarEdu)- Using MERN

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ABSTRACT-

AIStellarEdu is an adaptable and user- friendly educational technology (ed-tech) platform that has been painstakingly designed to give teachers a dynamic platform to demonstrate their knowledge and to give students an immersive learning experience. This ground-breaking project combines computer science, statistics, and creative teaching techniques to rethink traditional learning paradigms. In this article, we provide a detailed introduction of AIStellarEdu's features and functionalities while delving into its technological details. AIStellarEdu aims to bring about a paradigm shift in education by combining computer science, statistics, and creative teaching approaches. Beyond traditional limits, our purpose is to address healthcare issues, democratize the acquisition of information, and develop problem-solving abilities via easily available, technologically advanced education. At the center of our transformative mission is education, the cornerstone of societal growth. We use cutting-edge technologies to democratize knowledge so that students may interact with difficult topics related to problem-solving through creative instructional modules. The creation of an instructional platform that resembles disease diagnosis models is essential to our strategy. With the use of AI/ML algorithms as teaching aids, students engage in real-world problem-solving activities that foster analytical and critical thinking abilities. Our agile approach plays a high priority on adaptation to changing learner needs. The platform is constantly changing in response to user feedback, guaranteeing a dynamic, intuitive, and interesting learning environment.

Keywords: **- AIStellarEdu ,Immersive learning Experience, AI/ML, Innovative teaching**

I. INTRODUCTION

AIStellarEdu envisions a revolutionary approach to education in the modern world by combining computer science, statistics, and creative teaching techniques. Our goal is to address Educational concerns through accessible, technology-driven education, democratize knowledge acquisition, and develop problem-solving abilities. Our mission goes beyond traditional limits. At the center of our transformative mission is education, the cornerstone of societal growth. We use cutting- edge technologies to democratize knowledge so that students may interact with difficult topics related to problem-solving through creative instructional modules. Due to

lack of a full-fledged application in the market as they are unable to provide as such functionality like course review, doubt support, pdf content and also course review system via rating. The envisaged AIStellarEdu platform introduces a versatile and dynamic framework, granting Users the freedom to navigate a diverse educational landscape seamlessly. Learners and educators alike can engage with an array of educational modules meticulously crafted to enhance comprehension across various subjects, including computer science, statistics, and innovative teaching methodologies. The frontend, powered by cutting-edge technologies such as React.js, React.js libraries, and Tailwind CSS, ensures an interactive and user-friendly learning environment that adapts to diverse learning preferences.

At the core of AIStellarEdu's mission is the commitment to democratize knowledge acquisition, fostering problem-solving abilities and offering an immersive learning experience. The robust MERN stack (MongoDB, Express.js, React, Node.js) forms the backend, establishing a scalable microservices architecture that positions AIStellarEdu at the forefront of ed-tech innovation. This technological foundation aligns seamlessly with the dynamic needs of learners and educators, allowing for a transformative and inclusive educational solution.

II. PROBLEM STATEMENT

In today's educational landscape, there is a growing need for personalized, engaging, and accessible learning experiences for students across diverse backgrounds and abilities. Traditional educational systems often struggle to adapt swiftly to individual learning styles, hindering effective knowledge

acquisition and retention. AIStellarEdu aims to address these challenges by leveraging artificial intelligence to revolutionize education, providing tailored, interactive, and inclusive learning solutions that cater to the unique needs of every student, fostering a more effective and enjoyable education.

III. LITERATURE REVIEW

The emerging field of education and research powered by chatbots and artificial intelligence (AI) is examined by C. Kooli et al. [1]. The study explores the ethical implications of using these technologies in academia using a qualitative technique. The research evaluates existing practices, identifies obstacles, and finds opportunities related to AI systems and chatbots in education through expert analysis and interpretation. The study highlights how important it is for these technologies to assist human expertise and judgment. It also highlights how research procedures and educational frameworks need to change, especially when it comes to assessment practices.

A web portal that is a strategic response to the changing issues that educational institutions face in the digital age was presented by Amal Sharma et al. [2]. With a focus on thorough requirements analysis, stakeholder involvement, and technical innovation, the site seeks to simplify extracurricular and academic activities by offering a single point of contact for exams, club promotions, attendance, and fee payments.

In order to fully comprehend the situation, Sourav Das and Abir Mondal's [3] research on digital education in India using websites and applications that have been privatized uses a diverse technique. The research places itself within the body of knowledge by identifying trends, obstacles, and opportunities in online education in the Indian setting through a thorough examination of the literature. The study then uses a mixed-methods approach, integrating stakeholder interviews and surveys, including parents, teachers, and students. The objective of this strategy is to offer a comprehensive comprehension of the user experiences, preferences, and obstacles linked to the usage of websites and programs that have been privatized for digital education in India.

Sourabh Mahadev and Archana Ekbote [4] investigated the MERN STACK, which uses a methodical approach to improve the system's overall responsiveness and efficiency. First, a thorough performance evaluation is carried out, using profiling tools to identify possible bottlenecks. It is established that key performance indicators have baseline metrics. React.js optimization techniques on the front end include reducing HTTP requests by effectively bundling assets, enabling lazy loading for components and images, and maximizing rendering performance by utilizing React memo and avoiding pointless re- renders.

According to Sruthi Palliyalil and Sangeeta Mukherjee [5], Byju's App provides a self-paced learning environment that enables pupils to take on challenging ideas. It creates an immersive learning environment by utilizing a variety of contemporary approaches, including visual graphics, web-based learning, and video instruction. These developments greatly help pupils understand core ideas and get ready for tests. This study shows how Byju's App, which successfully integrates constructive teaching and learning approaches, has transformed the Indian education system.

The process of creating a website in the past and present, the evolution of content delivery over time, the website's usage, a website for mobile devices, and a performance comparison between two of the most popular web backend development 7 technologies— Python and Node.js—are all covered by S. S. Nandan et al. [6]. We evaluated both Locust, an open-source program, and Autocannon under comparable circumstances in order to compare their respective performances.

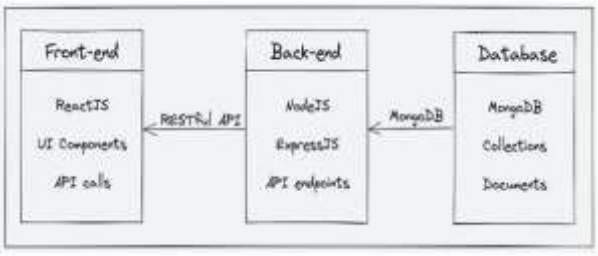
Sumita Sinku [7] draws the conclusion that a substantial transition is being facilitated by the broad use of digital technologies, internet connectivity for about a billion people, and the enormous potential of the education sector. Students and teachers are benefiting from increased flexibility and better access to knowledge because to the growing usage of Open Educational Resources and Digital and Live Virtual Classrooms. By enabling students to comprehend concepts in real-world contexts, the integration of Augmented Reality and Virtual Reality concepts also seeks to improve learning clarity, accountability, and engagement.

According to R. Gopal et al. [8], student expectations, timely feedback, course design, and teacher quality all have a favorable impact on satisfaction, which in turn improves student performance.

IV. PROPOSED MODEL

This envisioned education portal aims to revolutionize learning through a comprehensive online platform that empowers all stakeholders – students, educators, and administrators. It fosters collaboration and enriches learning experiences by providing a powerful suite of tools. Educators can design and deliver engaging courses using an intuitive Learning Management System (LMS), while students delve into a curated library of educational resources. These resources, meticulously categorized by subject, grade level, and even learning style, cater to individual needs and preferences. Fostering interaction and collaboration are features like secure messaging, interactive discussion forums, and video conferencing, which further enhance the learning experience by facilitating group projects and peer-to-peer learning.

Fig.1 High Level Architectural diagram



To empower educators in providing personalized and effective instruction, the portal offers robust assessment tools. These tools go beyond simply tracking student progress; they empower educators to personalize learning paths and provide targeted feedback through quizzes, assignments, and detailed rubrics. Streamlining administrative tasks is another key feature. Administrators benefit from efficient systems for record management, seamless communication with parents, and convenient calendar management tools, allowing them to dedicate more time to strategic initiatives that support the educational landscape.

Accessibility is paramount, and the portal is designed with inclusivity in mind. Features like screen readers, text-to-speech options, and support for diverse learning styles ensure everyone has equal access to educational opportunities. Additionally, the platform's technical foundation prioritizes security, scalability, and user- friendliness. Responsive design ensures optimal viewing on any device, guaranteeing a seamless learning experience regardless of location or device.

Successful implementation and long-term sustainability are ensured through collaboration with stakeholders, including educators, parents, and technology experts. Ongoing training and support empower users to maximize the platform's potential, while a sustainable funding model guarantees continued development and maintenance. This education portal aspires to be more than just a platform; it aims to be a catalyst for a dynamic, engaging, and effective learning environment for all, unlocking the full potential within each individual.

Fig.2 overall Backend Structure of Project

V.CONCLUSIONS AND FUTURE WORK

In conclusion, this document outlines the architecture, features, and functionalities of the AIStellar ed-tech platform. It highlights the use of MERN stack technologies and REST API design and outlines the deployment process using free hosting services, Vercel for the front-end, Render.com or Railway.app for the backend, and MongoDB Atlas for the database. Additionally, it lists potential future enhancements that could be implemented to improve the platform, along with their estimated timelines and priorities.

Throughout the development of the project, various achievements will be made in terms of implementing the desired functionalities and creating a user-friendly interface. However, there will be challenges to be faced during the development process, such as integrating different technologies and debugging errors.

This section discusses potential future improvements to the AIStellar platform. These enhancements are listed along with an explanation of how they would improve the platform and priority for implementation.

1. Gamification features: Adding gamification features such as badges, points, and leaderboards can increase user engagement and motivation. This would be a medium-priority enhancement.
2. Personalized learning paths: Creating personalized learning paths for each student based on their interests and learning style can increase student satisfaction and success. This would be a high-priority enhancement.

3. Social learning features: Adding social learning features such as group discussions, peer- to-peer feedback, and collaborative projects can increase student engagement and interaction. This would be a medium-priority enhancement.
4. Mobile app: Creating a mobile app for the platform would allow for more convenient access to course content and features, and would increase the platform's reach. This would be a high-priority enhancement.
5. Machine learning-powered recommendations

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