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FutureBuddy: Career Guidance System

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Abstract: *Career selection remains one of the most critical and confusing stages in a student's academic journey. Conventional counseling systems are limited by scalability and personalization, often failing to match individual abilities with suitable professions. FutureBuddy is a web-based Career Guidance System designed to overcome these limitations through structured, data-driven decision support. The system evaluates students across four domains—Personality, Interests, Skills, and Values—and applies a deterministic heuristic scoring engine to identify the most appropriate career paths. In addition to recommendations, FutureBuddy generates complete roadmaps detailing skills, certifications, courses, and milestones required to achieve each career. Built using the MERN stack (MongoDB, Express, React, Node.js) and integrated with Firebase Authentication, the system provides a personalized dashboard, progress tracking, and shareable career summaries. Initial testing shows that FutureBuddy improves decision clarity, increases engagement, and simplifies the overall career-planning process.*

Keywords: *Career Guidance, Rule-Based System, MERN Stack, Heuristic Scoring, Roadmap, Educational Technology*

I. INTRODUCTION

In today's dynamic job market, students struggle to identify the right career due to a lack of structured guidance and personalized information. Traditional counseling methods rely on subjective assessments, which can lead to confusion and misaligned career choices.

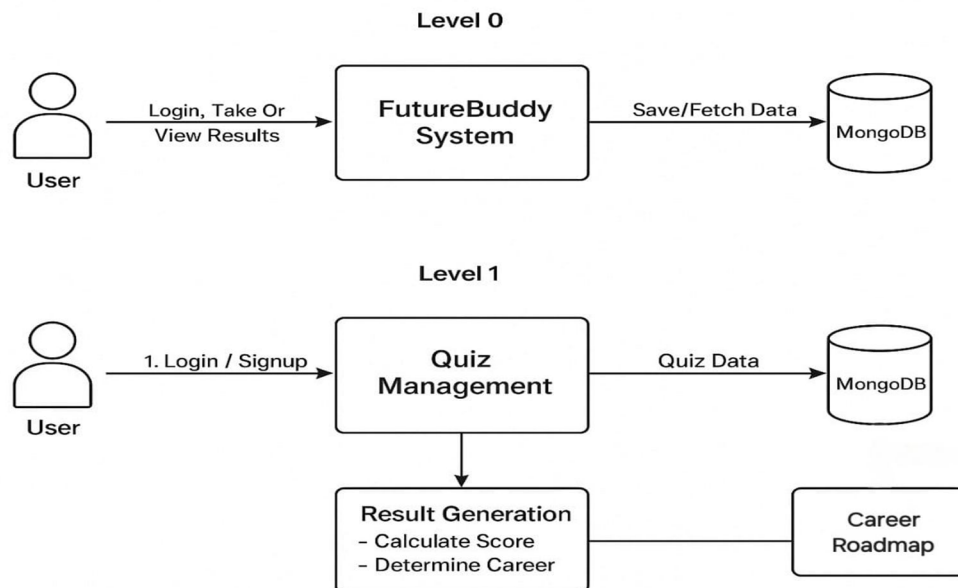
FutureBuddy introduces a systematic, technology-driven approach to career planning. By leveraging rule-based analytics and modern web technologies, it helps students discover careers that match their unique combination of interests, skills, and personal values.

The system is divided into four assessments—Personality, Interests, Skills, and Values—each designed to measure different aspects of an individual's potential. The collected data is processed through a deterministic heuristic model that generates weighted scores for multiple career paths. The top-ranked careers are then presented with a detailed roadmap outlining the educational path, required certifications, and professional milestones.

In addition, FutureBuddy enables institutions to scale their counseling efforts by offering dashboards that monitor collective progress, student strengths, and evolving career trends.

II. SYSTEM DESIGN AND METHODOLOGY

The FutureBuddy system is designed with a modular architecture that integrates frontend interactivity with backend intelligence to deliver a seamless and personalized career guidance experience. The frontend is developed using React.js and Tailwind CSS, providing a responsive and dynamic user interface optimized for accessibility and engagement. The backend, built with Node.js and Express.js, manages essential functionalities such as API communication, user authentication, and quiz scoring logic. Data storage is handled by MongoDB, which efficiently stores user responses, career-related datasets, and personalized roadmap information. For secure and reliable user identity management, Firebase Authentication is implemented, ensuring protected access and smooth login experiences. The system's workflow begins when a user completes the four structured assessment quizzes designed to evaluate personality, interests, skills, and values. Once submitted, the backend processes the responses using a deterministic rule-based algorithm that calculates suitability scores for various career paths. Each career option is then assigned a cumulative score based on the user's attributes and preferences. The platform subsequently displays the top career recommendations, each accompanied by a personalized roadmap outlining relevant technical and soft skills, recommended certifications, online learning resources, project or internship suggestions, and sequential milestones for achieving professional growth. Users can then track their progress through an interactive dashboard and share their results via email or a unique link. This integrated workflow effectively bridges the gap between career discovery and realization, ensuring that every recommendation is actionable and leads to tangible outcomes.



III. MODELING AND ANALYSIS

The core functionality of FutureBuddy is based on a rule-based scoring system that converts user quiz responses into numerical values for effective comparison. Each quiz section—personality, interests, skills, and values—contributes a specific weight toward the overall career suitability score. The backend calculates the cumulative scores for all career options using these predefined weights and normalizes the results to maintain fairness across categories. The roadmap generation module then maps each recommended career to verified information such as required skills, certifications, and growth milestones.

On the user dashboard, visual analytics display key insights including suitability rankings, skill gap identification, and roadmap progress tracking. Additionally, the admin panel allows system administrators to update career data, adjust section weights, and refine career information to reflect changing industry trends.

This structured, data-driven approach ensures that FutureBuddy delivers accurate and up-to-date career guidance without relying on AI or predictive models.

IV. RESULTS AND DISCUSSION

A controlled evaluation was conducted among fifty undergraduate Computer Science students to assess the effectiveness of the FutureBuddy system. Participants completed the assessment and reviewed their personalized career recommendations through the platform. The evaluation results revealed that 90% of students found the career recommendations relevant and easy to understand, while 85% reported that the roadmap section was particularly useful for visualizing skill progression and planning future learning steps. Additionally, 80% of participants expressed greater confidence in their career planning decisions after using the system.

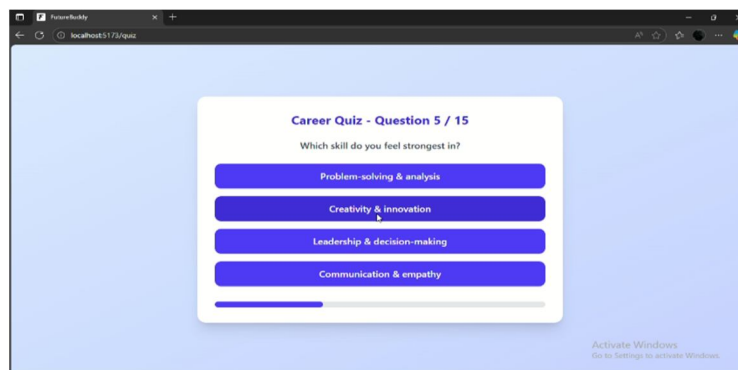


Fig. User Quiz Interface

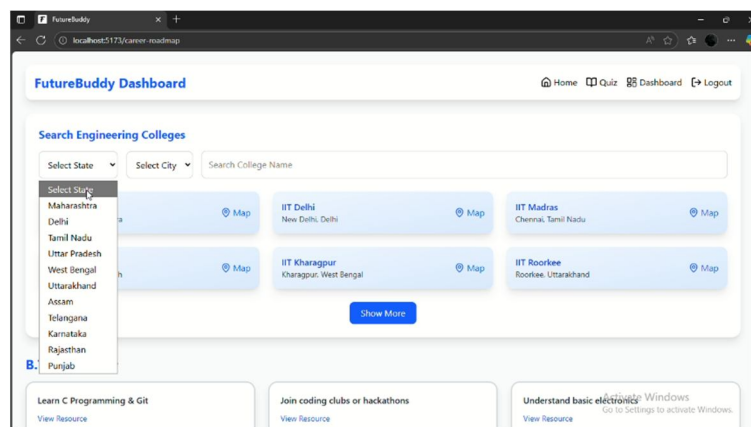


Fig. User Dashboard

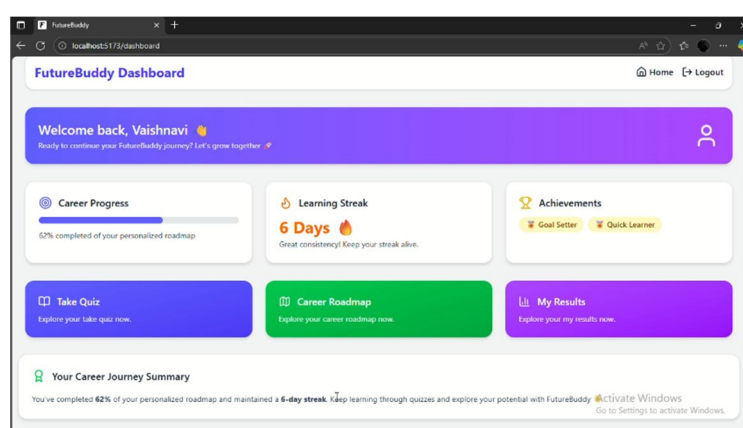


Fig. Career Roadmap Interface

From an institutional perspective, aggregated dashboards provided valuable insights into overall student interests, departmental skill gaps, and emerging career trends. The system demonstrated several key strengths, including transparent and explainable rule-based scoring, personalized and actionable career roadmaps, scalable architecture suitable for academic institutions, and historical tracking that allows for periodic reassessment. However, the current version does not yet include adaptive learning capabilities that respond to user behavior, and integration of dynamic labor-market data remains a planned enhancement for future development.

V. CONCLUSION

FutureBuddy demonstrates the effectiveness of structured, rule-based digital systems in delivering personalized career guidance. By combining modern web technologies with logical assessment methodologies, the system transforms subjective decision-making into a guided, data-backed process.

Future enhancements include integration of AI/ML techniques to personalize recommendations further, synchronization with live job and certification databases, and support for multilingual interfaces.

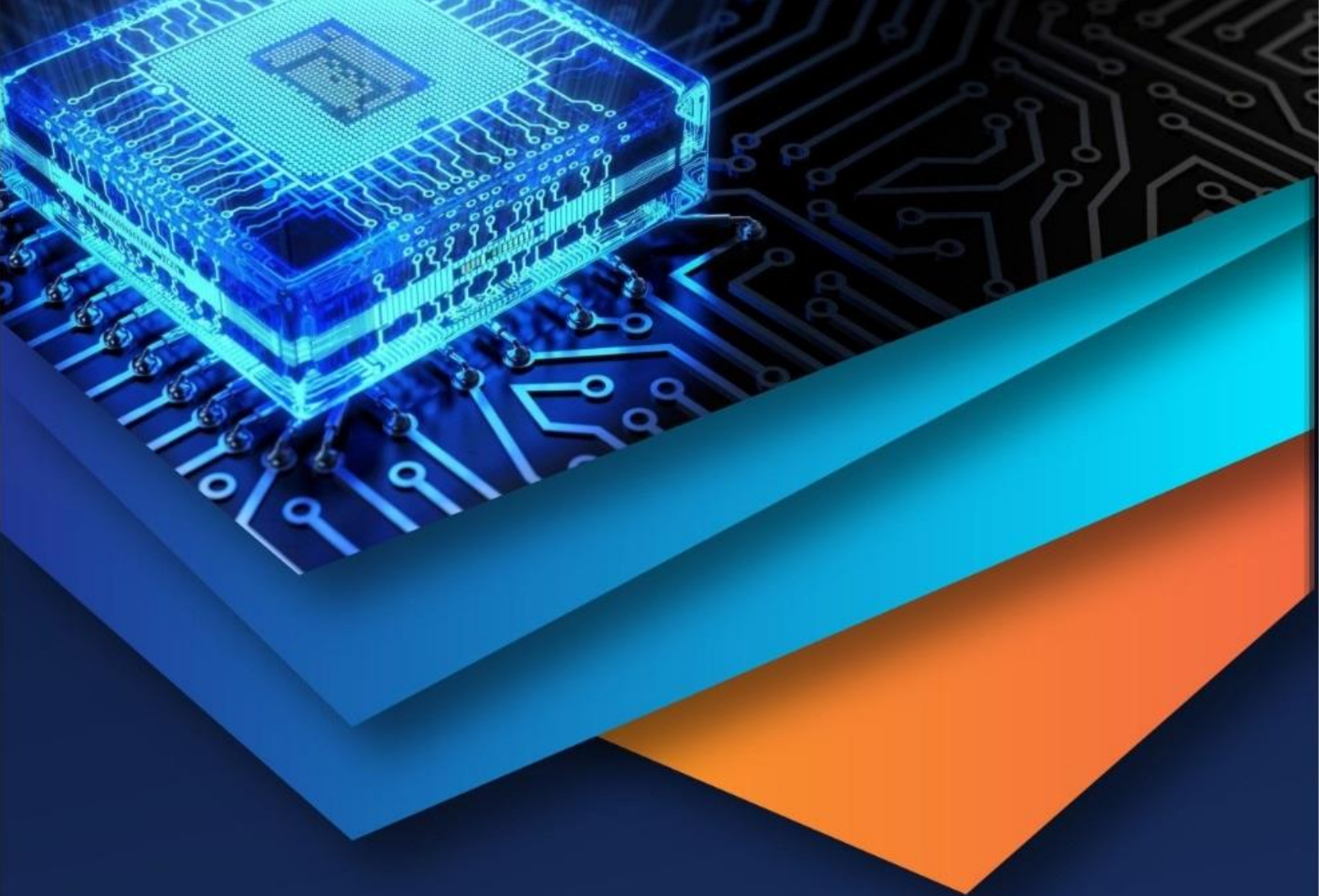
This approach represents a step forward toward democratizing career guidance and helping students transition from uncertainty to informed career planning.

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