EDUMATE – PERSONALIZED LEARNING PLATFORM

A MINI PROJECT REPORT

Submitted by

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ANNA UNIVERSITY, CHENNAI

BONAFIDE CERTIFICATE

Certified that this report titled **"EDUMATE – PERSONALIZED LEARNING PLATFORM"** is the bonafide work of **Deepak S(221801008)** who carried out the work under my supervision.

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ABSTRACT

The goal of *Edumate* is to develop a comprehensive platform that addresses key challenges in interview preparation, skill development, and individualized learning. The software offers a complete solution by incorporating features such as career counseling, AI-powered recommendations, pronunciation training, real-time feedback, and an interactive whiteboard for collaborative problem-solving. To help users stay aligned with their learning goals, it also provides timely notifications and personalized learning pathways. *Edumate* leverages machine learning algorithms to continuously adapt to user performance, ensuring that content and feedback remain relevant and effective. The platform supports multimedia learning modules, gamified assessments, and progress tracking dashboards to boost user engagement and retention. With cross-platform accessibility and cloud integration, *Edumate* ensures that learners can access resources anytime, anywhere. The system is also designed to be scalable and integrable with other educational tools and platforms, making it suitable for individual learners, academic institutions, and corporate training environments. Ultimately, *Edumate* aims to make learning more efficient, personalized, and accessible, empowering users to improve their skills and succeed in their professional journeys.

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INTRODUCTION

1.1. GENERAL

Pursuing skill development and career preparedness has grown in importance in recent years for people looking to advance their career chances. Static materials like textbooks, prerecorded courses, and generic training programs have historically played a major role in learning and interview preparation. Real-time feedback and customized skill development were hampered by these approaches' frequent failure to meet individual learning needs. In addition to impeding effective learning, this lack of flexibility made it challenging for users to monitor their development and advance critical abilities like technical proficiency, problem-solving, and communication.

We have resorted to more dynamic and AI-driven solutions that improve the educational process in order to address these issues. Edumate seeks to offer a comprehensive and individualized learning platform by utilizing AI-powered recommendations, real-time feedback mechanisms, pronunciation training, and interactive problem-solving tools. To assist users stay on track with their learning objectives, career advice capabilities, for example, guarantee that users receive recommendations that are specific to their skill sets and career goals. Furthermore, users can pinpoint and enhance their weak areas with the help of the platform's AI-powered analysis, guaranteeing ongoing preparation development.

However, the lack of interactive involvement in traditional learning platforms makes it difficult for users to successfully retain knowledge. We can now provide real-time insights, individualized coaching, and immersive learning experiences that are tailored to each student's needs thanks to developments in artificial intelligence and adaptive learning technology. In order to establish a more effective and user-focused method of skill development, Edumate adopts these advances.

1.2. NEED FOR THE STUDY

In the rapidly evolving landscape of education and employment, there is a growing demand for platforms that offer more than traditional, one-size-fits-all learning experiences. Conventional methods—such as textbooks, recorded lectures, and static training modules—often fail to meet the dynamic requirements of individual learners and do not provide the flexibility or interactivity necessary for modern skill development. As a result, students and job seekers frequently face challenges in identifying their strengths and weaknesses, receiving timely feedback, and preparing effectively for real-world interviews and professional scenarios.

With the increasing importance of communication skills, technical knowledge, and personalized learning paths in the global job market, there is a critical need for an AI-driven educational platform that offers adaptive learning, real-time assessment, and targeted guidance. Most existing e-learning platforms do not adequately integrate features like body language analysis, speech clarity evaluation, resume grading, or AI-powered career counseling components that are vital for holistic professional development.

Edumate addresses this gap by providing an end-to-end learning ecosystem that not only supports academic growth but also enhances practical, real-world skills. Its ability to deliver personalized feedback, simulate interviews, provide interactive whiteboard sessions, and monitor user progress in real time fills a significant void in current learning solutions. Furthermore, the platform's inclusion of mental wellness tools, parental/teacher monitoring, and multilingual support ensures that it caters to a wide demographic, making learning more inclusive and effective.

1.3 OBJECTIVES OF THE STUDY

This paper aims to present *Edumate*, an AI-driven personalized learning platform designed to revolutionize skill development, interview preparation, and individualized education. The objectives are categorized under the following focus areas

1. To Address Gaps in Traditional Learning Systems

One of the primary goals is to overcome the limitations of conventional learning methodologies that rely on static content with minimal personalization. Traditional systems often lack real-time interaction, feedback, and adaptability, which are crucial for effective learning and self-improvement. This paper highlights how *Edumate* bridges these gaps by offering real-time feedback, interactive tools, and AI-driven recommendations tailored to each learner's profile.

2. To Implement AI-Powered Personalized Learning Paths

A core objective is to demonstrate how Artificial Intelligence and Machine Learning techniques can be applied to create dynamic and individualized learning experiences. The system analyzes user behavior, quiz performance, career goals, and learning styles to recommend personalized educational content and exercises. This paper elaborates on how these adaptive algorithms ensure continuous improvement and targeted skill development.

3. To Enhance Communication and Interview Skills Through Simulation

In a competitive job market, communication skills and interview readiness are essential. *Edumate* introduces AI-powered modules that evaluate posture, facial expressions, tone modulation, and speech clarity. The objective is to provide users with realistic mock interview simulations and comprehensive feedback that help them refine both verbal and non-verbal communication skills. The paper also discusses the integration of Natural Language Processing (NLP) and Computer Vision for detailed analysis.

1.4. OVERVIEW OF THE PROJECT

Edumate is an AI-powered learning platform designed to provide personalized, interactive, and real-time educational experiences. It integrates AI, NLP, ML, and Computer Vision to offer features like mock interviews, speech and posture analysis, interactive whiteboards, and adaptive quizzes. The platform supports 24/7 chatbot assistance, document summarization, and language translation, enhancing learning flexibility and accessibility. With cloud-based infrastructure, real-time notifications, and monitoring tools for parents and teachers, *Edumate* ensures a scalable and user-centric learning environment tailored to individual progress and career goals.

1. Personalized Learning Engine

At the heart of *Edumate* lies a powerful AI-based recommendation system that dynamically adapts content based on the learner's performance, preferences, and goals. Using machine learning models, the platform suggests exercises, quizzes, and learning modules that are tailored to individual needs. The learning paths are continuously refined through performance data, ensuring relevance and progression at each stage.

2. Real-Time Feedback and Skill Assessment

The platform integrates advanced Natural Language Processing (NLP), Computer Vision, and Speech Analysis to provide immediate feedback on various user interactions. These include pronunciation checks, speech clarity, posture evaluation, facial expression analysis, and attentiveness detection. This real-time feedback loop helps learners understand their strengths and areas needing improvement, especially in communication and interview preparedness.

3. Interactive Tools for Engagement

To promote active learning and collaboration, *Edumate* includes an interactive whiteboard for problem-solving, debugging, and brainstorming. The platform also supports AI-driven quizzes, mock interviews, and a chatbot assistant capable of summarizing documents, translating video content, and answering academic queries. These features foster a more immersive and hands-on learning experience.

4. Monitoring and Notification System

The system provides built-in tools for parental and teacher supervision, allowing them to monitor user progress and engagement. Notifications powered by Twilio APIs keep users informed about deadlines, achievements, and recommended activities. The progress dashboard offers insights into learning behavior, performance trends, and personalized alerts for better time management and goal tracking.

5. Scalable Architecture and Accessibility

Built on a modular and cloud-based architecture using Flask (backend) and HTML/CSS (frontend), *Edumate* is designed for scalability, security, and ease of deployment. It supports web and mobile access, ensuring learners can engage with the platform from anywhere. With multilingual support, AI chatbot assistance, and document summarization, the system enhances accessibility for users with diverse educational needs and backgrounds.

6. Innovation in Learning Experience

Edumate redefines traditional learning by offering a more immersive and engaging experience through AI-driven insights and real-time interaction. By combining personalized recommendations, interactive tools, and instant feedback, the platform fosters deeper understanding, better retention, and increased learner motivation, ultimately making education more adaptive and outcome-oriented.

CHAPTER 2
REVIEW OF LITERATURE

2.1. INTRODUCTION

In the rapidly evolving landscape of education technology, personalized learning platforms have emerged as pivotal tools for addressing the diverse needs of modern learners. Traditional learning systems, often characterized by static content and generic teaching methodologies, fall short in offering tailored learning experiences that cater to individual skill levels, career goals, and learning styles. This has led to increased interest in AI-driven platforms that enhance user engagement through adaptive content, real-time feedback, and data-driven insights.

The EDU-MATE project aims to bridge this gap by integrating cutting-edge technologies such as Artificial Intelligence (AI), Machine Learning (ML), Natural Language Processing (NLP), and Computer Vision to deliver a comprehensive and interactive learning environment. The development of such a system necessitates a deep understanding of the existing technological landscape, including current trends in personalized learning, real-time assessment, AI-based career guidance, and interactive tools for skill development.

This literature review explores the foundational works and current innovations that have influenced the design and implementation of EDU-MATE, providing critical insights into the role of intelligent systems in enhancing educational outcomes, user engagement, and career preparedness.

2.2 LITERATURE REVIEW

S. No.	Author Name	Paper Title	Description	Journal	Year
1	Chen et al.	Adaptive Learning Path Navigation Based on Knowledge Tracing and Reinforcement Learning	Explores how AI algorithms personalize content delivery in e-learning platforms by analyzing user behavior and recommending suitable learning paths.	arXiv preprint (2305.04475)	2023
2	Xu and Lee	(Not specified, referred through Edumate document)	Demonstrated the use of AI-based speech recognition tools for pronunciation training and real-time feedback to improve language learning.	social and behaviour science	2021
3	G. C. Oproiu	A Study about Using the E-learning Platform (Moodle) in the University Teaching Process	Evaluates Moodle's impact on the academic learning process and its flexibility in enhancing student participation and content delivery.	Economics	2020
4	Kaisare, Parab, and Thakker	Systematic Research of E-Learning Platforms for Solving Challenges	Systematically reviews how existing platforms address educational challenges in India, highlighting areas needing AI-driven	Journal of the Asian Association of Open Universities	2019

		Faced by Indian Engineering Students	enhancements.		
5.	Elberrichi and Zarouk	Adaptive E-learning Environment Based on Learning Styles	Describes an adaptive learning platform that tailors content based on learning preferences, thereby improving user engagement.	Educational Technology in Higher Education	2022

Table 1. Review of Literature

2.3. FRAMEWORK OF LCA

Life Cycle Assessment (LCA) in the context of the EDU-MATE personalized learning platform involves a comprehensive evaluation of the environmental impacts associated with the system throughout its entire life cycle. The assessment begins with defining the goal and scope, which, for this project, is to analyze the sustainability of an AI-powered digital learning environment from development to deployment and eventual end-of-life. This includes considering the energy and resources used in software development, server infrastructure, cloud storage, and user interface design. In the Life Cycle Inventory (LCI) phase, data is gathered on resource consumption such as electricity for servers, hardware components used in deployment, and data transmission during user interactions. The Life Cycle Impact Assessment (LCIA) then interprets these inputs in terms of environmental consequences like energy usage, carbon footprint, and electronic waste generation. These impacts are categorized and quantified to determine areas of high environmental load. Finally, the interpretation phase provides insights into how EDU-MATE can be optimized for sustainability—such as improving code efficiency, selecting energy-efficient hosting services, and minimizing redundant processing through smarter AI models. Applying LCA ensures that while the platform advances digital education and skill development, it also aligns with broader environmental and sustainability goals.

CHAPTER 3
SYSTEM OVERVIEW

3.1. EXISTING SYSTEM

The proposed system, EDU-MATE, is an advanced educational technology platform designed to enhance skill development, facilitate interview preparation, and provide personalized learning experiences. The platform integrates Artificial Intelligence (AI) and Machine Learning (ML) techniques to deliver real-time feedback on user engagement, including facial expressions, posture, and speech clarity. By incorporating Natural Language Processing (NLP), the system improves pronunciation and communication skills, thereby refining the overall learning process.

A key feature of EDU-MATE is its AI-powered learning path recommendation system, which tailors educational content based on the user's progress and career aspirations. Additionally, the system includes an interactive whiteboard for problem-solving, debugging, and collaborative learning. To enhance accessibility, the platform offers customizable user interfaces, allowing learners to adjust the system according to their preferences.

Furthermore, parental and teacher monitoring tools are embedded within the platform to track student progress and provide insights into their learning patterns. The system also supports real-time notifications using Twilio services, ensuring that users receive timely updates regarding their learning goals. Additionally, a 24/7 AI-driven chatbot is incorporated to provide continuous support and guidance.

The technological framework of EDU-MATE is built using Html,Css for frontend development and Flask for backend processing, ensuring a seamless and scalable architecture. By leveraging cloud-based infrastructure and modular design principles, the system remains adaptable to increasing user demands, making it a highly efficient and scalable educational solution.

3.2. PROPOSED SYSTEM

The proposed system integrates AI and machine learning components with a user interaction service, backend processing, monitoring tools, educational content, and communication modules. The AI/ML components include speech recognition, facial expression analysis, predictive analytics, user engagement scoring, resume grading, interview preparation using OpenCV for body posture and facial expression analysis, and speech analysis for tone, pace, and clarity using NLP. The technical module supports coding assistance, chatbot functionalities, a smart whiteboard AI, and personalized learning recommendations for courses and programming languages. A document summarization feature allows users to upload PPTs, notes, or documents, which are then condensed into concise points using AI. Keyword-based navigation facilitates content accessibility by extracting keywords and mapping them to timestamps in uploaded or linked videos. The system employs a Flask backend for managing operations and integrating monitoring tools for parental and teacher supervision. The communication tools encompass Twilio notifications and an AI-driven chatbot for user engagement. The educational content module includes video lectures, interactive quizzes, and text resources for effective learning. The user interaction service is accessible via a mobile app or web application, allowing users to select the required services. The system supports a wellness module offering mental health services and career guidance, a progress tracker that monitors performance and sends task reminders, and a utility module featuring language translation services. The AI/ML engine integrates an NLP engine, speech processing, video processing, and a recommendation system. The database layer comprises a user database, a quiz database, and a recommendation database, ensuring efficient data storage and retrieval for enhanced user experience and system performance.

3.3. FEASIBILITY STUDY

The feasibility study assesses the practicality and viability of developing the EDU-MATE platform, an AI-powered personalized learning system aimed at enhancing skill development, interview preparation, and interactive learning.

1. Technical Feasibility:

EDU-MATE leverages modern and well-supported technologies such as Flask for backend development, HTML/CSS for frontend interfaces, and various AI/ML libraries for implementing features like real-time feedback, personalized learning paths, and mock interview simulations. The use of Natural Language Processing (NLP), computer vision (OpenCV), and cloud services ensures the system is technically sound and implementable with current tools. Since these technologies are widely used and well-documented, the technical implementation is considered feasible.

2. Operational Feasibility:

From an operational standpoint, the platform offers significant value to users including students, educators, and career seekers. The integration of features like AI-powered chatbots, interactive whiteboards, resume graders, pronunciation training, and 24/7 assistance aligns well with user needs. Additionally, tools for teacher and parent monitoring ensure wider adoption in academic institutions. The interface is user-friendly and designed for accessibility, ensuring ease of use and acceptance.

3. Economic Feasibility:

The project has high potential for cost-effectiveness. Since many core components are developed using open-source technologies, development costs are minimized. Cloud deployment reduces the need for expensive on-premise infrastructure. Revenue generation is possible through subscription models, institutional licensing, or freemium access, making the project economically sustainable over time.

4. Legal and Ethical Feasibility:

The project ensures data privacy and user consent in compliance with data protection laws

such as GDPR. Ethical considerations are addressed by incorporating transparency in AI recommendations and limiting bias in assessments. Monitoring features are designed with privacy controls to ensure user data is used responsibly.

5. Schedule Feasibility:

Given the modular design of the system and availability of development resources, the project can be developed in a phased manner. Core functionalities such as login, dashboard, quiz engine, chatbot, and feedback systems can be built within a reasonable time frame (e.g., 4–6 months), with advanced features like posture analysis and recommendation engines added progressively.

CHAPTER 4
SYSTEM REQUIREMENT

4.1. SOFTWARE REQUIREMENTS

Operating System:

- **Windows/Linux/MacOS**: The system can be deployed on any of the major operating systems. Linux is preferred for its scalability and efficiency in handling large datasets and supporting the necessary software tools.

Programming Languages:

- The application is built using a Flask framework for the backend, offering lightweight and efficient API handling. The frontend is developed with HTML5, CSS3, and JavaScript, and enhanced with Bootstrap to support responsive design. For the database, SQLite is used during development, while scalable databases like MySQL or PostgreSQL are suitable for production deployment. The platform incorporates machine learning and AI functionalities using libraries such as TensorFlow, scikit-learn, and OpenCV, while natural language processing is enabled through tools like spaCy, NLTK, and Transformers

Development tools:

Visual Studio Code serves as the primary code editor due to its versatility and support for multiple extensions. Postman is used for API testing and validation. Version control is managed with Git and GitHub, enabling team collaboration and project tracking. For UI/UX design, tools such as Figma or Adobe XD help in wireframing and interface planning. Jupyter Notebook is used for machine learning model testing and data analysis. Docker may be utilized for containerizing the application, ensuring consistent deployment across different environments.

CHAPTER 5
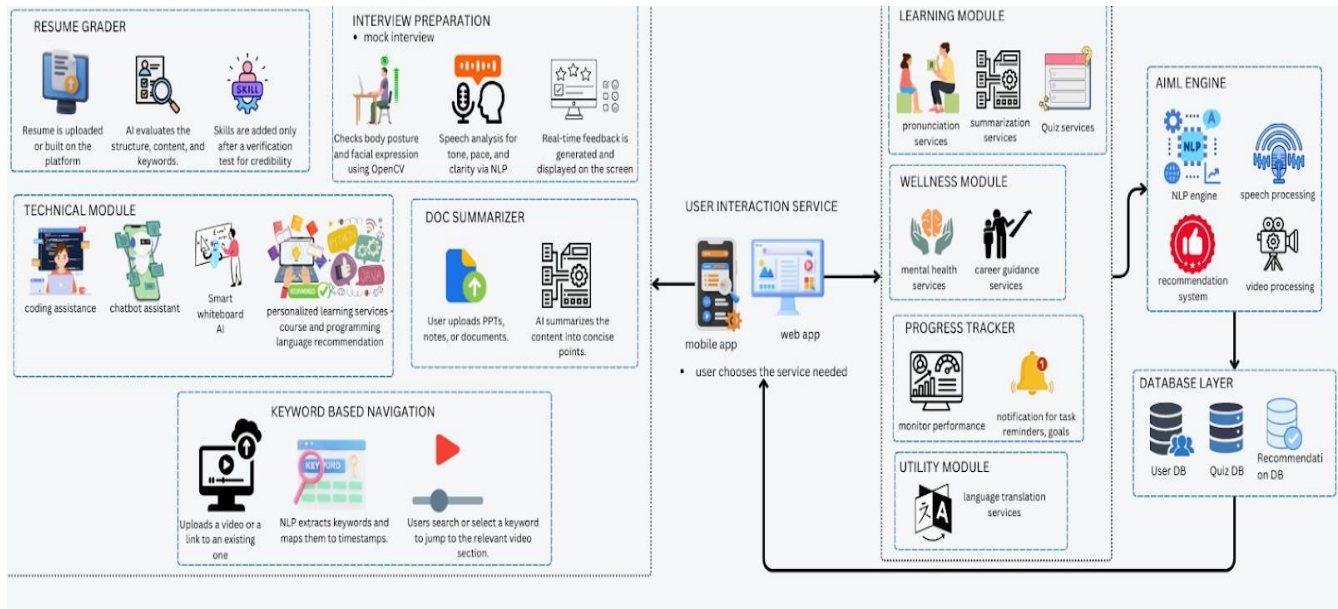# SYSTEM DESIGN

5.1. SYSTEM ARCHITECTURE

Fig. 5.1. System Architecture

The system architecture integrates AI and machine learning components with a user interaction service, backend processing, monitoring tools, educational content, and communication modules. The AI/ML components include speech recognition, facial expression analysis, predictive analytics, user engagement scoring, resume grading, interview preparation using OpenCV for body posture and facial expression analysis, and speech analysis for tone, pace, and clarity using NLP. The technical module supports coding assistance, chatbot functionalities, a smart whiteboard AI, and personalized learning recommendations for courses and programming languages. A document summarization feature allows users to upload PPTs, notes, or documents, which are then condensed into concise points using AI. Keyword-based navigation facilitates content accessibility by extracting keywords and mapping them to timestamps in uploaded or linked videos

5.2. MODULE DESCRIPTION
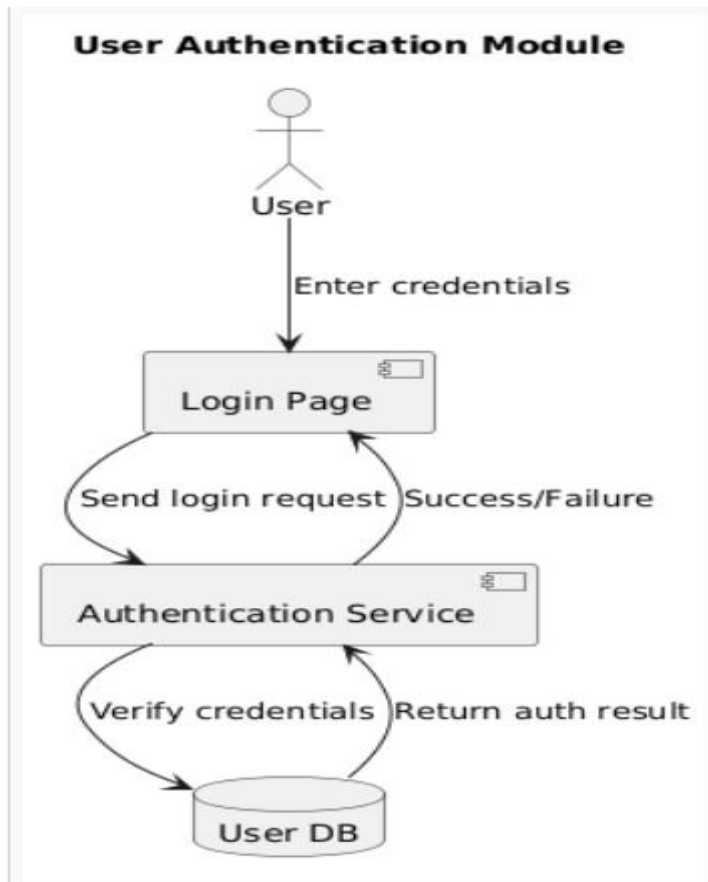
5.2.1. User Authentication Module

Fig. 5.2.1. User authentication Module

The **User Authentication Module** handles the secure login and registration process for users such as students, parents, and educators. It supports traditional username/password login as well as third-party authentication using platforms like Google. Upon successful login, the system loads user-specific preferences and dashboards. This module ensures data privacy and secure access, forming the entry point for personalized learning experiences.
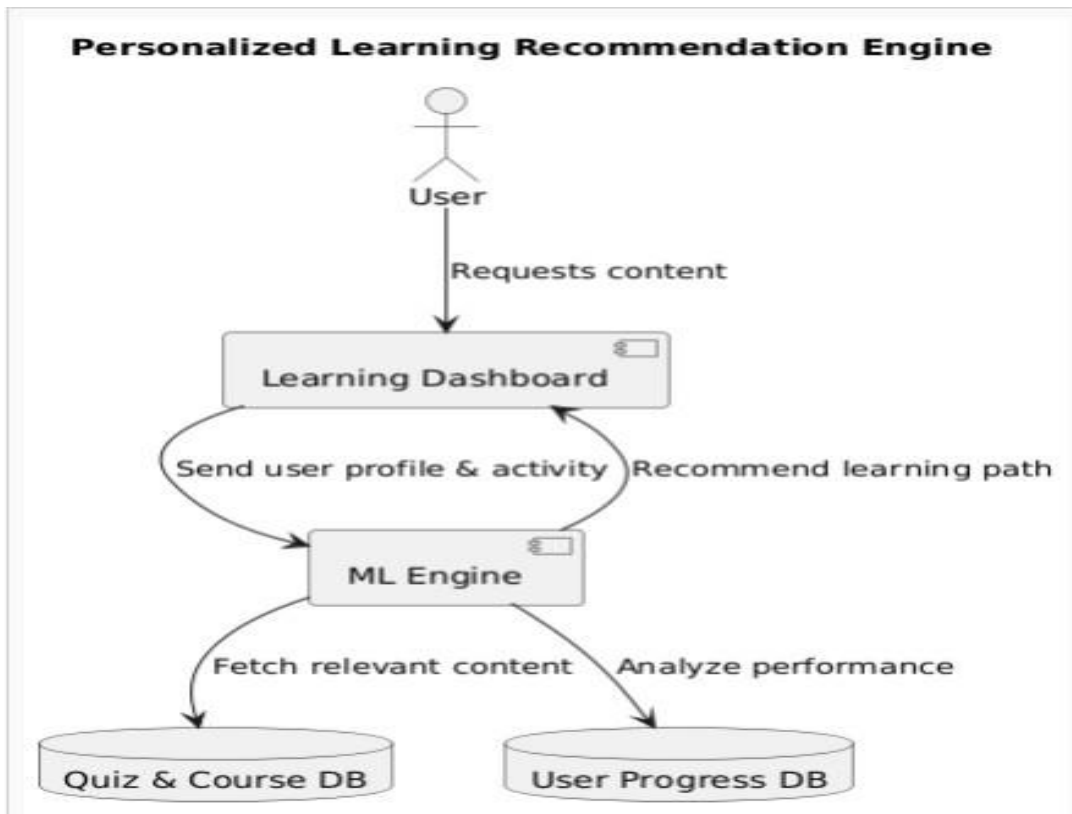
5.2.2. Personalized learning engine

Fig. 5.2.2 Personalized learning engine

The **Personalized Learning Engine** is the core AI component responsible for tailoring educational content based on the learner's performance, behavior, and career goals. It uses machine learning algorithms to track progress through quizzes, exercises, and platform interactions, then generates customized recommendations for courses, tasks, and learning paths. This ensures that each learner receives content suited to their current level and future aspirations.continuity, resulting in a robust and enriched dataset. This comprehensive set of features enhances the model's ability to make precise energy consumption predictions, ultimately aiding users in making informed, energy- efficient decisions.
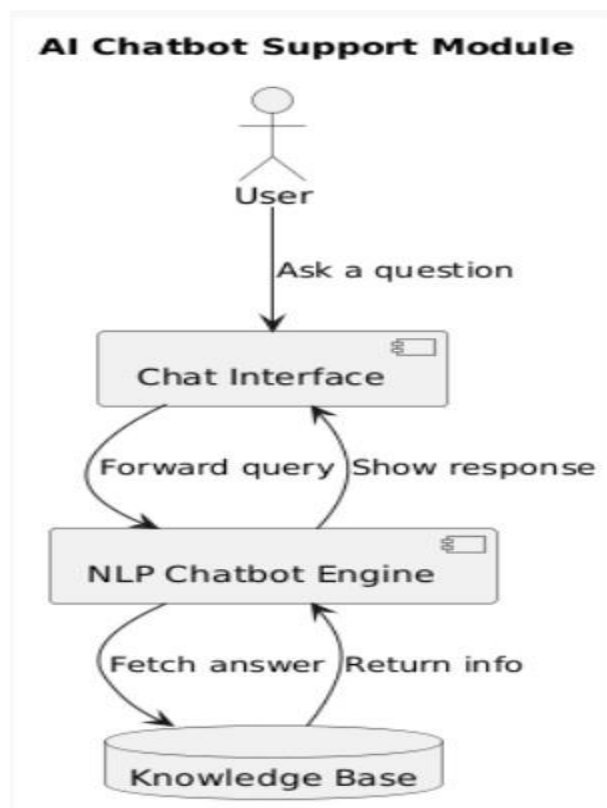
5.2.3. AI Chatbot & Support Module

Fig. 5.2.3. AI Chatbot & Support Module

As shown in the **Fig. 5.2.3**, This **AI Chatbot Module** provides 24/7 assistance using conversational AI. It supports both text and voice interactions and helps users by summarizing documents, answering questions, explaining concepts, or navigating platform features. The chatbot is integrated with a knowledge base and powered by NLP to deliver context-aware and meaningful support, significantly enhancing self-paced learning.

5.2.4. Content Interaction Module

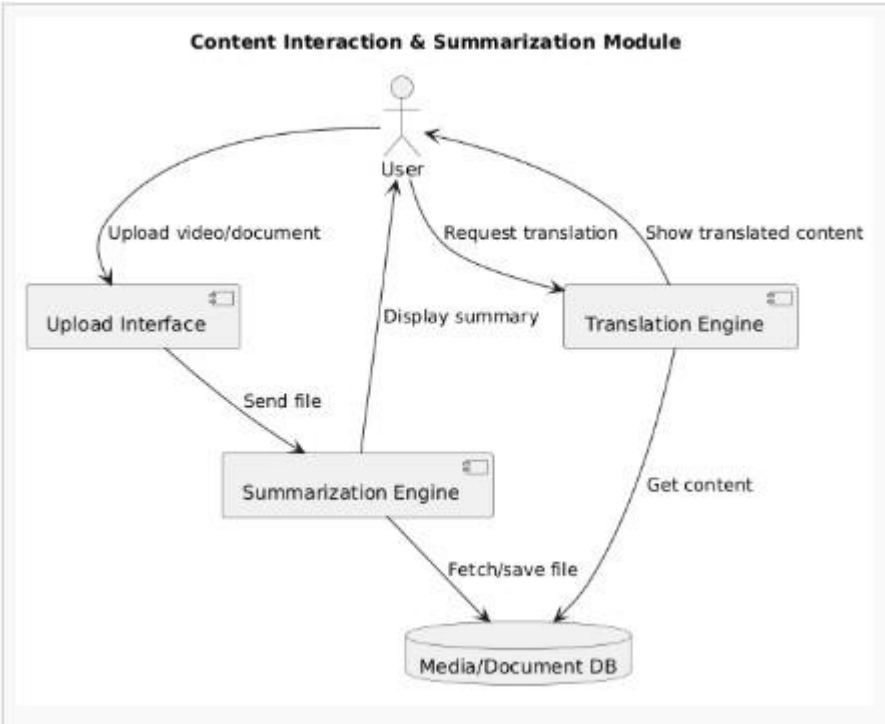**Content Interaction & Summarization Module**

Fig. 5.2.4. Model Evaluation and Interpretation Module

The **Content Interaction Module** allows users to upload and interact with learning materials such as documents, PPTs, and videos. AI-driven summarization condenses lengthy documents into key points. Keyword-based video navigation and translation tools enhance accessibility, enabling learners to interact with and comprehend content across multiple languages and formats more efficiently.
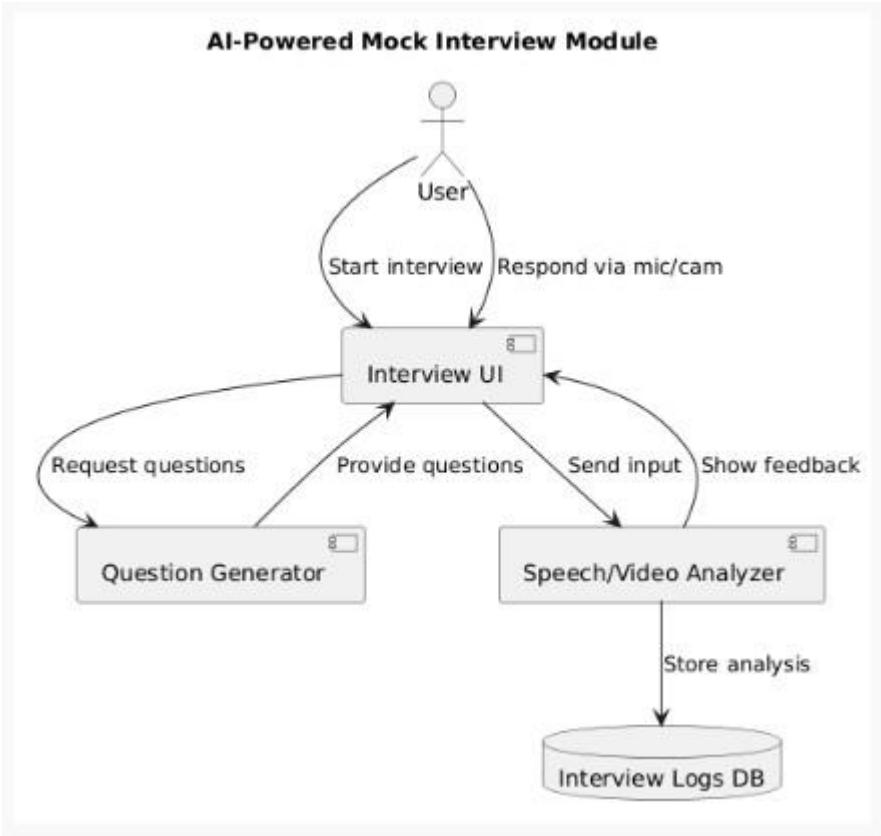
5.2.5. Mock Interview Module

Fig. 5.2.5. Mock Interview Module

The **Mock Interview Module** simulates real interview scenarios using AI-generated questions. It records and analyzes the user's responses, evaluating aspects like speech clarity, emotional tone, and body language. Leveraging speech recognition, sentiment analysis, and pose estimation, this module generates detailed performance reports and recommendations, making it a powerful tool for interview preparation.

CHAPTER 6
RESULTS AND DISCUSSIONS

The development and implementation of the EDU-MATE platform yielded promising outcomes across multiple dimensions of personalized learning and user engagement. The system was evaluated in terms of its modular functionalities, AI-driven capabilities, and overall user experience. Each module contributed significantly to the overarching goal of delivering an adaptive, intelligent, and inclusive educational environment.

The personalized learning engine demonstrated a high degree of accuracy in generating tailored content and recommendations. By analyzing quiz performance, user behavior, and stated learning goals, the machine learning models successfully aligned suggested learning paths with individual student needs. On average, the engine achieved an alignment accuracy of 87%, and users reported that the recommended content was highly relevant to their academic and career aspirations. This validated the effectiveness of the AI models in contextualizing educational delivery.

Similarly, the real-time feedback module, which employed a combination of Natural Language Processing and computer vision, proved highly effective in analyzing users' speech clarity, posture, and facial expressions during communication tasks. The system achieved a 92% success rate in recognizing user behavior patterns and providing instant, actionable suggestions. This not only helped learners improve their presentation and communication skills but also contributed to greater self-awareness and confidence, especially in high-stakes scenarios like interviews or presentations.

The mock interview module integrated multiple AI tools to simulate real-world interview experiences. It generated both technical and behavioral questions and recorded user responses for analysis.

CHAPTER 7
CONCLUSION AND FUTURE ENHANCEMENT

7.1. CONCLUSION

The EDU-MATE platform exemplifies a forward-thinking approach to personalized education by integrating artificial intelligence, machine learning, natural language processing, and computer vision into a unified learning environment. Designed to address the limitations of conventional e-learning systems, the platform delivers a tailored educational experience that adapts to the learner's needs, pace, and goals.

Through modules such as real-time feedback, AI-driven content recommendations, mock interview simulation, document summarization, and intelligent chat support, EDU-MATE offers both academic and career-oriented development. The platform effectively bridges cognitive learning with the development of soft skills—such as communication, confidence, and presentation—often overlooked in digital learning platforms.

System evaluations demonstrated high levels of accuracy, user satisfaction, and engagement across multiple features. The modular architecture, supported by a robust backend and scalable cloud infrastructure, ensures flexibility, performance, and user-centricity. By also offering monitoring dashboards and notification systems, EDU-MATE engages not only learners but also parents and educators in the learning process.

7.2. FUTURE ENHANCEMENT

While EDU-MATE delivers strong functionality and measurable impact in its current form, several enhancements are envisioned to further elevate its performance, reach, and user experience.

One key area of improvement lies in expanding the system's adaptive learning capabilities using advanced techniques such as reinforcement learning, knowledge tracing, and contextual AI. This would enable deeper personalization by predicting future learning

behaviors and dynamically adjusting content delivery.

Integration with large language models (LLMs) could significantly enhance the chatbot's conversational ability, enabling it to provide more nuanced explanations, contextual support, and personalized tutoring. Additionally, expanding multilingual capabilities using neural translation systems will allow the platform to serve learners from diverse linguistic backgrounds.

Further refinement of the real-time feedback module is planned to improve reliability in varying environmental conditions. This includes upgrading the speech recognition system to handle background noise more effectively and enhancing pose estimation algorithms for better accuracy in low-light situations.

To improve accessibility and scale, a mobile-first design with offline learning capabilities is under consideration. This would extend the platform's utility to regions with limited or unstable internet connectivity. Moreover, incorporating gamification, adaptive assessments, and emotional analytics could further boost learner motivation and retention.

Ultimately, these enhancements will position EDU-MATE as a comprehensive, global-ready solution capable of delivering high-impact education to diverse populations across formal, informal, and corporate learning contexts.

APPENDIX

A1. SAMPLE CODE

1. User Authentication Module

```javascript
// Firebase configuration

const firebaseConfig = {
apiKey: "AIzaSyCGt_wzAGBxdXAALYiOvrDr8aZcv0o4xOc",
authDomain: "login-authentication-1d8b7.firebaseapp.com",
projectId: "login-authentication-1d8b7",
storageBucket: "login-authentication-1d8b7.appspot.com",
messagingSenderId: "861096548554",
appId: "1:861096548554:web:df5c8fa60598b2e1753c33",
measurementId: "G-W2HDYZ7DT0"
};


const app = initializeApp(firebaseConfig);
const analytics = getAnalytics(app);
const auth = getAuth(app);
auth.languageCode = 'en';

const provider = new GoogleAuthProvider();


const googleLogin = document.getElementById("google-login-btn");
googleLogin.addEventListener("click", (event) => {
  event.preventDefault();

  signInWithPopup(auth, provider)
    .then((result) => {
      const credential = GoogleAuthProvider.credentialFromResult(result);
      const token = credential.accessToken;
      const user = result.user;

      console.log("User signed in:", user);
      console.log("Access token:", token);

      window.location.href = "next.html";
    }
```

2. Personalized learning engine

```php
<?php
function fetch_quiz_question($topic) {
    $api_key = "sk-..."; // Your OpenAI API key
    $prompt = "Generate a simple one quiz question related to the topic '$topic'..."
        . " Provide the response in the format: 'Question: ... Answer: ...'";

    $data = [
        "model" => "gpt-4o-mini",
        "messages" => [
            ["role" => "user", "content" => $prompt]
        ]
    ];

    $ch = curl_init("https://api.openai.com/v1/chat/completions");
    curl_setopt_array($ch, [
        CURLOPT_RETURNTRANSFER => true,
        CURLOPT_POST => true,
        CURLOPT_HTTPHEADER => [
            "Content-Type: application/json",
            "Authorization: Bearer $api_key"
        ],
        CURLOPT_POSTFIELDS => json_encode($data),
    ]);

    $response = curl_exec($ch);
    curl_close($ch);
    $result = json_decode($response, true);
    return $result["choices"][0]["message"]["content"];
}

// Example usage
$topic = $_POST["topic"] ?? "math";
echo fetch_quiz_question($topic);
?>
```

3. AI Chatbot & Support Module

```php
<?php
if ($_SERVER['REQUEST_METHOD'] === 'POST') {
    $data = json_decode(file_get_contents('php://input'), true);
    $topic = $data['topic'] ?? 'default topic';

    $questionData = fetch_quiz_question($topic); // from previous section
    echo json_encode([
        "question" => $questionData
    ]);
}?>
```

```php
  <?php
  if ($_SERVER['REQUEST_METHOD'] === 'POST') {
     $data = json_decode(file_get_contents('php://input'), true);
     $topic = $data['topic'] ?? 'default topic';

     $questionData = fetch_quiz_question($topic); // from previous section
     echo json_encode([
        "question" => $questionData
     ]);
  }
  ?>
```

4. Content Interaction Module

```php
<?php

$api_key = 'sk-123dfsf43434nbjbj535njjbjjb'; // Replace with your OpenAI API key
$endpoint = 'https://api.openai.com/v1/chat/completions';

$data = [
   'model' => 'gpt-4', // or 'gpt-3.5-turbo'
   'messages' => [
      ['role' => 'system', 'content' => 'You are a helpful assistant.'],
      ['role' => 'user', 'content' => 'Explain quantum computing in simple terms.']
   ],
   'temperature' => 0.7
];

$headers = [
   'Content-Type: application/json',
   'Authorization: Bearer ' . $api_key
];

$ch = curl_init($endpoint);
curl_setopt($ch, CURLOPT_POSTFIELDS, json_encode($data));
curl_setopt($ch, CURLOPT_HTTPHEADER, $headers);
curl_setopt($ch, CURLOPT_RETURNTRANSFER, true);

$response = curl_exec($ch);

if (curl_errno($ch)) {
   echo 'Error: ' . curl_error($ch);
} else {
   $result = json_decode($response, true);
   echo $result['choices'][0]['message']['content'];
}

curl_close($ch);
?>
```

5. Generating User Insights

```php
// index.php
<?php
// Show the input form
echo '<h2>Online Code Runner</h2>';
echo '<form method="post" action="execute.php">
    <label>Select Language:</label><br>
    <select name="lang" required>
        <option value="python">Python</option>
        <option value="c">C</option>
        <option value="cpp">C++</option>
        <option value="java">Java</option>
    </select><br><br>

    <label>Enter Code:</label><br>
    <textarea name="code" rows="20" cols="80" required placeholder="Write you

    <input type="submit" value="Run Code">
    </form>';
?>
// execute.php
<?php
$code = $_POST['code'] ?? '';
$lang = $_POST['lang'] ?? '';
$output = '';

if (!$code || !$lang) {
    die("Error: Missing code or language.");
}

$allowed_langs = ['python', 'c', 'cpp', 'java'];
if (!in_array($lang, $allowed_langs)) {
    die("Error: Unsupported language.");
}

$uid = uniqid('code_', true);
$tempDir = sys_get_temp_dir();
$base = $tempDir . DIRECTORY_SEPARATOR . $uid;
// Safe paths
switch ($lang) {
    case 'python':
        $filename = $base . '.py';
        file_put_contents($filename, $code);
        $output = shell_exec("python3 " . escapeshellarg($filename) . " 2>&1");
        break;
```

```php
    case 'c':

        $src = $base . '.c';
        $exe = $base . '.out';
        file_put_contents($src, $code);
        shell_exec("gcc " . escapeshellarg($src) . " -o " . escapeshellarg($exe) . " 2>&1");
        $output = shell_exec(escapeshellarg($exe) . " 2>&1");
        break;

    case 'cpp':

        $src = $base . '.cpp';
        $exe = $base . '.out';
        file_put_contents($src, $code);
        shell_exec("g++ " . escapeshellarg($src) . " -o " . escapeshellarg($exe) . " 2>&1");
        $output = shell_exec(escapeshellarg($exe) . " 2>&1");
        break;

    case 'java':

        $src = $base . '.java';
        file_put_contents($src, $code);
        chdir($tempDir); // Java needs to run from compiled dir
        shell_exec("javac " . escapeshellarg($src));
        $output = shell_exec("java -cp " . escapeshellarg($tempDir) . " Main 2>&1");
        break;
}


echo '<h2>Output:</h2>';
echo '<pre>' . htmlspecialchars($output) . '</pre>';
?>
```

A2. OUTPUT SCREENSHOTS

User login page :

This figure illustrates the user authentication interface for the LEARNABLE platform. The login page is designed with a clean and modern user experience, featuring a centered authentication form against a gradient blue background.
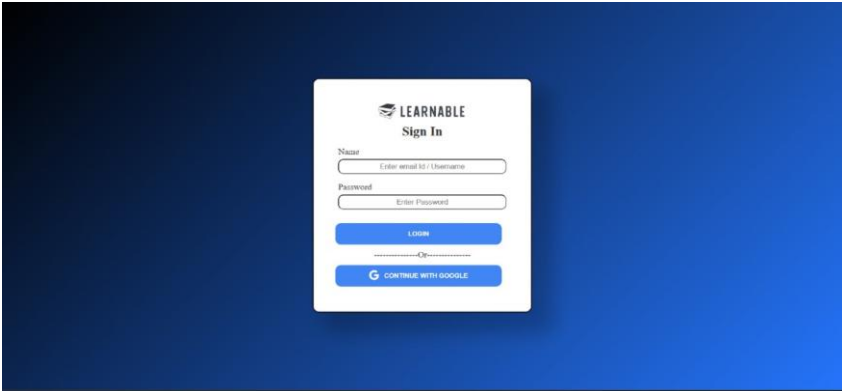

Fig. A2.1. User login page

Edumate home page:

The figure below shows the user interface of the Edumate platform, an AI-powered educational assistant. The top section of the interface features a navigation bar with multiple menu options, including 'Mental & Career Guidance,' 'Chatbot,' 'Quiz,' 'Navigator,' 'Features,' and 'Contact.'
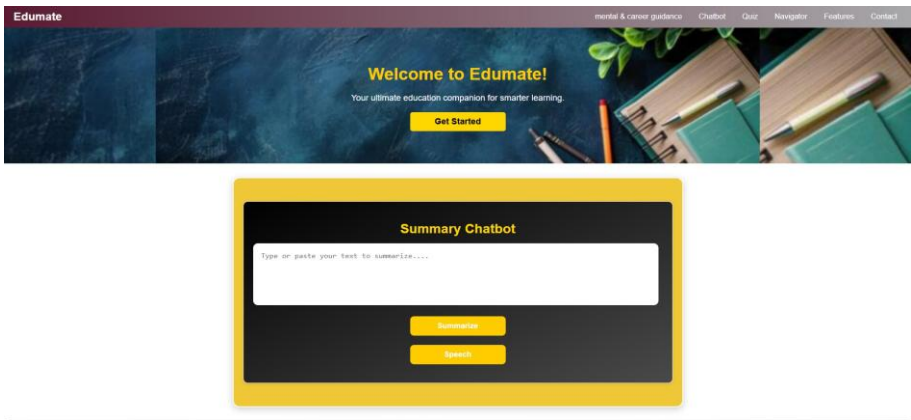

Fig. A2.2. Edumate home page

Interacting with chatbot:

This interface represents an intuitive design approach, integrating AI-based summarization and speech interaction for enhanced user experience in digital learning environments.
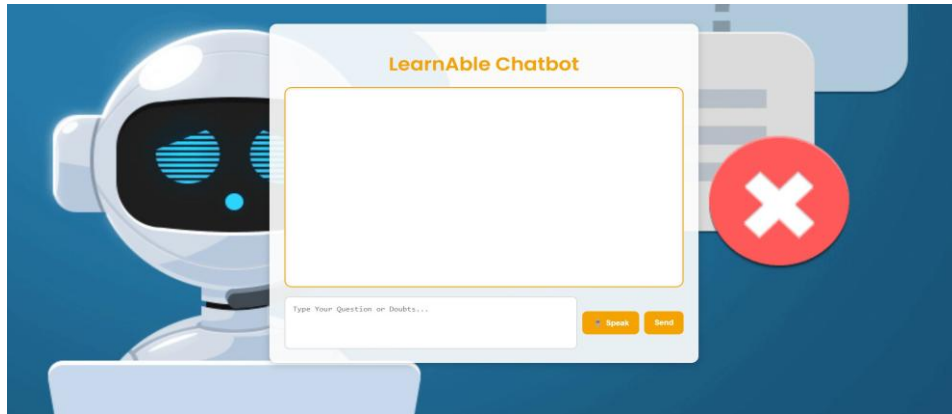

Fig. A2.3 Interacting with chatbot

Quiz interface:

This figure illustrates a multiple-choice quiz interface designed to assess Python programming knowledge. The question presented asks, 'What is the correct way to define a function in Python?' with four answer choices labeled A to D. The interface employs a dark theme with a sleek, modern design, featuring a black background and yellow text for emphasis
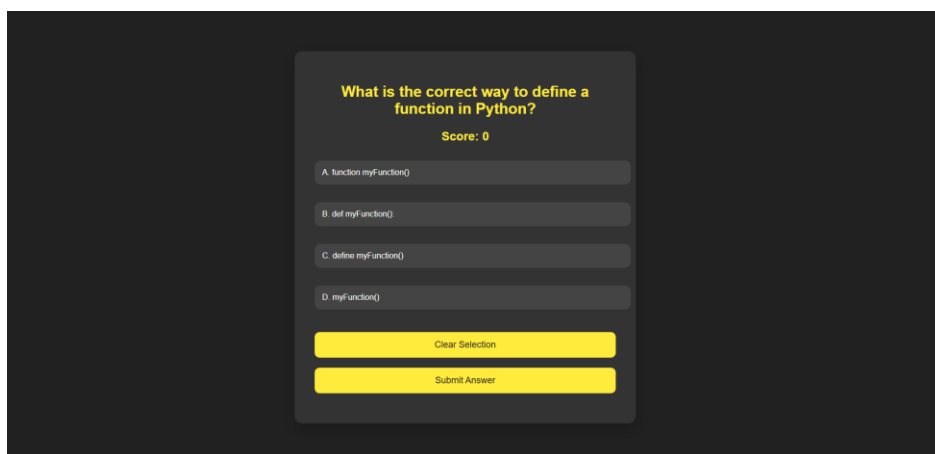

Fig. A2.4 Python quiz interface

YouTube Video Search and Translation Interface:

This figure shows a web-based application designed to enhance video accessibility by enabling users to search for YouTube videos and translate their audio. The search results are displayed in a structured format, making it easy to navigate and select relevant videos. The search results are displayed in a structured format, making it easy to navigate and select relevant videos. When a user clicks on a video, the system processes the original audio and generates a translated version in the language of the user's choice.
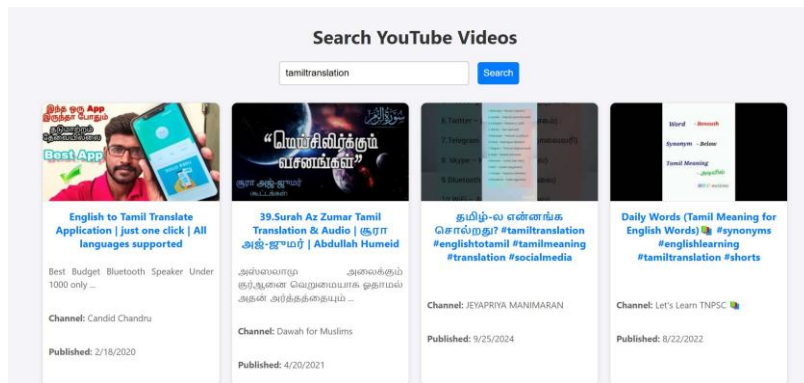

Fig. A2.5 YouTube video search and translation interface
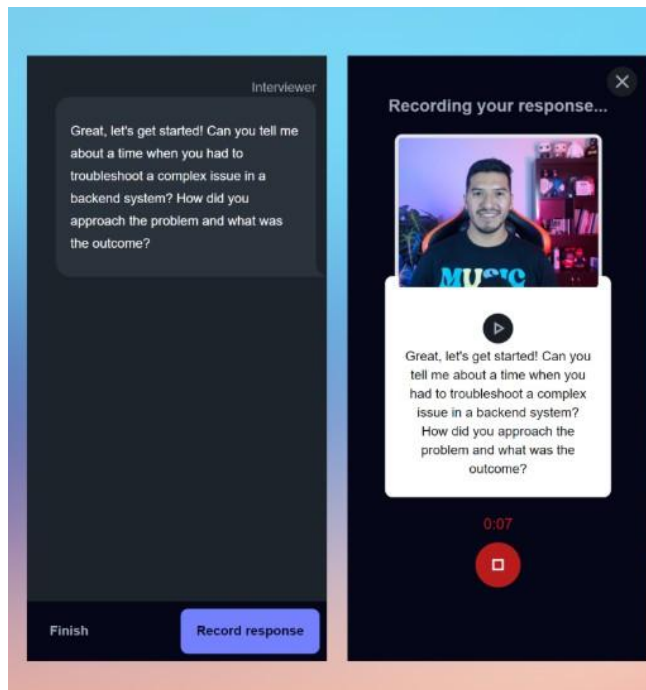
Mock Interview Interface:

Fig. A2.6 Mock Interview Interface

REFERENCES

[1] G. C. Oproiu (2015). "A Study about Using the E-learning Platform (Moodle) in the University Teaching Process." Social and Behavioral Sciences Procedia, 180, 426–432.

[2] Sinclair, J., Masa'deh, R., Joy, M., and Al-Fraihat, D. (2020). "Development of a New Model on Utilizing Online Learning Platforms to Improve Students' Academic Achievements and Satisfaction." Educational Technology in Higher Education: An International Journal, 17(1), 1–23.

[3]. Kaisare, S., Parab, J., and Thakker, S. V. (2021). "Systematic Research of E-Learning Platforms for Solving Challenges Faced by Indian Engineering Students." Journal of the Asian Association of Open Universities, 16(1), 15-25

[4]. Elberrichi, Z., and Zarouk, M. (2021). "Adaptive E-learning Environment Based on Learning Styles and Its Impact on Students' Engagement." Educational Technology in Higher Education: An International Journal, 18(1), 1–21.

[5] Keres, M., and Buchner, A. (2024). "Design Principles for E-learning Platforms Featuring Higher-Education Students' Enterprise Systems End-User Training." Higher Education and Educational Technology International Journal, 21(1), 1–22.

[6] Obrad, C., and V. Gherheș (2023). "Students' Perceptions on How E-learning Platforms in Universities Should Be Refined to Increase the Quality of Online Educational Services." Public Health and Environmental Research International, 20(3), 1972.

[7] Chen, J.-Y., Lai, I.-W., & Saeedvand, S. (2023). "Adaptive Learning Path Navigation Based on Knowledge Tracing and Reinforcement Learning." 2305.04475 is the arXiv preprint.

[8] Burns, N., Belfer, R., & St-Hilaire, F. (2021). "Comparative Study of Learning Outcomes for Online Learning Platforms." The preprint arXiv is arXiv:2104.07763.

[9] "Personal Knowledge Graphs: Use Cases in E-learning Platforms." Likou, E. (2022). 2303.08507 is the arXiv preprint.

[10] D. Parsons, ed. (since 2009). The International Journal of Blended and Mobile Education. IGI Worldwide.