Code Pilot Rag Powered Platform

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Abstract: — The raising demand for skilled software developers has highlighted the importance of personalized, context-aware, and accessible learning platforms. Traditional online resources often fail to provide individualized mentorship and real-time guidance, leaving learners with fragmented knowledge and limited career preparation support. an intelligent mentorship system that leverages Retriever-Augmented Generation (RAG) and Large Language Models (LLMs).

Code Pilot is designed as a mobile-first application that assists students and job seekers throughout their coding and career journey. The system integrates curated knowledge bases with AI-driven retrieval and generation techniques to deliver accurate, contextual, and personalized responses. It provides step-by-step explanations of coding concepts, system design guidance, resume analysis, and interview preparation material, making it a comprehensive career- enablement tool.

To tackle these challenges, Code Pilot is proposed as an intelligent mentorship system knowledge base construction, RAG pipeline integration, and rigorous testing before deployment on cloud infrastructure. By combining scalability, accessibility, and personalization, Code Pilot aims to democratize technical mentorship.

The work adds value to the growing domain of AI-powered education by demonstrating how RAG-driven platforms can transform self-learning into an interactive, personalized, and career-focused experience.

Index Terms: Artificial Intelligence (AI), Large Language Models (LLMs), Retriever-Augmented Generation (RAG), Intelligent Tutoring Systems, Coding Assistance, Career Guidance, Resume Analysis, Interview Preparation, Mobile Learning, Cloud Deployment.

1.   Introduction: -

The present-dayera, programming has become a highly critical skill for lerner , job seekers, and professionals aspiring to enter the IT industry. While numerous online platforms exist for learning, they often lack the ability to provide personalized mentorship, real-time guidance, and context-aware learning experiences. Learners are left with fragmented resources, overwhelming content, and minimal career preparation support.

The project titled "CodePilot: A RAG-Powered AI Mentor for Coding Mastery and Career Guidance" introduces a novel approach crafted to tackle the rising difficulties encountered by lerner , job seekers, and early-career developers in today's competitive technological landscape. With the rapid advancements in software development and the increasing expectations of the IT industry, learners often struggle to keep pace due to limited access to personalized mentorship, scattered learning resources, and inadequate career preparation tools. CodePilot seeks to overcome this limitation by providing 24/7 intelligent mentorship platform that is both scalable and accessible through mobile devices.

This paper introduces CodePilot, an AI-powered intelligent mentorship system designed as a mobile-first platform to assist learners and job seekers throughout their career journey. CodePilot leverages RAG and LLMs to provide context-aware coding assistance, system design guidance, resume analysis, and interview preparation material. By offering a comprehensive suite of tools within a single platform, CodePilot addresses the shortcomings of traditional e-learning systems and democratizes access to high-quality mentorship, even for learners from rural and underprivileged regions.

The remainder of this paper is structured as follows: Section II presents the related work and existing systems; Section III describes the methodology and system design of CodePilot; Section IV discusses implementation and testing; Section V provides results and discussion; and Section VI concludes with future research directions.

2.   Literature Survey:-

A thorough review of existing literature was conducted to understand the role ofAI, NLP, and Large Language Models (LLMs) in areas such as recruitment, coding

assistance, and career preparation. The works presented here examine, findings, and constraintslinks to the builted up of CodePilot.

Various researchers have exploredon enhancing recruitment and candidate evaluation processes through AI. Dr. S. Sarumathi et al. (2025) proposed an AI-Enhanced HR Interview Simulation system using facial expression and tone analysis with LLMs. Their study showed improved fairness and efficiency in candidate evaluation, although it raised concerns about ethics and data transparency. Similarly, Hemaswathi S et al. (2024) introduced an AI-Infused Smart Application Tracking System that leveraged NLP for resume parsing and ML-based ranking. While it improved automation and job-fit scoring, the system still suffered from inherited biases within training data.

In the domain of resume screening, Dilli Ganesh V et al. (2025) combined Deep Learning (DL) with NLP to assess unstructured resumes, demonstrating high fairness and improved explainability via Explainable AI (XAI). However, privacy safeguards were highlighted as a concern. Pravin Vitthal Yadav et al. (2024) surveyed startups to explore AI's impact on recruitment, revealing that 85% reported improved hiring success, though results were subjective due to reliance on self-reported data. Hansini Abeygunawardhana et al. (2025) worked on Video Analysis in Interviews usingCNNs via predict Big Five personality traits, but their system neglected audio and textual cues.

On the broader HR side, Charithma Jayasekara et al. (2023) proposed an AI Agent integrating NLP, Big Data, and Automatic Speech Recognition (ASR) for HR tasks, correction.

Expanding AI applications beyond recruitment and achieving high coverage but complexity in combining skill-based and behavioral analysis. Similarly, Moath M. Alshar et al. (2025) designed AI systems for personalizing HR marketing campaigns using collaborative filtering and recommender systems, achieving an F1 score of 86% and a 30% increase in click-through rates (CTR), though it suffered from cold-start and diversity issues. Adam Alami et al. (2024) emphasized task-based assessments for validating

candidate identity in software engineering recruitment, which improved pre-screening but faced scalability challenges.

NLP techniques, identifies gaps, and

Shifting to AI applications in software engineering and code generation, Andrei Kozyrev et al. (2024) developed CoqPilot, a plugin integrating LLMs with Coq proofs in VS Code. It automated proof generation effectively but was domain-limited. Zhijie Liu et al. (2024) assessed.

ChatGPT's ability to generate code, finding a 48% improvement on pre-2021 tasks and an 89% success rate in fixing vulnerabilities. Nonetheless, it struggled with newer tasks and required multiple iterations for

coding, Dongyu Zhang et al. (2024) proposed LLM-Based Hierarchical Label Annotation for social media illness detection, outperforming traditional methods but limited to the health domain. Xinyu Lian et al. (2025) introduced the Ciri framework, which used LLMs with few-shot prompting to detect misconfigurations across software systems. While accurate across multiple projects, it was less effective in environment-specific bugs.

3. Proposed System:

The proposed system, Code Pilot, overcomes these limitations by integrating Retriever-Augmented Generation (RAG) with Large Language Models (LLMs). The key differentiating factors include:

- **Personalized Mentorship:** Context-aware answers tailored to the learner's specific query.

- **Comprehensive Features:** Coding assistant, system design mentor, resume analyzer, and interview guide in one platform.

- **Scalable AI Integration:** Cloud-based deployment ensures accessibility for a wide user base.

- **Career-Oriented Support:** Direct resume feedback, interview question banks, and system design practice resources.

By combining AI-driven interactivity with curated knowledge bases, Code Pilot transforms traditional static learning into a dynamic, real-time mentorship experience.

- **Coding Assistant:** Offers step-by-step explanations of algorithms, debugging support, and code optimization guidance.

- blueprints, design pattern recommendations, and scalability strategies for software projects.

- suggests improvements based on industry standards.

- behavioral interview questions, along with personalized practice sessions and feedback.

4. Methodology:-

The project methodology follows a structured approach:

1. Requirement Analysis – Identify needs of learners and job seekers through surveys and research.

2. System Design – Develop an architectural model combining mobile frontend, backend APIs, RAG pipeline, and knowledge base.

3. Knowledge Base Construction – Curate reliable learning resources and prepare them for retrieval

4. Implementation – Integrate RAG with an LLM to generate context-aware responses.
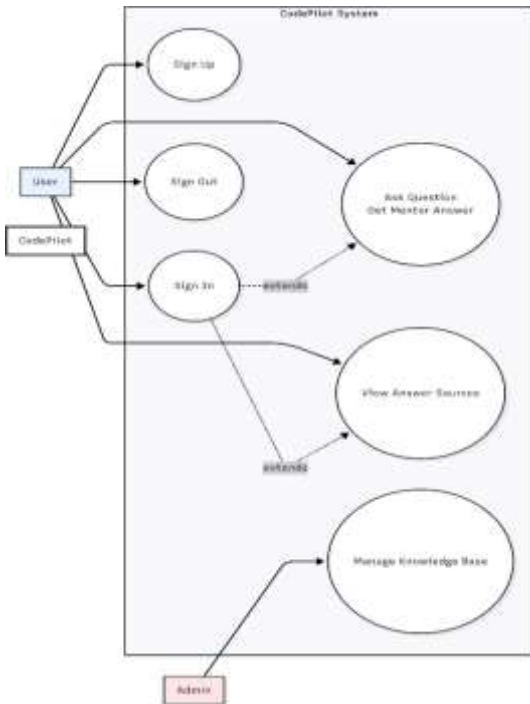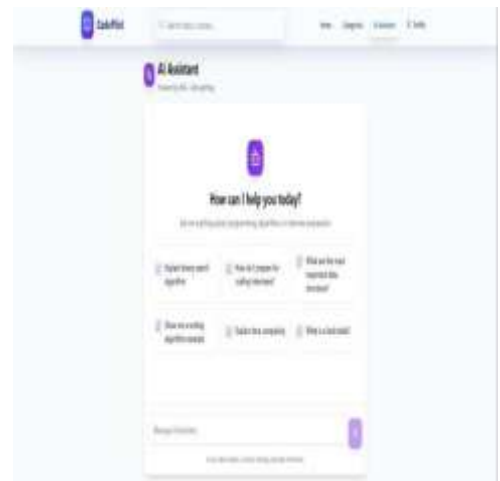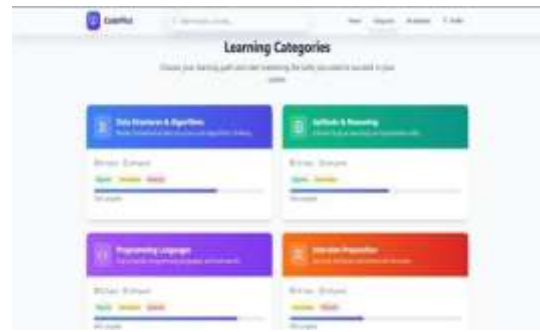

Figure 1: USE CASE DIAGRAM:

5. Result:-

6. Conclusion:-

The development of CodePilot: A RAG-Powered AI Mentor for Coding Mastery and Career Guidance demonstrates how AI techniques can be harnessed to transform the way students and job seekers learn, practice, and prepare for careers in the IT industry. Unlike conventional platforms that provide static and generic resources, CodePilot delivers personalized, context-aware, and interactive mentorship by integrating Retriever-Augmented Generation (RAG) with Large Language Models (LLMs).

Throughout the project, the system was designed to address the most pressing challenges faced by learners— such as lack of mentorship, overwhelming learning material, and limited placement support. CodePilot successfully incorporates key features such as a Coding Assistant, System Design Mentor, Resume Analyzer, and Interview Preparation Guide, thereby serving as a comprehensive career-enablement platform.

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The testing phase validated that the system performs reliably, responds within acceptable time limits, and produces relevant, high-quality outputs. Furthermore, the feasibility study confirmed that the solution is technically sound, economically viable, and operationally practical. By adopting a mobile-first approach and cloud-based deployment, including those from underprivileged and rural regions.

Future Scope

While **CodePilot** already provides a robust framework for AI-driven coding mentorship and career guidance, there is significant potential for further improvements. The following future enhancements are envisioned to make the system more intelligent, user-friendly, and impactful:

Multilingual Support

Integration of regional and global languages to ensure accessibility for non-English-speaking users.

This will help learners from rural and semi-urban areas access mentorship in their native languages.

Real-Time Code Debugging

Advanced integration with **online compilers and code sandboxes** (e.g., Replit, JupyterLite) to allow real-time execution and debugging of code.

AI-driven code correction and optimization suggestions will enhance practical learning.

AI-Powered Mock Interviews

Addition of **interactive interview simulations** for both technical and HR rounds.

Real-time evaluation of answers, coding performance, and communication skills, followed by feedback reports.

Voice and Chatbot Integration

Implementation of **voice-based interaction** to make the system hands-free and more conversational.

Enhanced chatbot capabilities for continuous engagement and doubt-solving.

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