Project Proposal:

SmartTutorPy - An AI-based Personalized Python Programming Tutor

Overview

Problem Statement	Traditional online programming courses often follow a rigid structure that does not accommodate the varying learning speeds, preferences, or difficulties faced by students. This can result in poor engagement and suboptimal learning outcomes. Fast learners may feel unchallenged, while beginners may feel overwhelmed.
Objective	To design and develop an AI-powered tutoring system that adapts Python programming content in real time based on individual student performance, pace, and engagement. The system will deliver personalized quizzes, real-time feedback, and dynamic content recommendations to optimize the learning experience.
Project Scope	The system will target foundational Python programming topics such as: - Variables and Data Types - Conditionals - Loops - Functions - Lists and Dictionaries
Project Date	Start Date: Jul 31, 2025 End Date: Aug 31, 2025

Project Specifics

Key Features	**Progress Tracking:** Logs scores, time taken, and attempts per quiz. - Learner **Profiling:** Classifies learners into types (struggling, average, advanced) based on performance. - **Adaptive Content:** Selects and adjusts difficulty of quizzes based on learner profile. - Feedback **Generation:** Provides hints, explanations, and motivational prompts. - Content Recommendation: Suggests videos, notes, or practice problems based on weak areas.
Tools & Technologies	Programming Language: Python - Libraries: pandas, scikit-learn (for basic ML), Streamlit (for UI), nltk/spaCy (optional NLP) - Dataset: Simulated learner interaction logs
Sample Dataset Fields	student_id - question_id - topic - difficulty - answer_given - correct_answer - score - time_taken_sec - attempts
System Architecture	• User Interface: Streamlit app for quizzes and feedback display - • Data Logger: Records quiz responses and timing • AI Engine: Profiles learners using performance metrics • Content Selector: Recommends the next question based on profile • Feedback Generator: Delivers hints or explanations dynamically
Expected Output	A working Streamlit-based web tutor Simulated data to mimic real learner behavior Personalized learning flow for at least 3 learner types - Demo video and documentation

Conclusion

Project Outcomes	SmartTutorPy aims to demonstrate how AI can personalize learning in computer science education, ensuring each learner receives the right content at the right time to maximize engagement and comprehension.