

AI for Bharat Hackathon

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Team Name : infraX

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Problem Statement : AI-powered solution that helps people learn faster, work smarter, or become more productive while building or understanding technology.

Brief about the Idea:

AI Pair Programmer is an intelligent, real-time coding assistant integrated directly into the developer's code editor. It continuously monitors the code being written, analyzes logic and structure, and provides instant suggestions, optimizations, and explanations.

The system functions as a virtual mentor, offering contextual guidance while the developer is typing. Instead of merely detecting errors after execution, it prevents common mistakes beforehand and promotes best practices.

This approach transforms coding from a trial-and-error process into an interactive and guided learning experience.

Your solution should be able to explain the following:

How different is it from any of the other existing ideas?

Detect syntax errors after compilation

Provide basic autocomplete suggestions

Highlight issues only after code has been written

How will it be able to solve the problem?

Monitoring code continuously as it is written

Detecting inefficient patterns and logical issues early

Explaining the reasoning behind each recommendation

USP of the proposed solution

Real-time Proactive Guidance

Learning-Oriented Explanations

Seamless Editor Integration

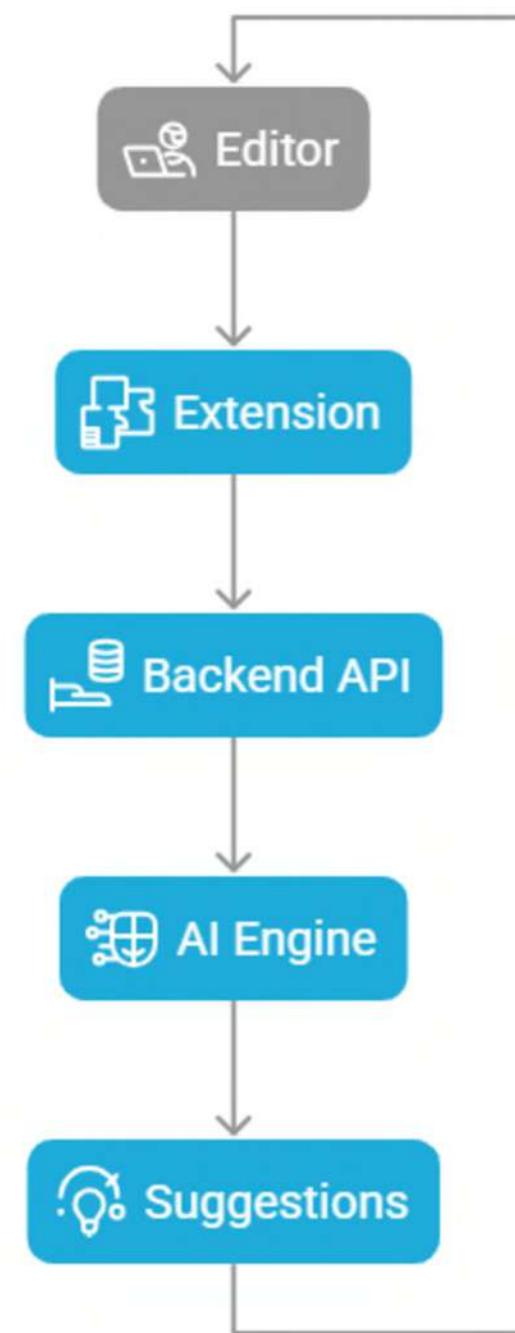
List of features offered by the solution

- Real-time code monitoring
- Intelligent optimization suggestions
- Detection of anti-patterns and bad practices
- Time and space complexity analysis
- Refactoring recommendations
- “Teach Me Mode” for conceptual explanations
- Documentation and commenting assistance
- Multi-language programming support
- Personal progress tracking dashboard

Process flow diagram or Use-case diagram

System Flow of AI-Driven Enhancements

- 1. Editor:** The developer writes code in the code editor.
- 2. Extension:** The editor extension captures code changes in real time.
- 3. Backend API:** The captured code is sent to the backend for processing.
- 4. AI Engine:** The AI engine analyzes logic, patterns, and efficiency.
- 5. Suggestions:** Optimized suggestions and feedback are returned and displayed in the editor.



Wireframes/Mock diagrams of the proposed solution (optional)

The interface will include:

- A suggestion panel alongside the editor
- Highlighted lines indicating potential improvements
- Contextual explanation tooltips
- A dashboard showing learning progress and statistics

The design remains minimal and non-intrusive to maintain productivity.

Architecture diagram of the proposed solution:

Frontend:

- VS Code Extension
- React-based user interface

Backend:

- FastAPI or Express server
- Request processing and session management

AI Layer:

- Large Language Model-based analysis engine
- Abstract Syntax Tree (AST) parser for static code analysis

Database:

- MongoDB or Firebase for storing preferences and learning data

System Flow:

Editor → Extension → Backend API → AI Engine → Suggestions → Editor

Technologies to be used in the solution:

- Python or Node.js
- VS Code Extension API
- Large Language Models (LLMs)
- Abstract Syntax Tree (AST) analysis
- React framework
- FastAPI or Express
- MongoDB or Firebase
- Cloud infrastructure (AWS/GCP/Azure)

Estimated implementation cost (optional):

The solution primarily uses open-source technologies, resulting in minimal development costs.

- **Core technologies:** No licensing cost
- **Cloud hosting:** Low cost
- **API usage:** Scalable and affordable

The prototype can be developed within a student-friendly budget with near-zero initial expenses.

Add as per the requirements for the hackathon:

Expected Impact:

Faster learning for students and beginners

Improved code quality from early stages

Reduced debugging time

Better coding practices and habits

Increased developer confidence and productivity

Future Scope:

Interview preparation assistance

Automated test case generation

Team collaboration features
Integration with learning platforms

Domain-specific coding modules

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Thank You

