Lecture 1- AI-Assisted Programming: Vibe Coding

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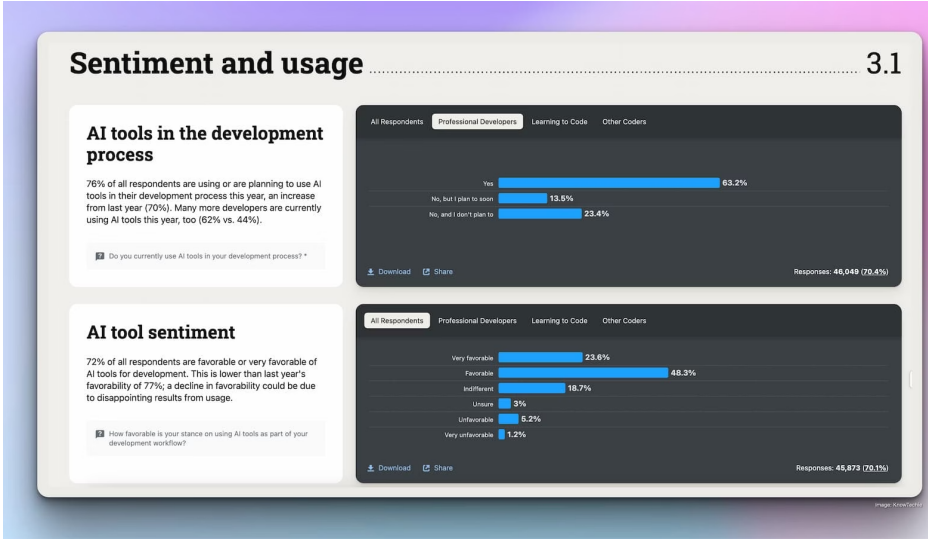
CSC-1004: Computational Laboratory Using Java
Course Page: [Click]

The Trend of AI Programming



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The Trend of AI Programming

Growing worries

According to a team of researchers at the US Department of Energy's Oak Ridge National Laboratory, there's a high chance that **AI will replace software developers as early as 2040**.

> *Programming trends suggest that software development will undergo a radical change in the future: the combination of machine learning, artificial intelligence, natural language processing, and code generation technologies will improve in such a way that machines, instead of humans, will write most of their own code by 2040, state the researchers.*

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The Trend of AI Programming

The trend you can never ignore!

Software engineers' need to be gradually reduced by AI: OpenAI CEO Sam Altman

ETtech • Last Updated: Mar 22, 2025, 08:23:00 PM IST

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Synopsis
OpenAI's Altman said that impact of AI on jobs would not set in suddenly but would accelerate gradually over time. He also highlighted that, while AI has already taken over significant portions of coding, the next big step would be "agentic coding". For success in future, he underlined the importance of adaptability and the capacity to learn.

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AI-Assistant for Programming

AI programming assistants are intelligent tools that help developers write, understand, and debug code. These assistants use artificial intelligence and machine learning models to provide real-time suggestions, code generation, and explanations.

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AI-Assistant for Programming

AI coding assistants are powered by Large Language Models (LLMs) trained on vast datasets of source code and natural language. These models:

- Understand programming syntax and patterns.
- Predict the next line of code.
- Translate human language into code.
- Explain and refactor existing code.

Traditional Programming v.s., AI Porgramming

Traditional Programming	**AI Programming**
Programmers write all code manually	AI generates code automatically
Requires deep knowledge of syntax and semantics	Can help beginners by explaining and generating syntax
Debugging is done manually step-by-step	AI may detect and suggest fixes for bugs in real-time

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Traditional Programming v.s., AI Porgramming

Traditional Programming	**AI Programming**
Time-consuming for repetitive coding tasks	Boosts productivity by handling boilerplate and repetitive tasks
Code is written based on programmer logic and planning	Code can be written from natural language prompts or comments
High control and precision over every line of code	May require reviewing and correcting AI-generated code

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A Case Study: Vibe Coding with DeepSeek

Vibe Coding with DeepSeek is an **AI-powered programming workflow** that enables developers to collaborate interactively with large language models to plan, generate, and refine code in real time.

This new approach transforms coding into a conversational process, where natural language instructions, contextual feedback, and automated reasoning streamline both design and implementation.

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A Case Study: Vibe Coding with DeepSeek

Collaborating with DeepSeek:

- Natural Dialogue: Communicate using plain English: describe problems, request algorithms, or ask for refactoring.
- Dynamic Feedback: DeepSeek explains design choices and syntax while proposing improvements.
- Context Awareness: It understands dependencies, prior code, and your overall project goal.

With this workflow, development becomes a loop of idea to generation to refinement.

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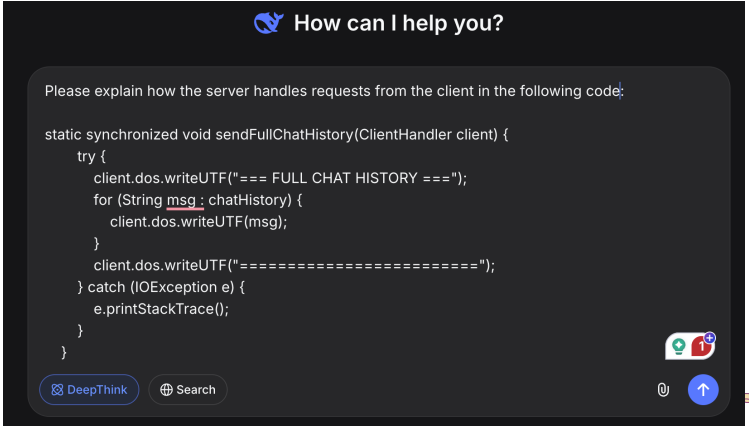
Vibe Coding with DeepSeek for Programming

The **Key Capabilities** of Vibe Coding with DeepSeek:

- **Code Understanding:** Explains complex logic step by step.
- **Adaptive Debugging:** Detects, explains, and corrects bugs interactively.
- **Code Generation:** Produces classes, functions, and documentation from descriptions.
- **Refactoring Support:** Rewrites code for clarity, structure, and maintainability.

Vibe Coding with DeepSeek for Programming

Code Explanation Example: DeepSeek can describe the purpose and flow of a Java or Python program in natural language.



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Adaptive Debugging: DeepSeek detects logical errors or misuse of APIs, then provides human-readable hints and fixed snippets. It is recommended to provide the complete code (including all relevant background).

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Vibe Coding with DeepSeek for Programming

Natural Language to Code:

Developers can simply describe functionality in sentences such as:

> "Write a Python class that manages multiple chat users with message history."

DeepSeek interprets the intent and outputs structured, ready-to-run code: complete with docstrings and explanations.

It is also recommended to include all relevant background code. (More information reduces ambiguity)

Vibe Coding with DeepSeek for Programming

Vision for the Future of Vibe Coding:

The boundary between **thinking** and **coding** is fading. With DeepSeek, the coding process becomes:

1. Conversational: guided by intention, not syntax.
2. Collaborative: human creativity meets model precision.
3. Continuous : ideas flow directly into functional prototypes.

This marks a shift from "programming with tools" to "programming with intelligence."

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An example of Vibe Coding

Finish Project 1 in ten minutes with vibe coding: Refer to the following tutorial:

- Step 1: Build a Java Project.
- Step 2: Chat with DeepSeek.
- Step 3: Verify the Code Generated by DeepSeek.

Learning from DeepSeek takes a longer time: Three to Four Weeks!

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Question and Answering (Q&A)