

# Rubber Duck Debugging with AI

## What is Rubber Duck Debugging?

Rubber duck debugging is a problem-solving technique used in programming where a developer explains their code line by line to an inanimate object, often a rubber duck. The process forces the developer to articulate their logic clearly, often revealing errors or gaps in understanding. The method is based on the principle that explaining a problem out loud can help clarify thoughts and uncover mistakes. It emphasizes the power of self-reflection in debugging.

Harvard's Computer Science course, CS50, has integrated AI-based tools to enhance learning, particularly through a system called the "CS50 Duck" or "CS50.ai." This AI-powered tutor offers various functionalities, including:

- **Debugging Assistance:** The AI helps students identify bugs in their code and provides suggestions rather than outright solutions, encouraging learning through problem-solving.
- **Code Explanation and Feedback:** It explains lines of code, error messages, and suggests improvements in code style, making complex topics more accessible.

This AI uses GPT-4 through Microsoft Azure and employs advanced techniques like retrieval-augmented generation (RAG) to ensure accuracy. This system is a key example of how generative AI can enhance educational accessibility while maintaining pedagogical integrity by focusing on guidance rather than direct answers.

## Rubber Duck Assignment

1. Select an assignment you are having trouble with.
2. Go to <https://cs50.ai>
3. Log in (You do not need an account)
4. Paste in the code you wish to work with.
5. Ask questions about the code.
6. Copy and paste your interaction into a Word document.
7. Go to a different AI.

8. Set the context for the chat with the following or similar prompt. The assigns the AI a role to play.  
**Act as a computer science tutor, please ask me questions to help me figure the issue on my own.**
9. Copy and paste your interaction into a Word document.
10. Attach to the assignment in Blackboard.

## Final Thoughts

You can continue to use CS50 Duck or other AI's to help debug or tutor you throughout this course.

My only request is that if you do, please include your interaction in the assignment.