AI Coding

Tips and Pitfalls

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Personal AI Coding Usage

- Wordle solver
- Neural network for NCAA basketball picks
- iOS app development
- Unfamiliar languages
- Understanding concepts
- Idea generation

Practical Tips

1. Be specific in your prompts.
2. Coding Assistant
3. Debugging Partner
4. Unsavory jobs
5. Build, then modify
6. Summarize or comment code
7. On-demand teacher

Be specific in your prompts

- Good prompt: “Write a C function that reads a temperature from a DHT11 sensor and returns it as a float.”

- Less helpful prompt: “How do I use sensors in C?”

- Tip: Include the language, platform (e.g., Arduino, dsPIC33EP128GP502), and what you're trying to achieve. The more specific the prompt, the better the response.

Your Coding Assistant

- Ask AI to scaffold your code: “Can you write the function headers for initializing a GPIO pin on a PIC microcontroller?”
- Let AI fill in boilerplate or help look up syntax once you plan the project.
- Reverse engineering AI output helps build knowledge: “Can you explain what lines 109-115 do?”

Your Debugging Partner

- When your code is broken, you can copy-paste the error and the function (or attach the file).

- Add context: “This is C code to blink an LED when a button is pressed on an Arduino. It compiles and runs, but the LED keeps blinking after I let go of the button. Also it emits a high-pitched sound which attracts bats to the lab. How can I fix it?”

- Does politeness work?

Unsavory Jobs

- Glorified copy/paste or find/replace.
- “This is the code to make Donkey Kong move to the upper left when I press 7 on the num pad. Finish it for the other 7 directions.”
- “Make a blank switch statement with 25 cases”

Build, then Modify

- Ask the AI to generate or explain a simple sample program, and then modify it:
  - "Give me a simple blinking LED program in C for Arduino."

- Then follow up:
  - "Now modify it so that LED1 blinks twice as fast as LED2."

- "First, I want to make a Tic-Tac-Toe game using Python and the TKinter graphics library. Then I want to make it 3D. Finally, I want to be able to play it online with my friends…"

Summarize or Comment Code

- "Can you add comments to this code?"
- "Can you explain how this code works?"
  - Be specific!
- "I don't like using null pointers. Can you rewrite the doNothing() function to use coroutines instead?"

Teacher on Demand

- "What are volatile variables in embedded C and when should they be used?"
- "What does '__delay_ms(1000)' do and how accurate is it on a PIC microcontroller?"
- "Can you summarize this research paper?"

Pitfalls to Watch For

1. Incorrect output / inappropriate style
2. Wrong hardware/libraries
3. Lack of understanding
4. Overdependence
5. Inadequate model/app for task
6. Privacy/security concerns

Incorrect Output

- AI sometimes generates incorrect, non-compiling, or outdated code.
  - It may hallucinate functions that seem perfect i.e. capitalizeEveryOtherLetter()
- Always try to compile and test before assuming it works. The AI cannot do this for you.
- Be sure it doesn't fail previously passed test cases.

Wrong Hardware/Libraries

- Especially in microcontroller work, AI may invoke invalid includes.
- Terrible at more obscure platforms/languages.
- LLMs predict text – they can only read the Internet and spit it back out.
- If in doubt, will just make things up.

Lack of Understanding

- Asking the AI to do everything may get you functioning code… without understanding.
- Advice: Ask it to explain itself. “Can you explain the logic in steps?”
- Opinion: It’s fine to do this for one-off solutions you’ll never need again.

Overdependence

- AI can shortcut the process of thinking your way through a problem.
- "Write a Father's Day email to the department. Express sympathy for those with dead/no fathers. Mention mothers as well. Throw in a few spelling and grammar errors so it looks real and maybe a couple emojis."
- Advice (from Claude Sonnet 4.0): Resist the urge to ask for complete solutions at the first sign of trouble — try to outline logic yourself, and use the AI to confirm or correct.

Inadequate Model/App

- Capability to view files/images.
- Context length
- Format (i.e. CoPilot)
- Price
- ChatGPT is not your only option.
  - APIs (openrouter.ai)
  - LLMs
  - Specialized GPTs

Privacy/Security Concerns

- "This code is for the F-77 fighter jet..."
- "Can you take a look at this patient database from the hospital I work at?"

Exercise

Write a C program that:

1. analyzes the strength of a user-input password and

2. generates a secure password based on user-defined criteria.