VS Code + GitHub Copilot

Setup & Workflow Guide

Physical Computing HS25

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1. Why AI Tools?

AI tools like GitHub Copilot are designed to support your learning, not replace it.

Benefits

- **Learning Support:** AI helps you understand concepts, debug errors, and learn patterns faster.
- **Efficiency:** Autocomplete, documentation, and quick explanations save time.
- **Translation:** Translates technical jargon and error messages into understandable language.

> ⚠ **Important:** AI is a tool to help you learn, not a replacement for understanding.

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2. Install VS Code

VS Code is a free, open-source code editor that works on Mac, Windows, and Linux.

Steps

1. Go to **code.visualstudio.com**
2. Download for your operating system (Mac/Windows)
3. Install and open VS Code

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3. Install Extensions

Extensions add functionality to VS Code. Open Extensions with `Cmd/Ctrl + Shift + X`

Required Extensions

Extension	Purpose
PlatformIO IDE	For Arduino development. Handles boards, libraries, and compilation.
GitHub Copilot	AI coding assistant. Autocomplete, chat, explanations.
C/C++ Extension	Syntax highlighting and code navigation for Arduino.

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4. Setup GitHub & Copilot

Step-by-step

1. **Create GitHub Account**
   Go to github.com → Sign up (free)

2. **Get GitHub Student Pack**
   Go to education.github.com → Free Copilot access with student email

3. **Sign in to VS Code**
   Click account icon (bottom left) → Sign in with GitHub

4. **Activate Copilot**
   Copilot icon appears in bottom right when active

> *Note: No student email? Copilot has a free tier with limited requests.*

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5. Custom Instructions

Custom instructions tell Copilot **how to help you**. They set the context for all conversations.

How to set up

1. Open Settings: `Cmd/Ctrl + ,`
2. Search: "Copilot instructions"
3. Paste the template we provide

Alternative: Project file

Create `.github/copilot-instructions.md` in your project root folder.

Our instructions template includes

- Your skill level (beginner)
- Teaching approach (explain, don't just solve)
- Error explanation format
- Arduino-specific guidance
- Code structure templates
- Best practices reminders

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6. Using Copilot Chat

Open Chat with: `Cmd/Ctrl + Shift + I`

Chat opens in the sidebar. Ask questions, get explanations, troubleshoot errors.

Good questions to ask

- "What does this error mean?"
- "How do I read a sensor value?"
- "Explain this code line by line"
- "Why isn't my LED turning on?"

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7. Copilot Features

Autocomplete

Suggests code as you type. Press `Tab` to accept. Ghost text appears in gray.

Explain Code

Select code → Right click → "Explain This". Or ask in chat: "explain this"

Fix Errors

Click error → Lightbulb icon → "Fix with Copilot". Or paste error in chat.

Generate Code

Write a comment describing what you want → Copilot suggests code.
Example: `// read temperature sensor`

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8. Best Practices

You're still the coder! AI is your assistant, not your replacement.

✓ DO

- Ask for explanations, not just code
- Understand before you accept
- Test code yourself
- Use it to learn patterns
- Ask "why" not just "how"

✕ DON'T

- Blindly copy-paste everything
- Skip understanding the code
- Let AI write your whole project
- Trust without testing
- Forget to learn the concepts

> **Goal:** Use AI to learn faster, not to avoid learning.

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9. Getting Help with Errors

With our custom instructions, Copilot explains errors in a structured format:

```
🔴 ERROR: [error message]

📍 WHERE: Line XX – [the problematic code]
```

```
💡 WHAT IT MEANS: [simple explanation]

🔧 HOW TO FIX: [solution with brief explanation]

📝 TIP: [how to avoid this in the future]
```

How to use

1. Copy the error message
2. Paste in Copilot Chat
3. Ask: "What does this mean?"

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10. Keyboard Shortcuts

VS Code Essentials

Action	Shortcut
Command Palette	`Cmd/Ctrl + Shift + P`
Settings	`Cmd/Ctrl + ,`
Extensions	`Cmd/Ctrl + Shift + X`
Toggle Terminal	`Ctrl + ``

Copilot Shortcuts

Action	Shortcut
Open Chat	`Cmd/Ctrl + Shift + I`
Inline Chat	`Cmd/Ctrl + I`
Accept Suggestion	`Tab`
Dismiss Suggestion	`Esc`

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11. Setup Checklist

- [ ] VS Code installed
- [ ] PlatformIO extension installed
- [ ] GitHub Copilot extension installed
- [ ] Signed in with GitHub account
- [ ] Custom instructions added

Need Help?

1. Ask Copilot first

2. Check Arduino docs
3. Search your error message
4. Ask us during class!

Custom instructions template: `copilot_instructions_physical_computing.md`