Ahmed's Programming & AI Roadmap

Phase 1: C Programming Mastery (Month 1-2)

Goal: Build deep understanding of memory, performance, and system-level thinking.

Topics:

- Variables, data types, operators
- Control flow, loops, functions
- Pointers, arrays, strings
- Memory management (malloc, free)
- Structures & file handling

Mini Projects:

- Calculator CLI
- Quiz or Todo App
- Student Record System (with file I/O)

Resources:

- The C Programming Language (K&R)
- Learn-C.org
- Harvard CS50 (first part)

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Phase 2: Python Programming + AI Foundations (Month 3-4)

Goal: Use Python for AI, ML, scripting, automation, and rapid development.

Topics:

- Python syntax, functions, classes
- Working with files, APIs
- Numpy, Pandas, Matplotlib (data tools)
- Basic ML with Scikit-learn

Mini Projects:

- Web scraper
- AI-powered chatbot (basic)
- Image classifier using Scikit-learn

Resources:

- Automate the Boring Stuff with Python
- Python Crash Course
- freeCodeCamp ML videos

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Branch 1: AI + Robotics (Month 5-8)

Goal: Create intelligent systems, from software agents to real robots.

Topics:

- Math for AI: Linear Algebra, Calculus, Probability
- ML with TensorFlow or PyTorch
- Robotics with Arduino and ROS

Projects:

- Voice assistant (Python)
- Smart vision bot (OpenCV + Python)
- Robot arm controller (Arduino + C)

Resources:

- 3Blue1Brown: Linear Algebra
- MIT Deep Learning YouTube
- The Construct ROS courses

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Branch 2: Game Engine + VR (Month 9-12)

Goal: Build 2D/3D engines and immersive worlds.

Topics:

- C++ basics (OOP, memory management)
- SDL2, OpenGL, Vulkan
- Game loops, physics, rendering
- Embedding Python for game scripting

Projects:

- 2D tile engine
- 3D basic engine with camera and physics
- AI-powered NPC system

Resources:

- TheCherno YouTube series (Game Engine Dev)
- Handmade Hero
- OpenGL Tutorial

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Branch 3: Systems Programming / OS Dev (Advanced Path)

Goal: Build a real OS, VM, or programming language from scratch.

Topics:

- Assembly + C
- Kernel design, interrupts, memory
- Virtual Machines and interpreters
- Compilers (parsing, bytecode)

Projects:

- Basic OS (bootable kernel)
- Stack-based VM
- Your own language interpreter

Resources:

- os.dev and littleosbook
- Crafting Interpreters
- Writing a Simple Compiler (Eli Bendersky)

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Final Projects / Capstone Ideas

- AI + VR Game: Build a game where NPCs are controlled by real AI
- Iron Man Jarvis Clone: Voice-controlled assistant with automation features
- Personal OS: Your own bootable operating system for fun or retro tasks

Notes:

- Always work on 1 core skill at a time.
- Avoid jumping between too many topics.
- Use weekends for small creative builds or fun hacking.
- Document every project in a GitHub portfolio.

Stay focused, stay sharp. You're not just coding anymore - you're building the future.