NEXT THINGS TO LEARN (Strongly Recommended)

1. Advanced C Topics (must-learn before embedded/software jobs)

A. Dynamic Data Structures

- Linked List (SLL, DLL)
- Stack (array + linked list implementation)
- Queue (array + LL implementation)
- Circular Queue
- Trees (Binary Tree, BST)
- Graph basics (BFS/DFS)

B. C Preprocessor Advanced

- #define, macros
- multi-line macros
- function-like macros
- conditional compilation
- include guards

C. Memory Deep Concepts

- Stack vs Heap vs Static memory
- malloc, calloc, realloc, free deep usage
- Memory leaks & segmentation faults
- Dangling pointer, wild pointer

- Function pointers (in detail)
- Callback functions

D. Algorithms & Coding Problems

- Searching & Sorting
- String manipulation problems
- Array problems (sliding window, 2-pointer)
- Bitwise problems
- Interview-level C questions

2. System Programming (Important for embedded + Linux)

- File descriptors
- Process management (fork, exec, wait)
- Threads (POSIX threads)
- Inter-process communication (IPC): pipes, message queue, shared memory
- Mutex, Semaphore
- Signals

3. Embedded Systems Path (HIGHLY recommended for you)

A. Embedded C

- volatile
- const correctness
- memory-mapped registers
- bitwise operations in hardware
- ISR (Interrupt Service Routine)
- Debouncing

- Timers, PWM, ADC, UART deeper level

B. Microcontrollers

- SAM4E (ARM Cortex-M4)
- Learn STM32 or ESP32 basics
- FreeRTOS basics (very important)

C. Communication Protocols

- I2C
- SPI
- UART advanced
- CAN (optional)
- Modbus (industry-level)

D. Real-Time Operating System

- FreeRTOS tasks
- queues
- semaphores
- mutex
- task scheduling

4. Projects to Build (Choose based on interest)

Beginner–Intermediate Projects

- Temperature + humidity display using UART/SPI
- Data logger using SD card
- ADC graph plotter

Advanced Embedded Projects

- FreeRTOS-based sensor monitoring system
- Power sequencing controller
- Home automation panel
- Motor control system
- Battery monitoring system

5. C++ (Optional but very useful)

- Classes
- OOP
- Inheritance
- Polymorphism
- Templates
- STL (vector, map, string)

SUMMARY — YOUR NEXT LEARNING PATH

- 1. Data Structures in C
- 2. Advanced C memory + preprocessor
- 3. System Programming (Linux basics)
- 4. Embedded C (MCU level + registers)
- 5. FreeRTOS
- 6. Build real projects