C Language Practical Study Plan - Embedded + RTOS Oriented

Week 1: Basic Syntax + Modular Programming

Day 1 | Basic Syntax: Data Types, Control Statements
Task: Write a simple calculator (add/subtract/multiply/divide)

Day 2 | Functions & Scope
Task: Write a temperature converter (Celsius to Fahrenheit)

Day 3 | Arrays and Strings
Task: Implement my_strlen, my_strcpy

Day 4 | Pointer Basics
Task: Write a swap function using pointers

Day 5 | Multi-file project + extern
Task: Write led.c/h to control LED logic

Day 6 | const & static
Task: Test the lifecycle of a static variable

Day 7 | Practice Project
Task: Use modular structure to simulate Button + LED control

Week 2: Pointers + Memory Management

Day 8 | Array vs Pointer
Task: Traverse array using pointers

Day 9 | Function Pointers
Task: Implement a menu system using callback functions

Day 10 | Pointer to Struct
Task: Encapsulate user data in a struct and access it via pointer

Day 11 | Dynamic Memory - malloc
Task: Dynamically allocate memory for sensor data

Day 12 | Memory Leak & Debug
Task: Create and fix a memory leak

Day 13 | void* & Type Casting
Task: Create a generic array printer using void*

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Day 14 | Linked List Project
Task: Implement dynamic linked list with add/remove/search

Week 3: Embedded Simulation

Day 15 | Bitwise Ops & Macros
Task: Implement macros for register bit control (SET_BIT / CLR_BIT)

Day 16 | Bit-field Struct
Task: Simulate STM32 control register struct

Day 17 | FSM Design
Task: Implement short press / long press button FSM

Day 18 | Timer Simulation
Task: Simulate timer using delay and variables

Day 19 | Function Pointer Array
Task: Implement menu dispatcher with function pointer array

Day 20 | Modular Thinking
Task: Write a 3-layer structure: driver + logic + interface

Day 21 | OLED Driver Project
Task: Simulate an OLED driver module with pointer access

Week 4: RTOS-style C Practice

Day 22 | Callback Design
Task: Write a timer structure with callback registration

Day 23 | Queue Structure
Task: Manually implement a circular queue in C

Day 24 | RTOS-style Typedef Handle
Task: Use typedef struct *Handle_t style design

Day 25 | ISR Simulation
Task: Simulate ISR flag setting + main loop polling

Day 26 | Semaphore Simulation
Task: Implement a basic binary semaphore

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Day 27 | Software Timer Architecture

Task: Write task scheduler with delayed execution

Day 28 | RTOS Project

Task: Simulate a mini RTOS: task switching, event trigger, scheduler