

Embedded Programming using C & EmbC

Synopsis & Objective of Course

This is a comprehensive training course intended not only to expertise a trainee in ANSI C but also the usage of C in Embedded Systems programming. Trainees successfully completing this course will have a sound understanding of functions, arrays and pointers, structures, file handling, multiple compilation etc. In addition a trainee will also learn the programming & standards of embedded C. Knowledge of “mixing C and assembly” will equip the trainee in the art of interfacing any processor or controller.

Target Audience

Programmers and engineers who wish to gain a solid understanding of designing using C as an embedded programming language.

Prerequisites

Attendees should have a basic knowledge of programming and computers. Previous knowledge of the C language is helpful but not essential.

Delivery

The training will be instructor led, with each section of the material being covered by the trainer and followed by hands-on practical exercises. Programming will be using GNU C compiler, however trainees can request for any other compiler too. Certain development projects will be given as assignments (under complete guidance) to master a trainee in implementation oriented programming. The intent will be to learn & gain proficiency in the intricacies of embedded programming.

Duration : 5 days

Course Contents

Day	Topic	Sub topics
Day 1	Basics of C Data memory map Flow control	What is a Language? Styles of programming & Introduction to C Data types & Modifiers Operators, Variables & Macros Concept of functions & parts of a program printf – scanf Global & Local variables Storage Classes Stack & heap Decision Control – <i>if else, goto</i> Loop Control – <i>while, do while</i> Loop Control – <i>for, continue, break,</i> Case Control – <i>switch</i> Introduction to pointers

	Pointers	Size & dereferencing of pointer
Day 2	Arrays Functions Strings Run Time	Pointer Arithmetic Arrays – a form of pointers Multi Dimensional Arrays Passing values & references Function pointer Recursive Functions Character Arrays – Strings Array of pointers to String String Functions Command line arguments Dynamic memory allocation Void pointer
Day 3	User data Types Pre-Processor Compilation & Running of Code I/O handling	Structures Declaring & accessing Arrays, pointers & structures in Structure Structure arrays & Structure pointers Unions & Enums Features of C Preprocessor Macros & Arguments Conditional compilation Parts of a program – in detail Steps involved in compilation Source code, assembly & bin/hex file Parser & Linker File Handling in C Text v/s binary mode Formatted I/O
Day 4	Embedded C Embedded Memory Limitations Critical Systems Optimisation Techniques	Review of C language with embedded Perspective System programming v/s Application programming Memory Alignment with Structures Bit Fields & padding Memory Management in C Memory-Map of Applications Undefined & Unspecified Behaviour Implementation Defined Coding Defensive & Assertive Programming Importance of Algorithm Loop Unrolling Loop Jamming & Inversion Strength Reduction & Tail Recursion elimination

Day 5	Coding Techniques Mixing C & Assembly	Various coding standards MISRA C Guidelines Embedded extensions of C99 Testing & Debugging Why use Assembly Code? Code memory & Subroutines Stack Pointer (& other registers) Calling Assembly functions in C Managing the Stack Frame Passing Values to a function Using C libraries & System Calls in Assembly
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Trainers' Profile

Corporate Trainer(s) with more than 6 years of experience in embedded development & corporate training in CMM level5 companies.

Scheduled & On-site Training

Apart from in-house training programs, comprehensive training can be also provided as per the requirement & will be optimally customized as per the client's needs.

For training calendar, availability of seats & other details please mail us at training@sigmasolutions.co.in