Embedded C, Embedded AI & RTOS

Course Syllabus

By Mr. Kishore Kumar Boddu

India's Leading Embedded Systems Trainer & Real-time Embedded Expert

KERNEL MASTERS

Embedded C, Embedded AI & RTOS Course

Course Objectives

- To get In-depth knowledge on Embedded C from the scratch.

- To gain hands-on experience with STM32 ARM Cortex board, which enables one to work with any hardware in future.

- Hands-on experience with protocols like I2C, SPI and UART.

KERNEL MASTERS

Embedded C, Embedded AI & RTOS Course

Hardware Requirements

- Kernel Masters has designed and developed Industrial Hardware boards in collaboration with Embedded Core Companies.
- These Hardware boards will be used as part of the course for real-time project. Students need to purchase the board at the time of project.
- Total estimated cost of hardware kit for Embedded C project will be approximately Rs. 10,000/-.
- The kit comes with below components:
  - STMicroelectronics based Raayan Mini Board (For Embedded C and RTOS)
  - ST Link V2 Debugger
  - ESP32 Wi-Fi Module
  - USB TO UART TTL 5V 3.3V CH340G module

KERNEL MASTERS

Embedded C, Embedded AI & RTOS Course

Part 1: Embedded C/ Firmware /Baremetal Programming

Part2: Embedded AI & RTOS

Part3: Embedded C Projects

KERNEL MASTERS

Part1: Embedded C

ARM Cortex M4

- ARM Architecture
- ARM Processor Modes
- ARM CPU Registers
- ARM Assembly Language
- System Tick Timer
- NVIC

Embedded Software

- Embedded C vs General C
- Bit-wise Operators
- Embedded C Programming
- Startup-Code
- Embedded C Hello world program.

KERNEL MASTERS

Part1: Embedded C

Embedded Hardware

- Raayan mini board specifications
- STM32F4 Controller Specifications
- STM32F4 Memory mapping
- STM32F4 Interrupt Vector table

Development Environment

- Install Keil Software
- Install STM32 Board support packages
- ST Link V2 Debugger Drivers
- HAL drivers using ST Cube

KERNEL MASTERS

Part1: Embedded C

STM32 Interfaces

- Timers
- Interrupt Controller
- PWM
- **GPIO Zone:**
  - LED, Switches, LCD
- **ADC Zone:**
  - LM35 Sensor

STM32 Communication Protocols

- **UART Zone**:
  - Wi-Fi, Bluetooth, GPS
- **I2C Zone**:
  - RTC, EEPROM, ADXL345
- **SPI Zone:**
  - TFT LCD, SD card
- **CAN Zone:**
  - IoT Node

KERNEL MASTERS

Part 2: Embedded AI & FREE RTOS

Embedded AI

- Peripheral Configuration
- Clock Configuration
- Code generation
- Code compilation
- Debug Features

Development Environment

- STM32 Cube
- Cube IDE
- ST Link V2 Debugger Drivers
- HAL drivers using ST Cube

KERNEL MASTERS

Part 2: Embedded AI & FREE RTOS

Real Time Operating System

- Introduction to RTOS
- RTOS Internals & Real time scheduling
- Thread Management
- Priority Scheduler
- Application programming on RTOS
- FREE RTOS Porting on Raayan mini
- Building RTOS for Target systems using ST Cube Software

Industrial Embedded IoT Projects

- Smart Weather Monitoring System
- Smart Tracking System
- Smart Attendance System
- Smart Data Logger
- Smart Gateway
- Smart Grid
- Smart Health Monition System
- Smart Hand Held Terminal
- Smart Home Automation

KERNEL MASTERS

Projects

- Smart Weather monitoring system
- Smart Tracking system
- Gate Monitoring system
- Attendance system
- Industrial IoT gate way
- CAN node IoT gateway

KERNEL MASTERS

Electronics Graduate Career Goal

Software Engineer

Service Based Companies

tcs Infosys accenture Cognizant

Job Designation
Software Engineer

Salary
Entry Level avg: 3.4 CTC
Exp. Level Avg: No.of Years exp * 2

Job Satisfaction
☹

Embedded Software Engineer

Semiconductor companies

Qualcomm intel ST BOSCH

Job Designation
Firmware Engineer,
System Engineer, R&D Engineer

Salary
Entry Level avg: 3.4 CTC
Exp. Level Avg: No.of Years exp * 4

Job Satisfaction
☺

After 2+ Years of Exp

Join Working Professional training at **Kernel Masters**

Gain 3+ years of Real-time Experience

KERNEL MASTERS

About **KERNEL MASTERS**

- Started in NOV,2012. **Completed 12 years**.

- Trained about 12000 students in 55 batches.

- Helped about 16000 students to get into Embedded Careers.

- About 30% of our students will be experienced from Embedded or an equivalent domain, who are looking for growth opportunities.

- Our courses have benefited both fresher's and experienced.

- Our candidates are working in Semi conductor companies like Qualcomm, Sasken, Collabera, Globaledge , Mirafra ,Smartplay, American Megatrends, Visiontek, Qolsys and Elear Solutions are few companies who regularly seek our talent in Device Drivers and Embedded Linux domain.

KERNEL MASTERS

"Embedded Training Institute of the year 2023-2024"
under Global Education Award category.

KERNEL MASTERS

"Embedded Training Institute of the year 2022-2023"
under Global Education Award category.

KERNEL MASTERS