

## Embedded Hardware & Protocol – 2.5 Months Eligibility – B.E, B.Tech, M.E, M.Tech.

### Modules

- C Programming
- Data Structures
- Linux Commands, Shell Scripting
- ARM7 & CORTEX-M3 Architecture
- Embedded Protocols - UART, I2C, SPI.
- FreeRTOS

### Platform:

- Ubuntu (Linux OS, with gcc compiler).
- Lpc 2129, Lpc 1768 ,Keil Microvision .

### Project Stream:

- Anti-Theft system for vehicles using Fingerprint sensors.
- Wireless Black Box using MEMS Accelerometer and GPS Tracking for Accidental Monitoring of Vehicle.
- Smart Zoned Based Vehicle Speed control using RF and obstacle Detection and Accident Prevention.
- Vehicle to vehicle communication using wireless technology.
- Fingerprint and iris biometric controlled smart banking machine embedded with GSM technology for OT.

### Modules

#### Section – 1 Recordings

#### Programming in C and Data Structures - 12 hrs

Introduction to C	Data types	Operators
Control Flow	Modular Programming	Preprocessor
Storage classes	Arrays & Strings - Character Arrays	Advanced C Programming: Pointers
Advanced Pointers : NULL pointer, Pointer to a constant , constant pointer	Dynamic memory allocation	Recursion
Command line arguments	Files I/O, Block I/O	Random Access - fseek , ftell , rewind
Data structures Introduction	Stack and Queues	Linked list introduction
Types of linked list	Trees Introduction	BST and Expressions

#### Linux Commands, & Shell Scripting – 2 hrs

File & Directory Commands - ls, mkdir, cd, pwd, rm,cat	Process Related Commands - Ps, fg, bg, jobs	Text Manipulation Commands - Head, tail, cut, paste, sort, diff, comm.
Shell Scripting	Conditions: if, switch, expr, test	Loops: while, for

#### Section – 2 Live Online Sessions

#### Embedded Design & Development

#### ARM & CORTEX-M Micro Controller

Introduction to ARM7	Introduction to LPC2129	GPIO
Vector Interrupt Controller and Timers	ADC, PWM,WDT,RTC	Embedded Protocols - UART, I2C, SPI

Introduction to ARM Cortex M3	Difference b/w ARM7 and Cortex Series Controller	Programming with Cortex M3(LPC1768)
Nested Interrupt	Embedded Testing	Debugging with JTAG
Overview : Design and Development of ECU	MISRA C guidelines, Static Analysis Tools	AUTOSAR Layer Model
SBUS CAN using BUS MASTER Software	OBD-2 Simulator with OBD Dongle Demo	
<b>-FreeRTOS –Real Time Kernel</b>		
Characteristics and Components	Need for RTOS in embedded devices.	Free RTOS Task Management & Multitasking
Inter Task Synchronization - Semaphores	Inter Task Synchronization - Mutex	Inter Task Synchronization - Counting
Inter Task Communication	Interrupts	