

EMBEDDED SYSTEMS WORKSHOP

ARCHITECTURE & NETWORKING CONCEPTS

- Introduction
- Design Space
- Types of Memory
- Memory Hierarchy
- Locality Principles
- Overview of the following Architecture :
 - X86
 - 68k
 - Power Pc
 - ARM
- Difference between micro controller & microprocessor
- Introduction to 8 bit & 16 bit micro controllers
- Overview of Networking
 - OSI model
 - TCP/IP Mode
 - 802.X Protocol

MICROCONTROLLERS

- Introduction to Micro-controllers
- The 8051 Architecture
 - 8051 hardware Detail
 - 8051 Oscillator and Clock
 - 8051 Registers
 - Memory Organization
 - Discussing 8051 Family
 - On Chip Peripherals
 - 8051 Interrupts
- Programming The Micro-controller
 - Programming Tools and Techniques
 - Addressing modes
 - Introduction To 8051 Instruction Set
 - Program Flow
 - Timers & Counters
 - Timer SFRs
 - Serial Port operations
 - Projects On Micro-controller Interfacing
- Interfacing 8051 with :
 - LED's
 - 7 Segment
 - Relay
 - Stepper Motor
 - LCD
 - ADC

CONTENT HIGHLIGHTS

ARM 32 BIT RISC MICROPROCESSOR PROGRAMMING
8051 MICROCONTROLLER PROGRAMMING
PIC 16F877 MICROCONTROLLER
EMBEDDED C PROGRAMMING IN 'LINUX'
CROSS COMPILERS, GCC, GDB
PORT PROGRAMMING
DEVICE DRIVERS
REAL TIME OPERATING SYSTEM (RTOS)

- External Memory
- 8255

PIC MICROCONTROLLER

- PIC Microcontroller Hardware Architecture
 - Memory Organisation
 - Interrupts & Reset
 - I/O ports
 - Timers
 - ADC I/O
 - Serial I/O
 - Asynchronous Serial port (USART)
 - Synchronous Serial ports
 - SPI Bus
 - I2C Bus
- Embedded C Language
 - I/O operations
 - Control statements
 - Functions, pointers & arrays
 - Structures & Unions
 - Memory Types
- Standard I/O and Preprocessor directives
- The CCS-PICC C compiler and IDE
 - Editor options
 - Source Files
 - Microchip MPLAB
 - Program and target device
- Project Development

EMBEDDED SYSTEM PROGRAMMING

- **Basic Linux Overview**
 - File System
 - Working with files & directories
 - Pattern search
 - VI editor
 - Shell programming
- **Introduction to Embedded C Programming**
 - S/W planning
 - Resource management
 - Control structure
 - Loops
 - Function
 - Pointer Manipulation

- User define data structure
- Files
- **Advance Linux Programming**
 - Low level IO programming
 - Low level file operation
 - Implementation of following IPC mechanism:
 - Semaphore
 - Pipes
 - Message Queue
 - Shared memory
 - Socket
- **Port Programming**
 - Introduction of Different kinds of ports
 - Serial and Parallel programming
 - Port Architectures
 - Security concerns and Protection rings
 - Port related SFRs
 - Simplex, Half/Full Duplex communication using ports
- **Device Driver Programming**
 - Introduction to Device Drivers in Linux
 - Compiling and Loading of Modules
 - Character Device Drivers
 - Interrupt Handling
 - Writing a Test Device Driver

OTHER TOOLS AND EMBEDDED SYSTEM DEVELOPMENT

- **GCC Cross Compiler**
 - Overview
 - Configuring for development platform
 - Configuring for target platform
 - Using cross compiler commands
- **GDB Debugger**
 - Overview
 - Introduction to gdb
 - Support and compatible Host and the target
 - GDB Commands
 - Running Programs under GDB
 - Breakpoints, watch points, and exceptions
 - Examining the Stack
 - Examining Source Files
 - Examining Data
 - Using GDB with Different Languages
 - Examining the Symbol Table
 - Specifying a Debugging Target

REAL TIME OPERATING SYSTEM – RTOS

➤ **Introduction**

- OS Overview
- Architecture of RTOS
- Hard Real Time System
- Soft Real Time System
- Features of Real Time System
- Choosing an OS for Embedded Real- Time System
- Task Concepts
- Creating & Maneging task
- Interrupt Service Routing
- Signal Service Routing

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VXWORKS

- Overview
- Architecture
- Vxworks Host target System
- Task creation & Control
- Task Scheduling
- Task start Transition
- Inter task Communication
- Inter task Signaling & Synchronization
- Watchdog timer management
- I/O Features

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TORNADO IDE

- Overview
- Project Management utility
- Shell
- Debugging
- Logic Analyzer (wind view)
- Target Server
- VxSim(target simulation)

ARM 32 BIT MICROPROCESSOR

➤ **THE ARM ARCHITECTURE**

- Overview of ARM
- ARM operation modes
- The ARM registers set, register organization summary according to the current mode
- Program Status Registers
- Exception handling, vector table, automatic switch into ARM mode
- Instruction sets : ARM branches and subroutines

➤ **ARM PROCESSOR CORE**

- ARM7TDMI core signals
- ARM7TDMI block diagram
- The ARM7TDMI instruction pipeline
- ARM7TDMI memory interface
- ARM9TDMI datapaths
- ARM9TDMI pipeline
- Example ARM9TDMI system
- Overview of ARM9E-S, ARM10, StrongARM and Xscale

➤ **KIEL**

- Compiler
- Debugger
- Simulator

➤ **INTRODUCTION TO FLASH MEMORY PROGRAMMING**

- Flash Memory System
- Flash Boot Loader
- Applications

Fee : **Rs.38,000/-**
38,000/-(during the workshop), 35000 Lump sum

Workshop Duration: 6 Months (2+2 hrs. 5 Days a week)