ADVANCED EMBEDDED LINUX DEVELOPMENT

CODE: ADV/ELD-2M

1. EMBEDDED C PROGRAMMING

a. INTRODUCTION TO EMBEDDED C PROGRAMMING
b. BUILD PROCESS (COMPILING ,LINKING AND LOCATING)
c. DATA TYPES, VARIABLES, LOOPS AND NESTED LOOPS
d. POINTER AND ADVANCE POINTERS
e. WORKING ON BIT MANIPULATION
f. DATA STRUCTURE IN C
    i. LINKED LIST
    ii. TREE (BST)
g. CODE OPTIMIZATION

2. EMBEDDED LINUX SYSTEM DEVELOPMENT

a. COMMANDS IN LINUX
b. LINUX SHELL SCRIPTING
c. SYSTEM CALLS (POSIX)
d. GNU TOOL CHAIN
e. GCC COMPILER
f. GDB DEBUGGER
g. MAKE UTILITY
h. BASIC LINUX PROGRAMMING
i. LINUX PROCESS MANAGEMENT
    i. TASK STRUCTURE AND PROCESS TABLE
    ii. CREATION, TERMINATION AND DAEMON PROCESS
j. LINUX SCHEDULER
    i. FIFO
    ii. ROUND ROBIN
    iii. PRE-EMPTIVE

k. Introduction to Linux file system
l. Handling files and directories

3. Advance Embedded Linux System Development

a. Playing with The Linux Environment
b. Terminals and pseudo Terminals
c. Linux Development tools chain
    i. Compilers
    ii. profilers
    iii. debuggers and their usage
d. Data and Memory Management
e. Processes creation and their Control
f. Signal handling
g. POSIX Thread programming.
    i. Multi Threading Its Advantages & Disadvantages
    ii. Thread Synchronization
        1. Semaphore
        2. Mutex
h. Different type of inter process communication mechanism
    i. Semaphore
    ii. Pipes
    iii. Shared memory
    iv. Message Queue
i. Network Programming using sockets

4. Introduction to Software Development

a. Life cycle of software development
b. Components of a Development System

5. Embedded Linux System Development

a. What are embedded systems?
b. Introduction to cross platform development process
c. Linux as an Embedded Operating System

d. Embedded system development hardware and emulators

6. Hardware Basics For Embedded System

a. Introduction to development boards and hardware
b. Introduction to Processors, Peripheral components , buses and Memory
c. Introduction to ARM Processor, ARM architecture and Arm programmer's model.
d. Understanding the Intergratorcp and Versatilepb development board Boards
e. Components of a development board.

7. Developing Complete Embedded System From Scratch

a. Embedded Linux
b. Configuration of the cross development environment
c. Embedded Software Architecture and components
d. Introduction to cross development tool chain and utilities.
e. Linux boot loaders & compilation
    i. UBoot
    ii. Redboot
f. Linux Kernel Directory Hierarchy
g. Linux Kernel Development Activity
    i. Kernel Selection
    ii. Kernel Customization
    iii. Kernel Compilation (making zImage for board)
    iv. Kernel Porting
h. Introduction to embedded file system (making root file system)
i. Preparing Busyboxs and cross compiling
j. Board bring up Activity (using uboot, zImage, rootfs)

Lab Work:

A. Boot Loader Cross Compilation
B. BusyBox Cross Compilation

C. BOARD BRING UP ACTIVITY FOR MINI2440
D. BOARD BRING UP ACTIVITY FOR VERSATILEPB