

Audit Course-2

Embedded Processors

Unit I : ARM7, ARM9, ARM11 Processors

Introduction to ARM processors and its versions, ARM7, ARM9 & ARM11 features, advantages & suitability in embedded application, ARM7 data flow model, programmer's model, modes of operations, Instruction set, programming in assembly language.

Unit II: ARM7 Based Microcontroller

ARM7 Based Microcontroller LPC2148: Features, Architecture (Block Diagram and Its Description), System Control Block (PLL and VPB divider), Memory Map, GPIO, Pin Connect Block, timer, interfacing with LED, LCD, GLCD, KEYPAD.

Unit III: Real World Interfacing with ARM7 Based Microcontroller

Interfacing the peripherals to LPC2148: GSM and GPS using UART, on-chip ADC using interrupt (VIC), EEPROM using I2C, SDCARD using SPI, on-chip DAC for waveform generation.

Unit IV : ARM CORTEX Processors

Introduction to ARM CORTEX series, improvement over classical series and advantages for embedded system design. CORTEX A, CORTEX M, CORTEX R processors series, versions, features and applications. Need of operating system in developing complex applications in embedded system, desired features of operating system & hardware support from processor, Firmware development using CMSIS standard for ARM Cortex. Survey of CORTEX M4 based controllers, its features and comparison.

Unit V : ARM CORTEX M4 based Microcontroller

ARM Cortex-M4F based Microcontroller TM4C123GH6PM: Block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics. Programming system registers using TivaWare, GPIO control, Watchdog Timer, System Clocks and control, Hibernation Module in TM4C microcontrollers, Interrupts, Interrupt vector table, interrupt programming, Timers and Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

Unit VI : Real World Interfacing with ARM-CortexM4F Based Microcontroller

Analog interfacing and data acquisition: ADC, Analog Comparators, DMA, Serial communication basics, Interfacing digital and analog external device: I2C protocol, SPI protocol & UART protocol. Concept of USB, CAN, and Ethernet based communication using microcontrollers. CAN, USB, ETHERNET applications in embedded c.

Text Books:

1. Andrew Sloss, Dominic Symes, Chris Wright, “ARM System Developer’s Guide – Designing and Optimizing System Software”, ELSEVIER
2. Joseph Yiu, “The Definitive Guide to the ARM Cortex-M”, Newness, ELSEVIER
3. Embedded Systems: Real-Time Interfacing to ARM Cortex-M Microcontrollers,2014, Jonathan W Valvano CreateSpace publications ISBN: 978-1463590154.
4. Embedded Systems: Introduction to ARM Cortex - M Microcontrollers, 5th edition Jonathan W Valvano, CreateSpace publications ISBN-13: 978- 1477508992

Reference Books:

1. LPC 214x User manual (UM10139) :- www.nxp.com
2. LPC 17xx User manual (UM10360) :- www.nxp.com
3. ARM architecture reference manual : - www.arm.com
4. Trevor Martin,”An Engineer’s Introduction to the LPC2100 series”, Hitex (UK) Ltd.
- 5.http://processors.wiki.ti.com/index.php/HandsOn_Training_for_TI_Embedded_Processors
http://processors.wiki.ti.com/index.php/MCU_Day_Internet_of_Things_2013_Workshop