National Institute of Electronics and Information Technology, Chennai

COURSE PROSPECTUS

Name of the Group:	VLSI & ES
Name of the Course:	Embedded System Design using ARM Cortex M4
Course Code:	ED100
Starting Date:	25th November 2019
Duration:	80hrs
Course Coordinator:	V. Gokilapriya
Last date of Registration:	22nd November 2019

Preamble:

In today's world, embedded systems are all over, homes, offices, cars, factories, hospitals and consumer electronics. The inherent value of embedded systems lies in its pervasiveness. They are literally embedded in all electronic products, from consumer electronics to office automation, automotive, medical devices and communications. They make the products smart, connected and are responsible for differentiating the products in the market. Embedded systems are normally built around Microcontrollers and ARM Processor based SOCs. This Embedded System Design course focuses on the architecture and programming of embedded processors, development of applications using Embedded/Real-Time Operating Systems and porting the applications on ARM.

Objective of the Course:

To develop the skillset required for Design and Development of the Embedded System Hardware (Interface / Peripherals) and Software for Embedded Applications / Product in the Industry.

Outcome of the Course:

1. Hands on exposure to the tool Chain utilized in Embedded System Design, Development & Verification.
2. Able to identify appropriate hardware and software for a given Embedded system application.
3. Feel confident and comfortable programming applications on the ARM Cortex-M platform.
4. Will be able to Program and interface the peripherals: General Purpose I/O, ADC, Timer / Counter, PWM, Sensors, DAC, Memory, Real Time Clock etc. to build a Embedded system.
5. Developing Competency in Interfacing ARM Cortex M4 using Communication Wired/wireless Communication Protocols /Devices.

Expected Job Roles:

∑ Design Engineer
∑ Embedded Engineer
∑ Embedded Programmer
∑ Verification Engineer

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Course Structure:

S.no	Module Name	Duration
1	Introduction to Embedded System	2 Hrs
2	ARM Cortex M4 and TM4C123GH6PM Launch Pad Architecture	6 Hrs
3	Embedded C Programming	18 Hrs
4	ARM Cortex–M4 Peripherals	14 Hrs
5	Interfacing using Embedded Wired Communication Protocol (UART, SPI, I2C)	20 Hrs
6	Interfacing using Wireless Communication Protocol (Bluetooth, Zigbee and GSM)	20 Hrs
	Total Hours	80 Hrs

Other details:

Course Fees

For General Candidates: Course fee is Rs.4, 500/-(Including GST)

For SC/ST Candidates: No Fee

However they are required to remit an amount of **Rs.1, 000/-**as advance security deposit. This amount will be considered as security deposit and will be refunded after completion of the course. If the student fails to complete the course successfully this amount along with any other security deposits will be forfeited.

Registration Fee: (non-refundable)

SC/ST: No registration fee

Others: **Rs.500/-. (Including GST)**

However the above registration fee shall be refunded on few special cases as given below

1. If course postponed and new date is not convenient for the student.
2. If course cancelled.

Payment schedule: The Fee is to be paid in one installment as given below.

Installment No.	Last Date for Payment	Amount (in Rs.)
1.	22nd November 2019	4500/-

Eligibility

1) Graduates of BE/B.Tech/M.Sc (Electronics/CS/IT)
2) Candidates who have appeared in the qualifying examination and awaiting results may also apply.

Number of Seats: 30

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How to apply:

Candidates are advised to download the Registration form from our website www.nielit.gov.in/chennai. After filing the form with all documents and fees, it can be submitted to NIELIT Chennai office in person or through post before staring of the course. Payment towards non-refundable Registration and Course fee can be paid through any one of the following modes:

- ∑ DD drawn from a nationalized bank (preferably SBI) in favor of "NIELIT Chennai" payable at Chennai.
- ∑ Online transaction: Account No: 32558810978 Branch: Kottur (Chennai), IFSE Code: SBIN0001669.
- ∑ Pay through nationalized bank Debit card (Service charges applicable)

Note: The Institute will not be responsible for any mistakes done by either the bank concerned or by the depositor while remitting the amount into our account.

Last date of Registration is 22nd November 2019

Selection of candidates: First cum First Serve basis

Admission Procedure:

All interested candidates are required to fill the Registration form with the fees (Registration and Course fees) before **22nd November 2019** with all the necessary following documents.

- Original and self-attested Copies of Proof of Age, Qualifications, etc.
- One passport size photograph and one stamp size photograph for identity card
- Self-attested copy of Govt. issued photo ID card.
- Self-attested copy of community certificate (if availing SC/ST fee concession)

Note: Working days are from Monday to Friday. Admission timings are from 9.00 am to 5.30 pm.

Discontinuing the course: No fees under any circumstances shall be refunded in case of a student discontinuing the course. No certificate shall be issued if discontinued.

Course Timings: 1.30 PM to 5:30 PM (Monday to Friday)

Location and how to reach: NIELIT Chennai is located at Gandhi Mandapam Road, Kotturpuram, Chennai (Landmark: Opp. To Anna Centenary Library)

Address:
National Institute of Electronics and Information Technology Chennai Centre,
ISTE Complex, No. 25, Gandhi Mandapam Road, Chennai – 600025
E-mail: training.chennai@nielit.gov.in
Phone: 044-24421445
Contact Person: V. Gokilapriya Mobile: 9962900976

Course enquiries: Students can enquire about the various courses either on telephone Or by personal contact between 9.15 AM to 5.15 PM (Lunch time 1.00 PM to 1.30 PM) Monday to Friday.

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Annexure

Detailed Syllabus & Learning Outcomes

S. No	Chapter Name	Course Outline	Duration (Hours)		Learning Outcome
			Theory	Lab	
1	Module-1 Introduction to Embedded System	∑ Introduction to Embedded System. ∑ Introduction to Embedded System Development Process - Tool Chain and Cross Compilation: Text Editors / Compilers / Programmers / Development tools/IDE, Debugger.	1	1	∑ To get overview of Embedded System Software development, testing & Verification. ∑ Hands on exposure to the tool Chain utilized in Embedded System Design, Development & Verification.
2	Module-2 ARM Cortex M4 and TM4C123GH6PM Launch Pad Architecture	∑ Introduction to ARM Cortex M4 microcontroller and TM4C123GH6PM Launch Pad architecture, Programmers Model, Processor Operating States, instruction set etc.	2	4	∑ Understanding of ARM Cortex-M4 and TM4C123 Launch Pad architecture
3	Module-3 Embedded C Programming	∑ Introduction to Embedded C programming, Storage Classes, Data Types, Controlling program flow, Arrays, Functions, Memory Management, Pointers, Arrays and Pointers, Pointer to Functions and advanced topics on Pointers, Structures and Unions, Data Structures, Linked List, Stacks, Queues, Conditional Compilation, Pre-processor directives, Variable arguments in Functions, bitwise operations, Typecasting.	10	8	∑ Embedded C Programming Concepts. ∑ Develop embedded application using Embedded C Programming.
4.	Module-5 ARM Cortex–M4 Peripherals	∑ ARM Cortex–M4 Peripherals- GPIOs, Timers / Counter, PWM; Interrupt handling – NVIC, ADC, Memory, Temperature Sensor, External: Display Devices, Actuators, Real Time Clock, and Sensors.	6	8	∑ Will be able to Program and interface the peripherals: General Purpose I/O, ADC, Timer / Counter, PWM, DAC, Memory, Real Time Clock, Temperature Sensor etc. to build an embedded system.

5.	Module-5 Interfacing using Embedded Wired Communication Protocol (UART, SPI, I2C)	∑ Introduction to Serial / Wired Protocols (UART, SPI, I2C) and its standards. ∑ Programming concept for interface to Arm Cortex M4 Controller using Wired Communication Protocols.	12	8	∑ Able to Configure and Program the for interfacing with different Modules / Devices using Serial / Wired Communication Protocols.
6	Module-6 Interfacing using Wireless Communication Protocol (Bluetooth, Zigbee and GSM)	∑ Introduction to Wireless and its standards -Bluetooth, Zigbee and GSM ∑ Communicating between the Arm Cortex M4 and Wireless Devices (Bluetooth, Zigbee and GSM)	12	8	∑ Able to interface and transfer & receive data between Bluetooth / GSM / Zigbee modules with ARM Cortex microcontroller.
Total Hours = 80			43	37	