



Indian Institute of Information Technology Vadodra

CS/IT 429

Embedded Systems

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Associate Professor, DA-IICT Gandhinagar

Embedded Systems

Course Code: CS/IT 429

Course Credit: 3 – 0 – 2 – 4

Important Note:

1. Try to attend all classes.
2. A separate note-copy to be maintained for the course.

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Embedded Systems

Grading Scheme:

Mid-Sem:	25%
End-Sem:	30%
Assignment:	05%
Quiz:	05%
Project:	10%
Lab Exam:	25%

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Embedded Systems

Course Content:

Unit 1: Introduction and Embedded Hardwares:

Review of Electronics, Introduction Microprocessor vs Microcontroller, Criteria for selecting a Microcontroller, CPU, GPU and FPGAs, Introduction and review of Embedded Systems, Embedded System types and applications, Microprocessor buses, Memory and Direct Memory Access, Interrupts and its types, Hardware Timers and Counters, Watchdog Timers, Pulse Width Modulator, LCD Controllers, Keypad Controllers, Stepper Motor Controller, A/D converters, Real Time Clock, Digital Information stored in Memory, Numbers, Finite State Machines (FSM), Arithmetic Circuits, Sequential Building Blocks, Basic Computer Architecture, Hardware Description Languages: Verilog HDL.

Unit 2: Embedded Programming:

Assembly programming style, Declarations Expressions-Arrays, Qualifiers and reading numbers, Decision and control statements-programming process, More control statements-Variable Scope and Functions.

Unit 3: Embedded Communication Protocols:

Embedded Networking: introduction, Serial/Parallel Communications, Serial communication protocols-RS232, RS485, Synchronous Serial Protocol-Serial Peripheral Interface(SPI), Inter-Integrated Circuits.

Unit 4: Introduction to Arduino and Real World Interfacing Applications:

Introduction to Arduino, Arduino architecture, Basic Structure of Arduino Programming, Arduino standard libraries and contributed libraries, Introduction to Embedded C and hardware programming, Arduino Interfacing with Bluetooth, Motor, DC motor, Stepper motor, Sensors.

Unit 5: Introduction to FPGA and Real-time Applications:

Concept of CPLD, FPGA, Familiarization with Xilinx FPGA development board, design constraints using FPGA, implementing designs using FPGA, System Design such as Traffic Light Control System, Processor implementation

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Some Text and Reference Books:

Text Books:

1. Embedded System Design: Frank Vahid and Tony Givargis, John Wiley and Sons.
2. Embedded Systems: Raj Kamal, Tata McGraw-Hill Education.
3. Embedded C: Michael J Pont, Pearson Education.
4. Introduction to Robotics: John J. Craig, Pearson.
5. Programming Arduino Getting Started with Sketches: Simon Monk, Tab Electronics.
6. Verilog HDL: A Guide to Digital Design and Synthesis: Samir Palnitkar, Prentice Hall.
7. Design Recipes for FPGAs: Peter R. Wilson, Elsevier.

Reference Books:

1. Embedded System Design: Steve Heath, Elsevier.
2. Programming in C: Stephen Kochan, Sams Publishing.
3. Arduino For Dummies: John Nussey, John Wiley & Sons.
4. Arduino Cookbook: Michael Margolts, O'Reilly.

Class and Lab Schedule:

Class Timings

Wednesday:	03:45 pm – 05:15 pm
Friday:	2:00 pm – 03:30 pm

Lab Schedule

Tuesday:	11:00 am – 01:00 pm
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GoogleMeet link for ICD students: <https://meet.google.com/vpm-wjov-nui>

I am available/approachable at

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yash_agrawal@daiict.ac.in