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Microprocessors And Microcontrollers

By Prof. Santanu Chattopadhyay | IIT Kharagpur

Learners enrolled: 8677

Prof Santanu Chattopadhyay

Microprocessors are used extensively in the design of any computing facility. It contains units to carry out arithmetic and logic calculations, fast storage in terms of registers and associated control logic to get instructions from memory and execute them. A number of devices can be interfaced with them to develop a complete system application. On the other hand, microcontrollers are single chip computers, integrating processor, memory and other peripheral modules into a single System-on-Chip (SoC). Apart from input-output ports, the peripherals often include timers, data converters, communication modules, and so on. The single chip solution makes the footprint of the computational element small in the overall system package, eliminating the necessity of additional chips on board. However, there exists a large range of such products. While the simpler microcontrollers are cheap, their capabilities (in terms of program size and analog and digital peripherals) are also limited. Such processors may be suitable for small applications. Microcontrollers like 8051, PIC belong to this category. On the other hand, advanced microcontrollers are often much more powerful, comparable to the very advanced microprocessors. The AVR and ARM processors are of this category.

This course will start with a discussion on a simple microprocessor, 8085. Understanding this architecture is the basis to follow any other complex CPU architecture. It will be followed by a complete overview of a range of microcontrollers covering 8051, PIC, AVR and ARM. The hardware intricacies of these processors and their programming will be covered. Different system design examples built around these

processors will also be

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INTENDED AUDIENCE : CSE, ECE, EE

PRE-REQUISITES : Digital Design, Digital Logic

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INDUSTRY SUPPORT : Companies involved in development of microprocessor and microcontroller based products

Summary

Course Status :	Completed
Course Type :	Core
Duration :	12 weeks
Category :	◦ Electrical, Electronics and Communications Engineering ◦ VLSI design ◦ Control and Instrumentation
Credit Points :	3
Level :	Undergraduate
Start Date :	24 Jan 2022
End Date :	15 Apr 2022
Enrollment Ends :	07 Feb 2022
Exam Date :	23 Apr 2022 IST

Note: This exam date is subjected to change based on seat availability. You can check final exam date on your hall ticket.

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Course layout

Week 1: Introduction: General processor architecture, Microprocessors, Microcontrollers

Week 2: 8085 – Part I

Week 3: 8085 – Part II

Week 4: 8085 – Part III

Week 5: 8085 – Part IV

Week 6: 8051 – Part I

Week 7: 8051 – Part II (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 8: PIC, AVR About Swayam (https://swayam.gov.in/about) | All Courses | ()

Week 9: ARM – Part I

Week 10:ARM – Part II

Week 11: Interfacing examples – Part I

Week 12: Interfacing examples – Part II

Books and references

1. R. Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”, Prentice Hall, 2014.
2. M.A. Mazidi, R.D. McKinlay, J.G. Mazidi, “The 8051 Microcontroller: A Systems Approach”, Pearson, 2013.
3. M.Bates, “PIC Microcontrollers”, Newnes, 2011.
4. M.A. Mazidi, S. Naimi, S. Naimi, “The AVR Microcontroller and Embedded Systems: Using Assembly and C”, Prentice Hall, 2011.
5. W.A. Smith, “ARM Microcontroller Interfacing: Hardware and Software, Eketor, 2010.

Instructor bio



Prof. Santanu Chattopadhyay

IIT Kharagpur

Santanu Chattopadhyay received his BE degree in Computer Science and Technology from Calcutta University (B.E. College) in 1990. He received M.Tech in Computer and Information Technology and PhD in Computer Science and Engineering from Indian Institute of Technology Kharagpur in 1992 and 1996, respectively. He is currently a Professor in the Department of Electronics and Electrical Communication Engineering, IIT Kharagpur. Prior to this, he had been a faculty member in the IIEST Sibpur and IIT Guwahati in the departments of Computer Science and Engineering. In both these places he has taught the subject of Compiler Design several times. His research interests include Digital Design, Embedded Systems, System-on-Chip (SoC) and Network-on-Chip (NoC) Design and Test, Power- and Thermal-aware Testing of VLSI Circuits and Systems. He has published more than 150 papers in reputed international journals and conferences. He has published several text and reference books on Compiler Design, Embedded Systems and other related areas. He is a senior member of the IEEE and an Associate Editor of IET Circuits Devices and Systems journal.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **23 April 2022** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.

The online registration f d and the certification exam fee needs to be paid. More details will be made available when the exam registration form is publ y changes, it will be mentioned there.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

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Prof. Jayanta Mukhopadhyay
Dean Outreach
IIT Kharagpur

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