EMBEDDED SYSTEM DESIGN WITH ARM

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PRE-REQUISITES : Basic concepts in digital circuits and microprocessor

INTENDED AUDIENCE : Computer Science and Engineering / Electronics and Communication Engineering / Electrical Engineering

INDUSTRIES APPLICABLE TO : ARM, Intel, Texas Instruments, Qualcomm, Samsung, TCS, HP

COURSE OUTLINE :

This course will discuss about the basic concepts of embedded system design, with particular emphasis on hands-on and demonstration sessions on system design using ARM microcontrollers. Keeping in view of the recent developments, this course will be based on state-of-the-art microcontroller boards and programming environments. This course will also help the participants to understand the developmental aspects of Internet of Things (IoT) based designs. Starting from the basics, the participants will be introduced to various interfacing issues with sensors and actuators. It is highly recommended that the participants procure some of the low cost microcontroller development boards and actually carry out the experiments that would be demonstrated

ABOUT INSTRUCTOR :

Prof. Indranil Sengupta has obtained his B.Tech., M.Tech. and Ph.D. degrees in Computer Science and Engineering from the University of Calcutta. He joined the Indian Institute of Technology, Kharagpur, as a faculty member in 1988, in the Department of Computer Science and Engineering, where he is presently a full Professor. He had been the former Heads of the Department of Computer Science and Engineering and also the School of Information Technology of the Institute. He has over 28 years of teaching and research experience. He has guided 22 PhD students, and has more than 200 publications to his credit in international journals and conferences. His research interests include cryptography and network security, VLSI design and testing, and mobile computing.

He is a Senior Member of IEEE. He had been the General Chairs of Asian Test Symposium (ATS-2005), International Conference on Cryptology in India (INDOCRYPT-2008), International Symposium on VLSI Design and Test (VDAT-2012), International Symposium on Electronic System Design (ISED-2012), and the upcoming Conference on reversible Computation (RC-2017). He had delivered invited and tutorial talks in several conferences in the areas of VLSI design and testing, and network security.

Prof. Kamalika Datta completed her B.Sc. (Computer Science) from Ravenshaw College, Cuttack, India in the year 2003, Master of Computer Application from Biju Pattanaik University of Technology, Bhubaneswar, India in the year 2006, and then Master of Science degree from Indian Institute of Technology, Kharagpur, India in 2010. She completed her Ph.D. from Indian Institute of Engineering Science and Technology, Shibpur, India. She has worked in industry and academia for almost 6 years. Currently she is a research fellow at Nanyang Technological University Singapore.

She has guided 2 PhD scholars, and has more than 60 publications in peer reviewed journals and conferences to her credit. Her research interests include logic design using emerging technologies, synthesis and optimization of reversible and quantum circuit, and embedded systems.

COURSE PLAN :

Week 1 : Introduction to embedded systems and microcontrollers

Week 2 : Instruction set architecture of ARM microcontroller, and assembly language programming

Week 3 : D/A and A/D converter, sensors, actuators and their interfacing

Week 4 : Microcontroller development boards and embedded programming platforms

Week 5 : Hands-on and demonstration I: Temperature sensing unit, Light sensing unit, Sound sensing unit

Week 6 : Hands-on and demonstration II: Feedback control system, relay control unit, driving electrical appliances like motors, bulb, pump, etc.

Week 7 : Hands-on and demonstration III: Object tracking using GPS and GSM

Week 8 : Hands-on and demonstration IV: Introduction to Internet of Things, smart home concepts, motion sensing using accelerometer, control of appliances over SMS