GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRONICS & COMMUNICATION (VLSI SYSTEM DESIGN) (42)
EMBEDDED SYSTEM DESIGN
SUBJECT CODE: 2714203
SEMESTER: I

Type of course:

Prerequisite: Assembly and C language.

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	PA (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2	2	5	70	30	20	10	20	0	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Embedded Micro controller Cores, Embedded Memories, SRAM, DRAM Controllers	6	15
2	Embedded System Design Aspects	4	10
3	Interfacing between analog and digital sections, signal conditioning, Interfacing with external systems, User interfacing	6	20
4	Software aspects of Embedded Systems	4	10
5	Real time programming languages & operating systems for Embedded Systems, Embedded programming in C/C++, Scheduler, Multitasking, Threading concepts and implementation	8	20
6	Serial Communication Interface: UART, SCI applications, Modern Serial Interface Standards, Modems, SPI, I2C, USB, Introduction to JTAG Port	8	15
7	Case study of Embedded Applications	6	10

Reference Books:

1. J. W. Valvo, Embedded Micro computer system, Brooks/Cole.
2. K. J. Ayala, The 8051 Microcontroller, Pernam Intl.
3. Jack Ganssle. The art of designing Embedded Systems.
4. Daniel W. Lewis, Fundamentals of Embedded Software

Course Outcome:
After learning the course the students will be able to:

1) Understand the concept of embedded system design and its application in different design and product, Programming for Embedded System Design.
2) Understand architecture and functionalities of each block inside the processor
3) Get idea about working of processor and its application

4) Select appropriate microcontroller for design
5) Calculate memory requirement and other on-chip/off-chip peripheral requirement
6) Understand requirement of a project as well as inputs and outputs of the system
7) Make flowchart of different tasks and decisions
8) Understand multitasking environment and development tools
9) Design software for the target processor/controller
10) Interface peripherals with the board
11) Understand different communication protocols to make the system as a part of network

List of Experiments:

1. Introduction to Embedded Systems and various design tools.
2. Interfacing of LED with ARM 7.
3. Interfacing of Seven Segments with ARM 7.
4. Interfacing of LCD display with ARM 7.
5. Interfacing of Stepper Motor with ARM 7.
6. Interfacing of GSM Module with ARM 7.
7. Interfacing of RF Tx and Rx with ARM 7.
8. Introduction to CCS and DSK 6713 kit.
9. Interfacing of Seven Segments with DSK 6713.
10. To Display word "Hello" with CCS and DSK 6713

Open Ended Problems:

Apart from above experiments a group of students has to undertake one open ended problem/ design problem.

Few examples of the same are given below.
1. Interfacing ARM7 development board to PC via USB port to transfer file.
2. SPI based network design.
3. SCI based network design.
4. CAN network application design
5. I2C network application design
6. Create zigbee RF transmitter receiver link
7. RFID based system design
8. Create touchsceen based application
9. Application to display institute logo on graphics LCD/LCD monitor/LCD TV
10. Developing an RTOS based multitasking applications

Major Equipments: MATLAB, DSK 6713, CCS, ARM 7/9 Boards, ARM IDE, Keil and different interfacing Modules etc.

List of Open Source Software/learning website:

1) http://www.freertos.org/
2) http://ecos.sourceware.org/
3) https://www.kernel.org/
4) http://www.coocox.org/index.html
5) https://www.rtai.org/
6) http://www.uclinux.org/
7) http://www.embeddedcraft.org/listrtos.html

8) www.embedded.com
9) www.virtualbreadboard.com
10) www.parallax.com
11) www.arduino.cc