GUJARAT TECHNOLOGICAL UNIVERSITY

SUBJECT NAME: Communication Buses & Interfaces
SUBJECT CODE: 3715413
M.E. (Embedded Systems) SEM-I

Type of course: Program Elective-II

Prerequisite: Fundamentals of Bus Architecture and Data Flow in Microprocessor, Microcontroller & Embedded Systems

Rationale: This course provides depth knowledge of common communication buses and interfaces useful for embedded applications. Students will become familiar with different protocols and will be able to justify use of protocol for given application.

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)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	%
1	Serial Busses: Physical interface, Data and Control signals, features	8	15%
2	Limitations and applications of RS232, RS485, I2C, SPI	6	15%
3	CAN - Architecture, Data transmission, Layers, Frame formats, applications	8	20%
4	PCIe - Revisions, Configuration space, Hardware protocols, applications	6	15%
5	USB - Transfer types, enumeration, Descriptor types and contents, Device driver	8	20%
6	Data Streaming Serial Communication Protocol: Serial Front Panel Data Port (SFPDP) using fiber optic and copper cable	6	15%

Reference Books:

[1] Jan Axelson, "Serial Port Complete - COM Ports, USB Virtual Com Ports, and Ports for Embedded Systems ", Lakeview Research, 2nd Edition
[2] Jan Axelson, "USB Complete", Penram Publications
[3] Mike Jackson, Ravi Budruk, "PCI Express Technology", Mindshare Press
[4] Wilfried Voss, "A Comprehensible Guide to Controller Area Network", Copperhill Media Corporation, 2nd Edition, 2005.
[5] Serial Front Panel Draft Standard VITA 17.1 – 200x
[6] Technical references on *www.can-cia.org, www.pcisig.com, www.usb.org*

Course Outcome:

At the end of this course, students should be able to:

- Select a particular serial bus suitable for a particular application.
- Develop APIs for configuration, reading and writing data onto serial bus.
- Design and develop peripherals that can be interfaced to desired serial bus.

List of Experiments:

1. To study and simulate I2C protocol
2. To study and simulate SPI protocol
3. To study and simulate I2S protocol
4. To study and simulate SSI protocol
5. To study and simulate UART protocol
6. To study and simulate IRDA protocol
7. To study and simulate CAN 2.0B protocol
8. To study and simulate USB 1.0 protocol
9. To study and simulate MODBUS protocol
10. To study and simulate JTAG 2.0 protocol

Major Equipment/software:

- System Bus and Protocol Analyzer Trainer
- Protocol Analyzer Software
- Proteus Software
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List of Open Source Software/learning website:

- **NPTEL Video lectures: http://nptel.ac.in/courses/108102045/14**