GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3725414
SUBJECT NAME: EMBEDDED WIRELESS TECHNOLOGY
Semester II

Type of course: Elective

Prerequisite: Digital Communication, Digital Electronics, Basics of Wireless Communication

Rationale: This subject provides an exposure to understand wireless communication technology and implementation of wireless concepts using embedded platform. It also helps the students to develop their own project or carried dissertation work on embedded wireless application. It provides an opportunity to the student to understand real environment problem in wireless communication and motivate them to bring out the solution by real life implementation.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Basics of Wireless Communication Technologies :** Analog modulation schemes like AM, FM, PM, digital modulation schemes like BPSK, QPSK, QAM, Multiple Access Schemes like TDMA, FDMA, CDMA, OFDM, Wireless Standards – IS 136, IS – 95, GSM, 3G, 4G, LTE, Wi-fi 802.11 (a,b,g,n) ,WiMax 802.16, Ultra wide band, software defined radio, cognitive radio, MIMO	12	25
2	**Embedded System :** Hardware, Software, Internet Access, Socket Programming, Internet Architecture, UDP, TCP, Client/Server, Internet application protocol – HTTP, FTP, SNMP, Audio/Video applications	08	20
3	**Embedded systems hardware and software interface :** Protocol debugging & testing tools, ping, sniffers, load generators, development tools – SDK, simulators, debuggers, TCP/IP architecture, socket programming and debugging	08	20
4	**Wireless Technologies and implementation :** Wireless LAN architecture, protocol, implementation and programming API, Bluetooth architecture, protocol, implementation and programming API, Zigbee architecture, protocol, implementation and programming API, RFID and its implementation using microcontroller, Real time implementation using GSM and GPRS modules	08	20
5	**Practical application of embedded system in Wireless field :** Health monitoring and data transmission by embedded unit, Event detection and transmission in traffic surveillances, Industrial automation and agriculture.	06	15

Reference Books:

1. Embedded Systems and Wireless Technology: Theory and Practical Applications, Raul A. Santos, CRC Press
2. Embedded Systems and Wireless Technology: Theory and practical applications by Dr. Raúl Aquino santos, MSc. Arthur Edwards Block (University of Colima, Mexico)
3. Fundamentals of Mobile and Pervasive Computing by Frank Adelstein, Sandeep K.S. Gupta, Golden G. Richard III, and Loren Schwiebert, Publisher: McGraw-Hill Education, 2005, ISBN-10:0071412379, ISBN-13: 978-0071412377.
4. Context-Aware Pervasive Systems: Architectures for a New Breed of Applications by Seng Loke, Publisher: AUERBACH, 1st edition (December 7, 2006), ISBN-10: 0849372550, ISBN-13: 978-0849372551
5. Cooperating Embedded Systems and Wireless Sensor Networks by Michel Banatre (Editor), Pedro Jose Marron (Editor), AnibalOllero (Editor), Adam Wolisz (Editor)

Course Outcome:

After learning the course the students should be able:

Sr. No.	CO statement	Marks % weightage
CO-1	Explore the practical application of wireless communication using embedded system	20
CO-2	Acquire the knowledge of present and future technologies used in wireless communication	30
CO-3	Utilize the knowledge of embedded and wireless technologies to solve the real life problems.	20
CO-4	Get involved in the long term/short term research activity	30

List of Experiments:

- To Study Various Multiple Acess methods like FDMA, TDMA and CDMA on kit/software tools.
- To simulate MIMO technique using simulation tools.
- To study OFDM and simulate it by using Simulation Tools.
- To Study Various Network Commands.
- To develop an application in embedded for object tracking using GPS
- To Study various AT Commands using Kit.
- To develop application for data transmission using Zig-Bee.
- To develop an application to operate device by sending SMS from remote location.
- To develop an application on embedded platform to sense data locally and send it at remote location.

- To develop a health monitoring application on embedded platform.

Major Equipment/software:

Personal Computer.
Oscilloscope
Wireless Communication Kits.
Embedded Kits
Scilab
Linux Platform

List of Open Source Software/learning website:

NPTEL Courses on Wireless Communication and Systems