GUJARAT TECHNOLOGICAL UNIVERSITY

Subject Name: Wireless Sensor Networks (Elective III & IV- Group 2)
Subject Code: 3725307
Semester II

Type of course: ME - Computer Engineering (Wireless And Mobile Computing)

Prerequisite: Fundamentals of networking
Mobile Networks

Rationale: NA

Teaching and Examination Scheme:

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

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment;

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Sensor networks overview: introduction, applications, design issues, requirements. Sensor node architecture	7	20
2	Network architecture: optimization goals, evaluation metrics, network design principles. Sensor network operating systems and brief introduction to sensor network programming	7	15
3	Network protocols: MAC protocols and energy efficiency.	7	10
4	Routing protocols: data centric, hierarchical, and location-based, energy efficient routing, Sensor deployment, scheduling and coverage issues, self-configuration and topology control. Querying, data collection and processing, collaborative information processing and group connectivity Target tracking, localization and identity management. Power management, Security and privacy	9	25

Text Books:

1. Protocols and Architecture for Wireless Sensor Networks by Holger Karl and Andreas Willig/ Wiley
2. Wireless Sensor Networks: Technology, Protocols, and Applications by Kazem Sohraby/wiley
3. Wireless Sensor Networks by Zhao Feng/ Elsevier India

Reference Books:

1. Security in Wireless Sensor Networks by Piotr Szczechowiak/ Lap Lambert Academic Publishing
2. Wireless Sensor Networks by Raghavendra Sivalingam Znati/ Springer India
3. Building Wireless Sensor Networks by Robert Faludi/ O'reilly

Course Outcome:

Student will learn:

Wide range of applications such as disaster management, military and security have fueled the interest in sensor networks during the past few years. Sensors are typically capable of wireless communication and are significantly constrained in the amount of available resources such as energy, storage and computation. Such constraints make the design and operation of sensor networks considerably different from contemporary wireless networks, and necessitate the development of resource conscious protocols and management techniques. This course provides a broad coverage of challenges and latest research results related to the design and management of wireless sensor networks. Covered topics include network architectures, node discovery and localization, deployment strategies, node coverage, routing protocols, medium access arbitration, fault-tolerance, and network security.

List of Experiments: (with Open Ended Problems)

1. Write an application in Castalia to find neighbours of a node.
2. Write an application to forward data from node to sink in Tiny OS.
3. Write an application that increments a 32-bit counter in an a infinite loo,. Every N increments, the application toggles LED 0. Choose an N so you can observe the toggling visually. Try making the counter a platform- independent type. Does the toggling slow down? How much? Try q 16-bit value.
4. Extend the blink application so it displays the least significant bits of a random rather than a counter. Generate the random number from one og the random number generators in the tinyOS Component libraries (RandomMlcgc or RandomlfsrC)

Major Equipment's:

Motes

List of Open Source Software/learning website:

tossim,

tinyos

onnet/opnet

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website