

15B1WCI831: Wireless Sensor Networks- Protocols and Applications

Course Credit: 3

Semester: VIII

Introduction

Wide range of applications such as disaster management, military and security have fuelled 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.

Course Objectives (Post-conditions)

Knowledge objectives:

By the completion of the course, you should be able to:

- Explore the design space and conduct trade-off analysis between performance and resources.
- Determine suitable medium access protocols and radio hardware.
- Prototype sensor networks using commercial components.
- Provision quality of service, fault-tolerance, security and other dependability requirements while coping with resource constraints.
- Explore Security, routing Protocol and information Fusion in WSN.

Application objectives:

- Architect sensor networks for various application setups.
- Evaluate the performance of sensor networks and identify bottlenecks.
- Assess coverage and conduct node deployment planning.
- Devise appropriate data dissemination protocols and model links cost.

Expected Student Background (Preconditions)

Computer Networks

Topics Outline:

S NO	Topics	Hrs
1	Introduction and Overview	2
2	Sensor Node Architecture	3
3	Sensor-Level Energy Management	3
4	Wireless Transmission	2
5	Sensor Network Architecture	3

6	Medium Access Arbitration	3
7	MAC Protocols for Sensor Networks	3
8	Network Bootstrapping and Clustering	3
9	Node Localization Techniques	3
10	Data Routing	4
11	Application Development Environments	3
12	Coverage and Placement Strategies	2
13	Tolerance of Nodes Failure	2
14	Underwater Sensor Networks	1
15	Sensor Network Security	2
16	Location Privacy , Security and Information Fusion	3
	Total	42

References

1. Protocols and Architectures for Wireless Sensor Networks, Holger Karl, Technical University of Berlin Andreas Willig, University of Potsdam ,Wiley, ISBN: 0-470-09510-5, June 2005
2. Wireless Sensor Networks, Cauligi S. Raghavendra, University of Southern California Krishna Sivalingham, University of Maryland Baltimore County ,Taieb M. Znati, University of Pittsburg ,Springer, ISBN: 1-4020-7883-8, August 2005
3. Jolly and M. Younis, “ An Energy Efficient, Scalable and Collision less MAC layer Protocol for Wireless Sensor Networks_,” *Journal of Wireless Communications and Mobile Computing*, Vol. 5, No. 3, pp. 285-304, May 2005.
4. A. A. Syed, W. Ye, and J. Heidemann, “ Comparison and Evaluation of the T-Lohi MAC for Underwater Acoustic Sensor Networks ,” *IEEE Journal of Selected Areas in Communication*, Vol. 26, No. 12, pp. 1731-1743, December 2008.
5. O. Younis and S. Fahmy, “ Distributed Clustering in Ad-Hoc Sensor Networks: A Hybrid, Energy-Efficient Approach ,” in the *Proceedings of the 23rd INFOCOM 2004*, Volume 1, 7-11 March 2004.
6. M. Youssef, A. Youssef, M. Younis, “ Overlapping Multihop Clustering for Wireless Sensor Networks ,” *IEEE Transactions on Parallel and Distributed Systems*, Vol. 20, No. 12, pp.1844-1856, Dec. 2009.

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

*Internal Marks Breakdown:

Assignments 9 marks (3x3)

Quizzes 12 marks (3x4)

Regularity 4 Marks