

# 17ES002 AD-HOC SENSOR NETWORKS

Hours Per Week :

L	T	P	C
3	-	3	5

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	45	15	30	-	5	5	-

## Course Objectives:

The objective of this course is to study the fundamentals of Adhoc and Sensor Networks useful in data acquisition and IoT systems

## Course Outcomes:

The student will be able to:

- Appreciate the importance of Adhoc and sensor networks for applications like environment monitoring, habitat monitoring, health care and data acquisition systems.
- Understanding of data transmission technologies of the Adhoc and sensor devices with focus on channel access routing and security.
- Appreciate the need and importance of converged networks, ubiquitous environment and 'Internet of things' in the context of Adhoc and sensor networks.
- Capable of model building ,new protocol design and strategies simulation of the systems that include the above.

## SKILLS:

- Developing New Routing Protocols.
- To do case study experiences for Adhoc sensor networks
- Gain knowledge on Mica Motes.

**UNIT - I**

**INTRODUCTION TO ADHOC NETWORKS:** Overview and Communication aspects of Manet, Challenges, Topologies, Routing classification approaches, Proactive, Reactive, Position based and Other Routing Protocols

**UNIT - II**

**BROADCASTING, MULTICASTING AND GEOCASTING IN MANETS :** Introduction, The Broadcast Storm - Broadcasting in a MANET, Flooding-Generated Broadcast Storm, Redundancy Analysis, Rebroadcasting Schemes, Multicasting - Issues in Providing Multicast in a MANET, Multicast Routing Protocols, Comparison, Geocasting - Geocast Routing Protocols, Comparison..

**UNIT - III**

**WIRELESS SENSOR NETWORK :** Introduction, The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications of Sensor Networks.

**UNIT - IV**

**DATA RETRIEVAL IN SENSOR NETWORKS :** Introduction, Classifications of WSNs, MAC layer Design issues and Protocols, Routing Protocols of Sensor Networks - Network Structure Based Routing, Flat versus Hierarchical Routing, Multipath and Query Based Routing, Location-Based Routing, Transport Layer, High-Level Application Layer Support, Adapting to the Dynamic Nature of WSNs.

**UNIT - V**

**SECURITY AND CONNECTIVITY TO OTHER NETWORKS :** Introduction, Security in Ad Hoc Networks, Distributed Systems Security, Key Management, Secure Routing, Cooperation in MANETs, Security of Wireless Sensor Networks, Intrusion Detection Systems, Ingredients of a Heterogeneous Architecture, Protocol Stack, Comparison of the Integrated Architecture

**TEXTBOOKS:**

1. Carlos Cordeiro and Dharma P Agarwal, Ad hoc sensor networks-Theory and Applications by World Scientific publications March 2006
2. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

**REFERENCEBOOKS:**

1. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication – 2002.
2. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005
3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.
4. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

**ACTIVITIES:**

- o Simulation of DSDV algorithm AODV algorithm and DSR algorithm along with the comparison with respect to the delay cost
- o Simulation of leach and Pegasus algorithm
- o Simulation of S-MAC algorithm
- o Simulation of S-MAC algorithm
- o Simulation of TEEN and APTEEN algorithms
- o Simulation of Secure data aggregation protocol for sensor networks

## **Ad hoc sensor Networks LAB**

### **Course Learning Outcomes:**

- To be able to understand importance of Microcontroller Programming and assembly programming languages.
- To be able to understand about importance of various Interfaces.

### **Note:**

- At least 10 experiments are to be carried out.

### **LIST OF EXPERIMENTS**

#### Simulation Experiments

1. AODV
2. DSDV
3. DSR
4. Multicast
5. other Protocols

#### Microcontroller Programming

1. Glowing LEDs.
2. Toggling LED's.
3. Transmitting a string through UART.
4. Controlling LEDs blinking pattern through UART
5. Echo each character typed on HyperTerminal.

### **RF Experiments**

1. Point to point communication of two C-Motes over the radio frequency.
2. Multi-point to single point communication of C-Motes over the radio frequency.

### **TEXTBOOKS:**

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 st Edition, VPT, 2014

### **REFERENCE BOOKS:**

1. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications, 2013
2. Cuno Pfister, Getting Started with the Internet of Things, O Reilly Media, 2011, ISBN: 978-1-4493- 9357-1