

PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

Kanuru, Vijayawada-520007

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (Data Science)

III B. Tech II Semester

Sensor Networks

Course Code	23DS4601E	Year	III	Semester	II
Course Category	PEC	Branch	CSE (Data Science)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes

Upon Successful completion of course, the student will be able to			
CO1	Describe the fundamental concepts of wireless sensor networks (WSNs), including architecture, protocols, enabling technologies, and application domains to <i>understand their design and practical applications</i>		L2
CO2	Apply design principles to develop energy-efficient communication protocols and architectures for sensor nodes in wireless sensor networks to <i>optimize performance and prolong network lifetime.</i>		L3
CO3	Use suitable infrastructure establishment methods such as synchronization, localization, and topology control in WSNs for optimizing performance and scalability to <i>enhance network efficiency and reliability</i>		L3
CO4	Analyze communication protocols and infrastructure techniques to evaluate and enhance performance, energy efficiency, and reliability in wireless sensor networks to <i>enhance energy efficiency and overall network effectiveness</i>		L4

Contribution of course outcomes towards achievement of program outcomes & Strength of correlations (3: Substantial,2: Moderate,1: Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2												
CO2	3												
CO3	3												
CO4		3									2		

PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

Kanuru, Vijayawada-520007

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (Data Science)

III B. Tech II Semester

Syllabus		
Unit No	Contents	Map ped CO
I	Introduction and Overview: Overview of wireless networks, types, infrastructure-based and infrastructure-less, introduction to MANETs (Mobile Ad-hoc Networks), characterise, reactive and proactive routing protocols with examples, introduction to sensor networks, commonalities and differences with MANETs, constraints and challenges, advantages, applications, enabling technologies for WSNs.	CO1
II	Architecture: Single-node architecture - hardware components, design constraints, energy consumption of sensor nodes, operating systems and execution environments, examples of sensor nodes, sensor network scenarios, types of sources and sinks - single hop vs. multi hop networks, multiple sources and sinks - mobility, optimization goals and figures of merit, gateway concepts, design principles for WNs, service interfaces for WSNs	CO1, CO2, CO4
III	Communication Protocols: Physical layer and transceiver design considerations, MAC protocols for wireless sensor networks, low duty cycle protocols and wakeup concepts - S-MAC, the mediation device protocol, wakeup radio concepts, address and name management, assignment of MAC addresses, routing protocols-classification, gossiping, flooding, energy-efficient routing unicast protocols, multi-path routing, data-centric routing, data aggregation, SPIN, LEACH, Directed-Diffusion, geographic routing.	CO1, CO2, CO4
IV	Infrastructure Establishment: Topology control, flat network topologies, hierarchical networks by clustering, time synchronization, properties, protocols based on sender-receiver and receiver-receiver synchronization, LTS, TPSN, RBS, HRTS, localization and positioning, properties and approaches, single-hop localization, positioning in multi-hop environment, range-based localization algorithms - location services, sensor tasking and control.	CO1, CO3, CO4
V	Sensor Network Platforms and Tools: Sensor node hardware, Berkeley motes, programming challenges, node-level software platforms, node-level simulators, state-centric programming, Tiny OS, nesC components, NS2 simulator, TOSSIM.	CO1, CO3, CO4

Learning Resources

Text Books

1. Protocols and Architectures for Wireless Sensor Networks, Holger Karl and Andreas Willig, 1st Edition, 2005, John Wiley & Sons.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao and Leonidas J. Guibas, 1st Edition, 2007, Elsevier (Morgan Kaufmann).

References

1. Wireless Sensor Networks: Technology, Protocols, and Applications, Kazem Sohraby, Daniel Minoli, and Taieb Znati, 1st Edition, 2007, John Wiley.
2. Wireless Sensor Network Designs, Anna Hac, 1st Edition, 2003, John Wiley.
3. Sensor Networks, Thomas Haenselmann, 1st Edition, 2008, Available online for free.
4. Wireless Sensor Networks: Architectures and Protocols, Edgar H. Callaway, 1st Edition, 2003,

PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

Kanuru, Vijayawada-520007

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (Data Science)**III B. Tech II Semester**

Auerbach Publications.

E-Recourses and other Digital Material

1. <https://nptel.ac.in/courses/106/105/106105160/>