

Course Description Summary

Course number: ECE 481	Course name: Wireless Sensor Networks
لغة تدريس المقرر : English	Pre-requisites: ECE 204, ECE 371
Credit hours: 3 (3+0+0)	Course level: Elective

Course Description

وصف المقرر :

This course provides an overview of basic networking concepts, including network architecture, design, the layering concept in networking and how data transferring between devices.

Course Outcome

مخرجات التعليم:

Upon completing the course, the student should be able to:

1. Recognize sensors platforms.
2. State the features of wireless sensor networks (WSN).
3. Describe wireless technologies for WSN
4. Explain the different applications of WSN
5. State different types of WSN.
6. State the current challenges for WSN.
7. State the research trends for WSN.
8. Describe Layers of the WSN Protocol stack.
9. Interpret CSMA technique
10. Describe MAC protocol
11. Describe SMAC protocol
12. Describe TRAMA protocol
13. Recognize routing mechanisms for Wireless sensor networks
14. Differentiate between Flat, Hierarchical, and geographic routing protocols.
15. Differentiate between flooding and gossiping protocols.
16. Describe SPIN routing protocol.
17. Describe Leach routing protocol.
18. Describe Pegasus routing protocol.
19. Explain Geographic routing.
20. Differentiate between Greedy and Face routing.
21. Describe GPRS routing protocol.
22. State the features of operating systems for WSN
23. Describe the components of tinyOs
24. Describe the interfaces of tinyOs, configurations, and wiring.
25. Describe the configurations of tinyOs.
26. Describe the wiring of tinyOs.
27. State challenges for time synchronization in WSN
28. Describe Global Positioning System
29. Describe NTP protocol
30. Describe TPSN protocol

31. State the general characteristics of IEEE 802.15.4 standard.
32. Describe the supported topologies of IEEE 802.15.4 standard.
33. Describe the physical layer of IEEE 802.15.4 standard.
34. Describe MAC layer of IEEE 802.15.4 standard.
35. State the challenges for localization algorithms in WSN.
36. Differentiate between range-based, range free localization techniques.
37. Describe Time of arrival (TOA) ranging technique
38. Describe one way TOA technique
39. Describe two way TOA technique
40. Describe Received Signal Strength RSS technique.

المواضيع

Topics

- Introduction to the course content, text book(s), reference(s) and course plan.
- Sensor networks: sensor platforms, WSN architecture and protocol stack, applications (military, environmental, health, home, industrial), factors influencing WSN design (hardware constraints, fault tolerance, scalability, power consumption, topology, transmission media)
- MAC protocols: challenges for MAC, CSMA, SMAC, and TRAMA.
- Network layer: challenges for routing, data centric and flat architecture protocols (flooding, gossiping, SPIN), hierarchical (Leach, Pegasus), geographic routing, energy efficient routing protocols.
- Location and positioning in wireless sensor networks: greedy and face routing protocols.
- TinyOs concepts and programming: components, interfaces, configurations, and wiring.
- Time synchronization in wireless sensor networks: challenges for time synchronization, Network Time Protocol, Timing Sync Protocol for WSN.
- IEEE 802.15.4 standard: general characteristics, supported topologies, physical, and Mac layers overview.
- Localization: challenges, ranging techniques, range based localization techniques, range free localization techniques.

Textbook and references

الكتاب المقرر والمراجع المساندة:

- Ian F.kyildiz, and M.Can Vuran , Wireless sensor networks, 2010.
- C. Poellabauer , Fundamentals of wireless sensor networks. Theory and practice, 2010Wiley.