Instructor
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Prerequisite: Consent of instructor

Text Book:

Classroom: TECH 116

Topics

Introduction.
   Sensor Mote Platforms.

   Military Applications.
   Environmental Applications.
   Health Applications.
   Home Applications.
   Industrial Applications.

   Hardware Constraints.
   Fault Tolerance.
   Scalability.
   Production Costs.
   Transmission Media.
   Power Consumption.

Physical Layer.
   Physical Layer Technologies.
   Overview of RF Wireless Communication.
   Channel Coding (Error Control Coding).
   Modulation.
   Wireless Channel Effects.
   PHY Layer Standards.

Medium Access Control (MAC).
   Challenges for Medium Access Control.
   Carrier Sense Multiple Access (CSMA) Mechanism.
   Contention based Medium Access.
   Reservation based Medium Access.
   Hybrid Medium Access.

Network Layer.
Challenges for Routing.
Datacentric and Flat architecture Protocols.
Hierarchical Protocols.
Geographical Routing Protocols.
QoS based protocols.

**Transport Layer.**
Challenges for Transport Layer.
Reliable Multi Segment Transport (RMST) Protocol.
Pump Slowly, Fetch Quickly (PSFQ) Protocol.
Event to Sink Reliable Transport (ESRT) Protocol.
GARUDA.
Real Time and Reliable Transport (RT)2 Protocol.

**Time Synchronization.**
Challenges for Time Synchronization.
Network Time Protocol.
Definitions.
Reference Broadcast Synchronization (RBS).
Adaptive Clock Synchronization (ACS).
Time Diffusion Synchronization Protocol (TDP).
Rate based Diffusion Protocol (RDP).
Tiny and Mini Sync Protocols.
Other Protocols.

**Localization.**
Challenges in Localization.
Ranging Techniques.
Range based Localization Protocols.
Range free Localization Protocols.

**Topology Management.**
Deployment.
Power Control.
Activity Scheduling.
Clustering.

**Wireless Sensor and Actor Networks.**
Characteristics of WSANs.
Sensor Actor Coordination.
Actor Actor Coordination.
WSAN Protocol Stack.

**Wireless Multimedia Sensor Networks.**
Design Challenges.
Network Architecture.
Multimedia Sensor Hardware.
Physical Layer.
MAC Layer.
Error Control.
Network Layer.
Transport Layer.
Application Layer.
Crosslayer Design.
Further Research Issues.
**Wireless Underwater Sensor Networks.**  
- Design Challenges.  
- Underwater Sensor Network Components.  
- Communication Architecture.  
- Basics of Underwater Acoustic Propagation.  
- Physical Layer.  
- Medium Access Control Layer.  
- Network Layer.  
- Transport Layer.  
- Application Layer.  
- CrossLayer Design.

**Wireless Underground Sensor Networks.**  
- Applications.  
- Design Challenges.  
- Network Architecture.  
- Underground Wireless Channel for EM Waves.  
- Underground Wireless Channel for Magnetic Induction.  
- Wireless Communication in Underground Mines and Road/Subway Tunnels.  
- Communication Architecture.

**Evaluation**

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<td>Quizzes</td>
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**Plagiarism**

It is the student’s responsibility to familiarize himself or herself with and adhere to the standards set forth in the policies on cheating and plagiarism as defined in Key to UB.
Project Instructions

1. Wepodia and Wikipedia
Please note Wepodia and Wikipedia are not scholarly references and should not be used as the only resources to write a technical paper. Read what Wikipedia's founder and others are saying: [http://chronicle.com/wiredcampus/article/1328/wikipedia-founder-discourages-academic-use-of-his-creation](http://chronicle.com/wiredcampus/article/1328/wikipedia-founder-discourages-academic-use-of-his-creation)

The same concept applies to Wepodia Citation

2. Citation
Please be advised that you need to correctly cite material to use from other sources. You cannot copy material as it is from the Internet. Copying complete paragraphs and sentences are not allowed.

Please finish this quiz before you submit any of your reports: [https://www.indiana.edu/~tedfrick/plagiarism/item1.html](https://www.indiana.edu/~tedfrick/plagiarism/item1.html)

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(1) Search the topic

(2) Understand and comprehend the material you were able to locate from your search

(3) Write using your own words and keep direct quotations, tables, and figures that are copied from their original sources less than 20% of your submission.

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