
6.885 Course Schedule, Version 2

Class 1 (Wednesday, February 7): Seth Gilbert

Course overview. Physical characteristics of mobile wireless ad hoc networks.

Schiller. Mobile Communication, Chapters 1 and 2.

Vaidya's notes on the physical layer.

Balakrishnan's 6.829 notes, Lecture 11.

Class 2 (Wednesday, February 15): Nancy Lynch

MAC layer: Schiller. Mobile Communication, Chapter 3.

Vaidya's notes on the MAC layer.

Gallager. A perspective on multiaccess channels.

Homework 1a handed out

Class 3 (Tuesday, February 21): Nancy Lynch

MAC layer: Komlos, Greenberg. An asymptotically nonadaptive algorithm for conflict resolution in multiple-access channels.

Brenner. A technical tutorial on the IEEE 802.11 protocol.

Bharghavan, Demers, Shenker, Zhang. MACAW: A media access protocol for wireless LANs.

Class 4 (Wednesday, February 22) Nancy Lynch

Localization: Savvides, Han, Srivastava. Dynamic fine-grained localization in ad-hoc networks of sensors.

Priyantha, Chakraborty, Balakrishnan. The Cricket location-support system.

Priyantha, Balakrishnan, Demaine, Teller. Mobile-assisted localization in wireless sensor networks.

Homework 1b handed out

Class 5 (Monday, February 27): Nancy Lynch, Tina Nolte

Localization: Moore, Leonard, Rus, Teller. Robust distributed networks localization with noisy range measurements.

Aspnes, Eren, Goldenberg, Morse, Whiteley, Yang, Anderson, Belhumeur. A theory of network localization.

Class 6 (Wednesday, March 1): Tina Nolte, Rui Fan

Localization: Aspnes, Eren, Goldenberg, Morse, Whiteley, Yang, Anderson, Belhumeur. A theory of network localization.

Time synchronization: Elson, Girod, Estrin. Fine-grained network time synchronization using reference broadcasts.

Homework 1 due

Homework 2a handed out

Class 7 (Monday, March 6): Rui Fan

Time synchronization: Karp, Elson, Papadimitriou, Shenker. Global synchronization in sensornets. Su, Akyildiz. Time-diffusion synchronization protocol for wireless sensor networks.

Fan, Lynch. Gradient clock synchronization.

Class 8 (Wednesday, March 8): Rui Fan, Paulina Varshavskaya

Time synchronization: Attiya, Hay, Welch. Optimal clock synchronization under energy constraints in wireless ad hoc networks.

Topology control: Li, Halpern, Bahl, Wang, Wattenhofer. Analysis of a cone-based distributed topology control algorithm for wireless multi-hop networks.

Bahramgiri, Hajiaghayi, Mirrokni. Fault-tolerant and three-dimensional distributed topology control algorithms in wireless multi-hop networks.

Homework 2b handed out

Class 9 (Monday, March 13): Seth Gilbert

Local infrastructure: Chockler, Demirbas, Gilbert, Newport, Nolte. Consensus and collisions detectors in wireless ad hoc networks.

Class 10 (Wednesday, March 15): Nancy Lynch

Network broadcast: Bar-Yehuda, Goldreich, Itai. On the time complexity of broadcast in multi-hop radio networks: An exponential gap between determinism and randomization.

Homework 2 due

Homework 3a handed out

Class 11 (Monday, March 20): Tom Wilson, Nancy Lynch

Broadcast: Bar-Yehuda, Goldreich, Itai. An efficient emulation of single-hop radio network with collision detection on multi-hop radio network with no collision detection.

Kowalski, Pelc. A time of deterministic broadcasting in radio networks with local knowledge.

Class 12 (Wednesday, March 22): Nancy Lynch, Martijn Stevenson

Broadcast: Kushelevits, Mansour. An $\Omega(D \log(N/D))$ lower bound for broadcast in radio networks.

Livadas, Lynch. A reliable broadcast scheme for sensor networks.

Point-to-point routing: Karp. Slides on routing in mobile networks.

Johnson, Maltz. Dynamic source routing in ad hoc wireless networks.

Hu, Johnson. Caching strategies in on-demand routing protocols for wireless ad-hoc networks.

Homework 3b handed out

Monday, March 27 and Wednesday, March 29 Spring break, no classes.

Class 13 (Monday, April 3): Calvin Newport, Nancy Lynch

Point-to-point routing—basic algorithms: Perkins, Royer. Ad hoc on-demand distance-vector routing.

Chen, Murphy. Enabling disconnected transitive communication in mobile ad hoc networks.

Link-reversal algorithms: Gafni, Bertsekas. Distributed algorithms for generating loop-free routes in networks with frequently changing topology.

Park, Corson. A highly adaptive distributed routing algorithm for mobile ad hoc networks.

Busch, Surapaneni, Tirthapura. Analysis of link reversal routing algorithms for mobile ad hoc networks.

Class 14 (Wednesday, April 5): Calvin Newport, Nancy Lynch

Point-to-point routing: Location-free routing:

Rao, Papadimitriou, Shenker, Stoica. Geographical routing without location information.

Fonseca, Ratsanamy, Zhao, Ee, Culler, Shenker, Stoica. Beacon Vector Routing: Scalable Point-to-point routing in wireless sensor networks.

Fang, Gao, Guibas, de Silva, Zhang. GLIDER: Gradient Landmark-based Distributed Routing for Sensor Networks.

Homework 3 due

Homework 4a handed out

Class 15 (Monday, April 10) Javier Velez, Nancy Lynch

Location-based routing:

Ko, Vaidya. Geocasting in mobile ad-hoc networks: location-based multicast algorithms.

Ko, Vaidya. Location-aided routing (LAR) in mobile ad hoc networks.

Kranakis, Singh, Urrutia. Compass routing on geometric networks.

Bose, Morin, Stojmenovic, Urrutia. Routing with guaranteed delivery in ad hoc wireless networks.

Karp, Kung. GPSR: Greedy perimeter stateless routing for wireless networks.

Class 16 (Wednesday, April 12): Pol Ypodimatopoulos, Nancy Lynch

Location-based routing:

Bose and GPSR papers, cont'd

Barriere, Fraignaud, Narayanan. Robust position-based routing in wireless ad hoc networks with unstable transmission ranges.

Kuhn, Wattenhofer, Zhang, Zollinger. Geometric ad hoc routing: Of theory and practice.

Homework 4b handed out

Monday, April 17 Patriot's Day, no class.

Class 17 (Wednesday, April 19): Rui Fan, Nancy Lynch

Global infrastructure: Elkin. Distributed approximations—a survey.

Kuhn, Wattenhofer. Constant-time distributed dominating set approximation.

Kuhn, Moscibroda, Wattenhofer. What cannot be computed locally!

Homework 4 due

Homework 5a handed out

Class 17 (Monday, April 24): Nancy Lynch, William Tetteh, David Karger

Location services: Awerbuch, Peleg. Concurrent online tracking of mobile users.

Jannotti, DeCouto, Karger, Morris. A scalable location service for geographic ad hoc routing.

Abraham, Dolev, Malkhi. LLS: A locality-aware location service for mobile ad hoc networks.

Class 19 (Wednesday, April 26): Tina Nolte, Alfred Ng, Grace Woo

Clustering: Mittal, Demirbas, Arora. Local clustering in large-scale wireless networks.

Middleware services: Token circulation, leader election: Malpani, Chen, Vaidya, Welch. Distributed token circulation in mobile ad hoc networks.

Malpani, Welch, Vaidya. Leader election algorithms for mobile ad hoc networks.

Homework 5b handed out

Class 20 (Monday, May 1): Alfred Ng, Grace Woo

Middleware services: Mutual exclusion, resource allocation: Walter, Welch, Vaidya. A mutual exclusion algorithm for ad hoc mobile networks.

Chen, Welch. Self-stabilizing dynamic mutual exclusion for mobile ad hoc networks.

Bulgannawar, Vaidya. A distributed k-mutual-exclusion algorithm.

Walter, Cao, Mohanty. A k-mutual-exclusion algorithm for wireless ad hoc networks.

Group communication: Dolev, Schiller, Welch. Random walk for self-stabilizing group communication in ad hoc networks.

Class 21 (Wednesday, May 3): Seth Gilbert, Brian Wu

Virtual objects: Dolev, Gilbert, Lynch, Shvartsman, Welch. GeoQuorums: Implementing atomic memory in ad hoc networks.

Compulsory protocols: Hatzis, Pentaris, Spirakis, Tampakas, Tan. Fundamental control algorithms in mobile networks.

Chatzigiannakis, Nikolettseas, Spirakis. On the average and worst-case efficiency of some new distributed communication and control algorithms for ad-hoc networks.

Chatzigiannakis, Nikolettseas, Spirakis. An efficient communication strategy for ad-hoc mobile networks.

Chatzigiannakis, Nikolettseas, Spirakis. An efficient routing protocol for hierarchical ad-hoc mobile networks.

Homework 5 due

Homework 6a handed out

Class 22 (Monday, May 8): Seth Gilbert, Tina Nolte

Virtual mobile nodes: Dolev, Gilbert, Lynch, Schiller, Shvartsman, Welch. Virtual mobile Nodes for mobile ad hoc networks.

Virtual stationary nodes: Dolev, Gilbert, Lahiani, Lynch, Nolte. Timed virtual stationary automata.

Dolev, Lahiani, Lynch, Nolte. Self-stabilizing mobile node location management and message routing.
Chockler, Gilbert. Replicated state machines for collision-prone wireless networks.

Class 23 (Wednesday, May 10): Jim Aspnes

Applications: Data aggregation:

Shrivastava, Buragohain, Agrawal, Suri. Medians and beyond: New aggregation techniques for sensor networks.

Nath, Gibbons, Anderson, Seshan. Synopsis diffusion for robust aggregation in sensor networks.

Patt-Shamir. A note on efficient aggregate queries in sensor networks.

Angluin, Aspnes, Diamadi, Fischer, Peralta. Computation in networks of passively mobile finite-state sensors.

Angluin, Aspnes, Chan, Fischer, Jiang, Peralta. Stably computable properties of network graphs.

Homework 6b handed out

Class 24 (Monday, May 15): Seth Gilbert, Tina Nolte, James McLurkin

Applications: Implementing atomic memory: Lynch, Shvartsman. RAMBO: A reconfigurable atomic memory service for dynamic networks.

Gilbert, Lynch, Shvartsman, RAMBO II: Rapidly reconfigurable atomic memory for dynamic networks.

Dolev, Gilbert, Lynch, Shvartsman, Welch. GeoQuorums: Implementing atomic memory in ad hoc networks.

Tracking: Demirbas, Nolte, Arora, Lynch. Stalk: A self-stabilizing hierarchical tracking service for sensor networks.

Robotics: TBA

Class 25 (Wednesday, May 17): Tina Nolte, Rachid Guerraoui

Applications: Robot motion control: Walter, Welch, Amato. Distributed reconfiguration of metamorphic robot chains.

Defago, Konagaya. Circle formation for oblivious anonymous mobile robots with no common sense of orientation.

Flocchini, Prencipe, Santoro, Widmayer.

Gathering of autonomous mobile robots with limited visibility.

Lynch, Mitra, Nolte. Motion coordination using virtual nodes.

Intelligent highways:

Sun, Garcia-Molina. Using ad-hoc inter-vehicle network for regional alerts.

Kan, Pande, Vinograd, Garcia-Molina, Event Dissemination in High Mobility Ad-hoc Networks.

Air-traffic management: TBA

Homework 6 due