Course syllabus: CSE/EE 597
Wireless and Mobile Sensing in the age of IoT

Catalog Description: This course introduces students to state-of-the-art research on Internet of Things (IoT), with a focus on wireless networking and mobile sensing. Topics of discussion include GPS and localization, gesture and emotion sensing with Wi-Fi, drones, sports and vehicular analytics, acoustics, robotic wireless networks, augmented and virtual reality, and security/privacy. Powerful and popular analytical techniques from linear algebra, signal processing, and machine-learning relevant to the applications will be discussed. Examples techniques are Trilateration, 3D Dead Reckoning, Orientation tracking, HMM, Viterbi Decoding, Doppler, Maximum Likelihood. Overall, the course would help students develop skills to create novel applications from wireless and mobile sensor data, and apply mathematical concepts to real world problems through a course project.

Prerequisites: Basic familiarity with probability, linear algebra, and programming is expected. However, the course is self-contained with introductory materials on math basics. An android tutorial may be presented. Android/iOS experience is a plus, but not required.

Instructor: Mahanth Gowda - mahanth.gowda@psu.edu

Schedule: T/R, 4:35 to 5:50 pm, Sackett Building 108

Grading: Paper reviews (15%), Class presentation (10%), Midterm (25%), Project (50%)

Office hours: T/R, after class

Topics:
- GPS and localization
- Gesture and emotion sensing
- Smart Environments: Drones, sports, and vehicular analytics
- Acoustics sensing and communication
- Robotic wireless networks
- Augmented and virtual reality
- Security and privacy: sensor data leakage and inference
- Battery less networking for IoT

Course website (full schedule): http://www.cse.psu.edu/~mkg31/teaching/cse_ee597/index.html

Reference books:
- Introduction to Linear Algebra, Gilbert Strang (MIT)
- Understanding Digital Signal Processing, Richard Lyons (UCSC)
- Mathematical Foundations of Computer Networking, Srinivasan Keshav (U. Waterloo)
- A Top Down Approach to Computer Networking, James Kurose (UMass)
- Data Analytics, David Forsyth (UIUC)
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