

CS 655: Wireless and Mobile Computing

Fall 2023

Time and location

Mondays, 4:30 pm - 7:10 pm
Horizon Hall, Room 1008

Instructor

Parth Pathak
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Office hours: TBD

Teaching Assistant

TBD

Course description

This course will cover state-of-the-art topics in wireless and mobile computing. The objective of the course is to introduce students to recent advances in mobile networking and sensing, with an emphasis on practical design aspects of the systems.

We will start with introductory topics in wireless networking and mobile sensing which will cover the design of today's wireless networks, and smartphone/wearable sensing techniques including activity and context recognition. We will then cover topics including next-generation multi-gigabit wireless networks (5G) and visible light wireless systems, integrated sensing paradigms including localization and wireless sensing for healthcare and interaction in smart spaces, low power networking with a focus on RFID backscatter and Internet-of-Things (IoT) devices, and wireless and mobile networking aspects of future mobile systems such as drones and autonomous cars.

Prerequisites

CS 555 (Computer Networks) or equivalent

Textbook

No required textbook

Course schedule (tentative)

Week	Topic
1	Course Introduction
2	Wireless basics
3	WiFi basics
4	Wireless transport and applications
5	Next-generation millimeter-wave wireless (5G and beyond)

6	AR/VR/MR and multimedia over wireless
7	LiFi - visible light wireless
8	Mobile computing basics
9	Mobile and wearable sensing
10	Wireless localization and device tracking
11	Wireless sensing in smart spaces
12	Wireless/mobile sensing for health, interaction, etc.
13	Internet-of-Things (IoT) - low-power wireless, LoRa, etc.
14	Internet-of-Things (IoT) - RFID, NFC, mobile payment, etc.
15	Robotic and drone-based wireless systems

Course structure and lecture format

- Project: 65% (project proposal, status reports, final report, and presentation&/demonstration)
Paper presentation: 15%
Paper summary: 10%
Class participation: 10%
- In most lectures, we will start with the instructor giving an overview of the topic of the week, discussing the basic techniques and protocols, followed by student presentations (30 mins. each) in the second half of the lecture. The presentations will be followed by Q&A, discussion, project status updates, etc.
- There will be no midterm or final exams in this course.
- Your duties will include reading the assigned paper(s) weekly and submitting the summary (summary format will be provided), giving a 30-minute presentation (once a semester), and completing a semester-long course project including all its milestones.

Reviews and presentation

- Students will be provided with 1-2 research papers after every week. You will be asked to read the papers and write a short review (answers to 4-5 questions) explaining the important aspects (central idea, pros, cons) of the papers. A format of the review will be provided beforehand. The presentation will include one oral presentation per student. A list of topics/papers relevant to the course will be provided to choose from.

Project

- The project will design and implement a mobile sensing technique or a wireless protocol within the topics of the course described above. The instructor will provide many sample ideas (e.g. smartphone localization with campus WiFi, activity tracking with a smartwatch, and many more), tutorials, and other necessary resources. Necessary mobile devices such as smartphones, IoT

boards, wireless sensors, wearables, etc. can be provided for implementation (depending on the size of the class). Experience with development on mobile platforms is *not* mandatory.

- The project can be done individually or in teams of 2 students. The project topic and team size should be discussed and approved by the instructor.

Policies:

- Late submission:
 - The paper summaries cannot be submitted late.
 - Late submissions of project milestones will be penalized at 15% each day, and will not be accepted after 3 days of the due date.
- Honor code:
 - All students must adhere to the [GMU Honor Code](#) and the [Computer Science Department's Honor Code](#) Policies.
 - The students are supposed to work individually unless told otherwise.
 - We reserve the right to use [MOSS](#) to detect plagiarism. Violation of the Honor Code will result in an F.
- Accommodations for disabilities:
 - If you have a documented learning disability or other condition that may affect academic performance, you should: 1) make sure this documentation is on file with the Office for Disability Services (SUB I, Rm. 4205; 993-2474; [Disability Services – An Office of University Life](#)) to determine the accommodations you need; and 2) talk with me **within the first week** of the semester to discuss any accommodation needs.
- Diversity
 - The class seeks to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences, including gender expression and identity, race, economic status, sex, sexuality, ethnicity, national origin, first language, religion, age, and ability. We encourage all members of the learning environment to engage with the material personally but to also be open to exploring and learning from experiences different than their own.
- Sexual Harassment, Sexual Misconduct, and Interpersonal Violence
 - As a faculty member, I am designated as a “Non-Confidential Employee,” and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason’s Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason’s confidential resources, such as the Student Support and Advocacy Center (SSAC) at 703-993-3686 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason’s Title IX Coordinator by calling 703-993-8730 or emailing titleix@gmu.edu.