Fall'25: CS 6301 Special Topics in CS: Machine Learning in Mobile Computing
Instructor: Yi Ding

Assignment: *Design Your Own Perceptive Mobile System* (Imagine a Futuristic Sensing-to-Learning Application)

Overview

In this individual assignment, you will **design a futuristic yet realistic mobile sensing system** that demonstrates how sensing, machine learning, and mobile computing can work together to enable a *"Perceptive Mobile AI."*
Your goal is to **imagine a system that learns from the physical world through sensors**, **processes information intelligently**, and **supports meaningful** applications — under mobile or edge constraints.

You may be inspired by recent research, your project, or your own creative vision — but your design must be **independent from your group project.**

Requirements

You will submit **one-page PDF document** that includes:

1. **System Diagram (Mandatory)**
    - Show the full pipeline: sensing → data processing → model → output/application.
    - Indicate the platform (e.g., smartphone, smartwatch, AR glasses, new wearable, drone, vehicle, etc.).
    - Specify the sensors used (Wi-Fi, IMU, acoustic, biochemical, GPS, etc.).
    - Include where computation happens (on-device, edge, or cloud).
2. **Description and Discussion (within the same page)**
    - Briefly describe the motivation and goal of your system.
    - Explain how your sensing and learning components connect.
    - Discuss key design considerations:
        - Energy / memory / latency
        - Communication & deployment
        - Privacy, robustness, or adaptability

You can use **ChatGPT or any AI tool** to brainstorm, write, or even help design the diagram — but the final result must clearly show **your own creative system concept**.
If you manage to make ChatGPT produce a beautiful and meaningful diagram — that's perfectly fine. The key is originality and clarity.

Constraints & Guidance

- You must **design independently** (not a group submission).
- Your idea can involve **multiple sensing modalities**, or focus on a novel sensor-device-application loop.
- You are encouraged to explore **emerging or futuristic sensors**, but avoid purely fictional devices.
    - Example ✅: biochemical patch, mmWave radar, acoustic localization.
    - Example 🚫: "sensor that directly reads human thoughts."
- The goal is to **imagine something possible within 3–5 years**, not pure science fiction.

Evaluation Criteria

Criterion	Description	Weight
Novelty (Creativity)	How innovative, bold, or insightful is your system idea? Does it go beyond existing designs or combine modalities in new ways?	50%
Realism & Rigor	Is the idea technically sound and complete? Does it consider hardware feasibility, sensing accuracy, computation, energy, and deployment constraints?	50%

Scoring Examples

- **100% (Excellent):** Highly novel *and* well-reasoned with clear system design and realistic considerations.
- **90% (Strong):** Either very novel but slightly unrealistic, or highly realistic but somewhat conventional.
- **80% (Good):** Solid design but limited novelty or depth of reasoning.
- **≤75% (Needs improvement):** Vague, unconvincing, or lacks technical grounding.

Submission

- **Format:** One-page PDF.
- **Deadline: 11/09/2025 11:59pm**
- **Submission:** Upload to eLearning under "Assignment: Perceptive Mobile System."

Inspiration

You may consider domains such as:

- **Smart Health:** wearable biochemical sensing + AI-driven feedback.
- **Urban Sensing:** multimodal crowd mobility tracking.
- **AR/VR Systems:** cross-modal perception for immersive interaction.
- **Environmental Sensing:** hybrid RF–optical monitoring for air, soil, or water.
- **Embodied AI:** adaptive robotic systems with edge reasoning.
- **The best design will be that outside of any of these scopes!**