Wireless Lab @ UT Austin (ECE Department)

1 Overview

We build next-generation **wireless communication and imaging systems** that make sensing and connectivity faster, more efficient, and more reliable, especially in challenging real-world environments. We focus on high-frequency mmWave and sub-THz systems, with an emphasis on building real hardware and deploying it in practice.

2 Vision

Future wireless systems will not just transmit data. They will sense, understand, and interact with the physical world. Two emerging trends drive our research:

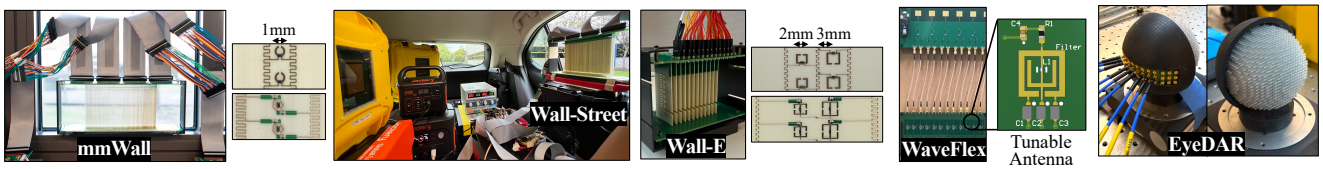
1. **Integrated sensing and communications:** next-generation networks will be *multi-functional,* supporting not only *reliable, ubiquitous data transport* but also enabling *reliable, ubiquitous sensing of the environment.* How can we design compact, efficient systems that jointly support high-performance communication and high-resolution sensing?
2. **Physical AI:** Autonomous systems, such as vehicles, robots, and drones, will make independent decisions while working alongside humans. How can we build Physical AI systems with an ability to *sense the world* and *communicate with it* such that these systems can navigate *safely* in *all conditions*?

3 Research Topics

A key bottleneck in wireless communication and sensing systems lies in digital processing, which is slow, power-hungry, and bulky. We fundamentally rethink wireless hardware architecture by making analog *computational.* Our research focuses on building physically engineered structures that move computation from digital to analog, enabling direct processing of wireless signals for near-instantaneous and low-power operation.

Our topics include **(1) radar/lidar imaging systems using computational metalenses**, **(2) wireless communication systems using programmable metamaterials**, and **(3) AI-integrated systems**, such as AI framework for wireless hardware design and building wireless hardware for AI workloads.

Broadly, our work spans RF/mmWave/sub-THz hardware design and prototyping, circuits, embedded systems, computer vision, signal processing, and full system integration. Our work was featured in multiple media outlets, including Reuters, Rice News, Business Wire, WSJ, Princeton News, Tech Xplore, Hackster.io, and Arduino.



mmWave networks [NSDI '23, HotMobile '21] Vehicular networks [MobiCom '26] Satellite networks [HotNets '22] CBRS networks [CoNEXT '24] mmWave radar [HotMobile '26]

Fig. 1: Our hardware prototypes and implementation for wireless communications and sensing/imaging.

4 Recruiting

We are looking for PhD students, Masters students, Postdocs, and undergrad interns who are excited about building real systems. We welcome applicants with backgrounds in EE, CS, physics, or related fields. Prior experience in RF systems, signal processing, circuits, wireless communications, embedded systems, or computer vision is recommended but not required. For more information, please visit https://kunwoocho.com or send an email (kc188@rice.edu) with your CV.