Kanav Sabharwal

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Research Interests

AI-Enhanced Physical Layer Design for Next-Generation Wireless Communication: My research focuses on developing robust and adaptive physical layer systems by augmenting traditional signal processing with machine learning. While classical approaches rely on simplified assumptions about noise and channel behavior, data-driven models can capture complex, real-world distortions. This leads to more reliable and efficient wireless links, advancing the vision of resilient 5G/6G networks and intelligent edge connectivity.

Education

- **National University of Singapore**   **Jan 2022 - Present**
  Doctor of Philosophy (Ph.D.) - Computer Science
  - GPA: 5/5
  - Advisor: Prof. Mun Choon Chan and Dr. Dinil Mon Divakaran
  - Research Direction: ML-enhanced PHY for Robust Wireless Networks
  - Graduate Courses: Advanced Topics in AI, Network Security, Advanced Topics in Networking, Exploration in CS Research

- **National University of Singapore**   **Aug 2020 - Dec 2021**
  Master of Computing (AI Specialization)
  - GPA: 4.83/5
  - Advisor: Dr. Dinil Mon Divakaran
  - Thesis: Bandwidth Tunable Defence to Improve IoT network Security using Adversarial Machine Learning
  - Graduate Courses: AI Planning and Decision Making, Uncertainty Modeling in AI, Neural Networks and Deep Learning, Natural Language Processing, Information Visualisation, Knowledge Discovery and Data Mining

- **Vellore Institute of Technology, Vellore**   **Jul 2016 - Jul 2020**
  Bachelor of Technology (Information Technology)
  - GPA: 9.05/10

Conference Publications

- **Enhancing LoRa Reception with Generative Models: Channel-Aware Denoising of LoRaPHY Signals**
  [ACM SenSys '24] [Paper] [Code]
  Kanav Sabharwal, Soundarya Ramesh, Jingxian Wang, Dinil Mon Divakaran, Mun Choon Chan

- **EGAL: Enhancing LoRa Network Lifetime with Load Balancing**
  [IEEE SECON '24] [Paper]
  Malaika Afra Taj, Kanav Sabharwal, Mun Choon Chan

- **Attacking logo-based phishing website detectors with adversarial perturbations**
  [ESORICS '23] [Paper]
  Jehyun Lee, Zhe Xin, Melanie Ng Pei See, Kanav Sabharwal, Giovanni Apruzzese, Dinil Mon Divakaran

- **Testing Masks and Air Filters With Your Smartphones**
  [ACM SenSys '23] [Paper]
  Bangjie Sun, Kanav Sabharwal, Gyuyeon Kim, Mun Choon Chan, Jun Han

- **iPET: privacy enhancing traffic perturbations for secure IoT communications**
  [PETS '23] [Paper] [Code]
  Akshaye Shenoi*, Prasanna Karthik Vairam*, Kanav Sabharwal*, Jialin Li, Dinil Mon Divakaran
  *Authors contributed equally

Skills

Technical: Machine Learning (Supervised, Unsupervised, Deep Learning), Generative AI, Signal Processing, Wireless Communications, 5G PHY/LoRaPHY Design, Channel Modeling, Beamforming, Software-Defined Radios (SDR)
Languages/Frameworks: Python, C/C++, PyTorch, TensorFlow, MATLAB, NumPy, SciPy
Tools & Platforms: GNU Radio, USRP/SDR Toolkits, Git, Linux, Wireshark
Soft Skills: Technical Writing, Critical Thinking, Research Leadership, Project Management, Adaptability, Collaboration, Mentoring

EXPERIENCE

- **Student Researcher**   **Nov 2020 - Jul 2021**
  NUS-Singtel Cyber Security R&D Lab, Singapore
  - Researched and developed an innovative defence mechanism to enhance IoT network security through Adversarial Machine Learning techniques
  - Implemented advanced device fingerprinting attack models to assess defence's effectiveness across various scenarios. Designed a tunable-overhead defense mechanism that substantially improved privacy over existing methods; published as first author at PETS '23

- **Machine Learning Intern**   **Dec 2019 - Jun 2020**
  6D Technologies, Bangalore, India
  - Collaborated with the R&D team to develop an ML-based 'SMS Firewall' capable of classifying spam and A2P messages within the network with 98% accuracy, while minimizing false positives—a critical aspect given the nature of the application
  - Developed a 'SIM Box Detector' by optimizing the analysis of network statistics

- **Academic Intern**   **Jun 2019**
  Hewlett Packard Enterprise (HPE) and NUS, Singapore
  - Ranked among the top students in the academic program focused on 'Big Data Analytics using Artificial Neural Networks.' Led a team of 5 members on various group projects as part of the curriculum.

- **Summer Intern**   **May 2018 - Jun 2018**
  Bharat Electronics Limited, Ghaziabad, India
  - Proposed a Machine Learning based substitute to the present Radar Surveillance system while studying about the role of IT in defense sector

TEACHING EXPERIENCE

- **Teaching Assistant**, *CS5229 - Advanced Computer Networks* with Prof. Mun Choon Chan
  Fall 2022, Fall 2023, Fall 2024

- **Teaching Assistant**, *CS5422/4222 - Wireless Networking* with Prof. Ambuj Varshney
  Spring 2023, Spring 2024, Spring 2025

- **Teaching Assistant**, *CS5346 - Information Visualisation* with Prof. Bimlesh Wadhwa
  Spring 2022

HONORS AND AWARDS

- **Research Achievement Award**, NUS School of Computing — 2024/25
  For outstanding research performance [Credential].

- **Teaching Fellowship Award**, NUS School of Computing — 2025
  For excellence in teaching.

- **Letter of Recommendation**, 6D Technologies — 2020
  Recognized by Assistant VP of Product Development for contributions to AI-based SMS Firewall in R&D team.

- **GAIP Scholarship**, NUS Global Academic Internship Program — 2019
  Top-ranked intern; received *A+ grade* with letters of recommendation from NUS and HPE.

- **Merit-Based Scholarships**, VIT Vellore — 2016–2020
  Awarded full merit-based tuition scholarship for academic excellence across all 8 semesters.

- **Gold Medalist**, Senior Secondary School — 2015
  Awarded for being the top academic performer throughout high school.

PROFESSIONAL SERVICE

- **Sub-Reviewer** *ICNP 2023*, *SenSys 2024*
- **Artifact Evaluation Committee Member** *SenSys 2024*

EXTRACURRICULAR ACTIVITIES

- **Core Member**, Indian Society for Technical Education (ISTE)
  Led a team of volunteers, managed technical events, and secured funding for campus initiatives.

- **Core Member**, FEPSI (NGO)
  Mentored underprivileged students by integrating academic support with engaging outreach programs.

- **Event Coordinator and Volunteer**
  Organized and coordinated technical festivals such as Horizon'17 and GraVITas'17; volunteered with the Events and Cultural Committee at Riviera'18.