Kanav Sabharwal

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Research Interests

Advancing wireless networking systems using AI techniques to enhance Physical Layer capabilities, improve performance, and ensure security.

Education

- **National University of Singapore** **Jan 2022 - Present**
  Doctor of Philosophy (Ph.D.) - Computer Science
  - GPA: 5/5
  - Advisor: Dr. Mun Choon Chan and Dr. Dinil Mon Divakaran
  - Research Direction: Focussing on AI-enhanced physical layer for wirless 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**
  [SENSYS '24] [Paper] [Code]
  Kanav Sabharwal, Soundarya Ramesh, Jingxian Wang, Dinil Mon Divakaran, Mun Choon Chan
- **EGAL: Enhancing LoRa Network Lifetime with Load Balancing**
  [SECON '24]
  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**
  [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 Skills:** Machine Learning (Supervised, Unsupervised, and Deep Learning), Generative AI, Signal Processing, Wireless Networks, Physical Layer Design, Software Defined Radio (SDR)
- **Languages and Frameworks:** Python, C/C++, PyTorch, TensorFlow, GNURadio, MATLAB, NumPy, SciPy
- **Soft Skills:** Critical Thinking, Problem Solving, Research, Team Collaboration, Leadership, Technical Writing, Fast Learner and Adaptability

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. The defence mechanism with a tunable bandwidth overhead, substantially improves privacy compared with existing approaches
  - Published research findings as primary author to an A-rank conference
- **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. Received a Letter of Recommendation (LOR) for outstanding performance
- **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 w/ Dr. Mun Choon Chan
  Fall 2022, Fall 2023, Fall 2024
- Teaching Assistant : **CS5422/4222**- Wireless Networking w/ Dr. Ambuj Varshney
  Spring 2023, Spring 2024
- Teaching Assistant : **CS5346**- Information Visualisation w/ Dr. Bimlesh Wadhwa
  Spring 2022

Professional Service

- **Contributed Reviews (Sub-Reviewer)**
  Conferences: ICNP 2023, SenSys 2024
- **Artifact Evaluation Committee**
  Conferences: SenSys 2024

Honors

- Research Achievement Award, School of Computing, National University of Singapore
- Teaching Fellowship Award, School of Computing, National University of Singapore
- Letter of Recommendation from the Assistant Vice President of Product Development at 6D Technologies, recognizing contributions to the R&D team in developing an AI-based 'SMS Firewall'.
- GAIP Scholarship for ranking among the top students in the Global Academic Internship Program 2019 at the National University of Singapore. Received a Letter of Recommendation from HPE for outstanding performance and a Letter of Evaluation from NUS with an A+ grade.
- Merit-based scholarship across all 8 semesters at VIT Vellore.
- Gold Medal awarded for being top performer (scholar) throughout senior secondary school.

Certifications

- Udemy Courses Completed: Signal processing problems, solved in MATLAB and Python | Mastering 5G PHY: Complete Development Training
- Coursera Courses Completed: Machine Learning by Andrew Ng | Neural Networks and Deep Learning | Text Retrieval and Search Engines | Cloud Computing Applications, Part 1: Cloud Systems and Infrastructure

Extra Curricular Activities

- Core Member, Indian Society for Technical Education: Managed technical events, led a team of volunteers, and secured funding for various initiatives.
- Core Member, FEPSI (NGO): Mentored underprivileged students by combining academic programs with engaging activities as part of outreach efforts.
- Coordinated technical events and fests, including Horizon'17 and GraVITas'17. Volunteered for the Events and Cultural Committee at Riviera'18.