Enguang Fan

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Education

University of Illinois, Urbana-Champaign, IL, USA — Aug 2024 – Dec 2027

Ph.D. Candidate in Computer Science — *Advisor: Prof. Klara Nahrstedt*

Research: Wireless/mobile sensing, indoor localization, and multimodal sensor fusion

University of Illinois, Urbana-Champaign, IL, USA — Aug 2022 – May 2024

Master of Computer Science

University of Illinois, Urbana-Champaign, IL, USA — Aug 2019 – Aug 2022

B.S. in Statistics & Computer Science, **Highest Distinction**

Publications

[1] **Enguang Fan**, Yifan Chen, Zihan Shan, Matthew Caesar, Jae Kim. *"Communication-Aware Multi-Agent Reinforcement Learning for Decentralized Cooperative UAV Deployment."* Accepted to *2026 IEEE Global Communications Conference (GLOBECOM)*, 2026.

[2] **Enguang Fan**, Anfeng Peng, Matthew Caesar, Jae H Kim, Josh Eckhardt, Greg Kimberly, Denis Osipychev. *"Towards Effective Swarm-Based GPS Spoofing Detection in Disadvantaged Platforms."* In *MILCOM 2023 - 2023 IEEE Military Communications Conference (MILCOM)*, Boston, USA, Oct 2023, pp. 7.

[3] Emerson Sie*, **Enguang Fan***, Federico Cifuentes-Urtubey, Deepak Vasisht. *"Crowdsourcing Ubiquitous Indoor Localization with Non-Cooperative Wi-Fi Ranging."* In *arXiv preprint*, 2025. `https://arxiv.org/abs/2506.18317`

[4] **Enguang Fan***, Emerson Sie*, Federico Cifuentes-Urtubey, Deepak Vasisht. *"Scalable Indoor Localization with Non-Cooperative Wi-Fi Ranging."* In *Proceedings of the 31th Annual International Conference on Mobile Computing and Networking (MobiCom)*, Hong Kong, China, Nov 2025. **Best Poster Runner-Up**.

[5] **Enguang Fan**. *"Real-Time Loop Closure Detection in Visual SLAM via NetVLAD and Faiss." arXiv preprint arXiv:2602.01673*, 2026.

Internship

Student Researcher, Google — May 2026 – August 2026, Mountain View, CA

Android Location Team — the team behind indoor positioning in Google Maps and Android Location Services.

Supervised by Dr. Roy Want

- Advanced the integration of Wi-Fi Round Trip Time (RTT) indoor localization into Android's *Fused Location Provider (FLP)* and scaled evaluation across numerous Google offices in Mountain View.
- Evaluated Google Wi-Fi hardware and enterprise-grade HPE Aruba, Cisco, and Arista access points, achieving **sub-second localization latency** with **90th-percentile errors of 1 meter and 2 meters**, respectively.
- Developed and evaluated tightly coupled particle-filter and Bayesian-grid methods for fusing Wi-Fi RTT measurements with motion sensors across varied motion and ranging conditions.
- Designed and implemented *APSelector*, a geometry-aware AP selection algorithm that prioritizes access points providing strong geometric constraints to mitigate NLOS and positive ranging biases.
- Incorporated IMDF walkable-path constraints, when available, as probabilistic priors to reject infeasible trajectories and further improve localization accuracy.

Student Researcher, Google — May 2025 – August 2025, Mountain View, CA

Android Location Team — the team behind indoor positioning in Google Maps and Android Location Services.

Supervised by Dr. Roy Want

- Designed and developed an advanced indoor localization prototype combining Wi-Fi Round Trip Time (RTT) and motion sensor fusion on pixel phone, achieving substantially lower latency and higher accuracy than Google's production *Fused Location Provider (FLP)* under challenging indoor environments (DFS channels, multipath-heavy areas).
- Implemented a passive Wi-Fi listening framework that reuses cached scan results from FLP to enable continuous RTT-based ranging without active scans, reducing localization update **latency by 57%** and eliminating blackout periods.
- Built a high-precision pedestrian dead reckoning (PDR) module leveraging Android's step detector and orientation sensors, and fused it with Wi-Fi RTT measurements through a multi-state Kalman filter, achieving **0.8 meter indoor localization accuracy** at 90% CDF using existing commercial Wi-Fi infrastructure.
- Contributed to ongoing efforts to integrate Wi-Fi RTT capabilities into Google's Fused Location Provider framework for next-generation indoor localization.

Research Experience

Crowdsourcing Ubiquitous Indoor Localization with Wi-Fi Ranging Oct 2024 – May 2025

Supervised by Prof. Deepak Vasisht

- Designed and implemented *PeepLoc*, a scalable indoor localization system that utilizes non-cooperative Wi-Fi Ranging measurements and IMU-based pedestrian dead reckoning (PDR) for accurate localization without any infrastructure support or PHY-layer access.
- Proposed a probabilistic backend for geolocating access points using one-way time-of-flight (ToF) estimates fused with PDR-based pedestrian trajectories, solving a joint non-linear least squares problem under noise and clock offset uncertainty.
- Developed a per-AP adaptive ranging model to account for Non Line-of-sight (NLOS) induced multipath distortion and hardware-induced RTT slope deviations, improving end-to-end client localization accuracy in complex indoor environments.
- Demonstrated that PeepLoc outperforms the Android Fused Location Provider (FLP) by over 40% in mean error (3.41 m vs. 7.71 m) across four real-world campus buildings, while maintaining zero dependency on 802.11mc/az protocols or GPS availability indoors.

Deep IMU Bias Inference for Robust Visual-Inertial Odometry Aug 2023 – Dec 2023

- Designed LSTM and Transformer models to infer time-varying IMU biases from measurement histories and prior bias estimates.
- Integrated the learned bias estimates as unary factors in a factor-graph state estimator, improving robustness when visual tracking was degraded or unavailable.
- Evaluated the approach on real-world data from handheld devices, quadruped robots, and drones, demonstrating transfer across different locomotion patterns.

Swarm-Based GPS Spoofing Detection by Multimodal Sensor Fusion May 2023 – Aug 2023

Supervised by Prof. Matthew Caesar

- Contributed to a research project focused on enhancing GPS spoofing detection in disadvantaged platforms, such as light weight drones in modern battlefields.
- Proposed an EKF based architecture for sensor fusion, intelligently combining observations across multiple sensors to detect GPS spoofing and reconstruct coordinates with confidence levels.
- Utilized simulation studies based on real-world mobility and sensor traces to demonstrate that the proposed approach significantly improves location accuracy and lower the error variance compared to baseline techniques.

Honors

- MobiCom 2025 Best Poster Runner-Up
- MobiCom 2025 Student Travel Grant
- IEEE MILCOM 2023 Student Travel Grant [Link]
- UIUC Fall 2022 Teachers(TA) Ranked as Excellent by Their Students [Link]

Skills

- Languages: Python, C/C++, Java, MATLAB
- ML and Scientific Computing: PyTorch, TensorFlow, NumPy, OpenCV
- Sensing and Estimation: Transformers, LSTMs, Kalman filtering, particle filters, factor graphs, sensor fusion, PDR, visual-inertial odometry
- Systems: Android, Wi-Fi RTT, ROS/ROS2, Linux, CMake

Service

- IEEE Transactions on Multimedia (Reviewer)
- IEEE Journal of Selected Topics in Signal Processing (JSTSP) (Reviewer)
- IROS 2026 (Reviewer)
- OSDI 2025 (Artifact Evaluation Reviewer)
- SIGCOMM 2025 (Artifact Evaluation Reviewer)
- EuroSys 2026 (Artifact Evaluation Reviewer)