YUANG FAN

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RESEARCH INTEREST

My research focuses on advancing foundation models through reinforcement learning, multimodal reasoning, and real-world sensing integration. I am particularly interested in improving generalization, robustness, and abstraction capabilities of large language models when applied to longitudinal behavioral, sensor, and visual data. Broadly, I aim to bridge large-scale AI systems with real-world, noisy, and heterogeneous data environments, enabling foundation models to operate reliably in healthcare and embodied sensing contexts.

EDUCATION

Columbia University, New York, NY **01/2025 – Present**
Ph.D. in Electrical Engineering
Co-advised by Prof. Xiaofan Jiang (ICSL) and Prof. Xuhai "Orson" Xu (SEA Lab)

Columbia University, New York, NY **09/2023 – 12/2024**
M.S. in Computer Science, GPA 3.95/4.00

New York University, New York, NY **09/2019 – 05/2023**
B.A. in Computer Science, GPA 3.97/4.00, summa cum laude

SELECTED PUBLICATIONS

Fan, Yuang, L. Xu, M. Wu, J. Nie, Q. Chen, Y. Yang, Z. Zhang, X. Liu, S. Nepal, X. Jiang, and X. O. Xu, "TimeSRL: Generalizable Time-Series Behavioral Modeling via Semantic RL-Tuned LLMs — A Case Study in Mental Health," Accepted to ACM IMWUT (to appear), 2026.

Fan, Yuang, X. Xu, and X. Jiang, "Poster: Split-and-Combine Rectification of Ultra-Wide Fisheye Images into Cubemaps," in *Proceedings of the 31st Annual International Conference on Mobile Computing and Networking*. New York, NY, USA: Association for Computing Machinery, 2025, 1359–1361. [Online]. Available: https://doi.org/10.1145/3680207.3765686

J. Nie, **Fan, Yuang**, Z. Xuan, M. Zhao, R. Wan, M. Preindl, and X. Jiang, "SoundTrack: A Contactless Mobile Solution for Real-time Running Metric Estimation for Treadmill Running in the Wild," *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.*, vol. 9, no. 2, Jun. 2025. DOI: 10.1145/3729486

J. Nie, **Fan, Yuang**, M. Zhao, R. Wan, Z. Xuan, M. Preindl, and X. Jiang, "Multi-Modal Dataset Across Exertion Levels: Capturing Post-Exercise Speech, Breathing, and Phonocardiogram," in *Proceedings of the 23rd ACM Conference on Embedded Networked Sensor Systems*, ser. SenSys '25, UC Irvine Student Center., Irvine, CA, USA: Association for Computing Machinery, 2025, 297–304. DOI: 10.1145/3715014.3722065

K. Hou, M. Zhao, L. Xu, **Yuang Fan**, and X. Jiang, *TDBench: A Benchmark for Top-Down Image Understanding with Reliability Analysis of Vision-Language Models*, 2025. arXiv: 2504.03748 [cs.LG]. [Online]. Available: https://arxiv.org/abs/2504.03748

Fan, Yuang, J. Nie, X. Sun, and X. Jiang, "Exploring Foundation Models in Detecting Concerning Daily Functioning in Psychotherapeutic Context Based on Images from Smart Home Devices," in *2024 IEEE International Workshop on Foundation Models for Cyber-Physical Systems & Internet of Things (FMSys)*, 2024, pp. 44–49. DOI: 10.1109/FMSys62467.2024.00012

J. Nie, H. V. Shao, **Fan, Yuang**, Q. Shao, H. You, M. Preindl, and X. Jiang, "LLM-based Conversational AI Therapist for Daily Functioning Screening and Psychotherapeutic Intervention via Everyday Smart Devices," *ACM Trans. Comput. Healthcare*, Jan. 2025. DOI: 10.1145/3712299

J. Nie, S. Xia, Y. Liu, S. Ding, L. Hu, M. Zhao, **Fan, Yuang**, M. Abdel-Aty, M. Preindl, and X. Jiang, "A Data-Driven and Human-Centric EV Charging Recommendation System at City-Scale," in *Proceedings of the 14th ACM International Conference on Future Energy Systems (ACM e-Energy '23)*, 2023. DOI: 10.1145/3575813.3597350

J. Nie, M. Zhao, S. Xia, X. Sun, H. Shao, **Fan, Yuang**, M. Preindl, and X. Jiang, "AI Therapist for Daily Functioning Assessment and Intervention Using Smart Home Devices," in *Proceedings of the 20th ACM Conference on Embedded Networked Sensor Systems (ACM SenSys '22)*, 2023. DOI: 10.1145/3560905.3568074

J. Nie, L. Hu, Y. Liu, **Fan, Yuang**, M. Preindl, and X. Jiang, "Human-centric data-driven optimization and recommendation in EV-interfaced grid at city scale: poster abstract," in *Proceedings of the 9th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (ACM BuildSys '22)*, 2022. DOI: 10.1145/3563357.3567752

RESEARCH EXPERIENCE

CIMS Global LLC — on assignment at Meta **06/2026 – 08/2026**
Clinical Data Scientist I *AI & Health Research — Health Technologies / Quantitative Science*
Health AI benchmark diagnostics: Built a benchmark-agnostic pipeline that detects non-specific grading rubrics by perturbing patient descriptions across clinically meaningful thresholds and measuring whether rubric scores respond; surfaced a substantial fraction of public HealthBench items whose rubrics miss clinically significant changes, replicated the result on a second benchmark, and contributed to a technical write-up for publication.

Intelligent and Connected Systems Lab (ICSL) & SEA Lab, Columbia University **2025 – Present**
Ph.D. Researcher *Co-advised by Prof. Xiaofan Jiang and Prof. Xuhai "Orson" Xu*
RL-Tuned LLMs for Generalizable Mental Health Prediction: Designed a two-stage reasoning framework in which a reasoning-oriented LLM (Qwen) first emits structured behavioral summaries from longitudinal wearable and smartphone sensor logs, then predicts depression and anxiety outcomes; trained with Group Relative Policy Optimization (GRPO) and reward shaping over summary quality to close cross-domain generalization gaps under heavy dataset heterogeneity and distribution shift. Built the end-to-end RL training and evaluation stack and scaled distributed training across multi-GPU Slurm clusters (H100/H200). (IMWUT'26)
Latent Diffusion Models for Fisheye Image Rectification: Designed conditional latent diffusion models with multi-branch and ControlNet-style guidance to map ultra-wide fisheye captures to cubemap projections; introduced a split-and-combine training strategy to overcome paired-data scarcity. Implemented in PyTorch and Hugging Face Diffusers with perceptual and reconstruction losses. (MobiCom'25 poster)

Intelligent and Connected Systems Lab (ICSL), Columbia University **2023 – 2024**
Graduate Research Assistant
SoundTrack: Acoustic Running-Metric Estimation on Smartphones: Built an on-device ML system that infers cadence and ground contact time from treadmill running audio. Curated a 60+ user in-the-wild gym dataset; engineered MFCC and spectrogram features; trained multi-task PyTorch models reaching 2.11% MAPE (cadence) and 8.78% MAPE (GCT); deployed via TensorFlow Lite for real-time inference. (IMWUT'25; MobiCom'24 poster)
Vision-Language Models for In-Home Psychotherapeutic Monitoring: Benchmarked VLMs and LLMs for detecting concerning daily-functioning cues in smart-home device imagery, integrated into a precautionary monitoring pipeline. (FMSys'24 @ CPS-IoT Week)
Mobile Mental Health Screening App: Led the port of a browser-based screening tool to Flutter (Python backend, Google APIs) and redesigned the UX. Trained new CNNs for facial emotion recognition, lifting accuracy from 60% to 70% while sustaining real-time on-device inference.

Intelligent and Connected Systems Lab (ICSL), Columbia University **Summer 2022**
Undergraduate Research Assistant
AI Therapist on Smart Home Devices: Developed a Flutter front-end that turns existing smart home devices into a precautionary screening and intervention channel for daily functioning; ran user studies with 20 subjects across 40 sessions, averaging 4.45/5.0 satisfaction. (SenSys'22 Best Demo Runner-Up)
City-Scale EV Charging Recommendation: Built a Flutter + Google Maps app that recommends EV charging routes in NYC by querying a deep-learning simulator over traffic, charger, and household-trip data. (e-Energy'23; BuildSys'22)

AWARDS & SERVICE

Phi Beta Kappa Honor Society, New York University, 2023

Best Demo Award Runner-Up, ACM SenSys, 2022

Dean's List of Academic Year, New York University, 2019 – 2023

Reviewer: ACM IMWUT, 2025; ACM Health Journal, 2025

TEACHING

Teaching Assistant, Columbia University: AIoT — Artificial Intelligence for Internet of Things (2025); Embedded AI (2026)