Qifei Cui

Philadelphia, PA
+1-805-971-1388 | qifei@seas.upenn.edu | linkedin.com/in/qifei | github.com/qifei-c | qifei-c.github.io

Education

University of Pennsylvania **Expected Aug 2026**
Master of Science in Engineering in Data Science Philadelphia, PA

GPA: 4.00/4.00

University of California, Santa Barbara (UCSB) **Dec 2023**
B.S. in Applied Mathematics; B.S. in Statistics & Data Science Santa Barbara, CA

- **Honors:** Dean's Honors List (multiple terms).

Major GPA: 3.95/4.00

Skills

Programming: Python (Advanced), C++ (Intermediate), SQL, MATLAB, JavaScript
ML & CV: PyTorch, scikit-learn, OpenCV; Transformers; Segmentation, 3D Pose, Recommenders; Adversarial learning
Robotics & Control: ROS 2, FK/IK, Real-time control, SLAM; MPC; OSQP; CLF–CBF, LMI/Lyapunov
Uncertainty & Probabilistic: Gaussian processes, Bayesian inference, Kalman filtering, Uncertainty quantification
Data & Systems: Git/GitHub, Docker, Linux, AWS (EC2 GPU), Anaconda, VS Code
Evaluation: ablations, paired tests, bootstrap CIs, calibration

Research Experience

Real-Time Vision-to-Robot Motion Transfer via ESFP Pipeline **Mar 2025 – Jun 2025**
Supervised by Prof. Pratik Chaudhari (UPenn) Philadelphia, PA

- Developed a real-time **ESFP** pipeline (Estimating–Smoothing–Filtering–Pose-Mapping) with ROMP 3D (video, ∼12 FPS) and optional MediaPipe Pose (camera, 30 FPS) feeding **HPSTM** (Transformer + differentiable FK + per-joint 3×3 covariance) and variance-weighted filtering; synchronized to **20 Hz** closed-loop control on uArm Swift Pro.
- Trajectory smoothness and anatomical integrity @20 Hz (joint-space): mean jerk = $\mathbf{5{\times}10^{-4}}$ **rad/s**^{3} (**–97.3%** vs *Savitzky–Golay*), mean accel = $\mathbf{8{\times}10^{-4}}$ **rad/s**^{2} (**–92.8%**); Bone-length MAE = **28.69 mm** / StdDev = **1.68 mm** (vs SG's 43.40 mm / 21.12 mm); MPJPE 37.50 mm (vs SG 25.79 mm).
- Fair comparison under equal-latency budgets: benchmarked against **2D lifting + classical filters** (VideoPose3D + *Savitzky–Golay*) while holding mapping/controller fixed; **HPSTM** delivered lower jerk and lower Bone-length MAE at 20 Hz with comparable short-window MPJPE.
- Noise-augmented training on AMASS reduces MPJPE by **20.6%** (34.44→27.34 mm) vs the clean-only variant of the same model; adding the covariance head improves clean-data Bone-length MAE by **18.6%** (35.42→28.54 mm). [arXiv:2506.21234] [Code] [Visualization] [Demo]

GANet-Seg: Adversarial Brain Tumor Segmentation **Sep 2024 – Dec 2024**
Supervised by Prof. Pratik Chaudhari (UPenn) Philadelphia, PA

- Proposed GANet-Seg, a hybrid GAN + U-Net framework that fuses a pre-trained PatchGAN discriminator with a 2D U-Net via an edge-guided adversarial signal (Laplacian-edge map × discriminator map) to sharpen tumor boundaries.
- Achieved TC(Tumor Core) Dice = **88.84%**, ET(enhancing tumor) Dice = **79.81%** on BraTS 2020 (train 369 / test 36); TC HD95 = **13.95 mm, 5.73 mm** better than nnU-Net trained with 1800+ samples in original paper.
- Discriminator demonstrates **98.11%** sensitivity at 0.4 threshold for tumor detection (higher FP trade-off); pre-training on 125 NFBS healthy T1 MRIs enables effective domain adaptation with limited pathological data.
- Lesion-wise (LW Dice) reports **TC=86.28%** on challenging cases; preprocessing with CDF-based enhancement and empty-slice filtering reduced training time by ∼**40%**. [arXiv:2506.21245] [Code]

Graph-Based Embedding Sequential Recommendation System **Aug 2023 – Jun 2024**
Supervised by Haowen Wang (Zhejiang University) Remote

- Pioneered an approach to the cold start problem in sequential recommendation systems by incorporating enriched text embedding for both users and items. Conducted experiments on selected testing sets from MovieLens-1M, focusing on the 30% of users with a watching history of less than 50 titles.
- Enhanced the base BERT4Rec model with dynamic graph layers to improve recommendation accuracy by **4.21%** and adaptability in user-item interactions with an increase in Recall@10 of **5.38%**.

Working Experience

United World College - Changshu China **Sep 2021 – June 2022**

Intern Teacher and Student Counselor in Math and Physics Dept Changshu, Suzhou

- Engineered interactive educational technology platform using CSS/JavaScript for physical concept visualization, developing 6 modular units that translated abstract IB curriculum into visual representations, with quantitative assessment showing 35% improvement in conceptual understanding in homework.
- Designed data-driven curricula through systematic analysis of IB knowledge frameworks and individual learning patterns, achieving 40% average improvement in Mathematics scores across 30+ students.
- Accelerated assessment workflow by 7x through OCR automation, processing entire Grade 12 Mathematics department's midterm exams (500+ students) in single day versus week-long manual process, while generating comprehensive analytics on scoring patterns.

Teaching & Mentoring

Mentor, DATS (MSE in Data Science) Program **2025 – 2026**

University of Pennsylvania Philadelphia, PA

- Mentor incoming master's students on course selection, research matching, and career preparation; host onboarding sessions, weekly meetings, and 1:1 check-ins.

Teaching Assistant, ESE 546 & ESE 542 **Fall 2025**

University of Pennsylvania Philadelphia, PA

- Graduate-level (500-series) courses; Hold weekly office hours; Proctor and grade assessments.

Teaching Assistant (appointed), ESE 650 **Spring 2026**

University of Pennsylvania Philadelphia, PA

Interests

Culinary Arts, Ultimate Frisbee