YIFAN YE

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Technical Portfolio

EDUCATION

University of Pennsylvania — Philadelphia, PA
M.S. in Electrical Engineering — Aug 2025 – Expected Jul 2027
Concentration: Photonics and Quantum Technology

Southern University of Science and Technology — Shenzhen, China
B.Eng. in Optoelectronic Information Science and Engineering — Sep 2021 – Jun 2025
GPA: 3.3/4.0

TECHNICAL SKILLS

Programming: C, Python, MATLAB/Simulink, JavaScript/TypeScript, Java

Embedded Systems: ATmega328PB, ESP32, STM32, Raspberry Pi/Pico; interrupts, timers, UART, I2C, SPI, I2S, PWM

Machine Learning: PyTorch, TensorFlow/Keras, computer vision, pose estimation, CNNs, GRUs/LSTMs, class-incremental learning, ONNX Runtime, RKNN

Hardware and Tools: System architecture, component selection, power distribution, schematic design, JLCEDA, Multisim, soldering, Git, Linux

Experimental Methods: Optical fiber sensing, fusion splicing and tapering, optoelectronic device fabrication and characterization, spin coating, electrode evaporation, wire bonding

EXPERIENCE

Astairo Robotics — Jul – Oct 2026

Robotics Engineering Intern

- Designed the hardware architecture for AstairoPets, a pet companion robot, around an RK3566 host and ESP32-S3 controller; defined component selection, power distribution, and interfaces for sensing, wheel drive, pan-tilt actuation, feeding, and audio interaction.
- Produced four iterations of hardware selection and connection documentation, including schematics, wiring tables, and pin assignments across UART, I2C, I2S, USB, GPIO-based SPI, and PWM; reassigned display pins and specified 3.3 V/5 V level translation to accommodate an additional odor sensor.
- Built a unified video perception pipeline integrating household/pet-object detection, 20-keypoint cat/dog pose estimation, RTMPose human pose, pet tracking, and static and temporal cat behavior recognition, with structured outputs for downstream applications.
- Implemented multi-model behavior decisions using RGB-GRU/Pose-GRU fusion over two-second windows, dish-context evidence for eating, causal smoothing, and confidence-based arbitration between static and temporal predictions; preserved source predictions and selection reasons.
- Compared six static classification architectures and selected MobileNet-V3-Large, obtaining **82.70% accuracy and 85.87% Macro-F1** on a 289-image development-test subset after removing images identical to training or validation samples.
- Prepared FP16 RKNN and ONNX deployment assets for RK3566 and developed a Linux perception service with time-based model scheduling, bounded history, local HTTP access, versioned releases, checksum verification, and rollback support.

PROJECTS

Paw Pulse: Embedded Pet-Monitoring Collar Fall 2026

University of Pennsylvania | ESE 5190 Final Project

- Developed a modular pet-monitoring collar around ATmega328PB and ESP32, integrating inertial sensing, optical PPG acquisition, contact temperature, GNSS, an LCD, buttons, and a local buzzer through interconnected development boards and sensor modules.
- Implemented bare-metal C firmware with timer-driven 50 Hz six-axis IMU acquisition and interrupt-driven, non-blocking UART transmission; used sequence identifiers and CRC checks to detect missing or corrupted samples while keeping acquisition independent of network uploads.
- Built an ESP32 Wi-Fi/HTTPS bridge and a TypeScript dashboard backed by Cloudflare D1, supporting authenticated telemetry, persistent history, CSV export, connection status, and device-command interfaces.
- Developed a streaming IMU step-counting algorithm using gravity estimation, adaptive thresholds, cadence and periodicity checks, and motion-artifact rejection; preserved filter and counting state across upload batches.
- Integrated a pretrained 17-class CNN–LSTM behavior model through a dependency-free JavaScript runtime; verified exported inference against an independent NumPy implementation with a maximum probability difference of 2.44×10^{-7} across three synthetic test windows.

Piezoelectric MEMS Microphone Design Apr 2026

University of Pennsylvania

- Designed an AlN-based piezoelectric MEMS microphone, including the cantilever structure, electrode and layer patterns, readout circuitry, and fabrication process flow.
- Used bimorph sensing beams and series electrical connections to increase voltage sensitivity; designed filtering and amplification around a sensitivity target above **0.5 mV/Pa**.

Vision-Based Ball Position Control and System Modeling Mar 2026

University of Pennsylvania

- Tuned a vision-based position-feedback system using an OpenMV camera for ball-position sensing and an Arduino-controlled actuation mechanism to adjust tray tilt.
- Estimated damping ratios and pole locations from experimental responses and constructed transfer-function models to characterize system dynamics and guide controller tuning.

Class-Incremental Event Recognition for Distributed Acoustic Sensing Nov 2024 – Jun 2025

Southern University of Science and Technology

- Built a machine-learning pipeline for event recognition in phase-sensitive optical time-domain reflectometry (ϕ-OTDR), using acoustic measurements collected under changing operating conditions.
- Processed heterodyne backscatter measurements through phase demodulation and transformed the resulting acoustic signals into image representations for ResNet-based classification.
- Developed a hybrid class-incremental learning framework combining exemplar replay, logit distillation, bias correction, and attention alignment to incorporate new event classes while mitigating catastrophic forgetting.

Pipeline Safety Monitoring with Distributed Acoustic Sensing Sep 2023 – Jul 2024

Southern University of Science and Technology

- Developed a ϕ-OTDR-based distributed optical fiber sensing system for pipeline safety monitoring, combining MATLAB signal demodulation with Python-based deep-learning event recognition.
- Connected optical sensing, signal processing, and pattern classification into an event-monitoring workflow; the project received a **Bronze Award in the 14th Challenge Cup National Competition**.

Ultrasonic Impact Localization in Solid Media Jul – Aug 2023

Southern University of Science and Technology

- Built an impact-localization prototype using edge-mounted PZT sensors on an acrylic plate, a Raspberry Pi controller, and a Raspberry Pi Pico acquisition interface.
- Implemented peak-detection preprocessing and compared geometry-based localization with a five-layer MLP implemented in Keras/TensorFlow.
- Received a **Second-Class Prize in the Guangdong Division of the TI Cup National Undergraduate Electronic Design Contest**.

Organic Photovoltaic Device Fabrication and Characterization

Optoelectronic Device Laboratory Project

- Fabricated organic photovoltaic devices using spin-coated active and interfacial layers and evaporated electrodes.
- Compared active-layer thicknesses and PEIE processing conditions through optical absorption and current-density–voltage characterization.

Motion Estimation from Communication Signals Nov 2022 – Jan 2023

Southern University of Science and Technology

- Applied Doppler-based signal processing to detect target motion from communication signals.
- Generated range–Doppler spectra and used ambiguity-function-based tracking to estimate target velocity and acceleration.

PUBLICATION

Weihao Lin, **Yifan Ye**, Jie Hu, Fang Zhao, Jinna Chen, Li-yang Shao, and Perry Ping Shum. "A Magnetic Field Fiber Sensor Based on Side Hole Fiber Filled with Magnetic Fluid in Fiber Ring Laser Cavity." *International Conference on Optical Communications and Networks (ICOCN)*, 2024.