Yu Li

✉ yul79@uci.edu   📞 (+86) 15271144175   🔗 Personal Website   ⭘ Github

Education

Wuhan University, Hongyi Honor College   **Wuhan, China**
B.Eng. in Microelectronics Science and Technology   *Sept 2021 – Jun 2025*

- GPA: 3.87/4.0; Ranking 2/25

University of California, Berkeley   **Berkeley, CA**
Visiting Undergraduate Student   *Jan 2024 – May 2024*

- Coursework: Intro to Digital Design and Integrated Circuits, Linear Integrated Circuits, Electronic Materials Characterization

Research Experiences

Embedded & Cyber-Physical Systems Lab ↗, UC Irvine   **Irvine, CA**
Advisor: Prof. Mohammad Al Faruque   *May 2024 – Present*
Project: Multimodal Sensor Fusion for Autonomous Driving

- Performed out-of-distribution detection based on multimodal datasets of autonomous driving scenarios to simulate anomaly scenarios.
- Developed an LVLM model for anomaly detection in adverse weather conditions and constructed a framework for autonomous driving scene anomaly detection.
- Proposed a camera-lidar multimodal fusion method, significantly improving stability and accuracy.

Laser and Ultrafast Imaging Lab ↗, Wuhan University   **Wuhan, China**
Advisor: Prof. Cheng Lei   *Sept. 2023 – Jul. 2024*
Project: Medical Ultrasound Image Segmentation ↗

- Collaborated with radiologists to construct a new ultrasound image segmentation dataset.
- Leveraged SAM's fine-grained segmentation capabilities to enhance feature extraction, effectively overcoming challenges posed by insufficient medical imaging data.
- Designed a Wisefusion module to integrate SAM features into the Transformer architecture, achieving state-of-the-art results on the BUSI dataset (mIOU >90%), and strong performance on the newly constructed dataset.

Project: Self-Supervised Depth Estimation in Endoscopy ↗

- Utilized a knowledge distillation framework, combined DDIM loss from the diffusion model with distillation loss and photometric loss to guide denoising in endoscopic scenes.
- Leveraged discriminative priors from the teacher model to further enhance the denoising process, improving the overall accuracy.

Yang Research Lab ↗, UC Davis   **Davis, CA**
Advisor: Prof. Weijian Yang   *Jul. 2023 – Jul. 2024*
Project: Monte Carlo-Based SpO2 Measurement Model ↗

- Constructed a 3D model of blood vessels in MATLAB with layer-specific optical absorption parameters, and performed Monte Carlo simulations to generate time-of-flight (TOF) curves.
- Developed a neural network to map absorption parameters to TOF values, allowing vessel characteristics prediction, and computed SpO2 using the Modified Beer-Lambert Law (MBLL).
- Devised an adaptive algorithm to separate mixed signals from mother and baby for SpO2 calculation, and deployed the system on portable detection devices for real-time monitoring with a model error under 5%.

Riscv Lab, Wuhan University   **Wuhan, China**
Advisor: Prof. Wei Liu   *Oct. 2022 – Jul. 2023*
Project: Electrocardiogram (ECG) Image Classification ↗

- Collected dual-lead ECG signals from the MIT-BIH database, enhanced data using GANs, and developed a lightweight model for real-time ECG-based preliminary diagnosis, deployed on embedded devices.
- Built an XGBoost-based diagnostic model after comparing AdaBoost, CatBoost, and random forests, and designed a voting system with four XGBoost models, achieving 97.4% accuracy with limited resources.

Selected Independent Projects

Efficient OCR Optimization with LoRA ⬈
Feb. 2024 – May 2024
- Fine-tuned the pre-trained TrOCR model on a custom dataset of handwritten, printed, and complex scene texts.
- Optimized the image encoder and text decoder with DoRA and LoRA methods, reducing trainable parameters using Parameter-Efficient Fine-Tuning (PEFT).
- Achieved 84.63% accuracy on complex scene datasets, validating the state-of-the-art performance of DLoRA-TrOCR.

RISC-V Based 3-Stage CPU Processor Design ⬈
Mar. 2024 – May 2024
- Designed a 3-stage RISC-V CPU pipeline in Verilog, and developed a testbench to verify ALU functionality.
- Integrated a direct-mapped cache using SRAM to support RISC-V instructions, CSRs, and basic functionality.
- Synthesized and optimized the Verilog design using VLSI tools, ensuring it passed all functionality tests.

Two-Stage Amplifier Design for LCD Driver ⬈
Mar. 2024 – May 2024
- Calculated required gain and slew rate for a two-stage amplifier based on specifications.
- Selected and optimized circuit components (PMOS/NMOS) using MATLAB scripts.
- Tuned parameters in Cadence, ensuring compliance with design rules and optimal performance.

FPGA-based Image Acquisition and Hardware Acceleration
Mar. 2023 – Jul. 2023
- Trained a YOLOv5 model on traffic light images, achieving over 95% accuracy, and developed a PCIe driver to efficiently transmit HDMI data from FPGA to the host computer.
- Accelerated image recognition on FPGA, storing the results in DDR4 memory for real-time vehicle detection.

Publications
C=Conference, J=Journal, S=In Submission, †=Equal Contribution

[J.1] S. Lv, S. Zeng, **Y. Li**, K. Yang, and Y. Chen. **Local Optimum Time-Reassigned Synchrosqueezing Transform for Bearing Fault Diagnosis of Rotating Equipment**. In *IEEE Sensors Journal*.

[J.2] **Y. Li**, J. Huang, D. Wang, L. Mei, and C. Lei. **Dual branch SAM-Transformer Fusion Network for Accurate Breast Ultrasound Image Segmentation**. Conditional Accpet in *Medical Physics*.

[C.1] **Y. Li**†, D. Chang†. **DLoRA-TrOCR: Mixed Text Mode Optical Character Recognition Based On Transformer**. In *International Conference on Neural Information Processing (ICONIP), 2024*.

[C.2] **Y. Li**, Y. Hu, J. Chen, B. Wang, and W. Liu. **ECG Classification with Dual Models: XGBoost Voting and Deep Learning with Attention**. In *ICACTE, 2023*.

[S.1] **Y. Li**†, J. Wang†, P. Khargonekar, and M. A. A. Faruque. **FusionUQ: Uncertainty-Aware Multi-modal Sensor Fusion for Adaptive Autonomous Systems with Vision-Language Model**. Submitted to *CVPR 2025*.

[S.2] **Y. Li**, D. Chang, J. Huang, L. Dong, D. Wang, L. Mei, and C. Lei. **SfMDiffusion: Self-Supervised Monocular Depth Estimation in Endoscopy Based on Diffusion Models**. Under Review in *International Journal of Computer Assisted Radiology and Surgery*.

[S.3] J. Huang, X. Li, and **Y. Li**. **Windowed Self-Attention Guided Multi-Scale Feature Stream Alignment Network for Ultrasound Image Segmentation**. Under Review in *Biomedical Signal Processing and Control*.

Patents

[P.1] **Y. Li**. Energy-saving calculation method, energy-saving controller, terminal and medium for split air conditioner. China Invention Patent, CN202310099177.0, filed Jan 30, 2023, issued February 23, 2024.

Honors & Scholarships
- **Innova International Exchange Scholarship**, 6 recipients university-wide — *2024*
- **Innova Excellence Scholarship**, Top 3% — *2023*
- **First-Class Scholarship**, Top 5%, 3 times — *2022, 2023, 2024*
- **Academic Excellence Scholarship**, Top 5%, 3 times — *2022, 2023, 2024*

Skills
- **Programming:** Python, C/C++, Matlab, Verilog
- **Platforms:** Ubuntu, FPGA, ASIC, Docker
- **Libraries:** Pytorch, Tensorflow, Keras, Scikit-learn, OpenCV
- **Tools:** Jupyter, Anaconda, Git, Cadence, Vivado, VCS, Quartus