Yuelin Xin

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Education

University of California, Irvine — *Irvine, CA*

Collaborative Research — *Jun 2023 - Present*

- Summer research student
- Research work on Computer Vision, specifically on Medical Image Registration, 3D Vision and Pseudo-supervised Learning
- With 1 research publication in review for WACV 2024
- Working with Prof. Xiaohui Xie: `https://www.ics.uci.edu/~xhx/`

University of Leeds — *Leeds, UK*

BSc in Computer Science — *Sep 2022 - Present*

- First Class Student (projected)
- Transferred from Southwest Jiaotong University
- Pursuing research work in Computer Vision and Low-level Optimisation with Machine Learning
- Working with Prof. Zheng Wang (`https://zwang4.github.io/`) and Dr. Sharib Ali (`https://eps.leeds.ac.uk/computing/staff/11465/dr-sharib-ali`)
- **Related modules:** Numerical Computation, Algorithms, Artificial Intelligence, Machine Learning, Computer Graphics, Compilers.

Southwest Jiaotong University — *Chengdu, China*

BSc in Computer Science — *Sep 2020 - Jul 2022*

- First Class student, School Scholarship & Best Student Award
- Research work on Computer Vision / Pattern Recognition
- With 1 research publication in IJCAI 2022 Workshop
- Working with Dr. Zhiguo Long: `https://zhiguolong.github.io/`
- **Related Modules:** Computer Architecture, Fundamental Mathematical Concepts, Professional Computing, Computer Processors, Introduction to Discrete Mathematics, Engineering Communication Skills.

Research

Kernel Transformer: Swin Transformer's Evil Twin — *Leeds, UK & Irvine, CA*

Project Owner — *Summer 2023 - Present*

- Working on a novel transformer backbone for dense prediction tasks, such as semantic segmentation and object detection
- Designed a sliding-kernel-based self attention mechanism that delivers more dynamic receptive fields and more efficient gradient propagation
- Uses ideas from Swin Transformer, but with a more flexible architecture
- In the process of producing a paper to present the work in collaboration with 2 universities, code at: `https://github.com/miraclefactory/kernel-transformer`

Optron: Better Medical Image Registration via Optimizing in the Loop — *Irvine, CA*

First Author & Project Correspondence — *Summer 2023*

- Worked on volumetric medical image registration tasks using state-of-the-art methods
- Devised a general, robust training architecture which consistently improves on previous deep learning methods with unsupervised training
- Achieved state-of-the-art performance on the IXI dataset with TransMorph
- Summarised our method and experiments into a paper (`https://arxiv.org/abs/2308.15216`) which is under review for **WACV 2024**

Scene Separation & Data Selection: Temporal Segmentation Algorithm for Real-time Video Stream Analysis — *Chengdu, China*

Project Lead & First Author — *Summer 2022*

- Developed and published a novel algorithm called 2SDS for real-time video scene segmentation and analysis (`https://arxiv.org/abs/2308.00210`). The work is featured and **orally presented in IJCAI 2022 workshop**.
- Built and trained a motherboard defect detection model based on YOLOv5 and 2SDS to detect and track small objects in real-time videos. The structure of the backbone network was changed to yield a much faster model
- Significantly improved the average inference speed of the model (up to 25% faster), we benchmarked an average inference time of 4.4ms on an NVIDIA Tesla P100 GPU

Projects

Hello Algorithm (English Edition) — *GitHub*

Personal Project — *Jan 2023 - Present*

- Leading translation author of the popular algorithm book *Hello Algorithm*.
- This project aims to create a free, open-source, and beginner-friendly crash course for data structures and algorithms.
- The original repository has 37k+ stars and 4k+ forks on GitHub.

The Hyper Speed Automatic Optical Inspection System (HSAOIS)

GitHub / Chengdu, China

Miracle Factory & Southwest Jiaotong University

Dec 2021 - Jun 2022

- An efficient and powerful automatic optical inspection system for the detection and analysis of motherboard defects on production lines. Light enough to run on IoT devices like NVIDIA Jetson Nano, powerful enough to detect tiny defects faster and more accurately than human eyes.
- Collected, labeled and published the largest public dataset of motherboard defects available for PyTorch with 1000+ items.
- Customized a new backbone for YOLOv5 to yield a much faster model without sacrificing accuracy, and we meticulously trained a family of more than 40 models on various specs & hyper-parameters.
- Wrote a technical & project specification document for the system which is more than 200 pages long.

The Lisa Programming Language

GitHub / Leeds, UK

Miracle Factory & University of Leeds

Dec 2022 - Present

- An experimental programming language and compiler architecture designed for the simplest and easiest implementation of high performance AI/ML systems.
- The language provides a simple syntax and performance similar to that of C/C++, with powerful features like JIT compilation, hardware adaptive optimisation, and so on.
- More details will be available as the project rolls out to the public.

Community Works

The Miracle Factory Community

GitHub / Global

Co-founder, Community Administrator & Researcher

April 2022 - Present

- Building the Miracle Factory community, a non-profit AI development and research community that gathers creativity and innovation to solve real-world problems.
- We strive to build a community that cares about the ethics and social impacts of AI.
- We care a great deal about the development of our student community, and we are planning on building a platform to support them, with Campus Expert Seminars, student support services, and so on.
- Actively maintaining the Miracle Factory GitHub organisation, and other open-source projects.

Skills

Programming	• **Proficiency in:** C, C++, HTML5/CSS3, Python. • **Also knows:** Java, JavaScript, Hack Assembly, HDL, Mojo, Rust, Shell, SQL, Swift, YAML.
Technical Skills	• **System:** Linux(Ubuntu/CentOS/RedHat), Unix-like CLIs(Bash/Zsh), System Architecture, Hardware Basics. • **Development:** LaTeX, Markdown, Version Control, Unit Tests, Agile Development, Docker.
Soft Skills	Project & Team Management, Documents Writing, Conference Presentation.

Languages

English	Academic level proficiency
Chinese	Native proficiency

References & more info available upon request.