Yiheng Xue (Billy)

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BRIEF STATEMENT

With two years of significant experience in a start-up, my research direction is primarily oriented towards machine learning, computer vision, and robotics. My goal is to further expand my expertise in the related field, priming myself for advanced studies and research. My academic voyage commenced at SUSTech *(Click on this link for a brief article about Southern University of Science and Technology (SUSTech), which significantly influenced my decision to attend)*, a prestigious institution that was ranked 166th globally by Times Higher Education in 2018 during my tenure there. At the end of my undergraduate life, my capstone design project, titled *Real-time 3D Human Skeleton Reconstruction Based on RGB-Camera Array*, earned the 2nd place in the College of Engineering.
My master's research examining a *3D Perceptual Algorithm Based on Multi-sensor Fusion*. This master's degree, generously sponsored by Huzhou Institute of Zhejiang University, is awarded by the University of Liverpool, passed with distinction. Over the last 4 years, I have accumulated extensive laboratory experience, adapting to project-centric environments and intensive work conditions. I've co-authored research papers for *Nature Communications* and *ACS Nano*, with primary-authored robotics paper currently under review in *IEEE RA-L* and *Ocean Engineering*.

With a focus on foundational principles and emerging technologies, I aim to address real-world challenges through rigorous research. My objective is advanced study and collaborative work in this domain. I am confident that my dedication to knowledge will facilitate new research opportunities. I am open to providing additional information to strengthen my application.

EDUCATION

2022-2024 **Master of Research**
FULL SCHOLARSHIP, PASS WITH DISTINCTION
Pattern Recognition and Intelligent Systems
The University of Liverpool

2015-2019 **Bachelor of Engineering**
EXCELLENT UG THESIS AWARD
Computer Science and Technology
Southern University of Science and Technology

2017 (SUMMER) **Visiting Student**
EXCELLENT STUDENT IN SUMMER PROGRAM
Electrical and Computer Engineering
The University of British Columbia

Bachelor dissertation: Real-time 3D human skeleton reconstruction based on RGB camera array (capstone design)
Supervisor: Prof. Qi HAO@SUSTech, Dr. Zhenhua WU@Huawei Technologies Co., Ltd.
Master dissertation: Research of 3D perception algorithm based on multi-sensor fusion (3D perception in USV target tracking)
Supervisor: Prof. Ming XU@University of Liverpool, Prof. Yong LIU@Zhejiang University

RESEARCH INTERESTS

Computer Vision

I am deeply invested in the premise that computers can *observe* the world through unique lenses, providing unexplored avenues for perception tasks. This encompasses leveraging integrated sensor technologies such as cameras, radars, and gimbals. My professional acumen in this domain is evidenced by five commercial projects completed independently, highlighting both research and engineering capabilities.

Machine Learning

I am committed to the application of machine learning for solving intricate problems. Striking a balance between traditional algorithms and deep learning techniques, I focus on method selection and optimization rooted in foundational principles. This is backed by scholarly contributions, including two co-authored interdisciplinary journal papers that focus on complex signal processing and classification.

3D Reconstruction

I am deeply engaged in 3D reconstruction as a means to both output deep learning results and enhance perception tasks. With two years of research experience in 3D modeling and visual SLAM, I have a lead-authored journal paper currently under review by *IEEE RA-L*. My contributions include optimizing the Surfel data format to develop an autonomous driving scene modeling system that surpasses NeRF in performance.

WORK EXPERIENCE

In my professional history, all my roles have been geared towards research-oriented explorations.

SEP 2022 – MARCH 2024 (FULL TIME)

Huzhou Institute of Zhejiang University

Perception Algorithm Engineer (USV)

While pursuing a research master's degree and working as an Algorithm Engineer, I explored USV control and swarm planning. I designed and implemented perception tasks in various platforms, leading to the development of these from the ground up. This fostered my understanding of robotics control.

SEP 2022 – SEP 2023 (PART TIME)

School of AIAC@Xi'an Jiaotong-Liverpool University

Teach Assistant

I served as a teaching assistant, specifically aiding in the Pattern Recognition module. I was entrusted with managing undergraduate tutorials and Q&A sessions, spanning two semesters and two distinct courses. My assistance with both theoretical and coding problems received high praise from students and faculty alike.

SEP 2021 – SEP 2022 (FULL TIME)

Southern University of Science and Technology (Department of CSE@SUSTech)

Research Assistant (Autonomous Driving)

Transitioning from commercial to scientific research, I deepened my understanding of autonomous driving challenges, specifically in computer vision and dataset issues. I aided in swiftly implementing state-of-the-art algorithms, and collaboratively, we developed a proprietary dataset annotation system set for open-source release. This system, lauded by initial users, optimized point cloud annotation. Additionally, I developed a unique approach to target detection in deep learning, adapting to different scenarios. I played a crucial role in securing NSF projects and led the creation of highly-visible lab project videos, attracting new talent to our lab. This role honed my technical skills and enriched my understanding of research methodologies and collaboration, preparing me for future challenges.

JULY 2019 – SEP 2021 (FULL TIME)

Roboeye Technology Limited

Computer Vision Algorithm Engineer

I was an active member of the Pioneer Team Project in the Nanshan District, Shenzhen. Our primary focus was on the research and commercialization of the *Next-Generation Intelligent Ultra-HD Camera Array System*. I have been instrumental in bringing five commercial projects to completion, even independently securing startup funding of 320,000 CNY for one. My contributions played a vital role in transforming my laboratory's research outcomes into practical applications and commercial products.

JULY 2019 – SEP 2021 (PART TIME)

Department of CSE@SUSTech

Teach Assistant

I was handling queries and addressing code engineering issues for two courses: *Machine Learning* and *Intelligent Robotics*. My duties also extended to participating in an innovative educational research project titled *Integrated Teaching Reform and Exploration for Machine Learning and Intelligent Robotics*. In this role, I was instrumental in setting up the experimental platform for the course.

COMPUTER SKILLS

PROGRAMMING	Python, Java, C++, Matlab
DEEP LEARNING	PyTorch, TensorFlow, MXNet
TOOLS	Linux, ROS, SQL, OpenCV
DESIGN	Final Cut, PR, PS, AI, Sketch

AWARDS

2024 **Best Overall Master Student (Ranked 1st)**
SAT, JITRI-XJTLU

2019 **2nd Prize of the Capstone Design Contest**
College of Engineering, SUSTech

2017 **Excellent Student in Summer Program**
Department of ECE, UBC

2019 **Champion as Honour Captain**
Zhixin College, SUSTech

2018 **Champion of the Football Tournament**
SUSTech, University Town of Shenzhen

INDEPENDENT PROJECTS

PYTHON Elastic-tracker: Unmanned surface vehicle (USV) object tracking and swarm planning - 2023
A robotic sensory system with high spatiotemporal resolution for texture recognition - 2022
Infrared camera-based posture recognition and sleep monitoring for infants and toddlers - 2022
NLP-BERT method-based ESG analysis and financial report evaluation - 2022
Integrated virtual and real scenario-based lane detection for autonomous driving - 2021
Gesture recognition-based live broadcasting mobile platform for human-machine interaction - 2021
Real-time 3D human skeleton reconstruction based on RGB camera array - 2019

C++ Semi-automatic point cloud annotation platform for autonomous driving datasets - 2022
GAN Fingerprint recognition for low-quality images under complex environmental conditions - 2020
MATLAB Monocular camera-based instant detection and interaction platform for Ping-Pong games - 2020
JAVA Efficient semi-automatic tool for image annotation on the Android platform - 2018
AR Real-time interactive terrain evolution sandbox utilizing Kinect technology - 2018
ROS Distributed parallel control for takeoff and landing in drone clusters - 2017
OPENCV STM32-based system for 3rd-order Rubik's cube recognition and solving - 2017

PUBLICATIONS

Yiheng Xue, Zhijun Lyu, Rui Ma, Meiying Zhang, Qi Hao†, Adaptive Large-Scale Novel View Image Synthesis for Autonomous Driving Datasets, *IEEE Robotics and Automation Letters*, under review, Oct, 2023.

Yiheng Xue*, Tao Huang*, Zheng Zhang, Zhenfeng Xue†, Yong Liu, USV Tracker: A Robust Tracking System Based on Multi-Sensor Fusion and Elastic Planning, *Trans*, in process, Oct, 2023. (*co-first authors)

Ningning Bai*, **Yiheng Xue***, Shuiqing Chen, etc,. Chuanfei Guo†. A robotic sensory system with high spatiotemporal resolution for texture recognition, *Nature Communications*, Accepted. (*co-first authors, editors' highlights)

Ningning Bai, Liu Wang, **Yiheng Xue**, etc,. Chuanfei Guo†. Graded Interlocks for Iontronic Pressure Sensors with High Sensitivity and High Linearity over a Broad Range, *ACS Nano*, Accepted.

Yiheng Xue, Yue Chen, Lin Wang, Yilin Zhang, *One Hundred Thousand Whys for High Technology* (Volumes 1-3), Guangdong Science and Technology Publishing House. Role: Illustrator. First Prize, 3rd Shenzhen Popular Science Achievement Exhibition.