Xumin Gao

Personal Profile: https://xumingaogithub.github.io/
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Research Interests

Computer vision, Robotic perception and autonomous systems, Interactive perception and human-robot interaction, Vision-language and multimodal models, Trustworthy and reliable AI

Education

University of Lincoln UK
PhD in Computer Science 12/2022 -Present
(AgriFoRwArdS CDT & Lincoln Centre for Autonomous Systems)
PhD Project: Image-Based Insect Counting in Water Traps under Interactive Robotic Stirring

University of Lincoln UK
MSc in Robotics and Autonomous Systems 10/2021 - 10/2022
(AgriFoRwArdS CDT & Lincoln Centre for Autonomous Systems)
Master Project: Automatic Aphid Counting Based on Yellow Water Pan Trap Imagery and Deep Learning

Wuhan University of Science and Technology China
MEng in Mechanical Engineering 09/2016 - 06/2019
(Institute of Robotics and Intelligent Systems & School of Mechanical Automation)
Master Project: Research on Local Structured Environment Perception and Object Detection for Indoor Mobile Robots

City College, Wuhan University of Science and Technology China
BEng in Mechanical Design, Manufacturing and Automation 09/2012 - 06/2016
(Department of Mechanical and Electrical Engineering)
Bachelor Project: Design of a Dance Robot

Work Experience

Beijing Mcfly Technology Co. Ltd Beijing, China
AI Algorithm Engineer 09/2019 - 02/2021
- Worked on the development of a weeding robot, weed monitoring using UAV imagery and deep learning, and farmland monitoring based on satellite imagery

Qingdao Smart Ground Vehicle Intelligent Technology Co. Ltd Beijing, China
Machine Vision Engineer (Internship) 04/2019 - 08/2019
- Worked on vehicle recognition and 3D reconstruction, and accelerating image processing algorithms using CUDA programming

Publications

[1] **X. Gao**, M. Stevens, G. Cielniak. *A Robotic Stirring Method with Trajectory Optimization*

and Adaptive Speed Control for Accurate Pest Counting in Water Traps. arXiv preprint arXiv:2510.21732, 2025. (Submitted to ICRA 2026)

[2] **X. Gao**, M. Stevens, G. Cielniak. *Counting with Confidence: Accurate Pest Monitoring in Water Traps.* The 8th IFAC Conference on Sensing, Control and Automation Technologies for Agriculture (AGRICONTROL 2025), California, USA, 2025.

[3] **X. Gao**. *The Human-Robot Interactive Reinforcement Learning for Robot Navigation of The Factory Transportation System in Grid World Environment.* TechRxiv preprint, 2025.

[4] **X. Gao**, W. Xue, C. Lennox, et al. *Developing a hybrid convolutional neural network for automatic aphid counting in sugar beet fields*. Computers and Electronics in Agriculture, 220, p.108910, 2024.

[5] **X. Gao**, M. Stevens, G. Cielniak. *Interactive Image-Based Aphid Counting in Yellow Water Traps under Stirring Actions*. The 27th International Conference on Pattern Recognition VAIB Workshop (ICPR2024), Kolkata, India, 2024.

[6] **X. Gao**. *Automatic Detection, Positioning and Counting of Grape Bunches Using Robots*. arXiv preprint arXiv:2412.10464, 2024.

[7] L. Jiang, W. Nie, J. Zhu, **X. Gao**, et al. *Lightweight object detection network model suitable for indoor mobile robots*. Journal of Mechanical Science and Technology, 36(2), pp.907-920, 2022.

[8] **X. Gao**, L. Jiang, X. Guang, et al. *Real-time Indoor Semantic Map Construction Combined with The Lightweight Object Detection Network*. The 2nd International Conference on Artificial Intelligence Technologies and Applications (ICAITA 2020), Dalian, China, 2020.

[9] **X. Gao**, L. Liu, H. Gong. *MMUU-Net: A Robust and Effective Network for Farmland Segmentation of Satellite Imagery.* The 2nd International Conference on Artificial Intelligence Technologies and Applications (ICAITA 2020), Dalian, China, 2020.

[10] **X. Gao**, L. Jiang, H. Wang, et al. *Algorithm of Extracting Line Feature of Laser Radar Combined with SVM*. Computer Engineering and Design, 40(08), pp.2384-2388, 2019.

Competition Awards

First Prize: 8th "Huawei Cup" China University Student Intelligent Design Competition *08/2018*

Finalist Award: 7th ABB University Student Innovation Competition *08/2018*

Skills and Languages

Technical Skills:

—Mechanical, Electrical, and Embedded Systems: Creo CAD, Altium Designer, 8051 Microcontroller, Arduino, STM32, Raspberry Pi, NVIDIA Jetson

—Programming Language: C, C++, Python, Matlab

—ML/DL Frameworks & CV Libraries: PyTorch, TensorFlow, Caffe, OpenCV

—Large-scale Vision and Vision-Language Models, and Multimodal LLMs: CLIP, DINO, SAM, Grounding DINO, Grounded SAM, LLaVA

—Robotic Software Architecture: ROS1, ROS2

Languages: Mandarin (native), English (Fluent)