

Ao XIAO

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Education

University of Manchester

06. 2024 –Present

Major: Robotics

South China Agricultural University

09.2020 –Jun. 2024

Major: Bachelor of Science in Electronic Information Science and Technology

GPA: 89.92/ 100

Core Modules: C Programming, Circuits, Fundamentals of Computer Networking, Introduction to Electronic Information Science and Technology, MATLAB Practical Training and Laboratory, C++ Object-Oriented Programming, Linux Operating System and Python Programming Basics, Electromagnetic Field Theory, Signals and Systems, Embedded System Principles, DSP Principles and Applications, Development and Application of Intelligent Robots, Microcontroller Principles and Applications, etc.

Supportive Skills

- ✓ **Programming:** C, C++, MATLAB, Python, 8051 Assembly Language.
- ✓ **Systems:** Linux, Windows
- ✓ **Technical Skills:** ROS2, DSP, FPGA, STM32 Microcontroller, Embedded Systems Development Board, Circuit Design and Schematic Capture, PCB Layout Design, Soldering, etc.
- ✓ **Software:** Pycharm, Keil uVision, Proteus, Altium Designer, Quartus II, Visual Studio, VMware Workstation, Arduino, etc.

Publications

- 1 Published Paper: J. Xie; T. Jing; B. Chen; J. Peng; X. Zhang; P. He; H. Yin; D. Sun; W. Wang; **A. Xiao**; S. Lyu; J. Li. Method for Segmentation of Litchi Branches Based on the Improved DeepLabv3+ [J], *Agronomy*. 2022, 12, 2812; ISSN 0002-1962. (SCI. JIF: 2.65)
- 2 Published Paper: J. Lin; **A. Xiao**; D. Zeng. Intelligent Greenhouse of Internet of Things that Can Predict Environmental Factors [J], *Shuzihua Yonghu*, 2022, 28(47):13-15; ISSN 1009-0843; CN 51-1567.

Research and Projects

Study on the Photosynthetic Parameters Model of Lychee Leaves at Different Growth Stages
Based on UAV Multispectral Imaging

5/2021-11/2022

- ✓ **Classification:** Undergraduate Innovation and Entrepreneurship Training Program (2021)
- ✓ **Research Aim:** This study aims to establish an inversion model for the photosynthetic parameters of lychee leaves at different growth stages. This research relates UAV spectral imagery data to lychee canopy photosynthetic parameters and uses machine learning algorithms to establish a relationship model based on vegetation indices and texture features for the inversion of lychee photosynthetic parameters.
- ✓ **Contributions:** Collected and organized SPAD values (chlorophyll content), water use efficiency, photosynthetic rate, transpiration rate, temperature, and other parameters of lychee leaves during different stages. Measured the CO₂ variation, humidity variation, and light intensity in the environment during the measurement period. These data are later used to design a photosynthetic parameter model. Performed threshold segmentation on the leaf images captured by the unmanned aerial vehicle and assist in spectral processing.
- ✓ **Result:** (1) Acquired **national-level project funding**. (2) Awarded **Outstanding Project Conclusion**. (3) Awarded **Second Prize** in the Entrepreneurship Program (2021).
- ✓ **Software Copyright:** Image Segmentation Software System Based on Lychee Canopy Multispectral Vegetation Index V1.0 (2022).
- ✓ **Patents:** (1) Multi-Sensor Irrigation Response System and Method Based on Unmanned Aerial Vehicle Spectral Remote Sensing (2023). (2) Method and System for Lychee Disease Detection Based on Unmanned Aerial Vehicle Hyperspectral Imaging (Under Review).

Predictive Environment Factors IoT Smart Greenhouse

2022

- ✓ **Classification:** 2022 Guangdong Provincial College Student Electronic Design Competition; “Bangpu” Cup, SCAU (2022).
- ✓ **Research Aim:** The objective of the project is to develop a system for predicting environmental factors in the agricultural industry using a LSTM-based deep learning model. The hardware components primarily consist of STM32 microcontrollers integrated with sensor control devices. As for the software, based on Alibaba Cloud, the system incorporates WIFI communication, a LSTM deep learning model, and enables remote control through PC and mobile app terminals, creating an IoT smart greenhouse.
- ✓ **Contributions:** Responsible for three modules: data transmission and remote management, IoT platform construction, and user online terminal. Stm32 utilizes the ESP8266 module and MQTT protocol to connect and transmit data to the established Alibaba Cloud IoT platform via serial communication. The cloud platform reads and displays various sensor data, allowing remote automatic or manual control of greenhouse equipment. Developed a web-based user terminal and mobile app, enabling users to remotely control the devices online, forming an IoT model of device-platform-user.
- ✓ **Result:** (1) Awarded **Second Prize** in the Guangdong Provincial College Student Electronic Design Competition (2022). (2) Awarded **First Prize** in “Bangpu” Cup, SCAU (2022).
- ✓ **Software Copyright:** Predictive Environment Factors IoT Smart Greenhouse V1.0 (2022).

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- ✓ **Patent:** An intelligent agriculture production management service system.

UAV Wind Speed Acquisition, Transmission, and Storage System

2022

- ✓ **Classification:** Collaborative project with J. Lin.
- ✓ **Research Aim:** To address the difficulties in determining the wind speed during UAV flights, we have designed a method that utilizes infrared measurement to determine wind speed by calculating the number of rotations of four blades.
- ✓ **Software Copyright:** UAV Wind Speed Acquisition, Transmission, and Storage System V1.0.

Vision Sensor-Based UAV with Machine Vision and Image Processing System

2022

- ✓ **Classification:** Collaborative project with J. Lin and D. Zeng.
- ✓ **Research Aim:** The research aims to invent a vision sensor-based UAV. The invention includes a UAV body equipped with a vision sensor, and a UAV control terminal equipped with a machine vision system and an image processing system. The image processing system extracts the morphological information and features of the images and compares them with benchmark images stored in memory for analysis.
- ✓ **Patent:** A Vision Sensor-Based UAV with Machine Vision and Image Processing System.

A Wind Field Simulation Test Equipment

2022

- ✓ **Classification:** Collaborative project with J. Lin.
- ✓ **Research Aim:** The present utility model relates to the field of model testing technology and discloses a wind field simulation test device. This design allows adjustable blowing positions and angles, enabling the simulation of airflow from different directions and obtaining various simulated data. Additionally, the device is easy to move.
- ✓ **Patent:** A Wind Field Simulation Test Equipment.

Robots and Canton Tower

2021

- ✓ **Classification:** 2021 Electronic Hardware Art Competition, SCAU
- ✓ **Research Aim:** The objective of the project is to create electronic devices crafted using printed circuit boards.
- ✓ **Contributions:** Proposed ideas, created a minimum system board for the 51 microcontroller. Assembled the Guangzhou Tower using soldering techniques. Utilized the 51 microcontroller to control the lighting of the Guangzhou Tower, as well as the built-in motors of a robot to control the movement of wheels in front of the Guangzhou Tower.
- ✓ **Result:** Awarded **Second Prize** in the Competition.

Extracurricular Activities

Electrical Intelligence and Technology Alliance, SCAU

9/2020-7/2022

- ✓ **Roles:** Event Planning Member (2020-2021); Event Planning Vice Leader (2021-2022)
- ✓ **Contributions:** Wrote proposals for the main activities, organized the committee, coordinated the work of various departments, and made on-site decisions during the events. Implemented activity regulations of the Electrical Intelligence and Technology Alliance and refined activity arrangements. Actively cooperated with the Executive Committee and performed urgent tasks assigned by the school and college.

VEX Robotics Team

9/2021-7/2022

- ✓ **Role:** Electrical Control Team.
- ✓ **Contributions:** The team is to utilize embedded development, communication mechanisms, driver implementation, and control algorithms to precisely control the movement and path planning of robots, enabling them to perform fast and accurate actions. I am responsible for coding, debugging, and optimizing control codes for the robots, selecting suitable sensors, and controlling power components.

Growth Consulting Workshop, SCAU

9/2020-2021

- ✓ **Role:** Publicity Member.
- ✓ **Contributions:** Wrote content for the "Heart Radio" and event promotional articles. Edited and proofread the articles to be posted on the official WeChat account, and managed the operation of the account. Organized several events on mental health being.

6th Swimming Championship, School of Electronic Engineering (Artificial Intelligence), SCAU

20/5/2021

- ✓ **Role:** Participant.
- ✓ **Result:** First Place, Men's 50m Backstroke.

Awards

Titles	Level	Classification	Grant Time
Second Class Scholarship, SCAU	University	Academic	2022, 2021
Outstanding Team, "Summer Rural Practice", School of Electronic Engineering (Artificial Intelligence), SCAU	School	Extracurricular	2022