Zehua Wu

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EDUCATION BACKGROUND

University of Pennsylvania, Philadelphia, USA — Sept. 2024 - May 2026
School of Engineering and Applied Science
Expected M.S. in Electrical Engineering in May 2026
GPA: 3.45/4.0

Southeast University Chengxian College, Nanjing, China — Sept.2020 - Jun. 2024
School of Electronic and Computer Engineering
B.Eng. in Automation
GPA: 3.59/4.0 | Ranking: 4th/58 (Top 6%)

RESEARCH INTERESTS

- Embodied Intelligence, Robotics, Computer Vision, Deep Learning

PAPERS & PATENT

- **Paper:** Zheng Ying, ***Zehua Wu***, Guifang Qiao, Lizhen Zhang, Jiajia Yu. "Robot geometric parameter identification method based on multi-objective difference evolution algorithm." China Measurement & Testing. **(Accepted, In Press)**
- **Paper:** Zheng Ying, ***Zehua Wu***, Guifang Qiao, Yichao Wu, Xinyun Zhu. "Compensation of industrial robot positioning accuracy based on multi-layer perceptron." Instrument Technique and Sensor.**(Accepted, In Press)**
- **Paper:** Zheng Ying, ***Zehua Wu***, Guifang Qiao. "Research on Robot Accuracy Compensation Method Based on Particle Swarm Optimization Neural Network." Journal of Mechanical Science and Technology. **(Under Review)**
- **Patent:** Junxin Sun, Jiajia Yu, Yirun Song, ***Zehua Wu***, Siyu Zhou, A Multi-model Detection Method and System for Intelligent Transportation[P], China Patent: CN116311100A, filed Mar.23, 2023, published Jun.23, 2023

PROFESSIONAL EXPERIENCE

Augmented Contact-aware Trowel-brick Manipulation via Imitation-Guided Policy
Advisor: Prof. Fei Liu, the University of Tennessee, Knoxville — Jun. - Aug. 2025

- Extracted spatial-temporal consistent 3D point clouds of trowel and bricks from human demonstration videos using CoTracker and Depth-Anything-2
- Performed trajectory extraction of workers' spreading mortar motion, and performed 3D scene reconstruction of major objects with PyVista
- Explored motion trajectory generation for spreading mortar actions using Linear Parameter-Varying Dynamical System and Probabilistic Movement Primitives
- Investigated geometry constraints within the reconstructed scene using basic constraint models to design motion policies

Precision Improvement System for Industrial Robot, Parameter Identification Algorithm
Advisor: Prof. Guifang Qiao, Nanjing Institute of Technology — Nov. 2023 - Jun. 2024
Won a ***third prize*** in the 2024 Jiangsu Instrumental and Control Society Undergraduate Completion (Thesis) Incentive Plan

- Built the forward kinematics model for Stabuli TX60 robot arm via MD-H parameterizations
- Conducted positioning experiments using the Leica AT960 laser tracker, and collected high-precision pose data for calibration
- Applied intelligent optimization algorithms, including Particle Swarm Optimization, Differential Evolution, and Neural Networks, for kinematic parameter identification & error compensation

Computer Vision and Self-driving Car Program
RA | Supervisor: Dr. Ian Deng, University of California, San Diego — Mar. - Sept. 2023

- Implemented various image operations and transformations, including rotation, mosaic, sampling, quantization, and shifting, and applied digital image processing techniques such as

2D convolution, spatial convolution, Gaussian kernels, and order-statistic filters
- Implemented practical image processing algorithms, including Canny Edge Detection, bilateral filtering, histogram equalization, and Adaptive Histogram Equalization
- Conducted image classification using TensorFlow on the CIFAR-100 dataset, evaluated performance metrics using confusion matrices and implemented KNN with Scikit-learn
- Trained and fine-tuned neural networks such as MLP and CNN for image classification tasks
- Designed and implemented semantic segmentation models using FCN8s with VGG16 as the backbone in TensorFlow, applying the model to a 12-class image segmentation dataset
- Developed DeepLab v3 model with ResNet-50 and Xception-65 as backbones, achieving 80.5% accuracy on the test dataset for a 12-class image segmentation task

Unmanned Robotic Control
RA | Advisor: Xuqiang Guo, Chinese Academy of Sciences Jun. - Sept. 2022
- Designed functional modules, and assembled a two-wheeled differential drive robot
- Completed the infrared sensor-based tracing in C language and Arduino IDE
- Implemented the PID control algorithms to control the trolley's speed during operation

SELECTED PROJECTS

Course Project for ESE6500 - Language-guided Indoor Robot Navigation Mar. - Apr. 2025
- Designed a framework integrating vision-language semantic mapping(VLMap) with LLM-based task planning to enable natural language instruction following for indoor robots
- Implemented a zero-shot object localization from RGB-D and LiDAR data, and generated collision-free trajectories via A* path planning
- Validated the system on an F1TENTH-scale autonomous vehicle, achieving structured multi-object pick-and-place tasks.

Course Project for ESE5460 - Semantic Segmentation Framework Nov. - Dec. 2024
- Developed a modular semantic segmentation framework supporting models like State-Space Models, SegFormers, and DeepLav v3+, capable of training, logging, visualization & inference
- Evaluated model performance on the BDD100k dataset for autonomous driving applications

MiniSpotify - An Android Music Player Nov. - Dec. 2024
- Designed a KotlinSpotify favorite app via Android Jetpack Library & Hilt Dependency Injection
- Implemented the BottomBar and App Navigation via the Jetpack Navigation component
- Created a mock RESTFUL Api JSON Server, and used Retrofit to handle requests
- Build the feed/album/favorite UI in Jetpack Compose following MVVM architecture
- Enabled the local cache ability for the favorite feature by using Room Database
- Integrated the Google Exoplayer to handle the global music playback

DeliciousChoices - A Spring Boot Based Online Food Ordering Web Application Aug. - Oct. 2024
- Developed CRUD REST APIs using Spring Controllers, encompassing functionalities such as registration, menu searching, ordering, and checkout
- Leveraged Spring Data JDBC and repositories to interface with a PostgreSQL database hosted on AWS RDS, handling data related to menus, restaurants, and more
- Implemented app authentication in Spring Security via session-based authentication mechanics
- Architected the project with a clear separation of concerns into controller, service, and repository layers, utilizing dependency injection for enhanced maintainability
- Constructed the frontend using React.js and Ant Design, providing users with the ability to seamlessly add items to their food cart and place orders
- Containerized the build and pushed the image to AWS ECR, successfully deployed it to AWS App Runner for streamlined scalability and accessibility

SKILLS

- **Programming Languages:** Java, Python, C++, JavaScript
- **Tools:** IntelliJ IDEA, Docker, AWS, Visual Studio Code, PyCharm, Anaconda, Colab, MATLAB, arm Keil5 MDK, Overleaf, Postman, Arduino
- **Frameworks:** PyTorch, TensorFlow, Spring Boot, React.js
- **Languages:** Chinese (Native), English (Professional Proficiency)