

# YEXIN ZHANG

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## EDUCATION

### University of Pennsylvania

Master of Science in Engineering, Artificial Intelligence and Robotics

Philadelphia, PA, United States

Sep 2023 - May 2025 (*Expected*)

### ShanghaiTech University

Bachelor of Engineering in Electrical and Information Engineering

Shanghai, China

Sep 2019 - Jun 2023

## EXPERIENCE

### AMNR Lab, ShanghaiTech University

Research Assistant

Shanghai, China

Jun 2021 - Jun 2023

#### - Acoustic Tweezer System Construction

- Built a 2500-channel phase-modulated square wave generator with FPGAs using Verilog.
- Developed a C++ Qt-based application, enhancing research efficiency by building user interface, creating functions for real-time image display and recording, task execution, and experiment data storage and visualization.
- Filtered out noise from the oscilloscope by designing a high-pass filter, improving the SNR by a factor of 11.5.
- Calibrated the micro camera with MATLAB, achieving average localization accuracy with only a 39 um error.

#### - Noncontact Particle Vision-Servo Manipulation on Water Surface

- Designed an adaptive end-effector for trapping irregular objects and conducted simulations using Python.
- Created a feature extraction algorithm for particle localization using OpenCV, achieving precision of sub-pixel.
- Realized automated trapping of PS particles and droplets through the implementation of an acceleration model.
- Implemented a closed-loop controller achieving precise position servo and orientation control with an error within 16 um and significantly reduced path planning error by 74.8%.
- Successfully achieved high-precision assembly of surface-mounted LEDs onto flexible circuit boards.

## P&G

Robotics Engineering Trainee

Remote

Apr - Jun 2023

- Implemented an object detection algorithm using Open3D and OpenCV, achieving a 97.5% accuracy in recognizing multiple boxes against complex backgrounds based on point clouds and grayscale images.
- Collaborated with a team to test the algorithm, improving overall object detection capabilities of the robot.

## PROJECTS

### Augmented Reality Application

Nov 2023

- Estimated the essential matrix from SIFT matching images, utilizing SVD method and RANSAC algorithm.
- Calculated camera poses and reconstructed 3D points using least square method, transformable into 3D models.
- Recovered users' camera pose by solving P3P and the Procrustes problem, and PnP with coplaner assumption.
- Implemented an AR application, allowing user to specify pixel position to place a virtual object in real world.

### Remote Control Car

Nov 2020

- Developed an STM32-based car with functionalities including gamepad control and automatic navigation.
- Integrated temperature and humidity sensors for real-time environmental data on a user-friendly LCD screen.
- Attained high navigation accuracy by meticulously testing and optimizing a PID controller-based system.

## COMPETITION

### 2021 Xilinx China Women in Technology Hackathon

Oct 2021

Runner-up and Best Innovation Award in China Region, Winner in Shanghai Division

- Develop a Python-based guide car for visually impaired using Xilinx PYNQ-Z2 FPGA development board.
- Implemented Joystick control, orientation guidance, obstacle avoidance, and trajectory tracking functions.

## TECHNICAL SKILLS

### Programming Languages

C/C++, Python, MATLAB, Java, HTML/CSS, JavaScript, Verilog, VHDL

### Other Skills

OpenCV, Qt, Open3D, Machine Learning, Git, Linux, Vivado, Keil, Proteus, PSIM, PNYQ, Lab Instruments, Digital Signal/Image Processing, 3D Geometry

## PUBLICATIONS

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- Y. Zhang et al., "Noncontact Particle Manipulation on Water Surface with Ultrasonic Phased Array System and Microscopic Vision," 2023 IEEE International Conference on Robotics and Automation (ICRA), London, United Kingdom, 2023, pp. 5459-5465, doi: 10.1109/ICRA48891.2023.10160724.
- Y. Zhang et al., "Ultrasonic Manipulation of Micro-object with Large Aspect Ratio by Multifocal Point Acoustic Tweezers" submitted under preparation to IEEE Transactions on Robotics.
- S. An, Y. Zhang et al., "Selective Non-contact Particle Manipulation with Ultrasonic Phased Transducer Array and Microscope", submitted to IEEE Transactions on Automation Science and Engineering.

*\*Supervised by Prof. [Song Liu](#) | [Advanced Micro-Nano Robot Lab](#) | [ShanghaiTech University](#)*