

# Yuxuan WU

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## Education Background

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**University of Michigan, Ann Arbor, United States of America** Sept 2023 – 2025

*Dual degree in Mechanical Engineering and Electrical and Computer Engineering* GPA: 4.00/4.00

- Relevant modules: Algorithmic Robotics, Machine Learning, Linear Systems Theory, Robot Kinematics and Dynamic, Robotic Systems Lab, Probability and Random Processes, Programming for Robotics, Mathematics for Robotics
- Labs and Projects: Arm Lab and Bot Lab in ROB550, Anytime Nonparametric A\*, Video-to-Video Summary Machine Learning Method

**University of Nottingham, Nottingham, United Kingdom**

Sept 2021 – June 2023

*Bachelor of Engineering (Hons) Aerospace Engineering*

GPA: 3.86/4.00

- Relevant modules: Dynamics and Flight Mechanics, Airframe and Materials, Aerospace Propulsion, Control of Aerospace Systems, Aerospace Design and Manufacture, Professional Engineering and Project
- Dissertation Topic: Aerodynamic analysis of a propeller

**University of Nottingham Ningbo China**

Sept 2019 – June 2021

*Bachelor of Engineering (Hons) Aerospace Engineering*

- Relevant modules: Aerospace Statics and Dynamics, Aircraft Design and Performance, Aerospace Electrical and Electronical Engineering, Aerospace Design and Materials

## Experience

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### YAVST: Yet Another Video Summarization Tool

*Overview: Developed YAVST, an innovative tool designed to automatically summarize long videos into concise, TikTok-style short clips by selecting the most impactful segments, addressing the growing demand for short-form content.*

- Video Summarization: Engineered an process to trim lengthy videos into short, engaging clips by identifying and selecting the most meaningful segments.
- Technological Integration: Combined traditional 2D CNNs for video frame feature extraction with transformer architectures to effectively understand and process temporal information.
- Performance Achievement: YAVST demonstrated strong performance, achieving an F1 score of 0.783 on the SumMe dataset, reflecting its effectiveness in video summarization tasks.

### Robotic Vision and Manipulation System for Autonomous Object Handling

*Overview: Developed an advanced robotic system integrating computer vision and robotic manipulation to autonomously recognize, pick up, and stack cubes of varying sizes, shapes, and colors.*

- Camera Calibration: Accurately determined the internal and external matrices of a depth camera, and applied corrections to enhance model accuracy for precise object recognition and manipulation.
- Computer Vision Algorithm Development: Leveraged OpenCV to design and implement algorithms capable of identifying cube attributes such as size, shape, and color, ensuring reliable and consistent object detection.

- Inverse Kinematics (IK) Implementation: Developed a custom IK function tailored to the robot arm's specifications, enabling precise control of arm movements for task execution.
- Task Automation: Wrote comprehensive functions to automate the robot arm's tasks, including object recognition, picking, and stacking, resulting in a fully autonomous system.

### **Autonomous Maze Navigation and Warehouse Management Robot (Mbot)**

*Overview: Engineered a versatile robot capable of autonomously exploring maps, navigating mazes with optimal pathfinding, and performing basic warehouse management tasks using a custom-designed forklift system.*

- PID Motor Control: Developed and implemented a PID control system to regulate Mbot's motor movement, ensuring precise navigation based on an open-loop trajectory.
- Environmental Mapping & SLAM: Utilized LIDAR sensors to map the environment, define boundaries, and implemented SLAM (Simultaneous Localization and Mapping) for real-time positioning and navigation.
- Path Planning: Integrated the A-star algorithm to optimize path planning, enabling Mbot to navigate through mazes using the shortest path.
- Forklift System Design: Designed and 3D printed a functional forklift attachment, enabling Mbot to lift and move blocks, thereby introducing basic warehouse management capabilities.
- Task Automation: Wrote comprehensive task function code to automate Mbot's operations, including mapping, navigation, and object manipulation.

### **Reproduction and Evaluation of Anytime Nonparametric A\* Algorithm\***

*Overview: Reproduced the Anytime Nonparametric A\* (ANA\*) algorithm, designed specific robotic application scenarios, and conducted a performance comparison with other path planning algorithms.*

### **Remote Undergraduate Research Intern, Carnegie Mellon University      July 2022 – Sept 2022**

*Project: Model-Free Safety Control for Reinforcement Learning (RL) in a Clustered Dynamic Environment (Supervisor: Prof. Changliu LIU)*

- Extend the Vanilla AdamBA algorithm to modify RL nominal controls in a clustered dynamic environment and successfully demonstrated better performance in terms of collision avoidance of the modified Vanilla AdamBA than other safe RL methods.

### **Undergraduate Research Intern, University of Nottingham Ningbo China July 2021 – Sept 2021**

- Programmed FPGAs to control a 6-axis manipulator for object recognition and capture.
- Used OpenCV for image processing to obtain coordinates of the target object.
- Calculated pulse and sent signal to motors via FPGAs to control the end-effector of the manipulator.
- Designed and improved parts of the manipulator using SolidWorks.

### **Skills & Interests**

*Technical:* Proficient with CATIA, 3DExperience, JavaFoil, SolidWorks, GasTurb 11, Abaqus, ANSYS, Mathematica, Jupyter, Git, LaTeX, Python, C, C++ and MATLAB.

*Language:* Native in Mandarin and Fluent in English.

*Interests:* Rock Climbing, mountaineering, and long-distance racing.