Yuxuan WU

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Education Background

University of Michigan, Ann Arbor, United States of America Sept 2023 – 2025
Dual degree in Mechanical Engineering and Electrical and Computer Engineering   GPA: 3.75/4.00
- 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, Large Language Model, Self-Driving Car
- Labs and Projects: Arm Lab and Bot Lab in ROB550, Anytime Nonparametric A*, Video-to-Video Summary Machine Learning Method, A Watermark for Large Language Models, End to End Learning for Self Driving Cars

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

Reproduction and Evaluation of A Watermark for Large Language Models

Overview: The watermarking algorithm from Kirchenbauer et al. was replicated and extended, embedding human-invisible but machine-detectable patterns in LLM-generated text.
- Robust performance was observed across English, Spanish, Chinese, and programming code, preserving detection accuracy with minimal quality loss.
- An adaptive δ mechanism was introduced to improve both perplexity and detection by adjusting bias based on token entropy and vocabulary size.

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.

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.