

# KE LIU

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Interests: *Full-stack, Deep learning and AI, NLP, Perception, Embedded control systems*

## EDUCATION

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### University of Michigan, Ann Arbor

**Bachelor of Science in Computer Science (Major) | Mathematics (Minor) | GPA: 3.75/4.0** Jan. 2020 – Apr. 2022

- Data Structures & Algorithms, Computer Organization, Computer Science Foundations, Web System Operating System, Machine Learning, Computer Vision, Intro to Algorithmic Robotics, Mobile App Development

**Master of Science in Robotics Engineering | GPA: 4.0/4.0**

Aug. 2022 – Apr. 2024

- Natural Language Processing, Mobile Robotics, Embedded Control Systems, Database Management Systems, Parallel Computing, Self-Driving Cars

## SKILLS

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- **Programming:** C++/C, Python, MATLAB, Simulink, Java, JavaScript, HTML, CSS, SQL
- **Tools and Frameworks:** AWS, Linux, ROS, Git, Flask, React, Django, Sqlite3, SwiftUI, PyTorch, Numpy, Pandas

## WORK EXPERIENCE

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### Honda Research Institute

Ann Arbor, MI | August. 2023 – Current

**Student Researcher, UAV Multi-Agent Control Group | Python, ROS**

- Establish communication between UGV and UAV by designing **ROS** architecture and use it to publish waypoints and GPS data for simulation. Implement waypoint navigation using odometry data and collision and avoidance algorithm for UAV.

### W.W. Grainger, Inc.

Chicago, IL | June. 2023 – August. 2023

**Software Engineer Intern, Grainger Insights Team | Typescript, React, Agile**

- Maintain Grainger website for providing all customers and sellers with analytics, reporting and actionable insights. Using **Agile** methodology, working with **Jira** and **Confluence** tools.
- Develop front-end view of React table, display product categories, history, locations in real time, using **Typescript**, **Next.js**, and **React**. Help construct the class component using Union type and Intersection type.
- Develop REST API and create **Backend-For-Frontend** endpoint for user purchase summaries using Spring Boot.

### Assistive Vision for Kellogg Eye Center

Ann Arbor, MI | Jan. 2021 – Nov. 2021

**Research Assistant, Mechanical Engineering Department | MATLAB, Python, OpenCV**

- Completed a **MATLAB** computer vision program individually for tracking the position (3DOF: X, Y and Z) of a surgical instrument that applied to surgical operation such as MIS (Minimally Invasive Surgery).
- Implemented **camera calibration** using **AprilTag** fiducial system in **Python** and with **OpenCV** to adjust the intrinsic and extrinsic matrices for calculating world configuration space.

## PROJECT EXPERIENCE

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**FETCH Tour Guide Research Project, Curly Lab | Python, NLP**

2023 Fall

- Design navigation system in FETCH robots as a tour guide for college art museum UMMA. Research and implement Large Language Model to achieve spatial **Task Learning** for Robot in **Visual Language Maps**.
- Collaborate with team member in designing multi-robot navigation algorithm using topological graph based on the **PCR**(Provider-Client-Robot) framework.

**Adaptive Cruise Control Project | C, Simulink, CAN**

2023 Winter

- Modeled a vehicle using **MATLAB Simulink**, and designed an **Adaptive Cruise Control** (ACC) system using **C** language.
- Build the vehicle model subsystem using NXP toolkits to incorporate **GPIO**, **PWM signals**, **QD**, **ADC** to enable the potentiometer, **motor control**, dipswitch functionality and haptic wheel. Designed **feedback system**, **PID control**.
- Set up **CAN**(Control Area Network) and implement ACC subsystem by setting up position and velocity control. Implement **automatic steering** using Pick Lead Logic.

**Network File Systems | C++**

2022 Winter

- Designed a multi-threaded network file server that client could interact via network messages. Implemented CRUD operations and designed routines to ensure crash consistency. Write **Unit Testing** and **Stress Testing** for validation.
- Used **Sockets** programming to implement parsing and validating requests and sending responses.
- Implemented **Hand-over-hand Locking** for multithreads.

**Object Detection and Classification Project | Python**

2021 Winter

- Explored supervised deep learning techniques for image data, designing **CNNs** to classify a dataset of 12,775 dog images by breeds. Used **Numpy**, **PyTorch** for data processing and training neural networks models.
- Utilized **transfer learning** and **data augmentation** to improve the performance on the test set (training and testing accuracy rate & **AUROC** score). Use confusion matrix to visualize the prediction accuracy.