Shiwei Liu

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EDUCATION

Nankai University, China   Sep. 2020- Jul. 2024

Bachelor of Engineering in Intelligent Science and Technology

- Average Score: 88.05/100; GPA: 3.62/4.0

PUBLICATION

"Research on ORB-SLAM in the Domain of Autonomous Vehicles", *ISSN: 0094-243X*, 2023 International Conference on Mechatronic Automation and Electrical Engineering

RESEARCH EXPERIENCE

On-site Research Program on Foundations of Robot Autonomy   Jul. 2023- Aug. 2023

Supervisor: Nader Sadegh, Associate Professor of Georgia Institute of Technology

- Built a common indoor environment using ROS and Gazebo, including the configuration of the drone's kinematics, dynamics models, and controllers
- Implemented an RGB-D camera-based ORB-SLAM localization task through C++ and Python coding
- Initiated environment setup, conducted simulations, and replicated the ORB-SLAM code

Intelligent Speech-Input Guiding System Based on Visual Recognition and Electrical Feedback

Leader of a team of 4   Apr. 2021- Jun 2024

Supervisor: Wang Fuyong, Associate Professor of Nankai University

- **Aim**: develop a speech input intelligent blind guidance system incorporating graphic recognition and electrical stimulation feedback to assist blind users to perceive the outside world and reach the destination safely
- Led obstacle recognition software development and embedded system hardware integration
- Overcame the limitation of project funds by using intrinsic camera parameters to estimate distances to recognized obstacle
- **Skills Used**: Python, Raspberry Pi, various cameras, STM32 development board, infrared distance sensors, magnetic acceleration sensors

Intrinsic Binary Nonlinear Regression for Lakebed Profiling   Nov. 2022- Jan. 2023

Sole Developer

Supervisor: Ni Yuanhua, Associate Professor of Nankai University

- Conducted model training by implementing a convolutional neural network in PyTorch, utilizing the architectural design of AlexNet, and optimizing the network's performance through the Adam gradient descent algorithm
- Successfully trained a model for classifying terrain images with high-frequency noise and similar local features, achieving an accuracy rate exceeding 92%
- **Skills Used**: PyTorch, AlexNet

Jackal Robot Terrain Recognition based on Single-GPU AlexNet   Nov. 2022- Jan 2023

Supervisor: Song Rui, Assistant Professor of Nankai University

- Designed a program to classify the terrain type for a ground-based robot, Jackal, based on images captured by its camera
- **Skills Used**: PyTorch, AlexNet, machine learning, deep learning

Panoramic Image Stitching and Object Detection   May. 2022- Jun. 2022

Group Leader

Supervisor: Sun Yue, Sun Mingzhu & Liu Xiaofang, Professor of Nankai University

- Conducted cylindrical image transformation to prepare the images for subsequent SIFT feature point detection
- Employed various algorithms, including KD-tree construction, K-nearest neighbors (KNN) classification, and Fast Approximate Nearest Neighbors (FLANN) matching, to perform matching of SIFT feature points between two images
- Utilized TensorFlow tools for model loading and employed the Selective Search algorithm for the iterative selection of candidate regions of interest
- Developed algorithms for panoramic image stitching with minimal artifacts and overlap and implemented object detection within the stitched images to identify and classify objects

- **Skills Used**: Python, OpenCV, Tensorflow, SIFT feature detection, FLANN matching, RANSAC, InceptionResNetV2

INTERNSHIP EXPERIENCE

Institute of Computing Technology, Chinese Academy of Sciences   Aug. 2023- Feb. 2024
- Conducted literature review and experimental replication work on cutting-edge papers related to Vision Navigation, such as visualizing the navigation results from "Hierarchical Object-to-Zone Graph for Object Navigation" using the AI2THOR simulator
- Explored the environment to build semantic maps related to object categories and using the FMM algorithm to plan paths for navigation to specified objects

Chongqing Hongbao Technology Co., Ltd   Jul. 2022- Aug. 2022
- Participated in the determination of the technical roadmap for the development of our HB FEI MU IoT Intelligent Gateway product
- Contributed to the visual processing module of the product by building convolutional neural networks using Pytorch and training them with a large dataset to identify corrosion areas in gas transportation pipelines
- Assisted with on-site installation of the product

COMPETITION EXPERIENCE

2022 Mathematical Contest in Modelling   Feb. 2022
- **Aim**: address a complex problem related to the feasibility of asteroid mining and its potential impact on global equity
- Developed a model to quantitatively assess "global fairness" by considering various indicators related to a country's comprehensive strength, such as per capita GDP, foreign exchange reserves, mineral wealth, successful rocket launches, and gold reserves
- Implemented mathematical reasoning, developed and debugged machine learning algorithms, and prepared the research paper
- Received the **Meritorious Winner** award

EXTRACURRICULAR EXPERIENCE

Badminton Association, Nankai University   Sep. 2020- Feb. 2023
Assistant to the President and Match Official
- Managed association communication groups and assisted the president in organizing regular intercollegiate matches
- Scheduled and arranged match fixtures and opponent information
- Served as a match official in the University Badminton Championship and Freshman Cup tournaments
- Achieved third place in the 2020 Nankai University Badminton "Freshman Cup" competition

Sports Department of Student Union, Nankai University   Sep. 2020- Jun 2021
Member
- Organized and officiated in sports competitions within the school, including scheduling and setting up match venues
- Wrote match reports and published them on the school's public platforms and news websites

Dragon Boat Association   Oct. 2020- Dec. 2021
Paddler and Boat Captain
- Led the team to achieve the 2nd place in the men's 500-meter dragon boat racing event at the 8th Citizen Sports Games

SKILLS

Programming: C++ (advanced), Python (advanced), C# (proficient)

Data Processing: MATLAB (advanced), SPSS (advanced)

Robotics and Simulation： ROS (advanced)