

Guanlin (Frank) WU

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EDUCATION

Chinese University of Hong Kong, Shenzhen	2020.09 - Current
<ul style="list-style-type: none">• Computer Science and Engineering• MGPA: 3.470/4.0• Core Courses: <i>Data Structure, Computer Architecture, Operating System, Software Engineering, Parallel Computing, Design and Analysis of Algorithm, Optimization, Stochastic Process, Reinforcement Learning</i>	<i>Shenzhen, China</i>
UC Berkeley	2018.06-2018.08
Academic Talent Development Program	<i>Berkeley, CA</i>

AWARD/HONORS

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- School of Data Science **Dean's List** in **2022-2023**

PUBLICATIONS

*: Corresponding Author

Guanlin Wu, Zhuokai Zhao, Yutao He*. "Reinforcement Learning Enabled 2D-LiDAR Autonomous System for Parsimonious UAVs." In Submission, *IEEE International Conference on Robotics and Automation (ICRA)* 2024. Available at [\[link\]](#).

Lifeng Guo*, Changhong Lu, and **Guanlin Wu**. "Approximation algorithms for a virtual machine allocation problem with finite types." *Information Processing Letters* 180 (2023): 106339. (SJR Q3). Available at [\[link\]](#).

Zeyi Jiang, Xuqing Liu, Mike Ma, **Guanlin Wu**, and Jay A. Farrell*. "LiDAR-Based Hatch Localization." *Remote Sensing* 14, no. 20 (2022): 5069. (JCR Q1, SCI Q2). Available at [\[link\]](#).

RESEARCH/WORKING EXPERIENCE

Chinese University of Hong Kong, Shenzhen/Attention with Inverse RL to Solve DTSP	2023.11 – Current
<i>Research Assistant advised by Prof. Guiliang Liu</i>	<i>Shenzhen, China</i>
<ul style="list-style-type: none">• Aim to apply Inverse Reinforcement Learning (RL) to develop a reward function, trained using expert data, that effectively solves the Dynamic Travelling Salesman Problem (DTSP) while incorporating obstacle avoidance.• Once the reward function is trained, we will employ an attention model integrated with RL for policy training.• We will conduct a case study using trained policy to simulate food delivery scenarios with Unmanned Aerial Vehicles (UAV).	
University of California, Los Angeles/UAV Motion Planning with Obstacle Motion Prediction	2023.10 – Current
<i>Research Assistant advised by Prof. Yutao He</i>	<i>Online</i>
<ul style="list-style-type: none">• Rather than using 2D-LiDAR, we aim to implement a motion prediction algorithm for moving obstacles based on RGB-Depth Camera. Transformer, integrated with RL, will be used to achieve a precise motion prediction.• With motion prediction algorithm, a path search algorithm based on transformer will be designed to guide the UAV flying through the moving obstacles.• Training process will be based on RELAX framework, which we have previously proposed.	
University of California, Los Angeles/UAV Path Planning and Dynamic Obstacle Avoidance	2023.06 – 2023.09
<i>Research Assistant advised by Prof. Yutao He</i>	<i>Online</i>
<ul style="list-style-type: none">• Designed a new UAV system based on 2D-LiDAR that included the Map Construction (based on Hector SLAM), the Path Planner (using RRT), and the Dynamic Obstacle Handler (using D3QN).• Developed algorithms for LiDAR detection (with noise decreasing and motion trajectory) and Reset in RL training.• Implemented a new training strategy for the RL model, where Dynamic Obstacle Handler was directly trained in the ROS-Gazebo-PX4 simulator with the UAV model "iris_rplidar."	
SENIOR/AGV Resource Pool	2023.02 – 2023.06
<i>JAVA Engineer</i>	<i>Beijing, China</i>
<ul style="list-style-type: none">• Implemented several technical approaches to implement the AGV Resource Pool, including the KM Matching algorithm, Dijkstra with time window, and Dynamic Merging.• Developed a simulator based on OpenTCS for performance testing with various possible algorithms.	
East China Normal University/Virtual Machine Allocation	2022.05 – 2022.11
<i>Research Assistant advised by Prof. Changhong Lu</i>	<i>Shanghai, China</i>

- Improved Best Fit Algorithm slightly for specific type of DVBP problem by using an innovative way of constructing the Balanced Binary Tree.
- Managed to use Approximation algorithm to prove the ratio between modified Best Fit Algorithm and Optimal solution.
- Found the Virtual Machine data about their type from VMAgent and HUAWEI.

Tianjin Port/LiDAR-Based Hatch Localization

2021.07 – 2022.04

Data Analyst

Tianjin, China

- Used laser to collect information about shipment and stockpile and simultaneously created a 3D model using Point Cloud.
- Applied Point Cloud and MATLAB to complete the rasterization process, one of the three stages of accomplishing the hatch localization
- After scanning a reference hatch with size 23.55*15.35m using LiDAR, the hatch localization algorithm was able to measure the hatch accurately with the same dimensions, satisfying the anti-collision requirement of error margins less than 0.5 meters.

COURSE PROJECTS

Operating System Course Projects

2022.09 – 2022.12

Independent Projects

CUHK(SZ)

- Learned about Kernel and loading a module into the Kernel. Created a kernel thread and forked a process to execute the test program.
- Used multithread programming to accomplish a game called “Frog crosses river” and implemented a thread pool.
- Developed a virtual memory simulation on GPU using CUDA programming, where physical and secondary memory were implemented by shared and global memories, respectively. Implemented memory replacement policy, virtual-to-physical address mapping, and paging system with swapping.
- Developed a file system management simulation on GPU memory using CUDA Programming. Implemented a logical file system to manage metadata, free-space manager, and a File Control Block (FCB) to store file information.

Design and Analysis of Algorithm Course Project: Pandemic Control Algorithm

2022.09 – 2022.12

Group Leader

CUHK(SZ)

- Implemented both the subtree-heavy algorithm and degree-heavy algorithm and conclude that subtree heavy performs 25% better than the other on average.
- Used Approximation algorithm to prove the ratio between Subtree-heavy Algorithm and Optimal solution.

Database System Course Project: E-commerce Web Shopping Platform

2022.02 – 2022.05

Group Leader

CUHK(SZ)

- Utilized Java, Vue, Maven, and MySQL through the project. Implemented the CRUD operations through front-end with corresponding changes to back-end.
- Cultivated leadership and the ability of distributing tasks to members of the group.

Computer Architecture Course Projects

2022.01 – 2022.05

Independent Projects

CUHK(SZ)

- Developed a C++ MIPS Instruction Set translator that converts instructions to machine code. It performs two scans of the input file to generate a label table and a vector of instruction lines, then outputs the translated machine code.
- Implemented a C++ simulator for the memory and register of the computer when running a MIPS asm file. This simulator displayed the changes in the Stack segment, Data segment (Dynamic data & Static data), and Text segment while running a MIPS code.
- Implemented an Arithmetic and Logic Unit (ALU) by using Verilog. This program implemented a simple CPU that supported basic instruction parsing, register value fetching, and ALU functions such as add, addi, etc.
- Developed a 5-stage pipelined CPU using Verilog, optimizing a program that previously required five clock cycles per instruction. The stages include reading instructions from memory, decoding the MIPS instruction into components, executing arithmetic and logical operations in the ALU, data memory access for fetch/store operations, and writing back to registers.

Others

- **Language:** English (Fluent; TOEFL 108; GRE 326+4), Chinese (Native)
- **Computer skills:**
 - **Programming Languages:** C, C++, Java, Python, MySQL, MATLAB, Verilog
 - **Frameworks:** PyTorch, CUDA, SpringBoot, Vue
 - **Simulation Platforms and Packages:** ROS, Gazebo, PX4, Rviz, Gmapping, QGroundControl, PointCloud, OpenTCS
 - **Toolchains:** Visual Studio Code, IntelliJ IDEA, PyCharm, CLion, Wenstorm, MATLAB, Conda, Git, LaTeX, Markdown
- **Interests:** Philosophy, RAP, Work out, Basketball