Zichao Hu

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Research Interest

- Multi-robot systems
- Robot learning, machine perception, tracking, and planning
- Human-robot interaction

Education

University of Virginia(UVA)   **Charlottesville, VA**

B.S. Computer Engineering, GPA: 3.96, Major GPA: 4.0   *Expected Graduation: May, 2022*

Publication

- Hanzhi Zhou*, **Zichao Hu***, Sihang Liu, and Samira Khan, "Efficient Graph SLAM For Sparse Sensing, " in *IEEE International Conference on Robotics and Automation (ICRA)(under review)*, 2022. (*The authors contributed equally)

Research Experience

Efficient Graph SLAM For Sparse Sensing   *January 2021 - October 2021*

🌐 https://www.zichaohu.com/documents/icra2022.pdf

- Led a project to solve the SLAM problems for resource limited nano robots that had one to two magnitudes less input information than a typical robot with a LiDAR or a camera
- Formulated a novel graph frontend to achieve local consistent pose estimations
- Implemented line feature extraction using split and merge method with hierarchical clustering
- Adapted the Cartographer's implementations of the real-time correlative scan matching algorithm to perform loop closure and proposed an approximate matching heuristic to reject false positive results
- Evaluated the system on the established Radish Dataset and self-collected dataset. The system achieved better visual quality than the previous state-of-the-art

Secure Multiparty Computation (MPC) Cryptography   *January 2020 - August 2021*

- Studied secure MPC protocols based on replicated secret sharing and Beaver Triple
- Studied post-quantum techniques such as learning with error (LWE) and learning parity with noise (LPN)
- Studied efficient pseudorandom correlation generator based upon LPN-assumption and bilinear function
- Investigated constructing a distributed point functions (DPF) with LWE to extend to a multi-party setting

Dynamic Computation Offloading for Nanodrone Swarms   *October 2021 - Present*

- The goal is to design a distributive scheduler system in order to balance the computation among drones and the server, and achieve better power and computation utilization efficiency
- Benchmarking the OMPL, Darknet, KCF, ORBSLAM2 workloads to setup the problem scope
- Building above workloads on raspberry pi 4 microprocessor to profile the performances

Work Experience

Scanoptix Inc., Fullstack Web Developer Intern   *October 2019 - August 2020*

- Developed the Scanoptix's medical imaging web app with Angular 9, AWS S3/Lambdas, and GraphQL
- Implemented a image processing pipeline to achieve zooming, rotating, cropping, tuning and filtering noises functionalities
- Set up a dockerized localstack and used Postman API to emulate the AWS workflow
- Used OAuth 2.0 as the protocol to perform authentication and authorization

Projects

Plannable.org 🌐 https://plannable.org/   *March 2019 - December 2019*

- Co-founded a free class scheduling website that has served over 2000 students
- Developed the website with modern technology such as Vue.js, Typescript.js, WebAssembly, and CSS Grid
- Conducted market research through various pitches, on/offline surveys, and analysis of the exisiting solutions

OpenStatics 🌐 https://openstatics.github.io/   *September 2019 - September 2020*

- Involved in developing instructional modules for the UVa MAE 2300/2310 courses to accelerate student comprehension through clean UI designs and intuitive user-controlled animations
- Utilized the JSXGraph library for the 2D/3D equation visualizations and animations
- Set up devops toolchains to enable effective collaborations among contributors

Skills

- Prolificient in **Python**, **C++**, Familiar with **Matlab**, **Window WSL**, **Linux**
- Experience with **ROS**, **G2O**, **NI Multisim**, **TI's MSP microcontroller**, **Solidworks**, **AWS**, **Javascript Frontend Frameworks**, **Express.js**
- Fluent in **English**, **Chinese**, Upper-intermediate in **Spanish**

AWARDS AND ACHIEVEMENTS

- Best Beginner Hacks at HooHacks UVa, **March 2019**
- ICPC Regional Qualifier Ranking Top 20%, **October, 2019**