Zichao Hu

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Research Interest

- Swarm robots, multi-robot systems
- Machine perception and tracking, navigation and planning, reinforcement learning
- Locomotion, exoskeleton, bio-inspired robotics

Education

University of Virginia(UVA) **Charlottesville, VA**
B.S. Computer Engineering, GPA: 3.95, 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.*

Research Experience

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

- Formulated a novel graph frontend using both raw odometry measurements and observation measurements to tackle the problem of data sparsity and correct robot pose trajectories
- 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 the proposed system, and extended with a approximate matching heuristic to address the sparse sensing problem
- Performed experiments on the established Radish Dataset and evaluated metrics to compare with previous works

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

- Studied secure MPC protocols based on replicated secret sharing and Beaver Triple
- Studied efficient pseudorandom correlation generator based upon LPN-assumption and bilinear function
- Performed crytanalysis on the distributed point functions (DPF) using information-theoretic security and reduction to private information retrieval (PIR)

Dynamic Computation Offloading for Nanodrone Swarms *September 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.
- Currently finding workloads and benchmarks to set up the problem scope
- Test running and profiling SLAM, path planning, object detection algorithms on raspberry pi 4 microprocessor

Work Experience

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

- Developed the Scanoptix's medical imaging Website with Angular 9, AWS S3/Lambdas, and GraphQL
- Implemented a image processing pipeline to achieve zooming, rotating, cropping, tuning functionalities and filter out noises using gamma correction
- 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
- Built the website with Vue.js, Typescript.js, and Webassembly
- Conducted market research through various pitches, on/offline surveys, and analysis of the exisiting solutions

Signature Replication Machine Capstone *September 2021 - December 2021 (**expected**)*

- Programmed the TI's MSP432 microcontroller to control motors drivers and switch sensors
- Designed PCB schematic using Multisim and Ultiboard, and cutomized a boosterpack to interface with the MSP432
- Processed image using OpenCV such as denoising and line thinning and converted into voltage outputs

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 at 36/160, **October, 2019**