# Hanlan Yang

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## EDUCATION

**Carnegie Mellon University** Pittsburgh, PA, USA
*Carnegie Institute of Technology, M.S. in Electrical and Computer Engineering* *Aug. 2021 - May 2023*
- **GPA: 3.79/4.00 TOEFL: 108 (S: 25) GRE: 320 (AWA: 3.5)**

**University of Pittsburgh** Pittsburgh, PA, USA
*Swanson School of Engineering, B.S. in Computer Engineering* *Aug. 2017 - May 2021*
- **GPA: 3.85/4.00** Degree Honor: Summa Cum Laude

## RESEARCH INTERESTS

Motion Planning/Decision Making/Industrial Application (mainly manufacturing) in Robotics, AI, ML

## PUBLICATIONS

- **Hanlan Yang**, Shohin Mukherjee, Maxim Likhachev, "*A-ePA*SE: Anytime Edge-Based Parallel A* for Slow Evaluations,"* Proceedings of the International Symposium on Combinatorial Search (SoCS), 2023. (Article link)
- Ramkumar Natarajan*, **Hanlan Yang***, Qintong Xie, Yash Oza, Manash Pratim Das, Fahad Islam, Muhammad Suhail Saleem, Howie Choset, Maxim Likhachev, *"Preprocessing-based Kinodynamic Motion Planning Framework for Intercepting Projectiles using a Robot Manipulator,"* International Conference on Robotics and Automation (ICRA), 2024. (Article link,* indicates equal contribution)

## RESEARCH EXPERIENCE

✧ **Search-based Planning Lab of Carnegie Mellon University** Sept. 2022 - Present
Research Assistant, Advisor: Maxim Likhachev, Mentor: Shohin Mukherjee

**Leveraging Parallel Heuristic Search in Deep-Reinforcement Learning** May 2024 - Present
- Utilize the parallel search algorithm edge-based A* with Slow Evaluation (ePA*SE) to improve the inference efficiency for the actor-critic policies in robotic manipulation domains.
- Research how to learn a critic network using RL and integrate it into heuristic search in robotic domains where good heuristic functions are absent (e.g., manipulation/planning with contact).
- Evaluate the performance of the algorithm, and the initial results showed a significant success rate increase from the baseline in generating a collision-free trajectory in a book shelve environment.

**Shield-based Protection Project** Sept. 2022 - July 2024
- Implemented a preprocessing-based planning framework with dome discretization to allow extremely real-time (under 20ms) online kinodynamic motion planning query for a projectile interception task.
- Designed and engineered a perception module using an RGB-D stereo camera to steadily estimate the trajectory of a baseball-sized projectile thrown from 8m away.
- Demonstrated on an ABB 6-DoF arm and a ZED 2i stereo camera with 80% of the blocking rate.

**Batch Parallelization Search Planner** Aug. 2023 - May 2024
- Researched to integrate the state-of-the-art GPU parallelization techniques in motion planning with a search-based planning algorithm, which chooses a batch of best states/edges to expand/evaluate.

**Anytime ePA*SE** Jan. 2023 - May 2023
- Improved a parallel search planning algorithm, ePA*SE, with anytime property so that A-ePA*SE will continue to improve solution quality efficiently with the remaining planning time.
- Evaluated A-ePA*SE with the 8-connected 2D navigation domain and showed it has a 300% speedup compared to the serial counterpart.

✧ **Nanofab Lab of Carnegie Mellon University, ANSYS** Jan. 2022 - May 2022
Research Assistant, Advisor: Gianluca Piazza, James Bain

- Constructed a GaAs-AlGaAs Electro-optic phase modulator model in the ANSYS Lumerical simulator.
- Set up a software pipeline to automate the optimization process to find the optimal geometric parameters of the phase modulator for fabrication in a real-world laboratory.
- Showcased visual results from the optimization sweep in the simulation, which optimized the geometric parameters of the phase modulator against two metrics – loss and $V_{\pi}$*L.

✧ **Photonics Lab of the University of Pittsburgh** Jan. 2020 - May 2020
Undergrad Research Assistant, Advisor: Nathan Youngblood

- Researched the robustness of convolutional neural network models on digit recognition under different levels of Gaussian noise. The study aims to find the optimal design for photonic tensors with limited precision.

## INTERNSHIP

**Arista Networks** Nashua, NH
*Position: Software Engineer Intern* May 2022 - Aug. 2022

- Implemented and tested four major components of a new debug framework, improving the efficiency of specific debug commands by 60%, which was eventually deployed to the main trunk of the Entrepreneurial Operating System that was released to the market.

## SKILLS

- Programming Languages: C/C++, Python, Java
- Software: Linux, ROS, Stable baseline 3, Torch, MATLAB, Android Studio, Altium, PSpice
- Hardware Platforms: Willow Garage PR2, ABB IRB-1600, ZED 2i Camera

## OTHERS

- Languages: Chinese (Native Speaker), English (Professional)
- USA Permanent Resident Status