

# Makarios Chung

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## EDUCATION

### University of Pennsylvania, School of Engineering and Applied Science

Candidate for Master's of Science in Engineering (MSE), Robotics – GPA: 4.00

May 2021

Bachelor of Science in Engineering (BSE) *Cum Laude*, Computer Science – GPA: 3.56

May 2020

**Relevant Skills:** C++, Python, Javascript, MATLAB, Algorithms and Data Structures, ROS, Git, Machine Learning, Systems Administration, Controls Engineering, (Trajectory) Optimization, Model Predictive Control, Linear Systems

## WORK EXPERIENCE

### Software Quality Engineer – Apple

April 2022 – Present

- Parallelized **Jenkins** compilation and testing pipelines, resulting in a threefold increase in throughput.
- Optimized local maintenance methods, reducing lab upgrade times from days to hours.
- Developed new features for internal websites using, among other technologies, Next.js and Three.js.

### Research Assistant – C3 Robotics Laboratory

July 2021 – April 2022

- Performed Literature Review on the current state of the art in SLAM Research
- Researched SLAM solutions for low-cost Augmented Reality glasses
- Used ROS packages to develop trajectory planner for tank-cleaning robot

### Intern – Systems & Technology Research, Cyber-Physical Systems Division

Summer 2020

- Developed and maintained a proprietary Discrete Event Simulation (DES) written in **Python**.
- Designed a system to auto-generate Hybrid Automata, and a wrapper to interface generated code with DES.
- Developed System-In-The-Loop (SITL) simulation to interface a Gazebo Simulation with the PX4 Control Stack.

### Research Assistant – Dynamic Autonomy and Intelligent Robotics (DAIR) Lab

June 2018 – August 2019

- Implemented a Linear Velocity Controller in **C++** with **Drake** for a **Kuka iiwa** robotic arm.
- Wrote **C++** code to perform System Identification on Cassie Robot utilizing **Drake** to model robot dynamics.

### Research Assistant – UPennalizers Robotic Soccer Team

June 2019 – August 2019

- Configured networking and calibrated localization on Nao V5 robots running **Gentoo** before games.
- Designed and implemented more efficient get-up strategies for robots in **Lua**.

## COMPUTER SCIENCE / ROBOTICS

### Graphics – CIS 560

Spring 2021

- Implemented various 3D graphics techniques, such as Rasterization, Anti-Aliasing, and GLSL Shaders
- Lead group final project, implementing a “Mini Minecraft” from scratch using the Qt C++ library.
- Implemented multithreaded terrain generation, allowing for smooth and seamless gameplay.

### Learning in Robotics – ESE 650

Spring 2021

- Implemented an Unscented Kalman Filter to estimate pose of quadcopter from noisy gyroscope and IMU data.
- Developed a Simultaneous Localization and Mapping (SLAM) algorithm with a Particle Filter backend.
- Implemented AlphaGo reinforcement learning algorithm for learning to play Chess from scratch in **Python**.

### Advanced Robotics – MEAM 620

Spring 2021

- Developed and tuned geometric controller for stabilizing and controlling quadrotor in **Python**.
- Implemented A\* pathfinding algorithms for quadrotor room navigation.
- Implemented trajectory optimization and geometric controller for cluttered environment navigation.

### Hybridized Model Predictive Control for Vehicle Platooning – Ctrl & Opt. in Robotics (MEAM 513)

Fall 2019

- Designed a **Model Predictive Controller** for vehicle platooning using the **Acado** optimization framework.
- Integrated **Acado**-generated solvers and controllers into the **Webots** simulation environment using **C++**.
- Implemented various cart-pole inverted pendulum swing-up & stabilization algorithms.

### Robotic Hand Orthosis – Rehabilitation Robotics

Summer 2019

- Developed, Modeled, and Engineered **Robotic Hand Orthosis** for patient with **Cerebral Palsy**
- Wired Arduino with Sensors and Actuators, and in charge of implementing grip control.
- Enabled patient to grasp objects with impaired hand for the first time in years.

### PennOS – Operating Systems (CIS 380)

Fall 2018

- Designed and implemented filesystem, system calls, and testing utilities for “PennOS” operating system in **C**.
- Developed a terminal shell in **C** that manages foreground and background processes, standard input and output file redirection, n-stage pipelines, and job control.