

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

May 2021

Bachelor of Science in Engineering (BSE) *Cum Laude*, Computer Science

May 2020

Relevant Skills: C, C++ Python, Java, MATLAB, Javascript, Lua, Unix, Bash, Zsh, ROS, Git, Machine Learning, Controls Engineering, (Trajectory) Optimization, Model Predictive Control, State Estimation

WORK EXPERIENCE

Software Quality Engineer – Apple

April 2022 – Present

- Parallelized **Jenkins** compilation and testing pipelines, resulting in a 3x increase in throughput.
- Used **React** and **ThreeJS** web-development frameworks to build internal data visualization dashboards.
- Wrote **Python** scripts to generate synthetic data for computer vision algorithms.

Research Assistant – C3 Robotics Laboratory

July 2021 – April 2022

- Performed Literature Review on the current state of the art in SLAM Research
- Used ROS packages to develop trajectory planner for tank-cleaning robot

Graduate Teaching Assistant – MCIT 593: Introduction to Computer Systems

Spring 2021

- Held office hours to answer questions and help deepen students' understanding of Computer Systems.
- Taught recitations to students on the Stack, C Fundamentals, and Linked Lists and Dynamic Memory allocation.
- Taught students debugging techniques using tools such as GDB and Valgrind.

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 Hardware-In-The-Loop (HITL) simulation to interface a Gazebo Simulation with the PX4 Control Stack.

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

June 2018 – August 2019

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

COMPUTER SCIENCE / ROBOTICS

Mini Minecraft – Computer Graphics (CIS 560)

Spring 2021

- Led group for final project "Mini Minecraft" written in **C++**
- Implemented multithreaded terrain generation, allowing for smooth gameplay.

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.

Pipelined, Superscalar Processor – Computer Organization and Design (CIS 371)

Spring 2018

- Programmed, debugged, and tested a pipelined superscalar LC4 processor in **Verilog**.
- Maximized speed of processor with hazard and bypass control units.

Learning in Robotics – ESE 650

Spring 2021

- Implemented Unscented Kalman Filter State Estimator to estimate pose of quadcopter from noisy IMU data.
- Wrote 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

- Implemented and integrated trajectory optimization and geometric controller into a single stack for navigating quadcopters through a cluttered environment.

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.
- Developed appropriate hybridized constraints to ensure convexity of problem.
- Integrated **Acado**-generated solvers and controllers into the **Webots** simulation environment using **C++**.

Robotic Hand Orthosis – Rehabilitation Robotics

Summer 2019

- Developed and prototyped **Robotic Hand Orthosis** for patient diagnosed with **Cerebral Palsy**
- Enabled patient to grasp object with impaired hand for the first time in years.

Stirling Engine – Machine Design and Manufacturing (MEAM 201)

Fall 2018

- Designed and machined a 2107 RPM **Stirling Engine** in Solidworks.