

Joshua Ramos

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Education

Carnegie Mellon University	May 2025
Master of Science in Electrical & Computer Engineering	GPA 4.00
Bachelor of Science in Electrical & Computer Engineering	GPA 3.53

Experience

Wurk-Life.com

Co-Founder, Development Lead May 2024

Partner: Luca Adams

- Finalist in the 2025 Carnegie Mellon University Undergraduate McGinnis Venture Competition

Amazon Web Services

Arlington, VA

Software Development Engineering Intern May 2025 – August 2025

Manager: Rex Morgan

- Prototyped an internal service that enhances the building experience for all Amazon software engineers.
- Deployed a cluster of containerized, embedded Apache Mina SSHD servers to proxy service requests and stream critical data.
- Worked with security teams to obtain system security clearance to securely route high critical data across VPC networks.
- Maintained discussions with primary stakeholders to iterate and deliver the product prototype in a timely manner.
- Designed unit/integration tests in Java, validating program functionality/performance to ensure high-quality solutions.

Amazon Web Services

Arlington, VA

Software Development Engineering Intern June 2024 – September 2024

Manager: Judy Meng

- Implemented a transformative feature for a customer facing front-end, leveraging a range of AWS technologies including Lambda, DynamoDB, S3, Cloud Development Kit, and Elastic Container Registry/Service.
- Constructed a robust REST API in Kotlin, enabling the seamless communication of customer data.
- Developed the foundation of a sophisticated back-end system, harnessing the capabilities of AWS DynamoDB, Lambda, and S3 storage to efficiently retrieve and analyze customer-requested data, store results, and subsequently provide actionable insights and analytics to customers.
- Implemented an intuitive and immersive user interface to showcase critical data metrics, optimizing customer experience and facilitating informed decision-making.
- Designed comprehensive unit tests in both Go and Kotlin, validating program functionality and performance to ensure high-quality solutions.

Research

Robomechanics Lab at Carnegie Mellon	Pittsburgh, PA
<i>Undergraduate Research Assistant</i>	<i>February 2022 – May 2025</i>
Advisors: Aaron Johnson	
Microtaur: A Low-Cost, Easily Implementable Quadrupedal Research Platform.....	
<ul style="list-style-type: none">○ Implemented kinematic simulations to model the motion of quadruped legs using MATLAB○ Implemented dynamic behaviors such as walking, trotting, hopping, and bounding gaits (C++).	
Safe Kinodynamic RRT for Navigating Friction Transitions.....	
<ul style="list-style-type: none">○ Investigating the integration of novel methods of stability analysis for hybrid systems in planning for AVs○ Programmed simulations in MATLAB to observe the performance of SOTA dynamically constrained planning algorithms such as the kinodynamic RRT on a 6D vehicle model with integrated hybrid system analysis techniques.	

Teaching

Carnegie Mellon University	Pittsburgh, PA
<i>Teaching Assistant: Introduction to Embedded Systems</i>	<i>August 2024 – May 2025</i>
Professors: Gregory Kesden and Mark Budnik	
<ul style="list-style-type: none">○ Administered recitations and office hours to enhance student learning, and assisted in the development of course lab projects.○ Guided 42 teams of students to construct customized RTOS kernels with multi-threading and dynamic scheduling, design, order and populate PCBs, implement bootloaders, UART, I2C, and motor encoder drivers (via EXTIs), and implement a PID controller to drive a car system using an STM32 Nucleo board.○ Reinforced students' understanding of safety critical systems (SIL, HAZOP, PHA, etc.), power-management, control systems, ARM architecture/assembly, serial communication, real-time kernel, real-time scheduling, concurrency control, and more.	

Presentations

Climber's Ligament Injury Mitigation Band	
<i>Carnegie Mellon ECE Design Experience Expo</i>	<i>December 2024</i>
Poster	
Microtaur: A Low-Cost, Easily Implementable Quadrupedal Research Platform	
<i>Carnegie Mellon Meeting of the Minds Undergraduate Research Symposium</i>	<i>May 2023</i>
Poster	

Skills

Programming Languages
Python, C, C++, SystemVerilog, Go, Java, Typescript, Kotlin, JavaScript, HTML, CSS
Software & Frameworks
AWS, Quartus, CAD (Fusion, SOLIDWORKS, KiCAD), MATLAB, Apache Mina, React, Docker, Bootstrap, Django
Hardware
PCB, FPGA, Microcontrollers (Arduino, ESP32, Teensy, STM32), Manufacturing (3D Printing, Soldering, Power tools)

Projects

Climber's Ligament Injury Mitigation Band

Product Design, Embedded Systems, Biomedical Engineering

Fall 2024

Teammates: Alexander Nguyen and Jubahed Qayum

- Invented CLIMB, a system capable of monitoring, analyzing, and visualizing forces applied by the hand over time.
- CLIMB improves the state of training/rehabilitation in rock-climbing by providing climbers with an unobtrusive, injury-prevention training device paired with the immersive CLIMB app to help users track, analyze, and share their workouts.
- Designed and created the CLIMB device (hardware) which comprises a PCB, a 3D-printed capsule, haptic DC motors, piezo-resistive sensors, and programmed an Olimex ESP32 to utilize on-board peripherals ADC, PWM, and Bluetooth Classic.
- Proposed the CLIMB solution to Carnegie Mellon faculty, derived design-requirements from use-cases and value-drivers, performed trade-off analyses per device subsystem, executed rapid design iteration, realized a risk-mitigation plan, and orchestrated a series of verification and validation trials which included durability, ergonomic, and safety testing.
- CLIMB can accurately measure up to 60lbs per pulley with 3% error, can be used at any distance from the paired device, and can visualize data from a workout within 5 seconds for a 10 minute workout.
- Won 1st place among 23 contending teams in the Carnegie Mellon 18-500 ECE Design Experience competition.

Autonomous Systems

Robotics, Optimal Control, SLAM, State Estimation, Python

Fall 2024

- Implemented a Linear-Quadratic Gaussian (LQG) controller using an Extended Kalman Filter (EKF SLAM) and an IH-LQR to track an optimized motion trajectory (A^*) for a 6D vehicle model, simulated in Webots.
- Designed a Model Reference Adaptive Controller (MRAC) and Linear-Quadratic Regulator (LQR) to fly and stabilize a quadrotor experiencing a stochastic 69% and 50% loss of thrust in one motor, respectively, simulated in Webots.

Real-Time Systems

Embedded Systems Engineering, Bare-metal Programming, C, ARM Assembly

Spring 2024

- Designed, ordered, and populated a printed circuit board using Fusion to support an STM32 with an ARM Cortex M4 processor.
- Programmed numerous driver files to configure communication protocols like I2C and UART among other peripherals, drove a motor using PWM and implemented an encoder using EXTIs and controlled it with a PID controller, flashed NeoPixels using DMA, implemented a RTOS kernel with multi-threading, and processed sensor readings using ADC on an STM32 Nucleo.

Network-On-Chip Design

Hardware Design, FPGA, SystemVerilog

Spring 2024

- Designed and implemented multiple, coordinated hardware threads in SystemVerilog to simulate a network-on-chip.
- Utilized fundamental design principles such as handshaking, pipelining, buffering, and fairness arbitration.

RPN Calculator Verification and Validation

Hardware Design, FPGA, SystemVerilog Assertions

Spring 2024

- Designed a robust testbench to exhaustively probe an RPN calculator based on a fault model I devised.

- Utilized constrained random testing, class-based vectorization, concurrent and immediate assertions, and task modularization.

Multi-Agent Planning Under Dynamic, Adversarial Conditions

Robotics, Path Planning, Simulation, Python

Spring 2023

- Designed a simulation to analyze the Learning Real-Time A* Search algorithm in a dynamic, adversarial environment.
- Simulated both centralized and decentralized planners utilizing multiprocessing techniques.

High-DoF Arm Motion Planning

Robotics, Motion Planning, C++

Spring 2023

- Wrote multiple planners for a planar arm with 6 joints to move from a starting state to goal state utilizing different sampling-based search methods: Probabilistic Road Maps (PRM), Rapidly-exploring Random Trees (RRT), RRT-Connect.

Game Development

Storyboarding, Game Design, Python

Fall 2021

- Designed an immersive top-down strategy game in Python (Tkinter) with graphics.
- Implemented randomized maze creation and intelligent agents to enhance the user experience.
- Optimized game performance by utilizing multiprocessing techniques.