

Allan Garcia-Casal

786-394-3624 | allang@u.northwestern.edu | github.com/allan-gc | allan-gc.github.io

EDUCATION

Northwestern University

M.S. in Robotics

Evanston, IL

Expected Graduation: Dec 2023

Select Courses: Machine Learning, Intro to AI, Robotic Manipulation, Embedded Systems, Sensing and Navigation for Robotics (SLAM) in C++

Boston University

B.S. in Biomedical Engineering

Boston, MA

Sep 2018 - May 2022

SKILLS

Programming: Python, C++, C, MATLAB

Robotics: Robot Operating System (ROS2/ROS), SLAM, Robot Kinematics and Control, Simulation, Gazebo, Moveit, OpenCV, Machine learning

Software: Git, Linux, CMake, Docker, PyTorch, Keras, Real Time Operating Systems (Zephyr)

Hardware: Circuit Design, CAD/SolidWorks, PCB Modeling

PROFESSIONAL EXPERIENCE

Stryker, Robotic Platform Accuracy and Registration

Weston, FL

R&D Engineering Intern

Jun 2023 - Sep 2023

- Created a physical system that tests the dynamic cutting accuracy of the Mako surgical robotic platform
- Used MATLAB/C for control of the dynamic test setup and for data analysis
- Developed a new surgical probe prototype that will allow for more accurate bone registration for the robot

Brigham and Women's Hospital, Department of Radiology

Boston, MA

Image Guided Surgery Research Intern

Jun 2021 - Aug 2021

- Optimized the registration of 3D meshes from MRI and CT scans
- Used Python point-cloud libraries for image segmentation and registration

SELECT PROJECTS

Prosthetic Elbow for Balance Adjustment

Current

- Creating a prosthetic elbow that maps real time movements to a corresponding output motor torque for balance adjustment
- Developing the control software using C with the Zephyr RTOS on the Teensy 4.1 board
- Designed a PCB for the system components

Adroit Robotic Arm sEMG Teleoperation

Winter 2023

- Developed software in Python and ROS that allows for teleoperation of an Adroit Robotic Arm using a Myo Gesture Armband
- Integrated a classification model in PyTorch that used sEMG readings for gesture recognition and classification
- Mapped the gestures/IMU data to control the end effector and joints

Simultaneous Localization and Mapping (SLAM) from Scratch

Winter 2023

- Implemented an Extended Kalman Filter for SLAM on a Turtlebot3 using ROS 2 and C++
- Utilized simulated lidar data, odometry, and differential drive kinematics to control the simulated robot

Franka Robotic Arm Motion Planning

Fall 2022

- Developed software in Python and ROS2 that allows a 7 DOF robot arm to autonomously prepare a cup of hot chocolate
- Integrated the MoveIt package into a ROS2 motion planning API in Python that was used to interface with the robotic arm

Robotic Arm Pen Tracker

Fall 2022

- Used an Intel RealSense camera to detect a pen and then had a px100 robotic arm grab it
- Implemented an object detection algorithm using the OpenCV Python library

MRI Compatible EEG Layer Design

Fall 2021, Spring 2022

- Designed MRI compatible EEG cap layer that helps attenuate noise from EEG/MRI readings
- Developed several cap designs using different insulating fabrics and conductive inks
- **Submitted for Publication:** Levitt, Yang, Williams, Lutschg, Garcia-Casal, Lewis, "EEG-LLAMAS: an open source, low latency, EEG-fMRI neurofeedback platform"

Pulse Oximeter Prototype

Spring 2021

- Designed a prototype pulse oximeter using CAD
- Developed analog signal filtering and detection software on Arduino IDE