Allan Garcia-Casal

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EDUCATION

Northwestern University **Evanston, IL**
M.S. in *Robotics* Expected Graduation: Dec 2023

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

Boston University **Boston, MA**
B.S. in *Biomedical Engineering* *Sep 2018 - May 2022*

SKILLS

Programming: Python, C++, C, MATLAB
Robotics: Robot Operating System (ROS2/ROS), Gazebo, SLAM, Robot Kinematics, Simulation
Software: Git, Linux, CMake, Docker, PyTorch, Real Time Operating Systems (Zephyr)
Hardware: Circuit Design, CAD/SolidWorks, Embedded Systems, PCB Modeling

PROFESSIONAL EXPERIENCE

Stryker, Robotic Platform Accuracy and Registration **Weston,FL**
R&D Engineering Intern *Jun 2023 - present*

- 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
- Utilized CAD for prototype development

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 methods testing

SELECT PROJECTS

Controlled Torque Prosthetic Elbow *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
- Designed and 3D printed the elbow and circuit housing CAD models

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 PyTorch model 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"