Allan Garcia-Casal

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EDUCATION

Northwestern University **Evanston, IL**
M.S. in *Robotics* *December 2023*
Relevant Courses*:* Machine Learning, Intro to AI, Robotic Manipulation, Embedded Systems, SLAM
Boston University **Boston, MA**
B.S. in *Biomedical Engineering* *May 2022*

SKILLS

Programming*:* C++, Python, C, MATLAB
Robotics*:* Robot Operating System (ROS2/ROS), SLAM, Robot Kinematics and Control, Motion Planning, Simulation, Gazebo, Moveit, Computer Vision, 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 *June 2023 - September 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 *June 2021 - August 2021*
- Optimized the registration of 3D meshes from MRI and CT scans
- Used Python point-cloud libraries for image segmentation and registration

SELECT PROJECTS

Simultaneous Localization and Mapping (SLAM) from Scratch (ROS2, C++) *Winter 2023*
- Implemented Extended Kalman Filter SLAM pipeline from scratch on a Turtlebot3 using ROS 2 and C++
- Developed libraries for differential drive kinematics and rigid body transformations
- Utilized lidar data, odometry, and data association to evaluate the pipeline in a simulated environment

Adroit Robotic Arm Teleoperation (Python, ROS, PyTorch) *Winter 2023*
- Developed a ROS control package that allows for teleoperation of an Adroit Robotic Arm using EMG/ IMU signals
- Integrated a CNN gesture recognition machine learning model for EMG signal classification
- Used Rviz for real time simulation of the robot arm and IMU movements

Prosthetic Elbow for Balance Adjustment (C, RTOS) *April 2023 - Present*
- Creating a prosthetic elbow that maps real time movements to a corresponding output motor torque
- Developing the motor control software using C with the Zephyr RTOS
- Designing a control algorithm that utilizes a PID controller and gait detection for real time balance adjustments

Franka Robotic Arm Motion Planning (Python, ROS2) *Fall 2022*
- Developed a ROS2 package that allows a 7 DOF robot arm to autonomously prepare a cup of hot chocolate
- Created a Python API for ROS2 MoveIt that was utilized for trajectory planning and execution

Robotic Arm Pen Tracker (Python, OpenCV) *Fall 2022*
- Implemented an object detection and tracking algorithm using the OpenCV Python library
- Utilized robot kinematic libraries for a px100 arm that allowed it grab the pen within its workspace

MRI Compatible EEG Layer Design (MATLAB) *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 (C) *Spring 2021*
- Designed a prototype pulse oximeter using CAD
- Developed analog signal filtering and detection software on Arduino IDE

AWARDS

Hispanic Scholarship Fund Scholar 2021, 2023