Allan Garcia-Casal

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

EDUCATION

Northwestern University **Evanston, IL**
M.S. in *Robotics* *December 2023*
Select 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* *May 2022*

SKILLS

Programming: C++, Python, 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 *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

EKF SLAM For Differential Drive Robot *January 2023 - March 2023*

- Implemented Extended Kalman Filter SLAM from scratch on a Turtlebot3 using ROS 2 and C++
- Utilized lidar data, odometry, and data association to evaluate the pipeline in a simulated environment

Adroit Robotic Arm sEMG Teleoperation *January 2023 - March 2023*

- Developed control package in Python and ROS that allows for teleoperation of an Adroit Robotic Arm using a Myo Gesture Armband
- Integrated a CNN gesture recognition machine learning model into a ROS control pipeline for the Adroit
- Used Rviz for real time simulation of the robot arm and IMU movements

Prosthetic Elbow for Balance Adjustment *March 2023 - Present*

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

Franka Robotic Arm Motion Planning *November 2022 - December 2022*

- Developed software in Python and ROS2 that allows a 7 DOF robot arm to autonomously prepare a cup of hot chocolate
- Created an API in Python for the ROS2 MoveIt motion planning package to use for the trajectory planning

Robotic Arm Pen Tracker *November 2022*

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

MRI Compatible EEG Layer Design *September 2021 - May 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 *March 2021 - May 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