**epicLab.html**

**Introduction**

I joined the lab under the Human Robotic Augmentation Team through the Vertically Integrated Projects program at Georgia Tech. My team led by Ben Shafer, a GT grad student, is centered around testing a variety of controllers (including proportional myoelectric, impedance, neuromuscular model based, hybrids, etc.) and utilizing Human in the Loop Optimization (HiLo) to decrease the metabolic cost of using a hip exoskeleton. The role of my partner and I in the project was to develop a controller with a user interface using MatLab and to link this controller to a Simulink model. The goal of the controller we worked on was to adjust control parameters live while also allowing the user to visualize the current state of the exoskeleton better than what was previously provided with Simulink Real Time Explorer. The ultimate goal was to reduce the total time spent testing with a person in the hip exoskeleton.

**The Project**

My partner and I decided to split the project into two main components. Component one was the ability to access the Simulink model from our controller and change the control parameters live without having to rebuild the model. The second component was the ability to pull data off the currently running Simulink model and into our GUI. My partner focused on the first component while I worked on the second. I struggled a lot initially in the project attempting to figure out the best way to pull a constantly changing value from the Simulink model. I considered C-Mex functions, creating a user block and then setting the user data field to the needed value but in the end with a little bit of external help I decided that host scopes would be the most effective method to implement for this project. After making this decision, I implemented a timer object on the MATLAB side of the project so that it would constantly pull the data values from the running Simulink model at a fast-enough rate to keep the graphs up to date. I found that I could not surpass 14 Hz with the timer object in the GUI if I wanted it to not show any lag. I ended up deciding to use an animated line to graph the data we pulled from the model because it was the easiest one that met all our requirements.

**The Final Product**

By the end of the semester, we had finished working on our MATLAB GUI and it was ready to be packaged into an app. We were now able to control parameters from the GUI and also provided a lot of customizable features in terms of graphing the data live. In addition, the user is also able to save the data recorded during the testing session. Our final step was to modularize the GUI so that we would be able to use the GUI with various different Simulink models. Once we finished making it, we presented the app to the rest of the members in the lab.

**Longterm Outcome**

This experience overall was very useful as I got a lot of exposure to a lab environment. I learned a lot in terms of actually getting hands on with a project. However, I would say that the most important lesson I learned was the importance of not going down rabbit holes when presented with a broad problem. To elaborate a little bit, early on in the project the first thing I had to figure out was how to pull data from the Simulink model and into the MATLAB app at a very fast rate. I evaluated a couple different possibilities and looked into the different options. I spent a lot of time trying to do this by using user defined MATLAB function blocks and changing their user data parameter. However, this was extremely complex, so I was stuck on this part of the project for a while. It was during this roadblock where I got help from my mentor, Ben. He suggested I check out host scopes. Host scopes were the answer to my problems, but I had not realized this because I had not come across it during my initial research. This roadblock could have been easily avoided if I had looked into how I could use Simulink a little bit more from a higher-level perspective to achieve my goal rather than immediately diving into user defined functions. Through this, I learned the importance of when presented with a problem, attempting to find the easiest and most efficient way to solve a problem rather than exhausting all my resources into one sole idea that could potentially work.

Scno.html

## Introduction

This is a national organization of which there is a branch in Georgia Tech. Our purpose is to help local non-profits in any manner we can and by doing so also gain experience in the field of consulting through the organization as well as by meeting with like-minded individuals. During my time in this organization, I have been able to serve on two teams tasked with helping two different local non-profits.

## The Project

### Client #1: City of Refuge: Atlanta

City of Refuge is a local homeless shelter in Atlanta that is well known for being well organized and well managed. On the team serving this client, my role was a Business Analyst. Our goal was to create a donor analysis report and provide suggestions for them to increase donor retention as a whole. They provided us with a history of donations they received including the amount and the donor’s name if it was not anonymous. This data was in the form of around 15,000 different data points. I was the primary data analyst for this set of data and tasked with essentially identifing useful trends with this unsorted data set. I found several useful factors through these data points such as the time ranges in which different entities would frequent higher amounts of donations. In addition, one other trend we identified was the stock price of the company in relation to if they donated during that time period. There were also a couple other factors that we were able to realize through the data. Another aspect in which we wanted to service the client was by looking at their current website, donations options and other factors, etc. We realized that their website was rather outdated and did not have an option for a reoccurring subscription plan. This is something that we recommend and was implemented soon after. Once we finished our analysis, we prepared a final report to present to both the members of this organization as well as our contact within City of Refuge. [INSERT (recommendations?)]

### Client #2: Community Assistance Center

Once the previous project had been finished, I got the chance to work alongside fellow organization members to help the Community Assistance Center. On this team my role was a Senior Business Analyst. The Community Assistance Center or CAC in short is essentially a food pantry that picks 300 local individuals every year and helps them recover from some form of accident or incident that renders them unable to provide for their family. They help by giving the family a certain amount of allotted food throughout the year at regular time intervals. Our main objective was to decrease the food waste and increase the efficiency of the center as a whole. Unlike the previous project, we got the chance to visit the Center while they were in operation. During this visit, we got to see in person the food intake process (food that was donated), the methods of storage and how the food is transferred from storage and into the actual pantry where the person visiting the center can pick it up. We identified 2 [CONFIRM] main avenues in which we could improve the efficiency of the center and decrease food waste. Currently, they manually log the total pounds of food received into several binders and then manually transfer this information to an online database at a later time. The staff mentioned that this was a rather tedious process so we decided to migrate this process of logging information to an online spreadsheet so they can just export it to the databases that they are required to fill out for tax purposes. The second area of opportunity was rearranging the layout of where they actually give out the food. Currently it is in the form of a grocery store with different sections. However, certain items depending on when they would spoil do not count towards the weight allotment each client has. Essentially they are allowed to take as much of these items as they would like and these items are constantly fluctuating and changing during the day. Currently, these “free weight items” are stated on a single whiteboard. As a result, it is not easy for the person at the checkout area as well as the customers to know which items are free weight and thus there is confusion and food waste. We propose that by putting these items all in one area within eyesight of the person in the checkout area, there would be much less confusion for all involved parties. We have communicated our suggestions with our contact at the Community Assistance Center and we are currently in the process of implementing them. [CONFIRM]

## Longterm Outcome

From the first project, I got the chance to use my newly learned MATLAB skills and saw the project from a new perspective through exposure to more experienced members on my team. While I was working on this project, I was taking a MATLAB class so I was able to use my MATLAB skills for data analysis. This was just a great feeling overall because never before had a class really immediately been of practical use in the real world. Going into this project, I was very focused on solely the data points and how best we could utilize them to help our client. However, through the guidance of more experienced members from my team, I realized that other aspects like the clients websites and how they interact with companies would be of equal importance. From the second project, I got the chance to improve my abilities in analyzing a currently operating process and figuring out the best ways in making it more efficient with minimal energy at minimal costs. This is something that is very important for any engineer to be good at since it is something that is often required of for things that exist in the world. Everything can be made more efficient and will continue to be made so.