Rodny Luke Penner & Luke Roberts

Quinn Lanik

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Final Project Coding Report (Approved by Taryn Jordan)

The Project that we decided to work on was to create a GUI that would allow us to see the vertical and horizontal distance that an object would travel for any given launch angle up to 90 degrees and initial velocity up to 500 m/s. This project was approved by the LA Taryn Jordan, and she agreed that this was a good possibility for a final project. Both of the members on our team are mechanical engineering majors and therefore will be taking many physics classes throughout the rest of our college career. This GUI is both very practical and used knowledge from many of our math and physics classes. Hopefully, we should be able to use this GUI in future engineering classes.

The way we initially approached the design process was to look at what we learned from lab 10 and 11. These labs had various examples of different UI elements, as well as tips and commands for git bash that were needed to create branches and repositories. The example video posted by Quinn showing how to create different UI controls such as sliders and plots was also used as a reference for creating our code. Finally, to actually create the functions to make plots based on the inputted data, we needed to have a basic understanding of physics and calculus; We needed to know a few equations for 2-dimensional motion as well as the relationships between position and its derivatives of velocity and acceleration.

Our project was a very successful combined effort, but this does not mean that there were not any complications with the process. One of the biggest concerns that we ran into was when one of our team members contracted the coronavirus. This added another layer of complication to an already difficult task. We resorted to meeting over zoom calls and phone calls in order to finish our project. This created some difficulties as the quarantine dorms do not provide exceptional wifi, but we were able to persevere. Thankfully our newfound knowledge of Git allowed us to be able to simultaneously work on the same matlab code. It is safe to say that without Git this project would have been next to impossible. We were able to each create branches on one main git function that allowed us to be able to see the others work as well as edit it when needed. This added to the overall chemistry of the group and allowed for a more fluid group project experience. Another difficulty that was run into was first getting values onto the sliders so that when the user was using the sliders, they would actually be able to see the values for the angles and initial velocity on the graph. Without this aspect, the GUI would have seemed much less effective and students would not be able to see their inputs. We were able to solve this problem through creating a controls image.velocityText, as well as image.angleText. What this allowed us to do was create a value output for the angle and velocity sliders. Another problem that we ran into was getting the output for the graph onto a GUI and formatting it to fit to the page. Initially we only used a plot graph function, and this put the graph on the same image as the gui slider, however it also created a figure on top of this. We needed to add commands at the beginning of the function that set image.distance = 0, and create an image.p = plot(0,0) and image.p.Parent.Position = []. These commands allowed the gui and the graph to be on the same figure and interact, as well as created a way for us to manage the size of the graph on the page.

Learning about GUI’s was a very important topic which can definitely be used in the future. They are very useful because they allow for people who have almost no knowledge of code to be able to use the code that you have created. This is important because we can therefore create functions that are applicable to everyone. This will also be useful especially in mechanical engineering. Most likely we will be working with programs and other functions in order to design machines and create successful outputs. Gui’s will play an important factor in this because we will be able to make something with code or another design and be able to simplify it through the use of a GUI in order for companies or individuals, with no experience in coding, to use. One specific example of this could be to create a code that would be able to tell whether a certain material would be able to handle a weight value. This could be used by creating an equation in order to see how much weight a metal could handle. This code could then be transferred to a figure and have a GUI textbox or slider that the user would be able to input a weight value into. Then the code would run and have an output that either said that it was able or was not able to handle the load. Another output could say how much margin of weight was left unused. This obviously would take more planning than we described, but it is a possible function of a GUI. This knowledge of GUI’s is absolutely crucial to coding and will definitely be used by our group members in the future.