**Resultant Forces**

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This GUI, developed in MATLAB by CS majors Jonathan Kenney and Elizabeth Sheetz, is designed to allow physics students studying resultant forces to input force vectors and then calculate the resultant. The student can choose between using either rectangular or polar coordinates. We choose this concept because often when it comes to things like resultant forces it very much helps to have a visual. Also the GUI doubles as a calculator for getting the components of the resultant.

Resultant vectors are essentially the output vector of adding the components of the involve vectors. This all happens behind the scenes in the GUI as it is assuming the student already has some understanding on how resultants work and is more meant to be a visual for the student to see the resultant of various inputs.

In order to operate the GUI, the user inputs either the XY coordinates for a point or the polar coordinate and then the program will generate the vector from the origin. If in polar, the program then converts so that the force vector is in rectangular and will display the force on the axes. When the use would like to see the resultant, all they need do is hit the button to generate it. Also, there is a clear button for the user to clear off the GUI of any plotted vectors and any inputs.

When working on the project, Jonathan did a lot of the implementation as far as designing the layout and writing the code. Elizabeth was in charge of researching how various aspects of the GUI would work as well as brainstorming the ideas. Of course both members worked across the line and did a little of everything, but those were the focuses for each member.

The greatest challenge was trying to get the numerous number of elements interacting properly. Due to the large number of edit boxes, buttons, and the axes, getting everything synergized and clearing up all the nuance problems was both time consuming and frustrating. Additionally, it was hard for us to pin down a topic, so once we had a clear vision the rest was fairly painless.

Ultimately, the GUI project was an interesting dive into some of the capabilities of MATLAB. Walking away, it still feels like GUIs are a bit constrained here, however that is most likely due to a distinct lack of the breadth of capabilities on the team’s part. The project was most definitely a great conduit for solidifying the workings of functions in MATLAB as well as a fun creative experience.