Statics Calculator

# Introduction

The concept for this program began in one of our Engineering Mechanics lessons. We were instructed with solving a handful of questions related to forces and moments, and though the questions were quite simple, we found that process of solving each question was painfully slow and tedious. It was then that we decided that there should be a faster, more efficient way of calculating the resultant force and moment acting on a given body, and thus we began work on our Forces and Moments Calculator.

# The Program

The program has two primary functions. Firstly, the user may input the magnitude and angle of any number of forces, which the program will then use to calculate the magnitude and direction of the resultant force acting on a body, along with the resultant force’s horizontal and vertical components. Secondly, the user may input up the magnitude, angle and displacement from the origin of any number of forces in order to calculate the resultant moment acting on a body.

In addition the program has a number of features in place to improve the user experience. Firstly, the program contains a table that constantly displays the magnitude and angle of the resultant force, its horizontal and vertical components, along with the resultant moment. Secondly, includes a visual representation of the quadrant in which the resultant force acts. Thirdly, the user is able to save and load entered data. Fourthly, the user is able to freely switch between degrees and radians in the measurement of angles with the press of a single button. Finally, under the settings menu, the user may switch the colors of the text and background, along with the ability to adjust the precision of the results in the table.

# Future Improvements

The program is not very portable due to a high dependence on the Windows Application Programming Interface. Thus, it is strongly optimized for Windows, but can be run on other platforms like GNU/Linux and OSx with the help of emulators like Wine. By porting the program to other multi-platform libraries like SDL or GTK+, it would be more portable.

We would also like to add a better graphical interface, with a more responsive design that scales with any screen resolution.

Finally, we would also want to add more functionality to the program, such as additional tools, undo/redo, file browser with a compression algorithm and a mouse-based force drawing system.