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L.A who approved the project:

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**Report on the Design and Coding Process**

For this final project, I decided to design a simple calculator using Matlab GUI. Matlab GUI is an important graphical user interface because it allows higher productivity, while facilitating a lower cognitive load. The calculator I created is designed to perform 4 fundamental mathematical operations: addition, subtraction, multiplication, and division. When the program is run, a new screen appears which allows the user to enter any numerical values (regardless of its sign) and perform basic mathematical operations. The code is designed in a such a way that whenever a non-numerical value is entered and an invalid operation is performed, a value called “NaN” is automatically displayed meaning that the result to the mathematical operation is a non-real number. The calculator has 2 main textbox/entry box which allows the user to input any real number regardless of its sign. The two entry boxes are separated by a mathematical operation symbol which changes based on the operation selected by the user. A third textbox, located on the top right corner, displays the final answer of any calculation performed. The calculator has a drop-down menu that allows the user to choose between 4 different mathematical operations (addition, subtraction, multiplication, and division). Lastly, the calculator has a button labeled “equal" on the bottom right corner that allows the user to display the final answer to any calculation whenever the button is pressed.

I decided to code a calculator for this project because I believe it represents a good example of using different styles of UI control elements as well as callback string functions within a program. All throughout the code, the main different styles of UI control elements I used include panels, buttons, textbox/entry box and list/dropdown. Buttons tell users they can perform a particular action, like submitting whereas list/dropdown allows users to select an item from a list that drops down once they click on it. Textbox/entry box enables the user to enter any text into a specific field. Usually, it’s used to capture a single line of text, but can be configured to capture multiple ones. The second part of my code includes the use of a couple of callback string functions. I designed them in a such a way that they pass into other functions as arguments, which are then invoked inside a major outer function to complete some kind of action. In other words, they’re executed whenever the user clicks on the drop-down menu or any other button on the calculator.

One of the main challenges I faced was to come up with a design process that was less complex and easy to implement. Also, I had a hard time writing a code that would not crash whenever an invalid input is entered. Calculators are usually really hard to design and use a wide variety of callback string functions. Writing a simple and easy to implement code was quite challenging and took a lot of trials and errors. GUIs are important tools in today’s modern society especially in computer software design. They are necessary for correct functioning of software applications. That’s why it’s really important to design GUIs that are stable and reliable. As a Biomedical Engineering major, I believe using GUIs will be a major component in my career path. Nowadays, the medical device industry is developing more [devices](http://ww5.artversion.com/ximedica/patient-care/) with graphical user interfaces (GUI) than ever before. And I believe GUIs must meet actual users’ needs in the context of real-time use. With what I have learned in this class and what I’ll learn in future computer science classes, I’ll be able to design and code GUIs that are easy to implement and solve major issues within the Biomedical Engineering field.