

Introduction to Matlab GUIs (v. 1.0)

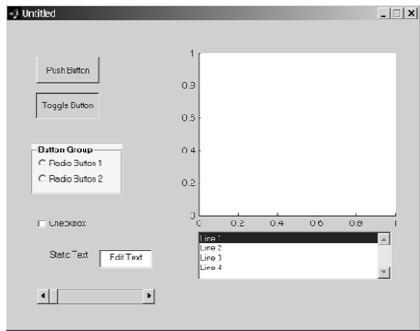
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GUI Whats & Whys

- GUI is an acronym for Graphical User Interface.
- A GUI is a pictorial interface to a program.
- GUI's make programs easier to use by providing a consistent appearance.
- GUI's have intuitive controls like pushbuttons, edit boxes, and menus.
- All modern operating systems and programs have GUI's.

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Sample GUI



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Programming GUI's

- Designing and writing GUI programs differs from what you've done previously, but builds upon it.
- The GUI window must be designed and laid out.
- GUI programs must respond to user inputs occurring in arbitrary order.
- Fortunately, Matlab and other modern programming environments now support GUI development.

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GUI Terms & Concepts

- GUI programming is actually very similar in most modern computer languages, so what you learn here will be applicable to most other languages.
- User inputs are known as **events** and a program that responds to events is called an event driven program.
- There are three principal elements involved in GUIs (see the next slide).

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Principal GUI Elements

- Components – Each item on a Matlab GUI is a graphical component
 - Types include controls (*edit boxes, buttons, etc.*), *menus, toolbars* and *axes*.
- Containers – Components of GUI must be arranged within a container, which is an area on the screen.
 - The most common is a *figure*.
 - Other types include *panels* and *button groups*.
- Callbacks – A mouse click or key press within a GUI is (or creates) an event, and for a Matlab program to perform its function it must respond appropriately to each event. The code executed in response to an event is called a callback.

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Selected GUI Components

- See my Matlab GUI Programming Reference (available at <http://people.msoe.edu/~tritt/ge4200>).
- This handout is similar to Table 10.1 in Chapman's Matlab Programming for Engineers (3rd and 4th editions).

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Speaking of Chapter 10

- Reminder, there is a serious error in Figure 10.9.
- **Above and below** the 2nd box down from the top of the figure change:
 - `MyFirstGUI_Callback` to `MyFirstButton_Callback`

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Creating & Displaying a GUI

- The "GUIDE" tool allows programmers to lay out GUI by selecting and aligning components
- Once in place, the programmer can edit component names, colors, sizes, fonts, etc.
- When "GUIDE" saves the GUI, it creates a `.fig` figure file and a working `.m` function file that includes skeleton subfunctions that can and should be modified to implement the desired behavior.

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Basic Steps in GUI Creation

- Decide what elements are required. Roughly lay out components on paper (or word processor). Think in terms of inputs, outputs and states.
- Use *GUIDE* to lay out the components on a figure. The size, alignment, and spacing can be adjusted by built in tools in the guide.
- Use the *GUIDE Property Inspector* tool to give each component a unique tag (effectively its name) and characteristics (size, color, etc).

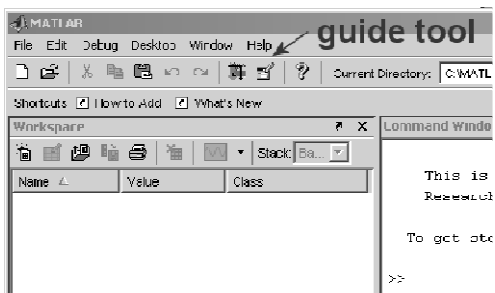
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Basic Steps (continued)

- Save the figure to a file. Saving the figure creates a .fig file that contains the GUI layout and it also creates an m-file that contains the code to load the figure along with the skeleton callback functions for each GUI element.
- Write code to implement the behavior associated with each callback function.
- Avoid changing component and function names after using *GUIDE*.

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Starting "guide"



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The *GUIDE* Tool

As of 1/4/12, a *Table GUI component* button and *Tool Bar Editor* button have been added.

The screenshot shows the GUIDE tool interface. At the top, there are five buttons: 'Align Objects', 'Menu Editor', 'Tab Order Editor', 'Property Inspector', and 'Object Browser'. Below these is a toolbar with various icons. On the left side, there are three callout boxes: 'GUI Components' pointing to a list of components, 'Design Area' pointing to the main workspace, and 'Drag to Resize Design Area' pointing to the bottom-right corner of the workspace. The workspace itself is a grid with a central area containing a table component.

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Examples

- See my Click Me example.
- See Chapman's MyFirstGUI example on pages 456 to 463 of his book. I recommend you work through this example at your computer.
- See my "improved" version of Chapman's first GUI example (MyFirstGUI3Notes.pdf).

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