

# Chapter 7

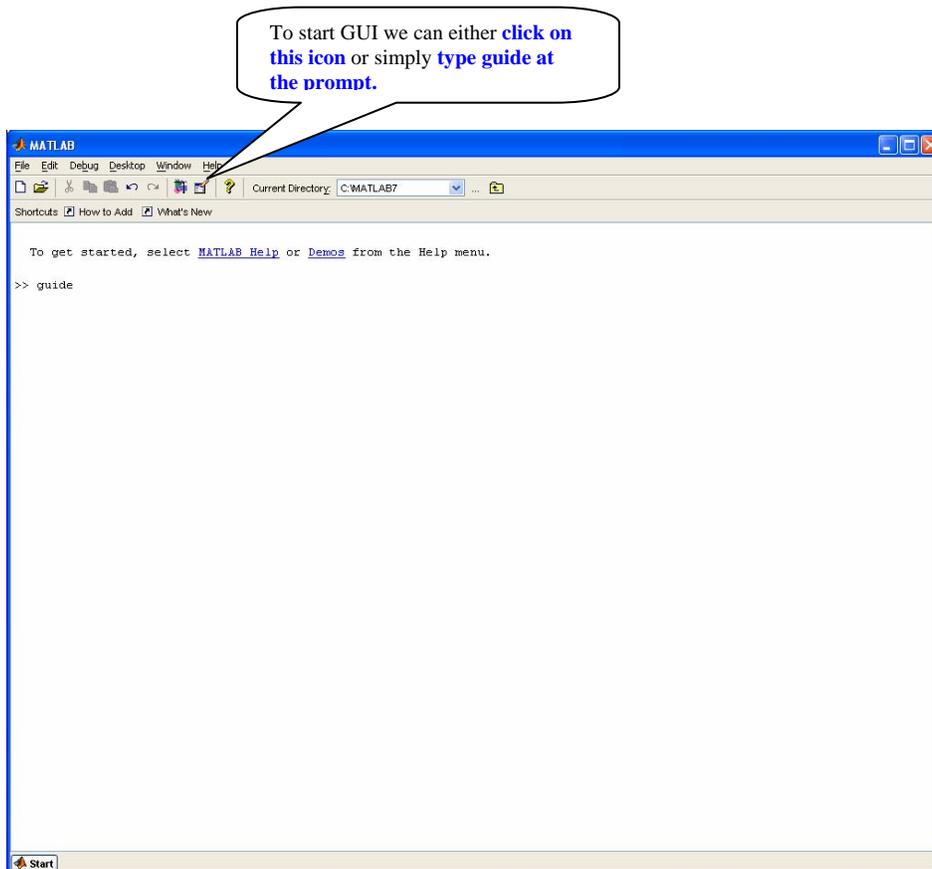
## - Graphical User Interface with MATLAB -

How to get started?

There are two ways to launch Graphical User Interface (GUI). You can either

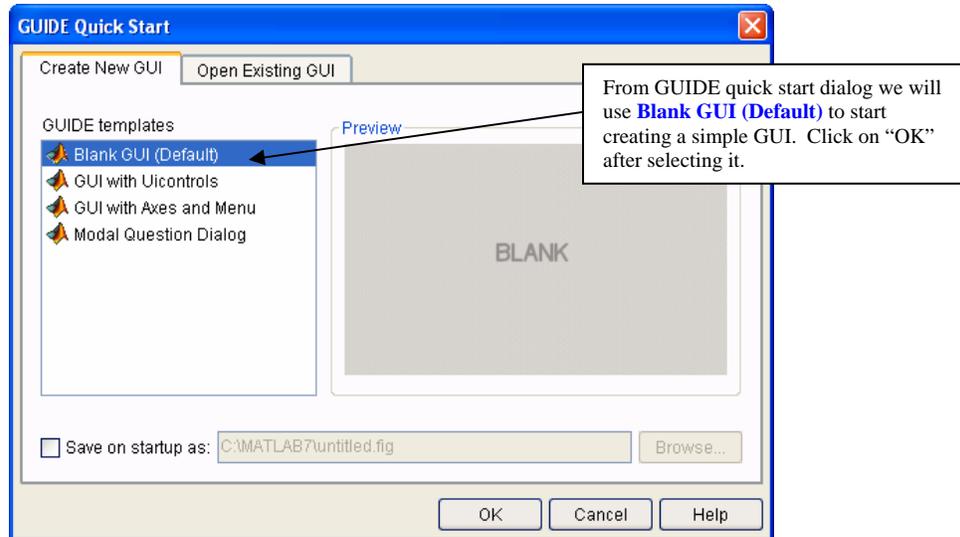
1. Click on the “Guide” icon
2. Type guide at the prompt

Just follow the instruction below:



## Got a "Guide Quick Start" Window?

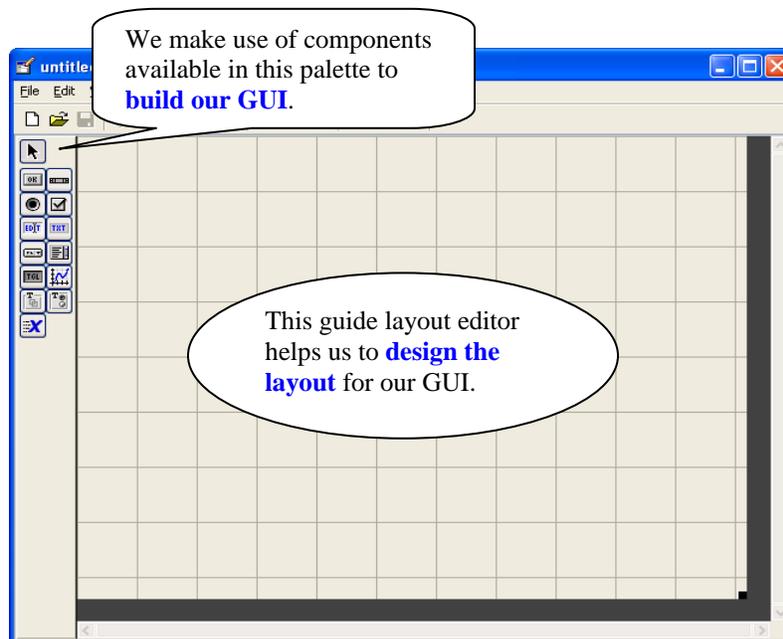
Next, we are going to create a simple Guide User Interface.



## A New Untitled Window

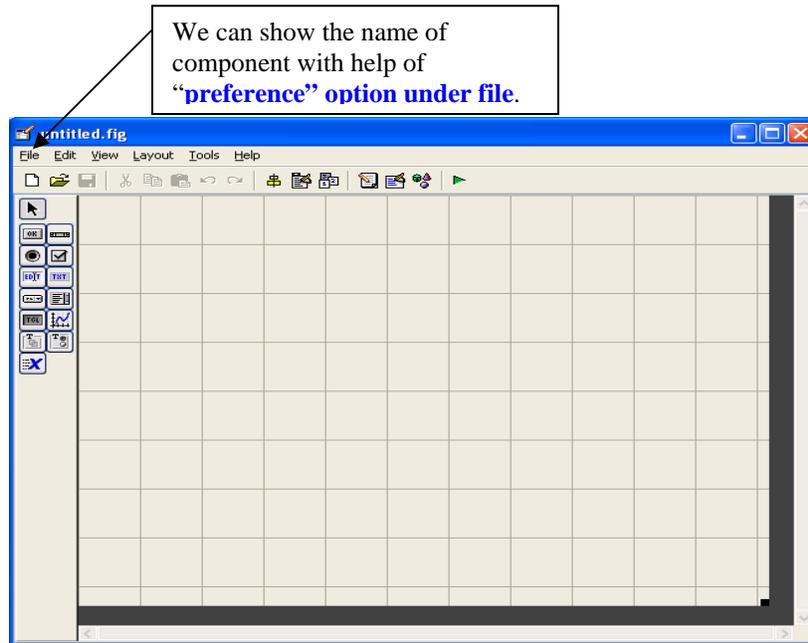
How to deal with a new GUI window?

Use the icons on the left to design the layout of your GUI.

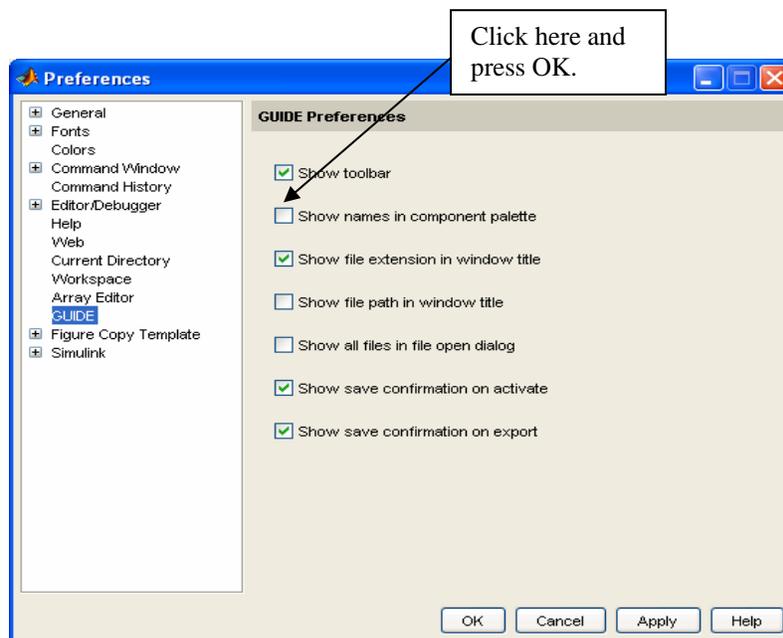


## Component Palette

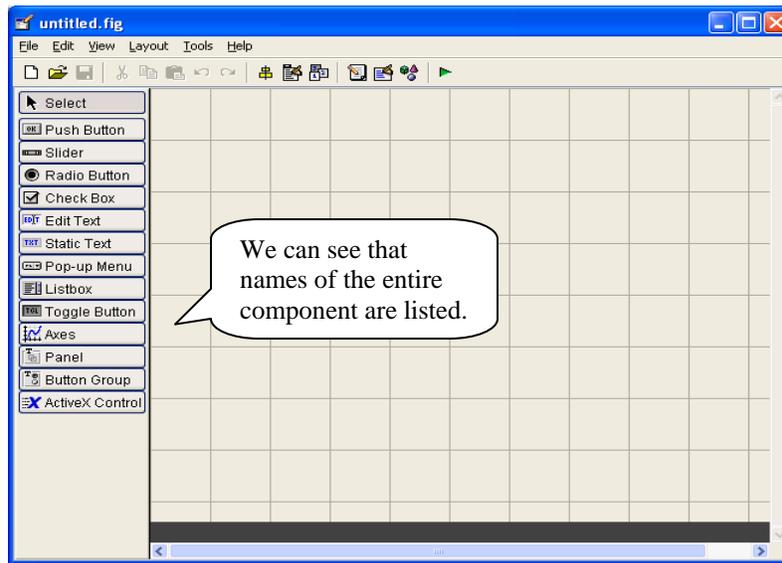
Want the names of these components to be shown?  
You can do it by using the “preference” option under “file”.  
Just follow the steps shown below:



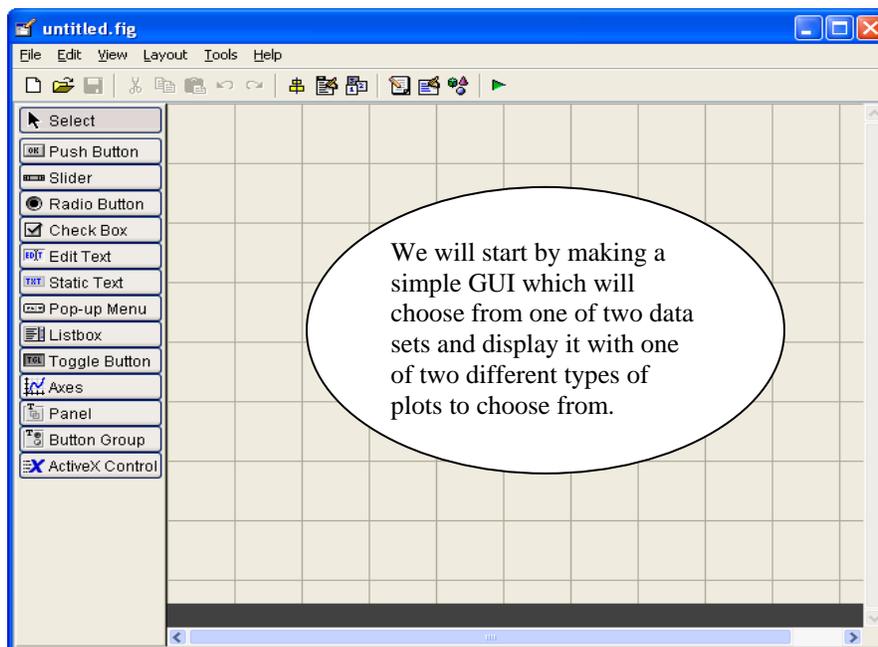
The Preferences window will pop up after you select “preference” option.



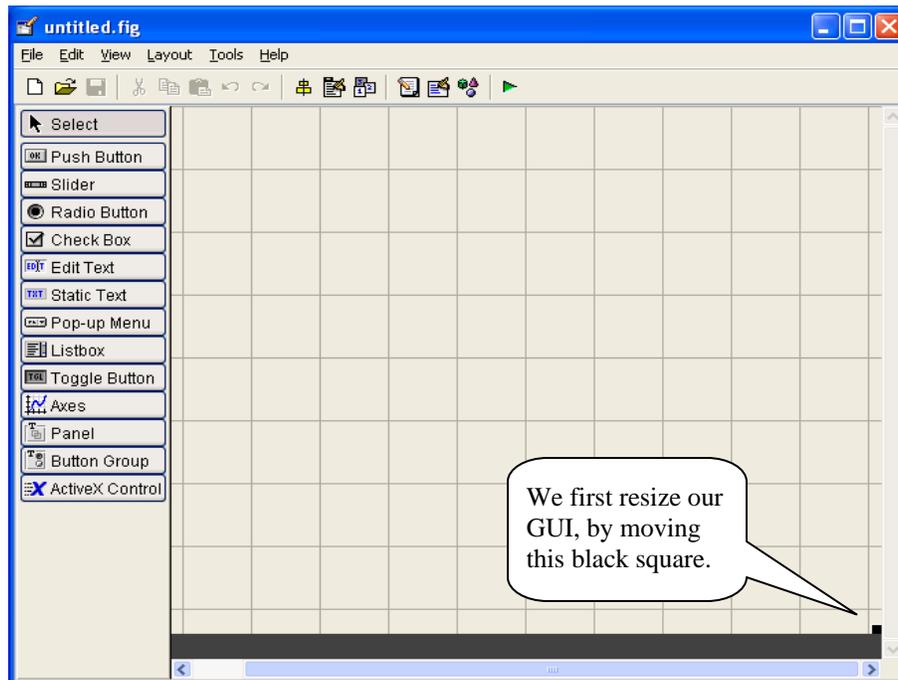
Now, you can see all the names of the components.



Let's Start Making a Simple GUI!

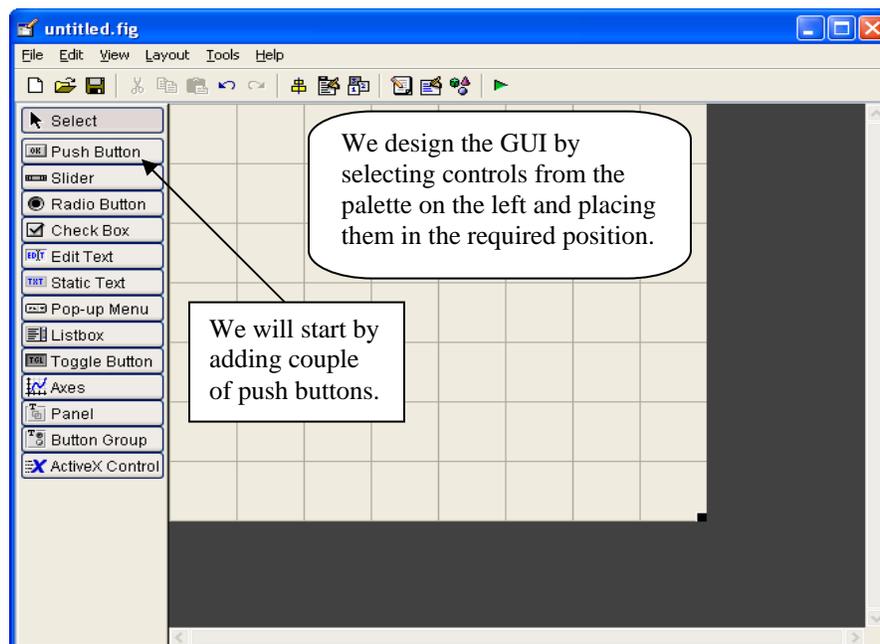


## Step 1: Resize your GUI



## Step 2: Adding "Push Buttons"

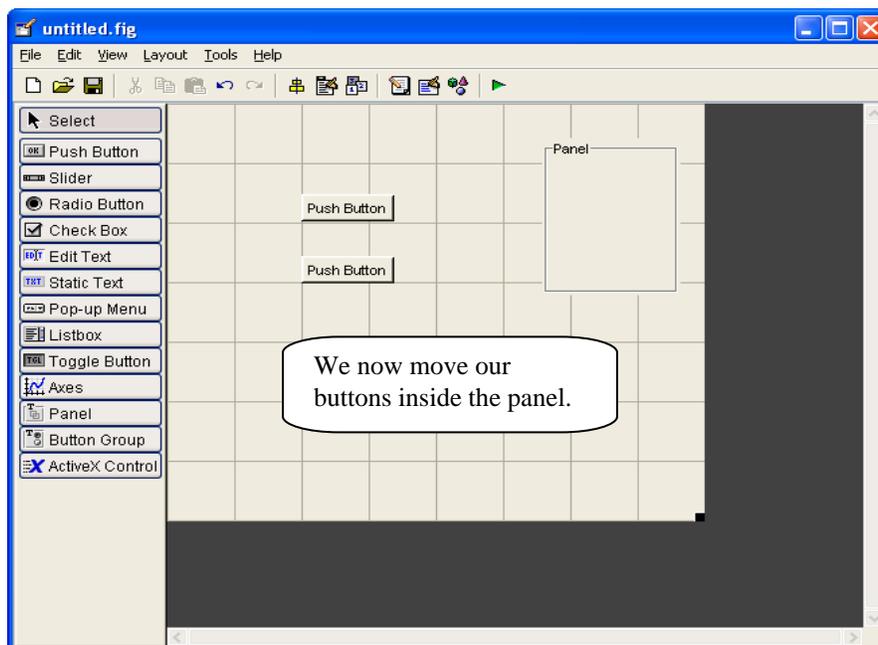
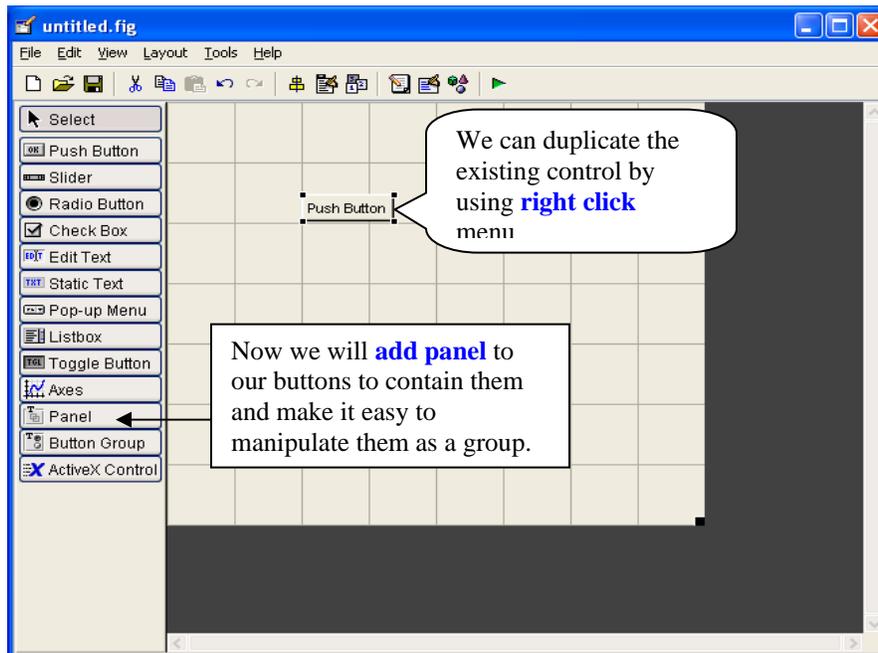
Simply drag the "Push Button" to the position that you want it to be appeared to.



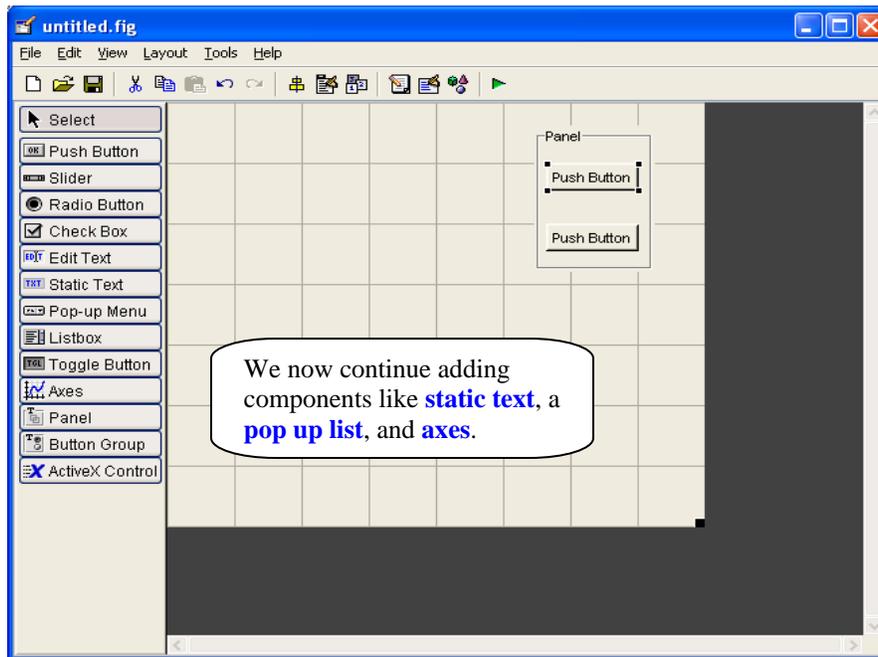
### Step 3: Duplication & Adding a “Panel”

To duplicate another “push button”, simply “right click” on the one you just created and choose “Duplicate”.

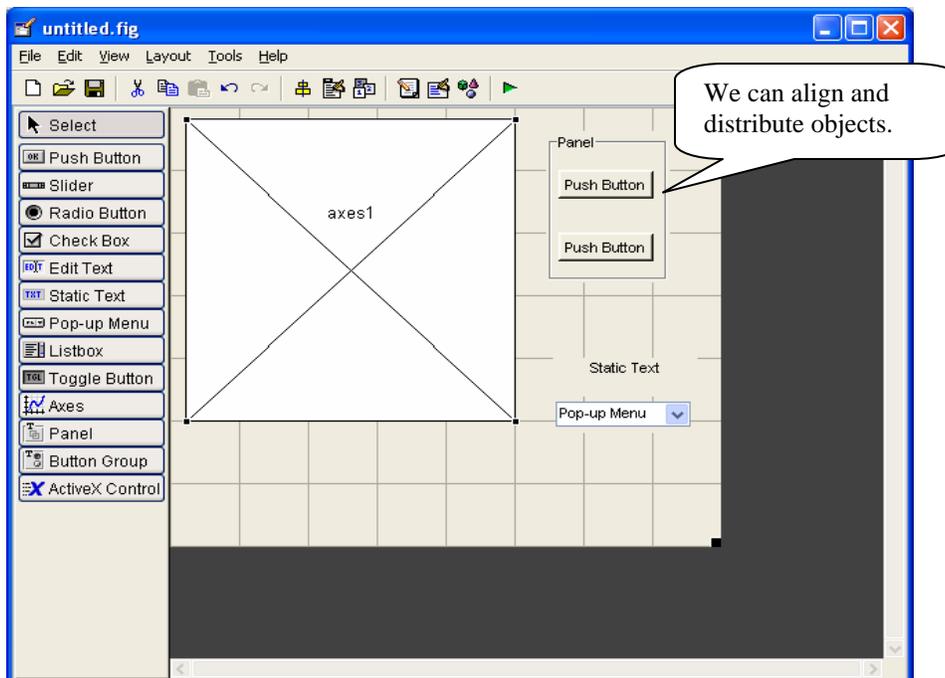
Add a panel after duplicating the push button.



#### Step 4: Adding “Static Text”, “Pop-up Menu & “Axes”



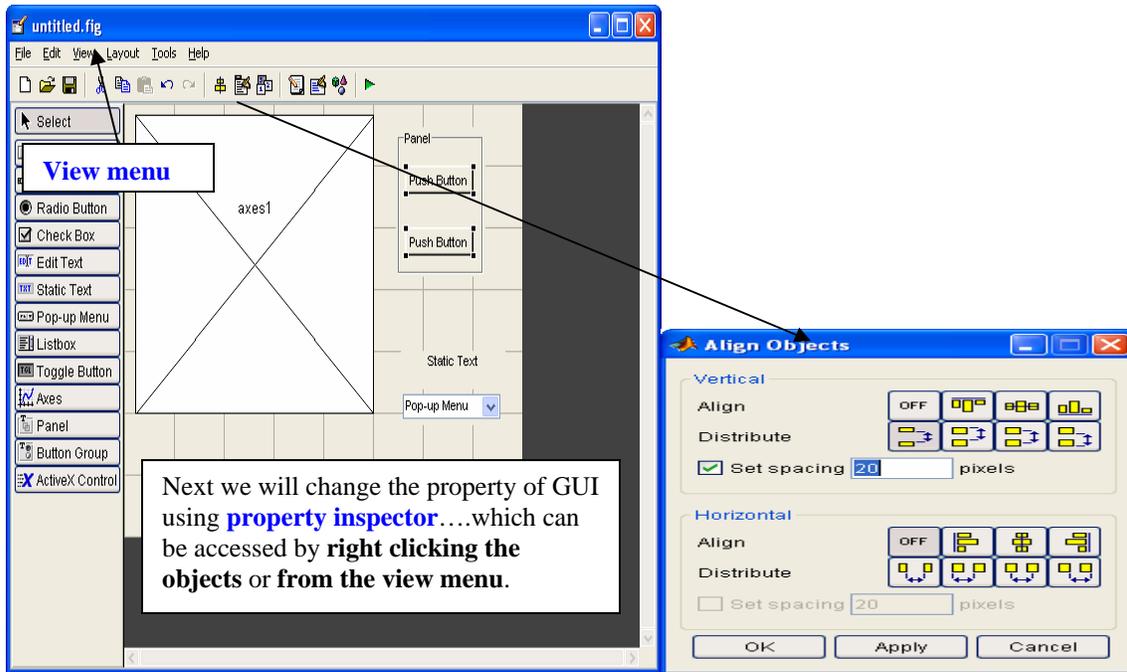
#### Step 5: Alignment & Setting up Objects



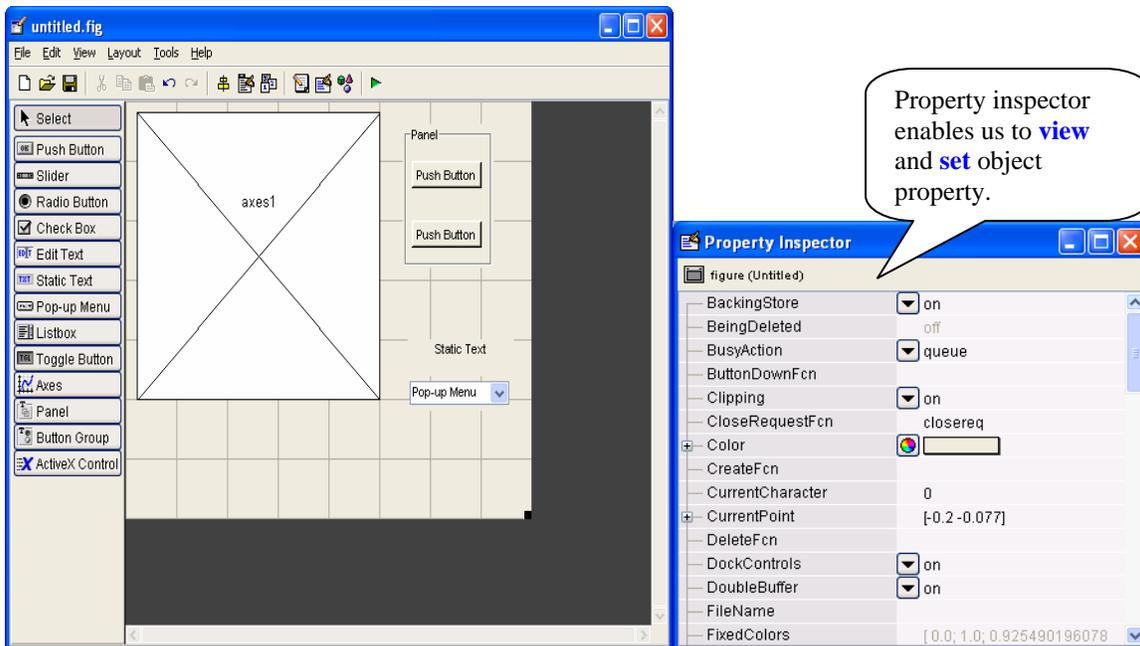
## Step 5.1: "Property Inspector"

There are two ways to reach "property inspector"!

1. Right click on the object.
2. Select it from the "View" menu

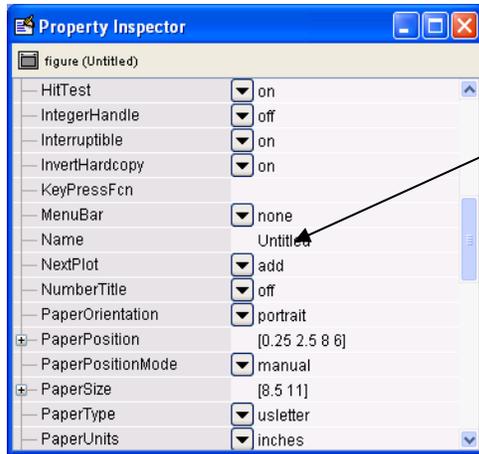


## Functions of Property Inspector: View & Set object property

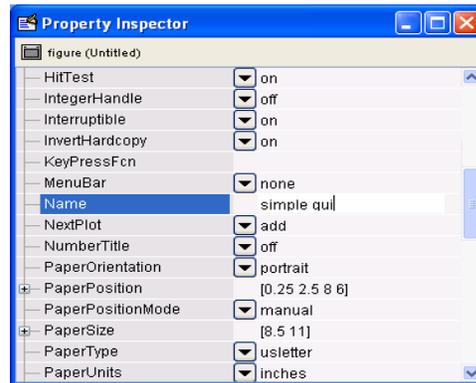


## Rename the GUI from “Property Inspector”

Rename it from “Untitled” to “simple gui”

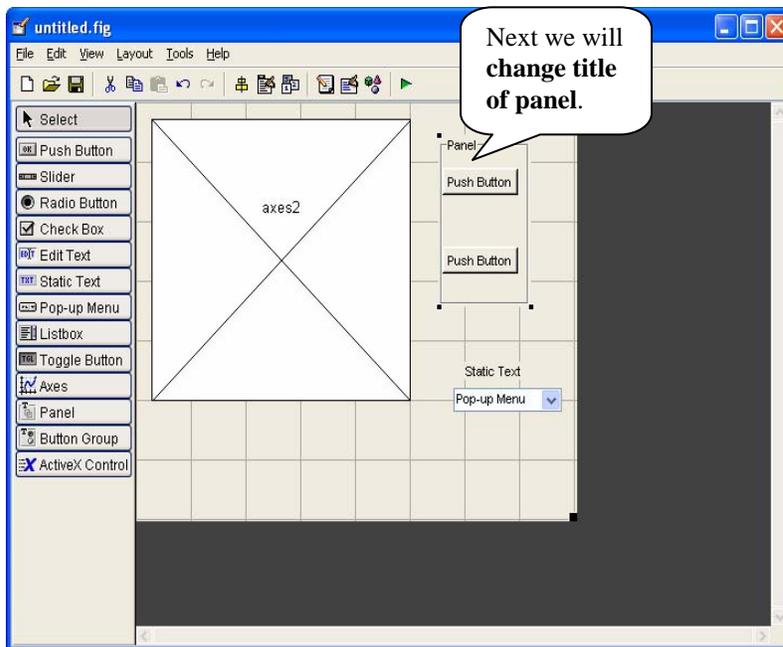


First, we will change the name property of GUI. This is what is displayed in the GUI title. We will change the title to whatever title we want lets say simple gui, as shown below.

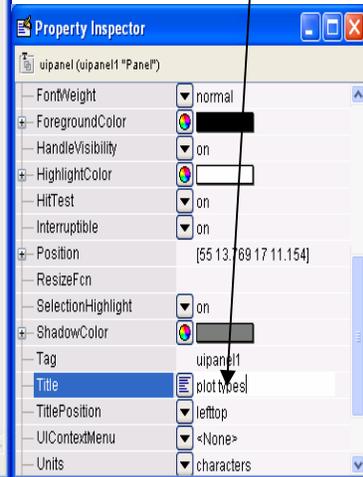


## Rename the Panel

Change the “title” from “Panel” to “Plot types”!

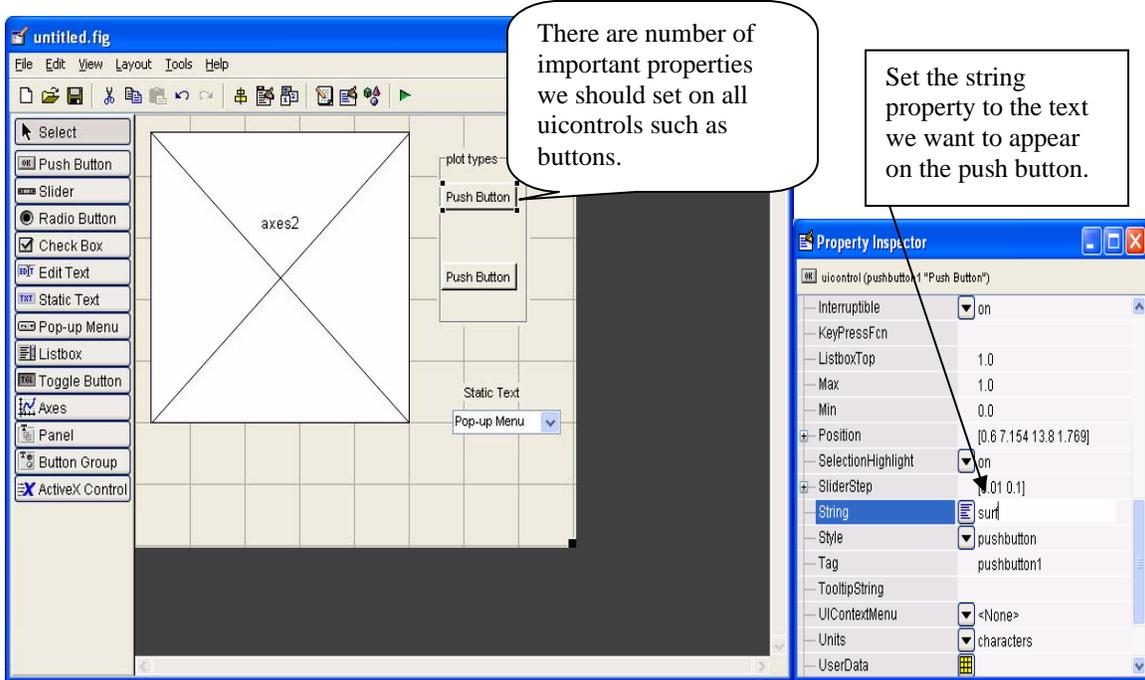


We change the title in property Inspector.

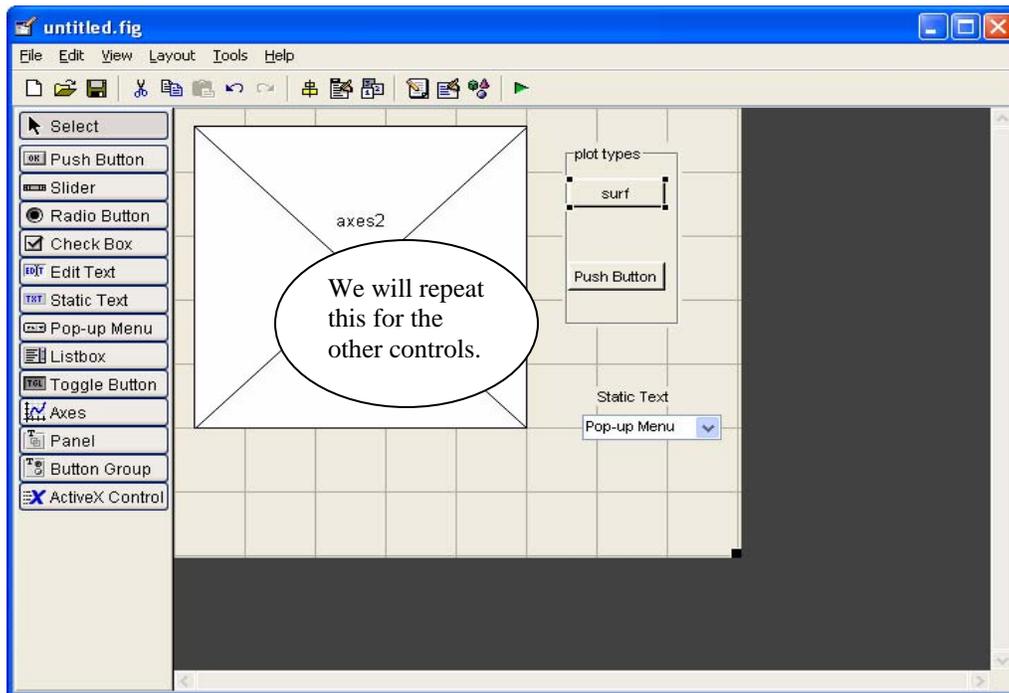


## Set up the “String Property”

Change the “string” from “Push Button” to “surf”.



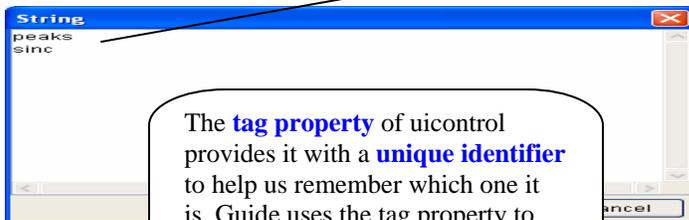
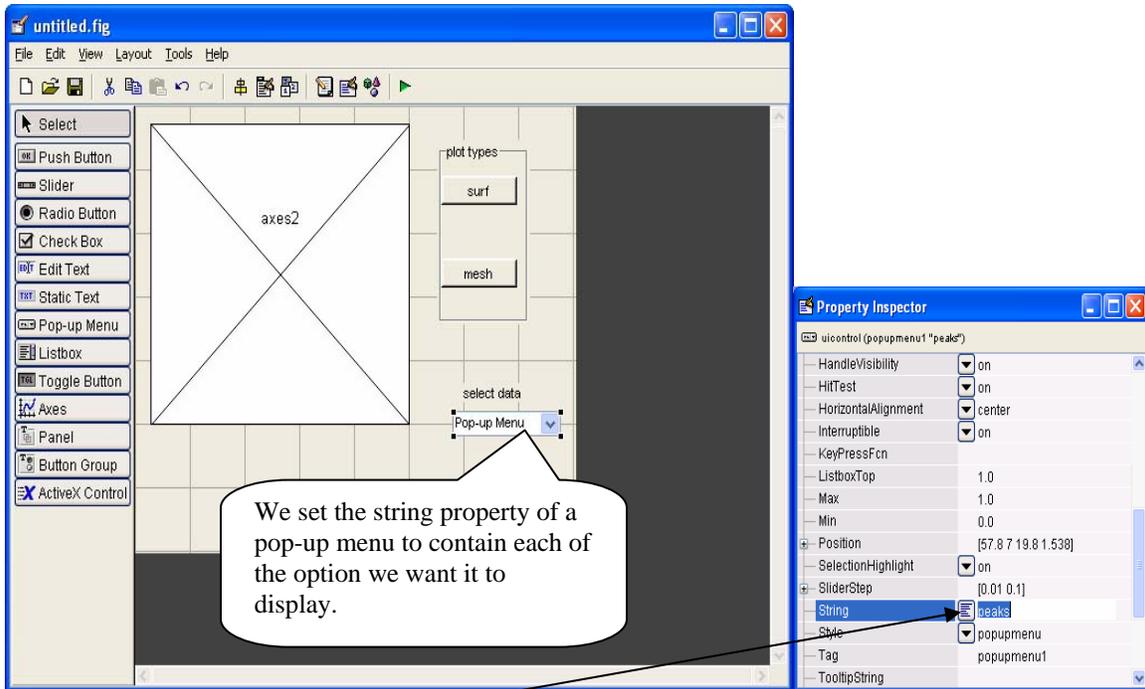
The screenshot shows the MATLAB GUI editor interface. On the left is a toolbox with various UI controls. The main workspace contains a plot area labeled 'axes2' and a 'plot types' panel with two 'Push Button' controls. A 'Property Inspector' window is open on the right, showing the properties for the selected 'uicontrol (pushbutton1 \*Push Button\*)'. The 'String' property is highlighted and set to 'surf'. A callout bubble points to the 'String' property with the text: 'Set the string property to the text we want to appear on the push button.' Another callout bubble points to the 'Push Button' controls in the workspace with the text: 'There are number of important properties we should set on all uicontrols such as buttons.'



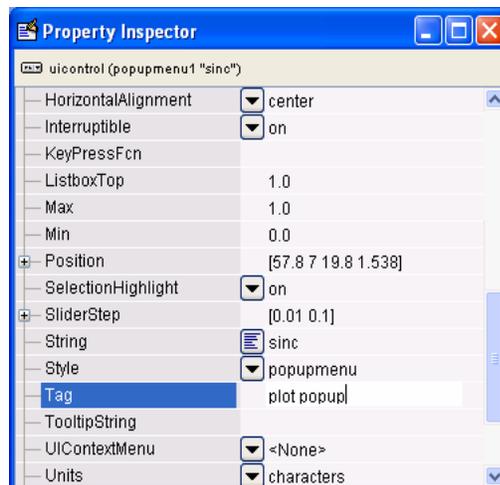
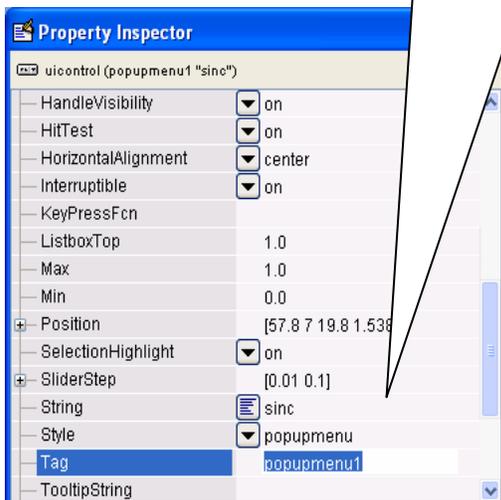
The screenshot shows the MATLAB GUI editor interface. The 'plot types' panel now contains a text box labeled 'surf' and a 'Push Button' control. A callout bubble points to the 'surf' text with the text: 'We will repeat this for the other controls.'

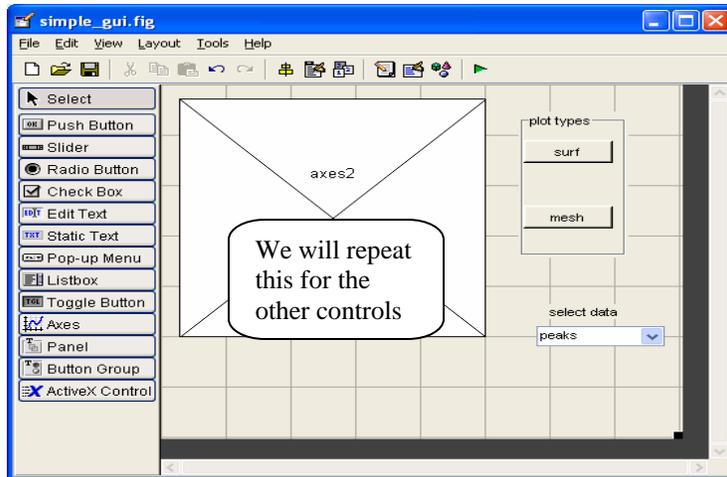
## Set up the “Tag Property”

Change the “String” from “Pop-up menu” to “peaks sinc” as shown below.

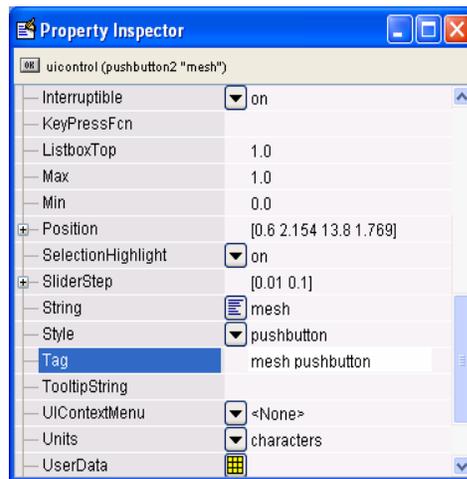
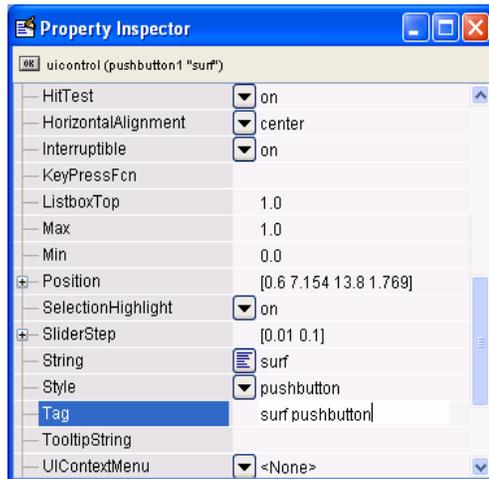


Change the “Tag Property” from “popupmenu1” to “plot popup”

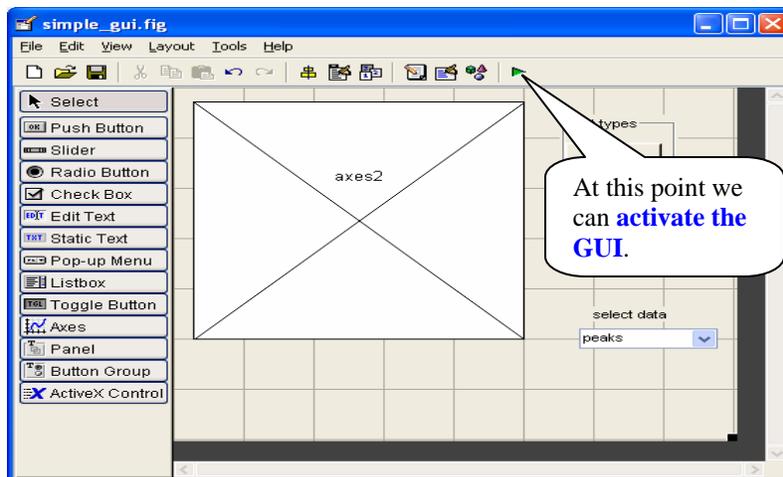




Change the “Tag Property” from “pushbutton1” to “surf pushbutton”  
 Change the “Tag Property” from “pushbutton 2” to “mesh push button”

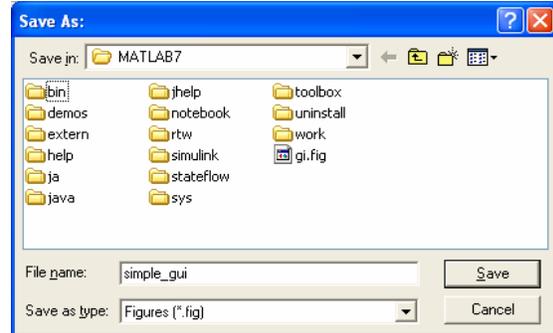
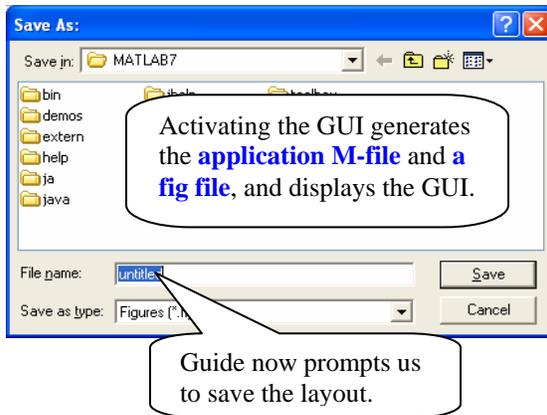


Step 6: Activate the GUI

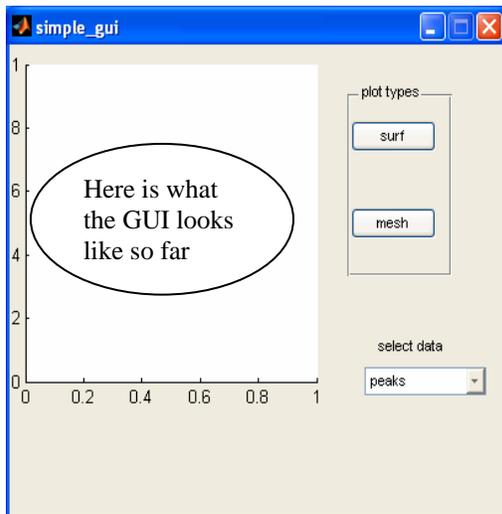


## Step 6.1: Save the file

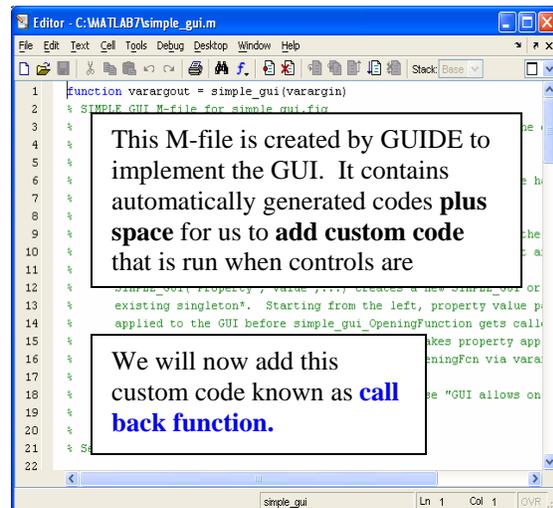
Save the file as “simple\_gui”.



## Step 6.2: How your GUI looks like?



## Step 6.3: Your GUI codes



## Step 7: Adding Custom Code (Call Back Function)

The "show functions" button will help us navigate the M-file to each callback.

We will go to the **openingFcn** routine which is called first when GUI runs.

Here we will **define three data two data sets and create an initial plot.**

In this function, we can **load or create data** which is used in the GUI and we can do some initial plotting.

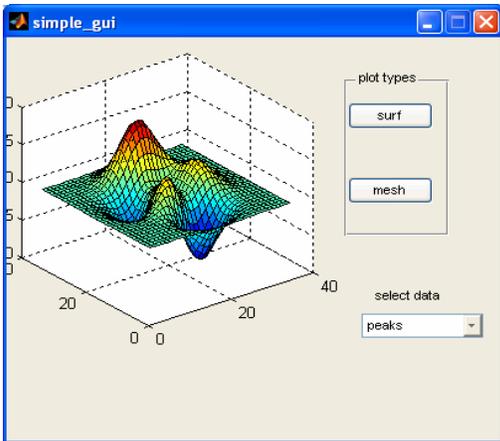
To share data within the GUI we use the **handles structure** which is passed between functions.

This auto generated lines **specifies what is returned as an output argument** when the GUI is called.

This line at the end is **required to update the handles data structure.**

We can look at the created GUI again.

We will switch back to our layout editor.



When a GUI is completed and running and we click on a **user interface control** such as a push button MATLAB executes the controls call back function

There are two ways to execute “**Call Back Function**”.

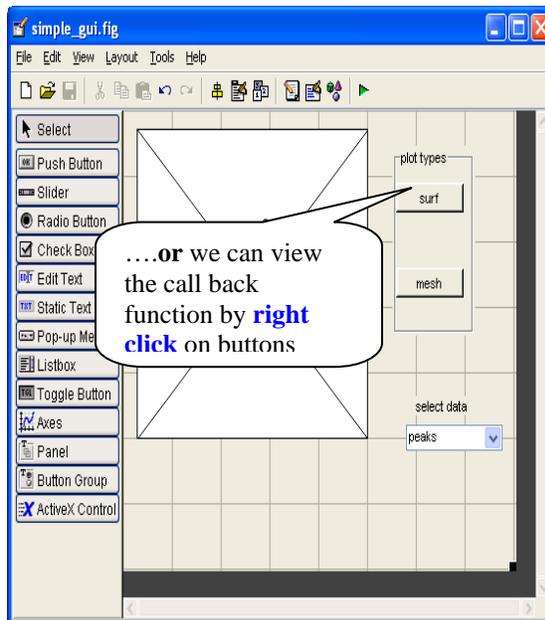
1. Click on “how functions” button
2. Right Click on the buttons that you want to call back.

To navigate the uicontrols call back function in the generated M-code, we can **either** use the “**show functions**” button in the editor.....

```

52 % hObject handle to figure
53 % eventdata reserved - to be defined in a future version of MATLAB
54 % eventdata reserved - to be defined in a future version of MATLAB
55 % varargin variable arguments (see VARARGIN)
56
57
58
59
60
61
62
63
64 % Choose default command line output for simple_gui
65 handles.output = hObject;
66
67 % Update handles structure
68 guidata(hObject, handles);
69
70 % UIWAIT makes simple_gui wait for user response (see UIRESUME)
71 % uiwait(handles.figure1);
72

```



For the first push button labeled surf, we will specify that a surface plot of the current selected data is created and we will repeat this for other callbacks.

```

86 % --- Executes on button press in pushbutton1.
87 function pushbutton1_Callback(hObject, eventdata, handles)
88 % hObject handle to pushbutton1 (see GCBO)
89 % eventdata reserved - to be defined in a future version of MATLAB
90 % handles structure with handles and user data (see GUIDATA)
91
92
93 % --- Executes on button press in pushbutton2.
94 function pushbutton2_Callback(hObject, eventdata, handles)
95 % hObject handle to pushbutton2 (see GCBO)
96 % eventdata reserved - to be defined in a future version of MATLAB
97 % handles structure with handles and user data (see GUIDATA)

```

```

86 % --- Executes on button press in pushbutton1.
87 function pushbutton1_Callback(hObject, eventdata, handles)
88 % hObject handle to pushbutton1 (see GCBO)
89 % eventdata reserved - to be defined in a future version of MATLAB
90 % handles structure with handles and user data (see GUIDATA)
91 % display surf plot of current selected data
92 surf(handles.current_data);
93
94 % --- Executes on button press in pushbutton2.
95 function pushbutton2_Callback(hObject, eventdata, handles)
96 % hObject handle to pushbutton2 (see GCBO)
97 % eventdata reserved - to be defined in a future version of MATLAB
98 % handles structure with handles and user data (see GUIDATA)
99 %display mesh plot of current selected data
100 mesh(handles.current_data);
101
102 % --- Executes on selection change in popupmenu1.
103 function popupmenu1_Callback(hObject, eventdata, handles)
104 % hObject handle to popupmenu1 (see GCBO)
105 % eventdata reserved - to be defined in a future version of MATLAB
106 % handles structure with handles and user data (see GUIDATA)
107

```

The pop up menu enables the GUI user to select the data to plot.

```

94 % --- Executes on button press in pushbutton2.
95 function pushbutton2_Callback(hObject, eventdata, handles)
96 % hObject handle to pushbutton2 (see GCBO)
97 % eventdata reserved - to be defined in a future version of MATLAB
98 % handles structure with handles and user data (see GUIDATA)
99 %display mesh plot of current selected data
100 mesh(handles.current_data);
101
102 % --- Executes on selection change in popupmenu1.
103 function popupmenu1_Callback(hObject, eventdata, handles)
104 % hObject handle to popupmenu1 (see GCBO)
105 % eventdata reserved - to be defined in a future version of MATLAB
106 % handles structure with handles and user data (see GUIDATA)
107
108 % Hints: contents = get(hObject,'Contents') returns
109 % contents as a cell array containing the text from
110 % the popup menu.
111
112 % --- Executes during object creation, after setting all properties.
113 function popupmenu1_CreateFcn(hObject, eventdata, handles)
114 % hObject handle to popupmenu1 (see GCBO)
115 % eventdata reserved - to be defined in a future version of MATLAB

```

Depending upon which menu option is selected...

..the GUI will set the current data to one of the two datasets created before

```

97 % eventdata reserved
98 % handles structure
99 %display mesh plot of
100 mesh(handles.current_data);
101
102 % --- Executes on selection change in popupmenu1.
103 function popupmenu1_Callback(hObject, eventdata, handles)
104 % hObject handle to popupmenu1 (see GCBO)
105 % eventdata reserved - to be defined in a future version of MATLAB
106 % handles structure with handles and user data (see GUIDATA)
107
108 % Hints: contents = get(hObject,'Contents') returns
109 % contents as a cell array containing the text from
110 % the popup menu.
111 val=get(hObject,'value');
112 str=get(hObject,'string');
113 switch str(val)
114 case 'peaks' % user select peaks
115     handles.current_data=handles.peaks;
116 case 'sinc' % user select sinc
117     handles.current_data=handles.sinc;
118 end

```

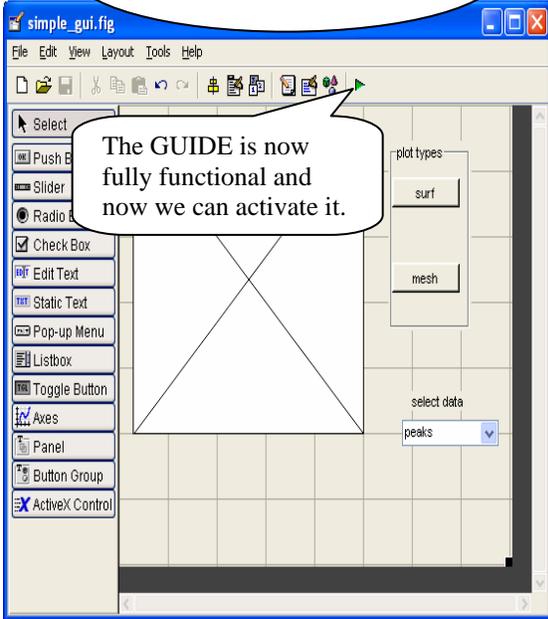
```

Editor - C:\MATLAB7\simple_gui.m
File Edit Text Cell Tools Debug Desktop Window Help
99 %display mesh plot of current selected data
100 mesh(handles.current_data);
101
102 % --- Executes on selection change in popupmenu1.
103 function popupmenu1_callback(hObject, eventdata, handles)
104 % hObject handle to popupmenu1 (see GCBO)
105 % eventdata reserved - to be defined in a future version of MATLAB
106 % handles structure with handles and user data (see GUIDATA)
107
108 % Hints: contents = get(hObject,'String') returns popupmenu1 contents
109 % contents(get(hObject,'Value')) returns selected item from po
110 val=get(hObject,'value');
111 str=get(hObject,'string');
112 switch str(val)
113     case 'peaks' % user select
114         handles.current_data=
115     case 'surf' % user select
116         handles.current_data=handles
117 end
118 guidata(hObject,handles);
119 % --- Executes during object creation, after setting all properties.
120 function popupmenu1_CreateFcn(hObject, eventdata, handles)

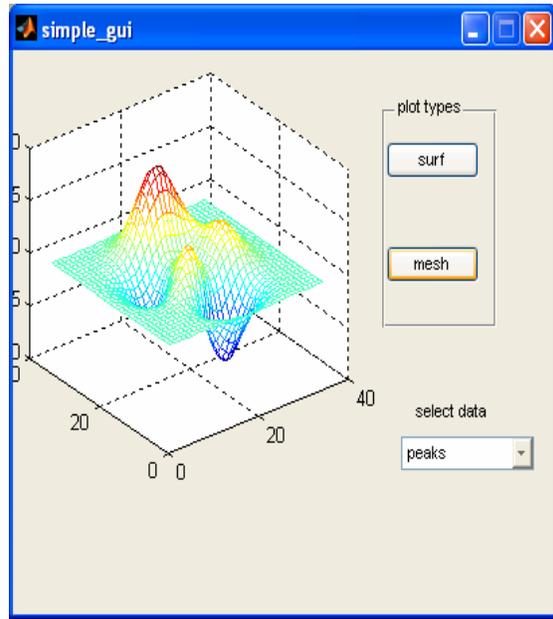
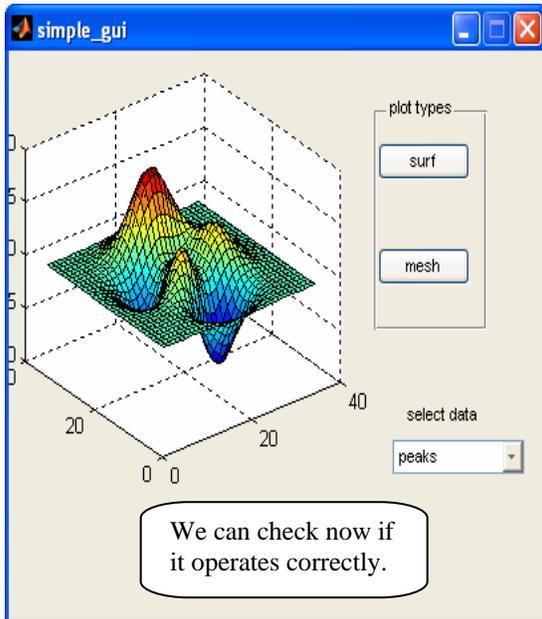
```

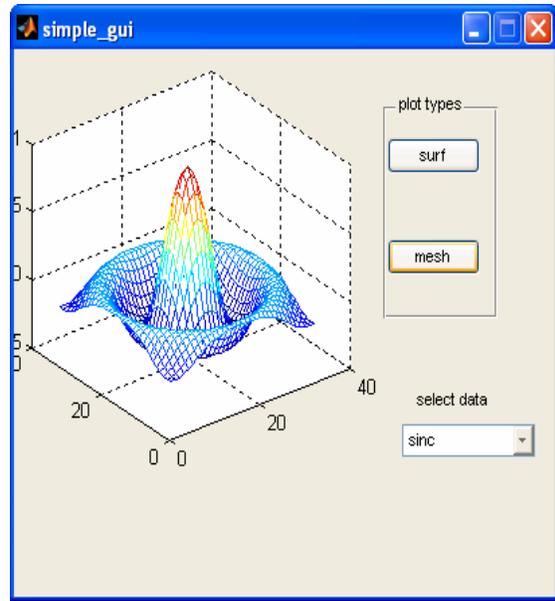
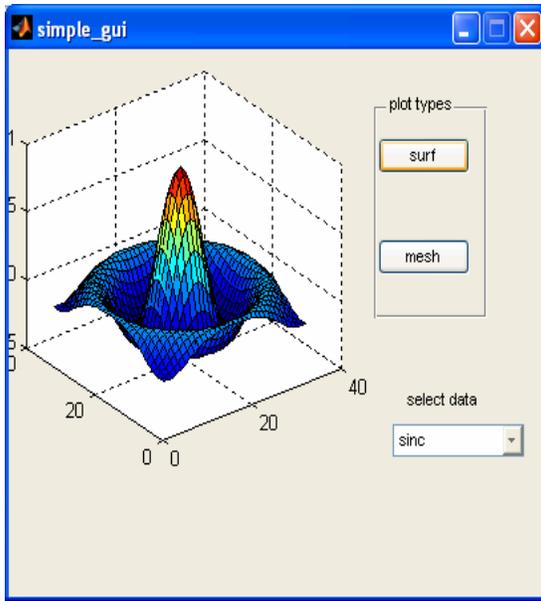
We now need to update the handles data structure once again.

We will bring back the guide layout editor...

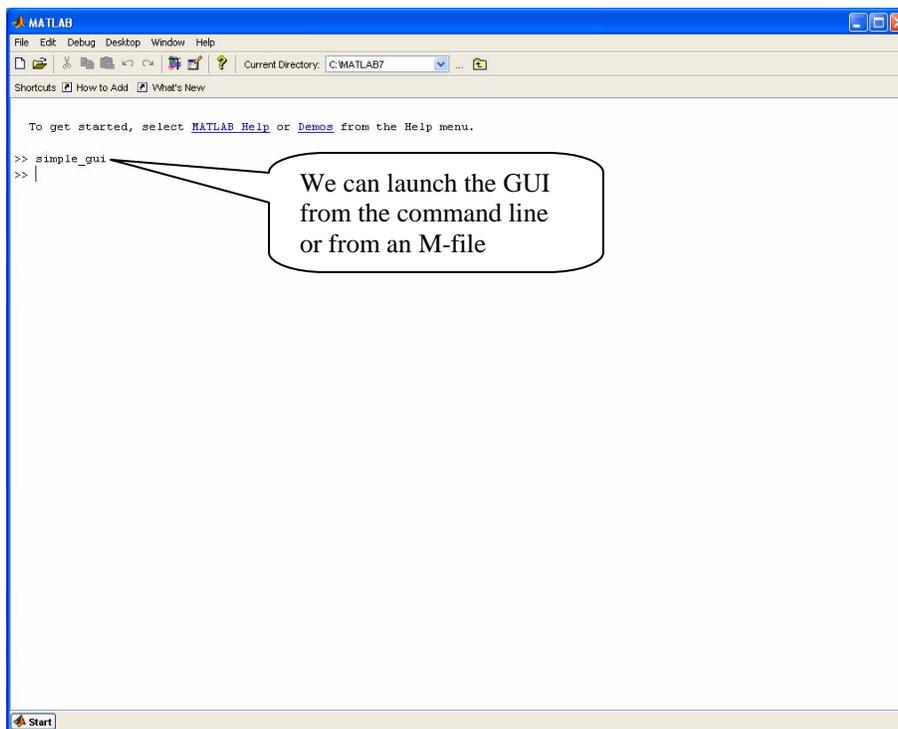


Final Step: Our GUI Outcome





## How to Launch GUI?



**This concludes the simple demonstration how to create GUI.**