Graphical User Interface Design in MATLAB

Zachary Hamida, PhD Student

Polytechnique Montreal

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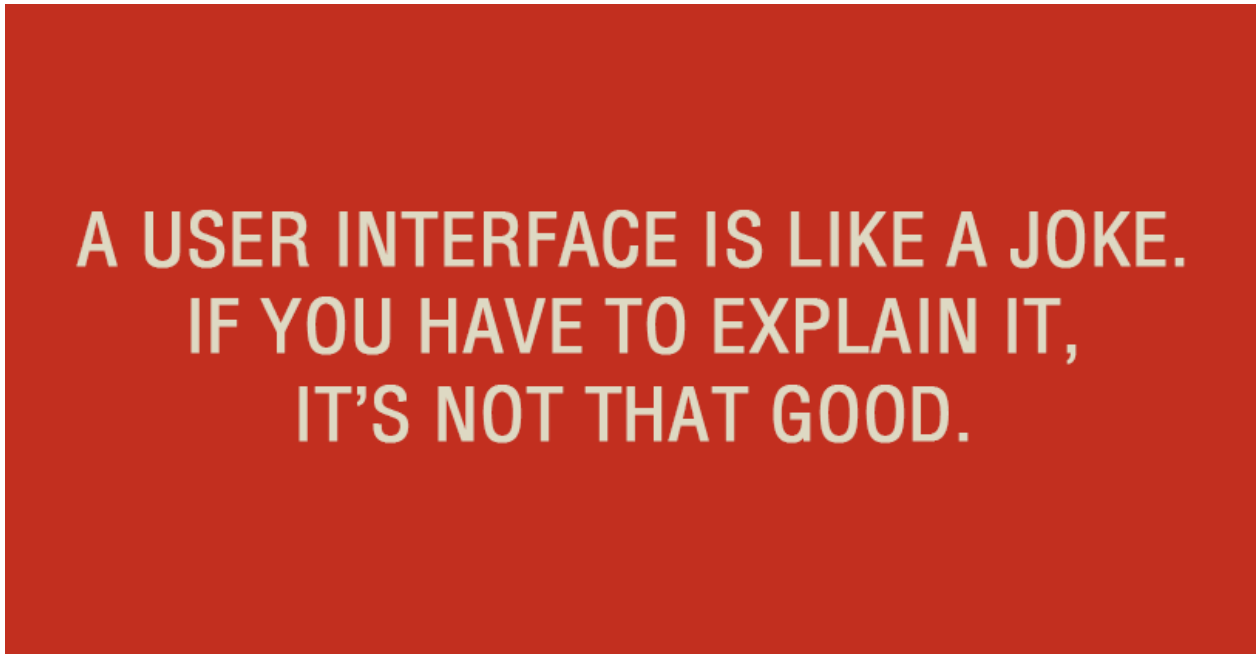
Graphical User Interface (GUI):

- GUI is a visual way of interacting with a computer program.
- The purpose of a GUI is to make things as easy as possible from the user end.

Graphical User Interface (GUI):



Martin LeBlanc

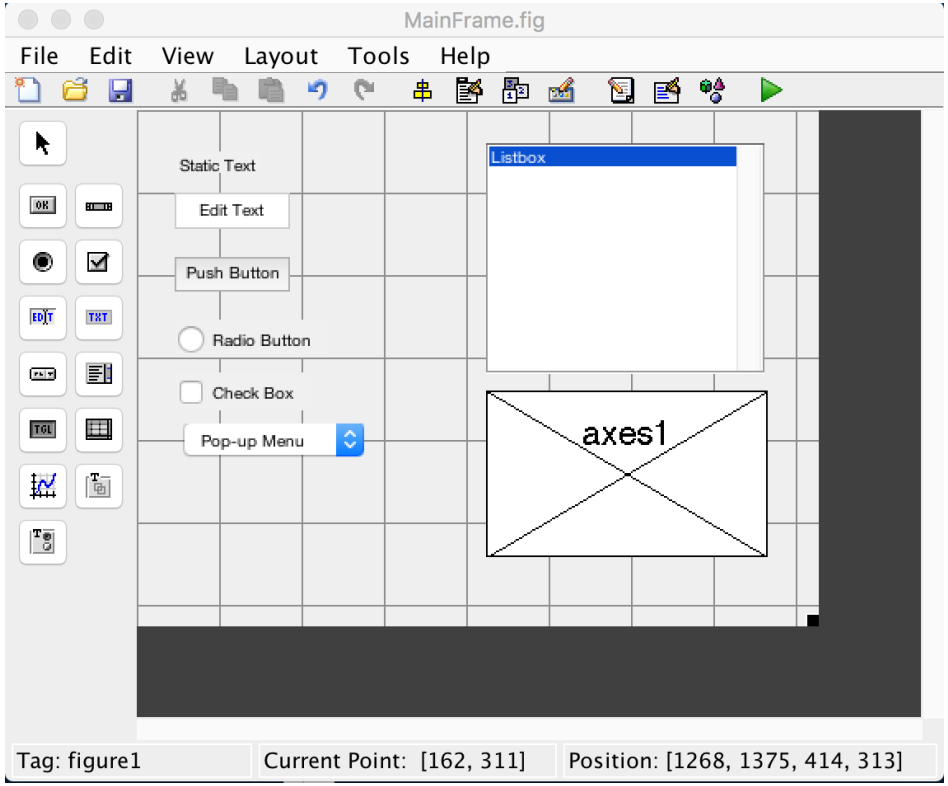
MATLAB GUI Main Components

1. Visual Components.
2. Code Components.

MATLAB GUI Visual Components

1. Figures (Frames).
2. Objects (i.e. Text box, drop down menu... etc.).

MATLAB GUI Visual Components



MATLAB GUI Code Components

1. Callback functions: sensors for the user actions, in which when it detects the action, it triggers a response. (response=execute your code!) (i.e. Mouse Click, Button Down, Click and hold... etc.).

2. Developer Code (you).

MATLAB GUI Code Components

```
% --- Executes on button press in pushbutton1.
function pushbutton1_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

My functions goes here, they will be excuted once the callback is triggered

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% Hints: contents = cellstr(get(hObject,'String')) returns listbox1 contents as cell array
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MATLAB GUI Code Components

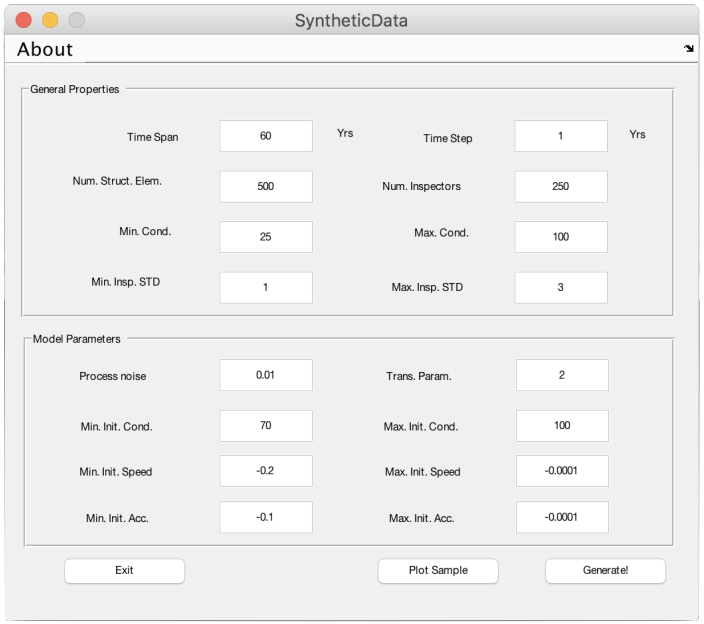
Callback function input arguments: (MathWorks)

1. hObject: the UI component that triggered the callback.

2. eventdata: a variable that contains detailed information about specific mouse or keyboard actions.

3. handles: a struct that contains all the objects in the UI. GUIDE uses the guidata function to store and maintain this structure.

Communicating with Objects:



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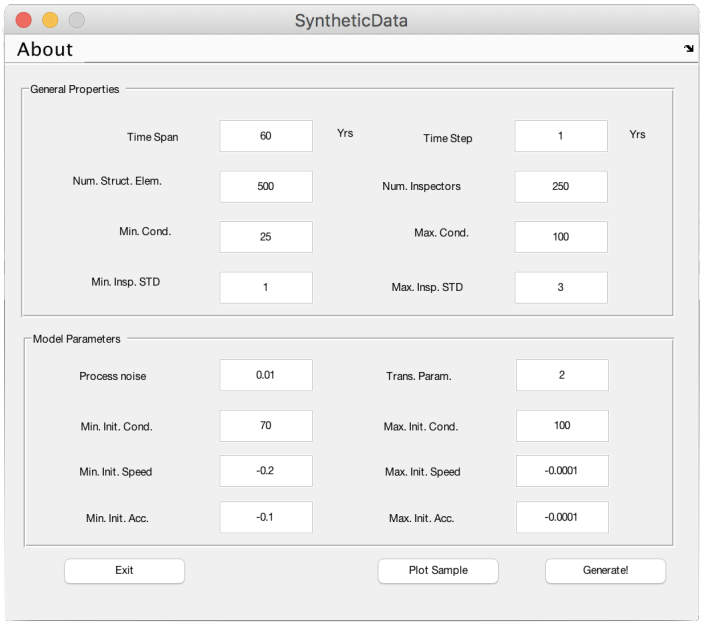


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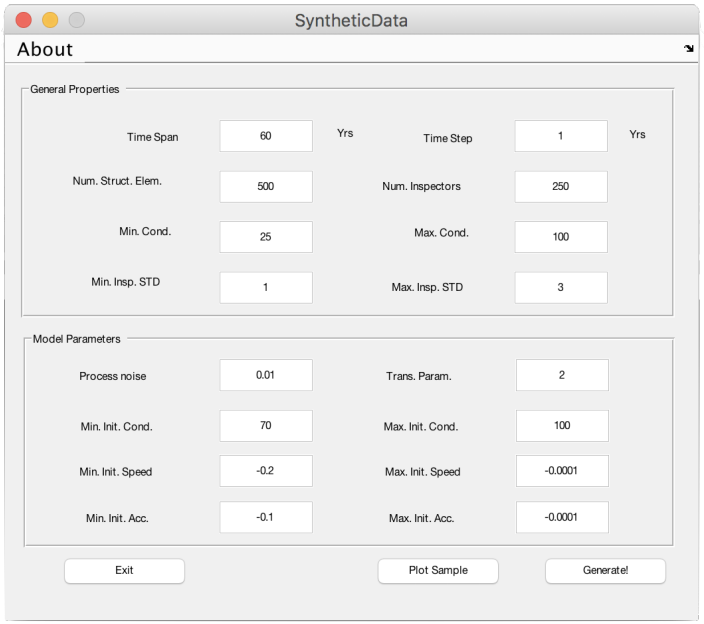

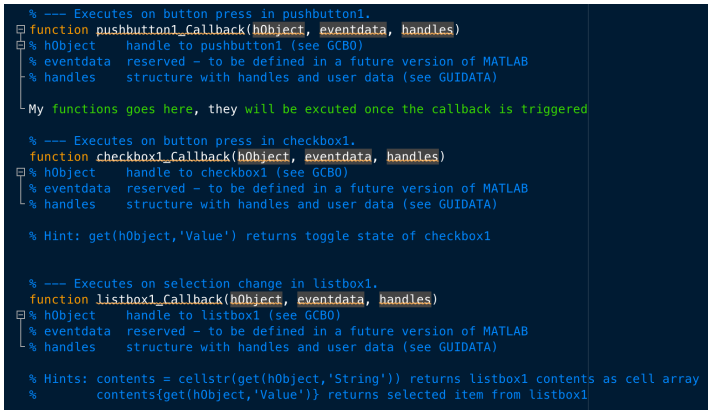

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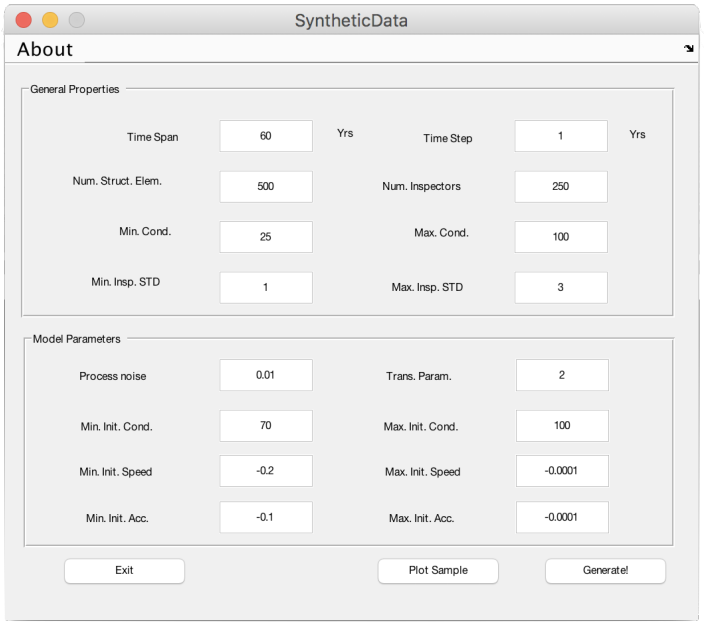

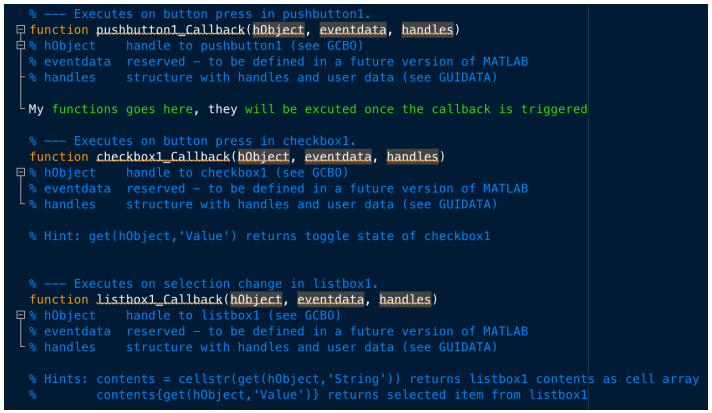

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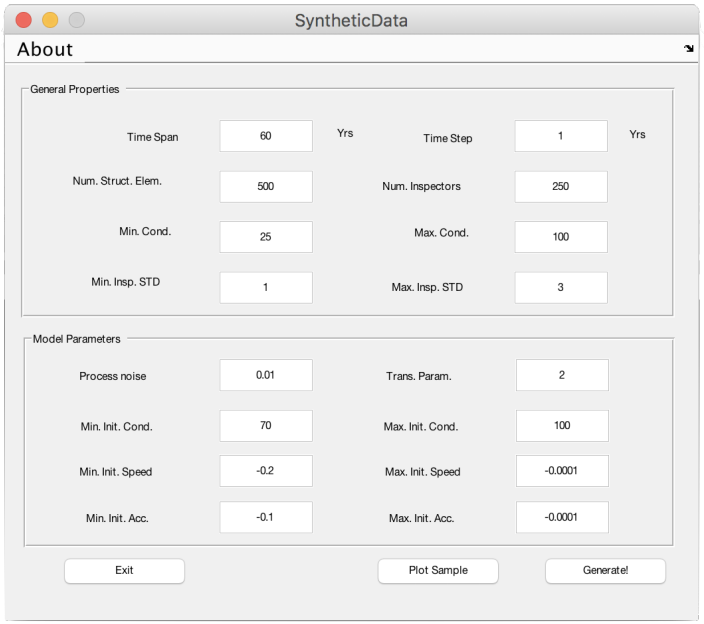

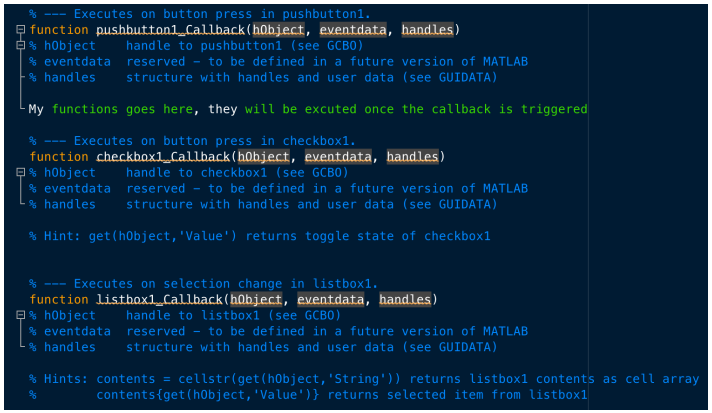

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-In which callback function I should place my code?

(A better question is:)

-What change (or actions) I want to happen instantly when the user interact with EACH OBJECT alone?

Communicating with/between Objects:

If I need to get information from other GUI objects or I need to send information to other GUI objects:

1. *set*(**handles**.ObjectTagName, 'property', $X_{variable}$).
2. $X_{variable}$ = *get*(**handles**.ObjectTagName, 'property').

Build a Simple GUI for a Function

Let's consider building a GUI to the following function.

```
%%Code snippet - Matlab
function [ y ] = ProductFun( x1, x2 )
y=x1.*x2;
end
```

*Matlab Tutorial 1

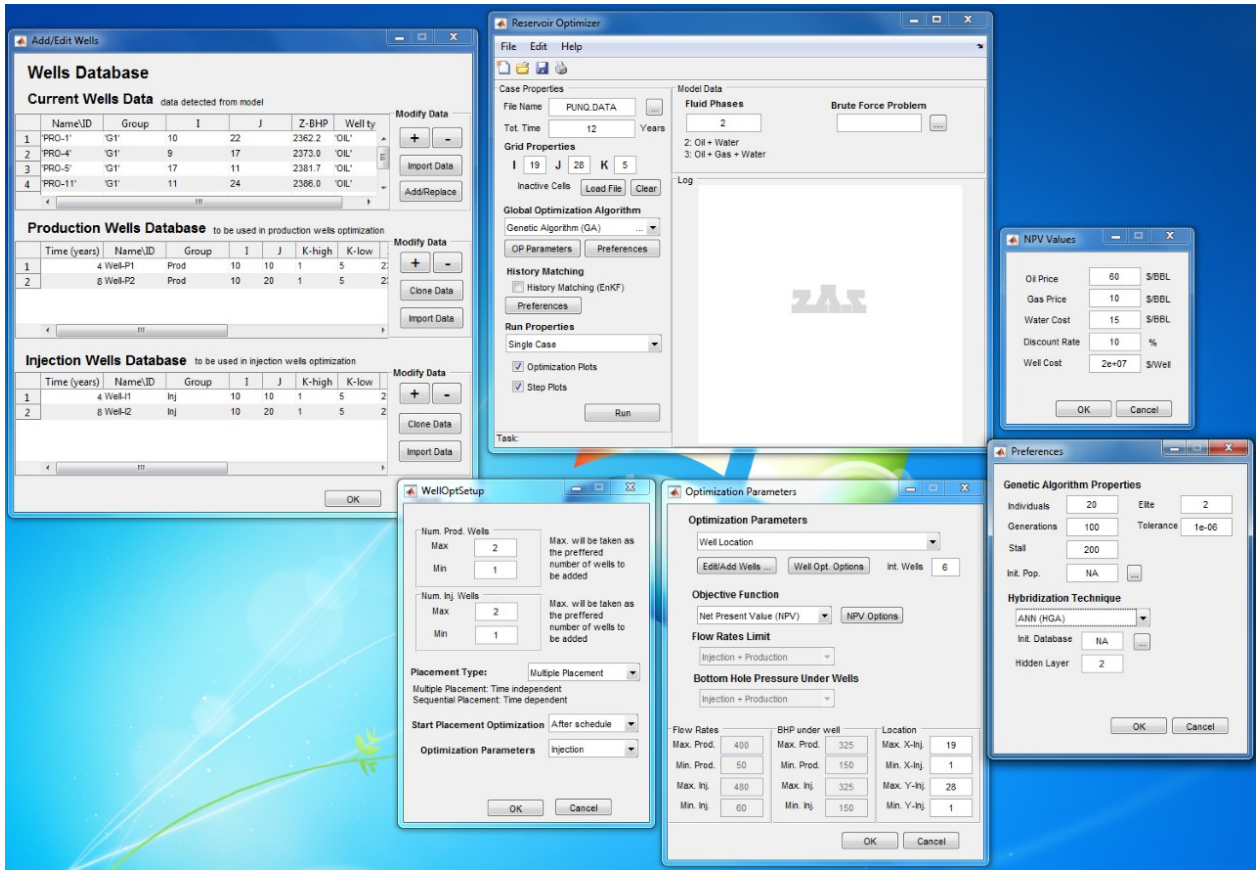
Loading and Extracting Data

```
%% Loading Data in Matlab GUI
FilterExt={'*.mat';'*.*'};
[FileName, FilePath]=uigetfile(FilterExt,'
    Select...');
MyData=load(fullfile(FilePath,FileName));

%% Saving Data in Matlab GUI
FilterExt={'*.mat';'*.*'};
[FileName, FilePath] = uiputfile(FilterExt,
    'Save as', 'My Output');
save(fullfile(pathname,filename),'My GUI
    Output');
```

*Matlab Tutorial 2

Build Multiple Frame GUI



*Matlab Tutorial 3

Exchanging Data Between Callbacks/Frames

1. Exchange data among callbacks:

```
setappdata(handles.MyObj, 'X', var);
MyVar=getappdata(handles.MyObj, 'X');
```

2. Exchange data among GUIs:

```
setappdata(0, 'X', var);
MyVar=getappdata(0, 'X');
```

3. Echange data among GUIs and among Callbacks:

```
global MyVar
```

Load Data at the Start

To start with with a set of default values, the code should be placed under the following function:

GUIFunctionName_OpeningFcn(hObject, eventdata, handles, varargin)

Graphical User Interface (GUI)

Summary:

1. GUI: main components are frames and objects.
2. A frame is a container for a set of objects.
3. Each object has a set of properties.
4. Objects properties are stored in "handles".
5. A change in the property of one of the objects may trigger a callback function.
6. We write code at the callback when an action (from the program) is expected to happen right after the user interaction with the object.