

GUI Program

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Summary :

This application note is mainly talk about what is GUI and how we are going to implement it in our project. We are using python instead of other programming languages to set our GUI.

Key word:

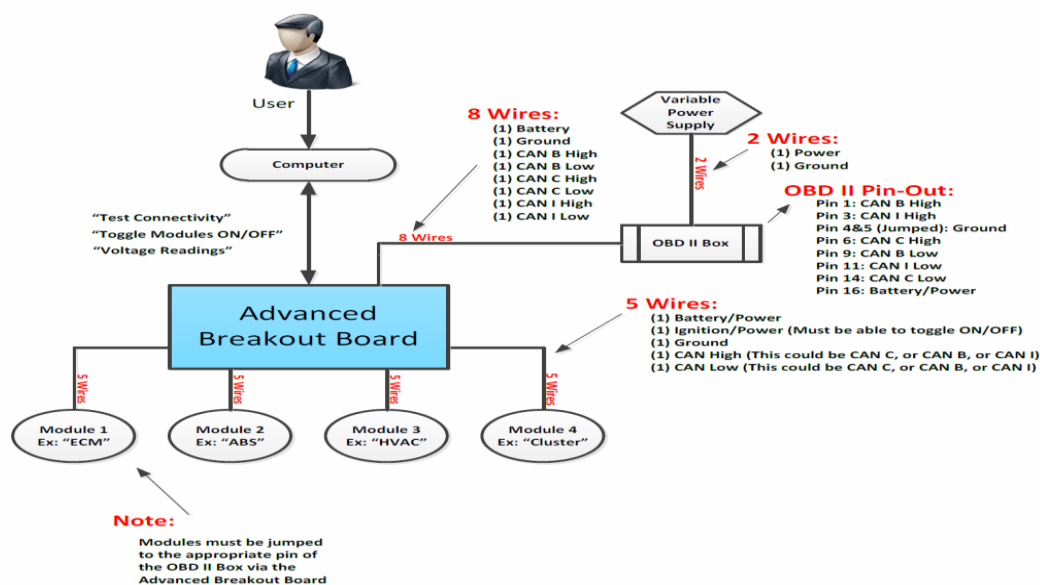
GUI, Python, TKinter, Interaction, Window, Control, Frame, Layout, Child, Widgets, Tree

Introduction

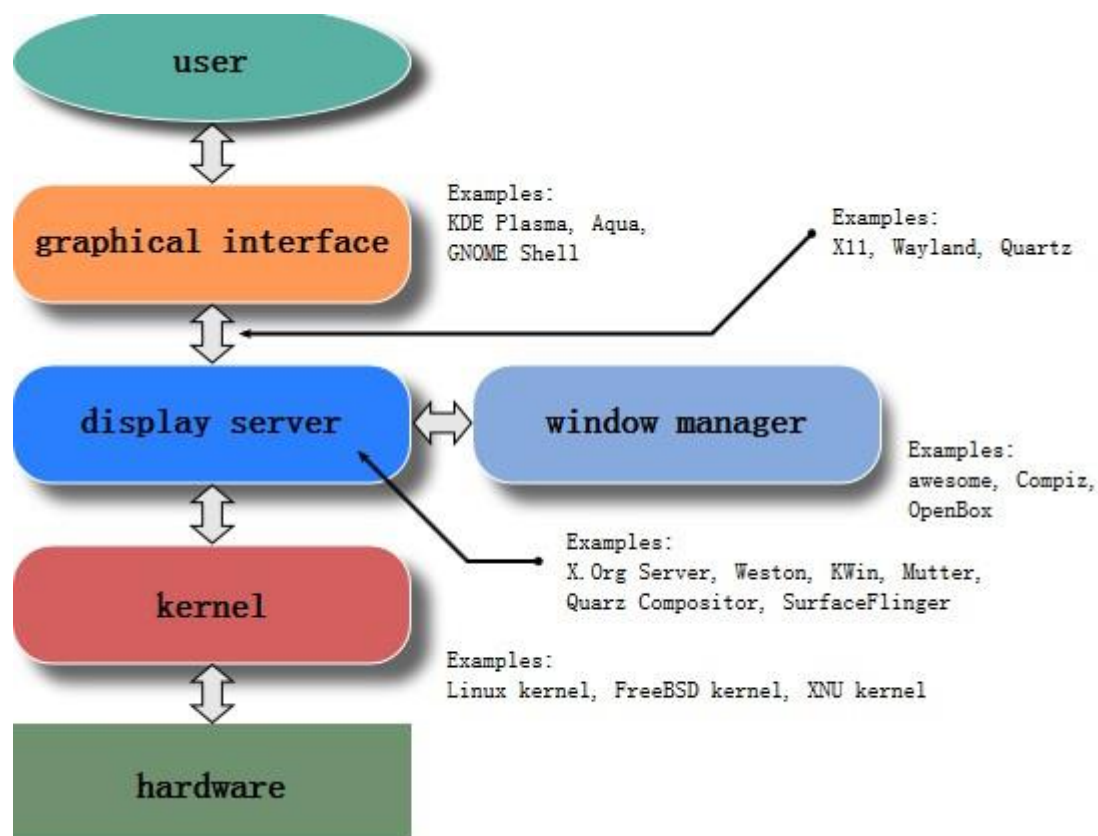
GUI is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicator. GUI was introduced in reaction to the perceived steep learning curve of command-line interfaces, which require commands to be typed on the keyboard. The actions in GUI are usually performed through direct manipulation of the graphical elements. Besides in computers which are mostly use, GUIs can be found in hand-held devices such as MP3 players and touch screen devices. For our project, we will use a laptop. The following image is an example of interface.



A GUI uses a combination of technologies and devices to provide a platform that the user can interact with, for the tasks of gathering and producing information. We will use GUI connected with a laptop and connected with our microcontroller on the other side. We need to read the voltage and current through microcontroller and display on our laptop by using the interaction of GUI, microcontroller and laptop. The following image is our basic structure of our project. We can see the GUI on the upper left side. Moreover, we have a link between GUI and microcontroller. We can easily control our new modules for cars by control our laptop through GUI.



Designing the visual composition and temporal behavior of GUI is an important part of software application programming in the area of human-computer interaction. There is lots of languages can programming the interface. For example, C++, Python, Java, PHP, Ruby and .NET are all accepted by GUI programming. Java is mostly used in current window designing. However, we have less time to do it. Thus, we choose Python instead. Python is simple to program. It also has many usable libraries, but it has some limitations. Luckily, Python is enough for programming our project. Here is the image for basic layer we need to handle. We need to combine them together and make it work.



GUI Programming

Python has a few ways to make graphical applications. We will concentrate on tKinter which is based on TK. While we programming GUI, there are some terms we probably need to know.

Window is an area of the screen controlled by an application. They are usually rectangular but some GUI environments permit other shapes. Windows can contain other windows and frequently every single GUI control is treated as a window in its own right.

Control is a GUI object used for controlling the application. Controls have properties and usually generate events. Normally controls correspond to application level objects and the events are coupled to methods of the corresponding object such that when an event occurs the object executes one of its methods. The GUI environment usually provides a mechanism for binding events to methods.

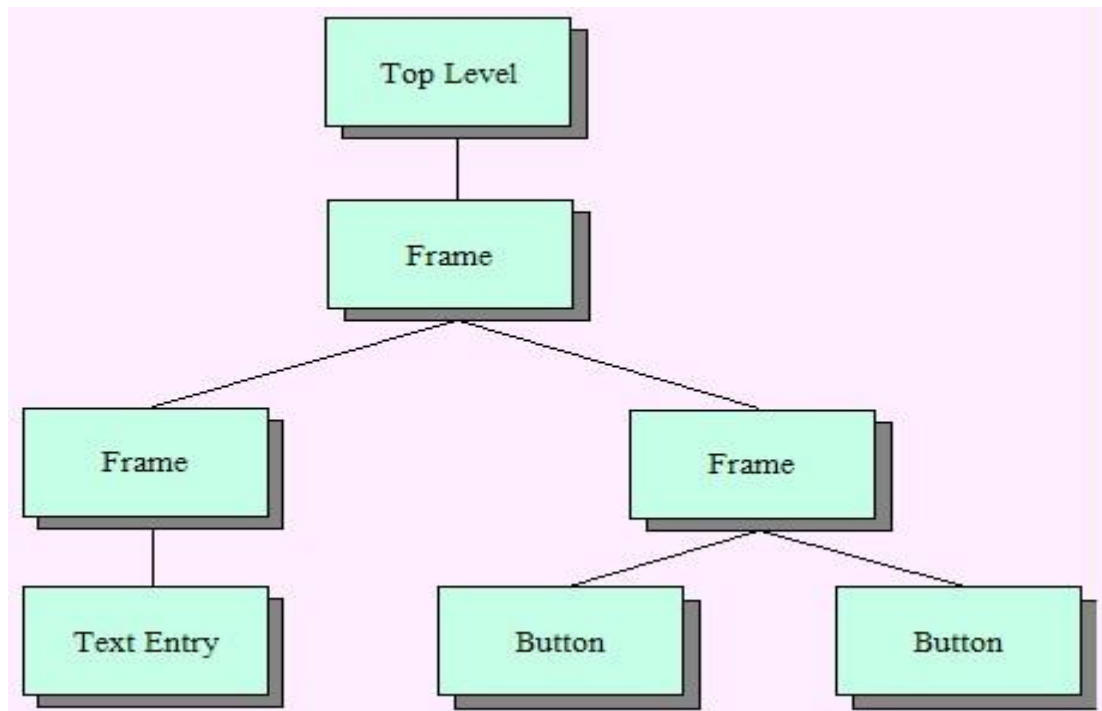
Frame is a type of widget used to group other widgets together. Often a Frame is used to represent the complete window and further frames are embedded within it.

Controls are laid out within a Frame according to a particular form of Layout. The Layout may be specified in a number of ways, either using on-screen coordinates specified in pixels, using relative position to other components.

For Child term, GUI applications tend to consist of a hierarchy of widgets or controls. The top level Frame comprising the application window will contain sub frames which in turn contain still more frames or controls. These controls can be looked as a tree structure with each control having a single parent and a number of children.

Widgets are that subset of controls which are visible and can be manipulated by the user or programmer.

As I mentioned, we need build a tree so that we can visualize our process. The follow image is a simple tree for the application.



Then, we can start to program our GUI by using python language.

```
from Tkinter import *
```

```
# set up the window itself
```

```
top = Tk()
```

```
F = Frame(top)
```

```
F.pack()
```

```
# add the widgets
```

```
lHello = Label(F, text="Hello")
```

```
lHello.pack()
```

```
bQuit = Button(F, text="Quit", command=F.quit)
```

```
bQuit.pack()
```

These codes are basic part for setting each part. There will be more code for setting on it. We can use **top.mainloop()** to start our event controlling. After we finish using one item, we need to delete them each time in order to save our memory. Each item we can build a class to define them and call them in main control function. At last, we can handle several dialogue windows by using specific commands which are exist in python library.