tk_tools Documentation

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Mar 27, 2022

Contents

CHAPTER 1

Installation

1.1 Pip

To install, simply `pip install tk_tools`. All images and other source material are included as packages within python, so you shouldn't have to do any funky workarounds even when using this package in pyinstaller or other static execution environments. Some environments may require some basic modification to this, such as the use of *pip3* instead of *pip*.

1.2 Setup.py

Clone the git repository, navigate to the cloned directory, and `python3 setup.py install`.

1.3 Dependencies

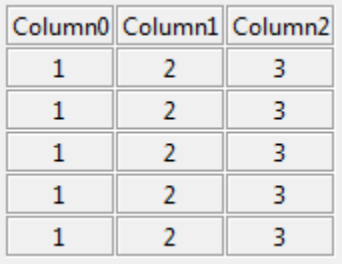
The tk_tools package is written with Python 3.5+ in mind! It uses type hints so that your IDE - such as PyCharm - can easily identify potential issues with your code as you write it. If you want this to support a different python version, create an issue and I'm sure that we can work something out easily enough.

CHAPTER 2

Widget Groups

Widget Groups consist of groups of other widgets.

2.1 LabelGrid



Column0	Column1	Column2
1	2	3
1	2	3
1	2	3
1	2	3
1	2	3

class groups.**LabelGrid**(*parent*, *num_of_columns: int*, *headers: list = None*, ***options*)

A table-like display widget.

Parameters

- **parent** – the tk parent element of this frame
- **num_of_columns** – the number of columns contained of the grid
- **headers** – a list containing the names of the column headers

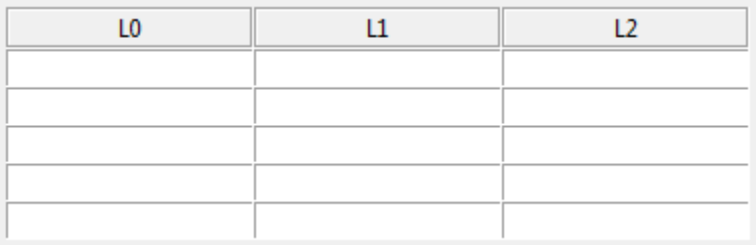
add_row(*data: list*)

Add a row of data to the current widget

Parameters **data** – a row of data

Returns None

2.2 EntryGrid



class groups.**EntryGrid**(*parent*, *num_of_columns: int*, *headers: list = None*, ***options*)
Add a spreadsheet-like grid of entry widgets.

Parameters

- **parent** – the tk parent element of this frame
- **num_of_columns** – the number of columns contained of the grid
- **headers** – a list containing the names of the column headers

add_row(*data: list = None*)
Add a row of data to the current widget, add a <Tab> binding to the last element of the last row, and set the focus at the beginning of the next row.

Parameters **data** – a row of data

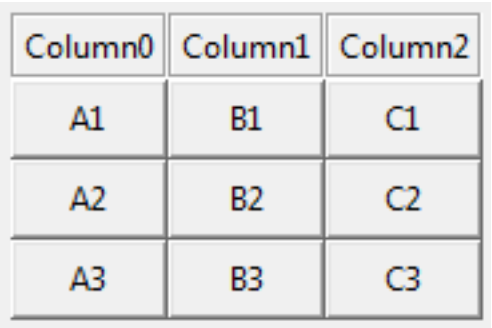
Returns None

read(*as_dicts=True*)
Read the data from the entry fields

Parameters **as_dicts** – True if list of dicts required, else False

Returns entries as a dict or table

2.3 ButtonGrid



class groups.**ButtonGrid**(*parent*, *num_of_columns: int*, *headers: list = None*, ***options*)
A grid of buttons.

Parameters

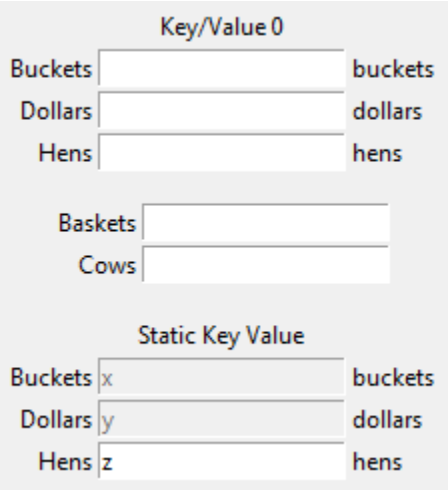
- **parent** – the tk parent element of this frame
- **num_of_columns** – the number of columns contained of the grid

- **headers** – a list containing the names of the column headers

add_row(*data: list*, *row_label: str = None*)
Add a row of buttons each with their own callbacks to the current widget. Each element in *data* will consist of a label and a command. :param data: a list of tuples of the form ('label', <callback>) :return: None

2.4 KeyValueEntry

The screenshot consists of three individual examples of `KeyValueEntry` widgets.



class groups.**KeyValueEntry**(*parent*, *keys: list*, *defaults: list = None*, *unit_labels: list = None*, *enables: list = None*, *title: str = None*, *on_change_callback: callable = None*, ***options*)
Creates a key-value input/output frame.

Parameters

- **parent** – the parent frame
- **keys** – the keys represented
- **defaults** – default values for each key
- **unit_labels** – unit labels for each key (to the right of the value)
- **enables** – True/False for each key
- **title** – The title of the block
- **on_change_callback** – a function callback when any element is changed
- **options** – frame tk options

add_row(*key: str*, *default: str = None*, *unit_label: str = None*, *enable: bool = None*)
Add a single row and re-draw as necessary

Parameters

- **key** – the name and dict accessor
- **default** – the default value
- **unit_label** – the label that should be applied at the right of the entry
- **enable** – the 'enabled' state (defaults to True)

Returns

change_enables(*enables_list: list*)
Enable/disable inputs.

Parameters **enables_list** – list containing enables for each key

Returns None

get()
Retrieve the GUI elements for program use.

Returns a dictionary containing all of the data from the key/value entries

load(*data: dict*)
Load values into the key/values via dict.

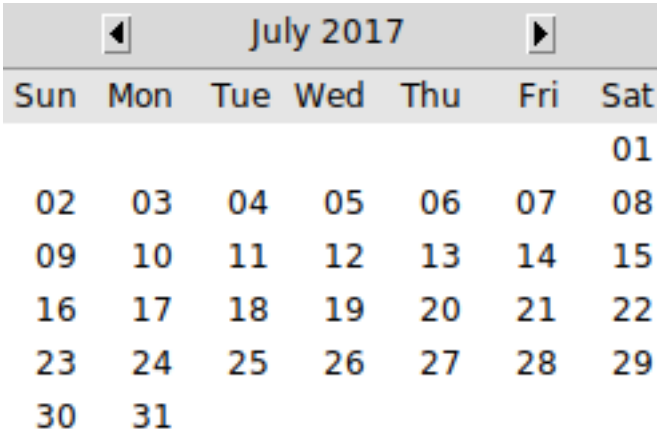
Parameters **data** – dict containing the key/values that should be inserted

Returns None

reset()
Clears all entries.

Returns None

2.5 Calendar



class groups.**Calendar**(*parent*, *callback: callable = None*, *year: int = None*, *month: int = None*, *day: int = None*, ***kwargs*)
Graphical date selection widget, with callbacks. To change the language, use the `locale` library with the appropriate settings for the target language. For instance, to display the `Calendar` widget in German, you might use:

```
locale.setlocale(locale.LC_ALL, 'deu_deu')
```

Parameters

- **parent** – the parent frame
- **callback** – the callable to be executed on selection
- **year** – the year as an integer, i.e. *2020*
- **month** – the month as an integer; not zero-indexed; i.e.

"1" will translate to "January" :param day: the day as an integer; not zero-indexed :param kwargs: tkinter.frame keyword arguments

add_callback(*callback: callable*)
Adds a callback to call when the user clicks on a date

Parameters **callback** – a callable function

Returns None

class datetime(*year*, *month*, *day*[, *hour*[, *minute*[, *second*[, *microsecond*[, *tzinfo*]]]]])
The year, month and day arguments are required. tzinfo may be None, or an instance of a tzinfo subclass. The remaining arguments may be ints.

astimezone()
tz -> convert to local time in new timezone tz

combine()
date, time -> datetime with same date and time fields

ctime()
Return ctime() style string.

date()
Return date object with same year, month and day.

dst()
Return self.tzinfo.dst(self).

fromisoformat()
string -> datetime from datetime.isoformat() output

fromtimestamp()
timestamp[, tz] -> tz's local time from POSIX timestamp.

isoformat()
[sep] -> string in ISO 8601 format, YYYY-MM-DDT[HH[:MM[:SS[.mmm[uuu]]]]][+HH:MM]. sep is used to separate the year from the time, and defaults to 'T'. timespec specifies what components of the time to include (allowed values are 'auto', 'hours', 'minutes', 'seconds', 'milliseconds', and 'microseconds').

now()
Returns new datetime object representing current time local to tz.
tz Timezone object.
If no tz is specified, uses local timezone.

replace()
Return datetime with new specified fields.

strptime()
string, format -> new datetime parsed from a string (like time.strptime()).

time()
Return time object with same time but with tzinfo=None.

timestamp()
Return POSIX timestamp as float.

timetuple()
Return time tuple, compatible with time.localtime().

timetz()
Return time object with same time and tzinfo.

tzname()
Return self.tzinfo.tzname(self).

utcfromtimestamp()
Construct a naive UTC datetime from a POSIX timestamp.

utcnow()
Return a new datetime representing UTC day and time.

utcoffset()
Return self.tzinfo.utcoffset(self).

utctimetuple()
Return UTC time tuple, compatible with time.localtime().

selection
Return a datetime representing the current selected date.

class timedelta
Difference between two datetime values.

timedelta(days=0, seconds=0, microseconds=0, milliseconds=0, minutes=0, hours=0, weeks=0)

All arguments are optional and default to 0. Arguments may be integers or floats, and may be positive or negative.

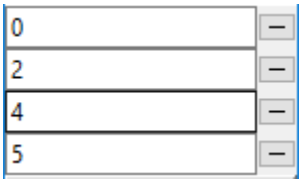
days
Number of days.

microseconds
Number of microseconds (>= 0 and less than 1 second).

seconds
Number of seconds (>= 0 and less than 1 day).

total_seconds()
Total seconds in the duration.

2.6 MultiSlotFrame



class groups.**MultiSlotFrame**(*parent*, *columns: int = 1*)
Can hold several removable elements, such as a list of files, directories, or a checklist.:

```
# create and grid the frame
msf = tk_tools.MultiSlotFrame(root)
msf.grid()

# add some items
msf.add('item 1')
msf.add('item 2')
```

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```
# get any user-entered or modified values
print(msf.get())
```

Parameters

- **parent** – the tk parent frame
- **columns** – the number of user columns (defaults to 1)

add(*string: (<class 'str'>, <class 'list'>)*)
Add a new slot to the multi-frame containing the string. :param string: a string to insert :return: None

clear()
Clear out the multi-frame :return:

get()
Retrieve and return the values in the multi-frame :return: A list of values containing the contents of the GUI

2.7 SevenSegment

class groups.**SevenSegment**(*parent*, *height: int = 50*, *digit_color='black'*, *background='white'*)
Creates a single seven-segment display which may be used to emulate a numeric display of old:

```
# create and grid the frame
ss = tk_tools.SevenSegment(root)
ss.grid()

# set the value
ss.set_value(2)

# set the value with a period
ss.set_value(6.0)
```

Parameters

- **parent** – the tk parent frame
- **height** – the widget height (defaults to 50)
- **digit_color** – the digit color (ex: 'black', '#ff0000')
- **background** – the background color (ex: 'black', '#ff0000')

class groups.**SevenSegmentDigits**(*parent*, *digits: int = 1*, *height: int = 50*, *digit_color='black'*, *background='white'*)
Creates a single seven-segment display which may be used to emulate a numeric display of old:

```
# create and grid the frame
ss = tk_tools.SevenSegment(root)
ss.grid()

# set the value
ss.set_value(2)

# set the value with a period
ss.set_value(6.0)
```

Parameters

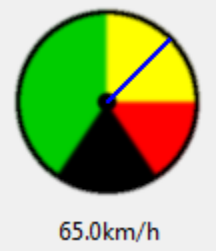
- **parent** – the tk parent frame
- **height** – the widget height (defaults to 50)
- **digit_color** – the digit color (ex: 'black', '#ff0000')
- **background** – the background color (ex: 'black', '#ff0000')

CHAPTER 3

Canvas Widgets

These widgets provide visual feedback to the user using the canvas.

3.1 RotaryScale



class canvas.**RotaryScale**(*parent*, *max_value: (<class 'float'>, <class 'int'>) = 100.0*, *size: (<class 'float'>, <class 'int'>) = 100*, *unit: str = None*, *img_data: str = None*, *needle_color='blue'*, *needle_thickness=0*, ***options*)

Shows a rotary scale, much like a speedometer.:

```
rs = tk_tools.RotaryScale(root, max_value=100.0, size=100, unit='km/h')
rs.grid(row=0, column=0)

rs.set_value(10)
```

Parameters

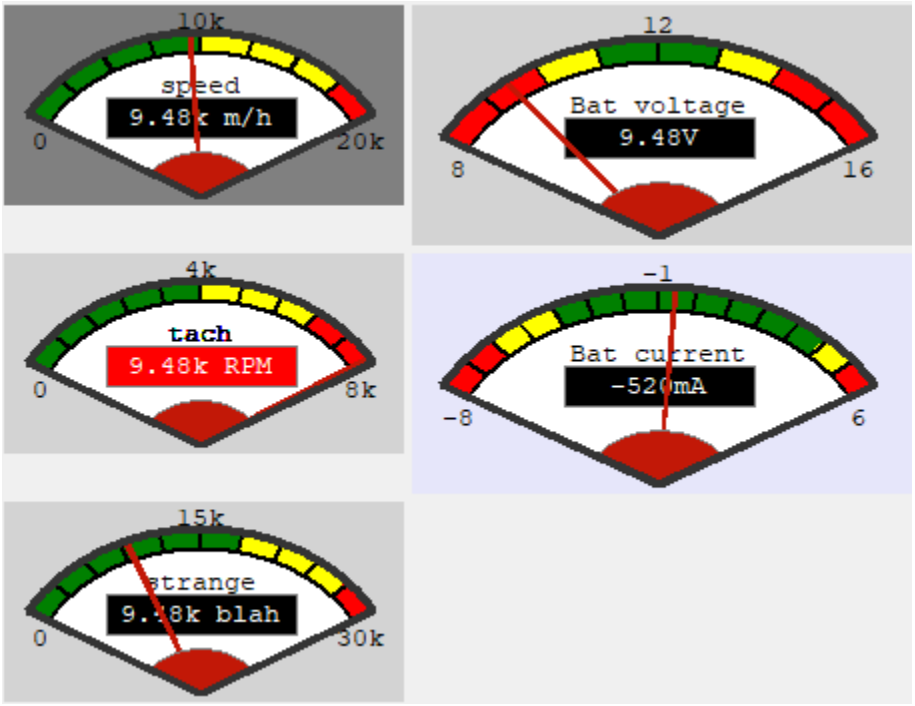
- **parent** – tkinter parent frame
- **max_value** – the value corresponding to the maximum value on the scale
- **size** – the size in pixels
- **options** – the frame options

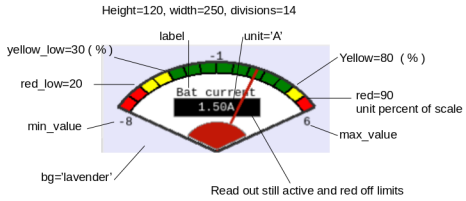
set_value (*number: (<class 'float'>, <class 'int'>)*)
Sets the value of the graphic

Parameters **number** – the number (must be between 0 and 'max_range' or the scale will peg the limits

Returns None

3.2 Gauge





class canvas.**Gauge** (*parent, width: int = 200, height: int = 100, min_value=0.0, max_value=100.0, label='', unit='', divisions=8, yellow=50, red=80, yellow_low=0, red_low=0, bg='lightgrey'*)
Shows a gauge, much like the RotaryGauge.:

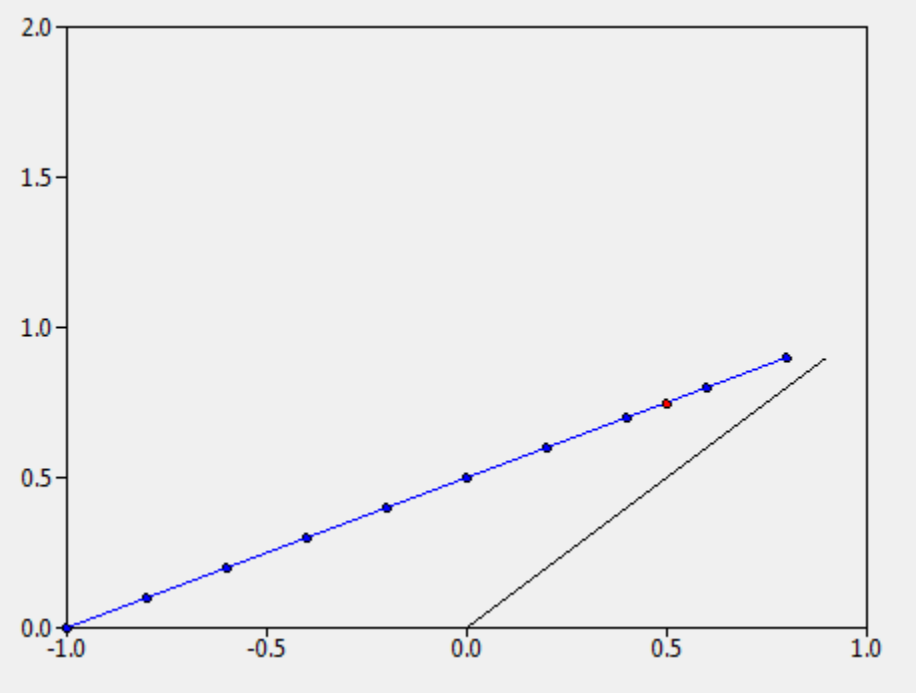
```
gauge = tk_tools.Gauge(root, max_value=100.0,
                       label='speed', unit='km/h')
gauge.grid()
gauge.set_value(10)
```

Parameters

- **parent** – tkinter parent frame
- **width** – canvas width

- **height** – canvas height
- **min_value** – the minimum value
- **max_value** – the maximum value
- **label** – the label on the scale
- **unit** – the unit to show on the scale
- **divisions** – the number of divisions on the scale
- **yellow** – the beginning of the yellow (warning) zone in percent
- **red** – the beginning of the red (danger) zone in percent
- **yellow_low** – in percent warning for low values
- **red_low** – in percent if very low values are a danger
- **bg** – background

3.3 Graph



class canvas.**Graph**(*parent*, *x_min: float*, *x_max: float*, *y_min: float*, *y_max: float*, *x_tick: float*, *y_tick: float*, ***options*)

Tkinter native graph (pretty basic, but doesn't require heavy install).:

```
graph = tk_tools.Graph(
    parent=root,
    x_min=-1.0,
    x_max=1.0,
    y_min=0.0,
    y_max=2.0,
    x_tick=0.2,
```

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```
    y_tick=0.2,
    width=500,
    height=400
)

graph.grid(row=0, column=0)

# create an initial line
line_0 = [(x/10, x/10) for x in range(10)]
graph.plot_line(line_0)
```

Parameters

- **parent** – the parent frame
- **x_min** – the x minimum
- **x_max** – the x maximum
- **y_min** – the y minimum
- **y_max** – the y maximum
- **x_tick** – the 'tick' on the x-axis
- **y_tick** – the 'tick' on the y-axis
- **options** – additional valid tkinter.canvas options

draw_axes()
Removes all existing series and re-draws the axes.

Returns None

static frange(*start*, *stop*, *step*, *digits_to_round=3*)
Works like range for doubles

Parameters

- **start** – starting value
- **stop** – ending value
- **step** – the increment_value
- **digits_to_round** – the digits to which to round (makes floating-point numbers much easier to work with)

Returns generator

plot_line(*points: list*, *color='black'*, *point_visibility=False*)
Plot a line of points

Parameters

- **points** – a list of tuples, each tuple containing an (x, y) point
- **color** – the color of the line
- **point_visibility** – True if the points should be individually visible

Returns None

plot_point(*x*, *y*, *visible=True*, *color='black'*, *size=5*)
Places a single point on the grid

Parameters

- **x** – the x coordinate
- **y** – the y coordinate
- **visible** – True if the individual point should be visible
- **color** – the color of the point
- **size** – the point size in pixels

Returns The absolute coordinates as a tuple

3.4 LED

class canvas.**Led**(*parent*, *size: int = 100*, *on_click_callback: callable = None*, *toggle_on_click: bool = False*, ***options*)
Create an LED-like interface for the user.:

```
led = tk_tools.Led(root, size=50)
led.pack()

led.to_red()
led.to_green(on=True)
```

The user also has the option of adding an *on_click_callback* function. When the button is clicked, the button will change state and the on-click callback will be executed. The callback must accept a single boolean parameter, *on*, which indicates if the LED was just turned on or off.

Parameters

- **parent** – the parent frame
- **size** – the size in pixels
- **on_click_callback** – a callback which accepts a boolean parameter 'on'
- **options** – the frame options

to_green(*on: bool = False*)
Change the LED to green (on or off).

Parameters **on** – True or False

Returns None

to_grey(*on: bool = False*)
Change the LED to grey.

Parameters **on** – Unused, here for API consistency with the other states

Returns None

to_red(*on: bool = False*)
Change the LED to red (on or off) :param on: True or False :return: None

to_yellow(*on: bool = False*)
Change the LED to yellow (on or off) :param on: True or False :return: None

CHAPTER 4

Smart Widgets

Smart widgets consist of existing widgets with improved API. In most cases, these widgets will simply incorporate the appropriate type of `xVar` for the widget type. For instance, imaging providing for an `OptionMenu` without having to use a `StringVar`. These widgets generally appear the same as their ordinary counterparts that are already present within the library.

4.1 SmartOptionMenu

class widgets.**SmartOptionMenu**(*parent*, *options: list*, *initial_value: str = None*, *callback: callable = None*)

Classic drop down entry with built-in tracing variable.:

```
# create the dropdown and grid
som = SmartOptionMenu(root, ['one', 'two', 'three'])
som.grid()

# define a callback function that retrieves
# the currently selected option
def callback():
print(som.get())

# add the callback function to the dropdown
som.add_callback(callback)
```

Parameters

- **data** – the tk parent frame
- **options** – a list containing the drop down options
- **initial_value** – the initial value of the dropdown
- **callback** – a function

4.2 SmartSpinBox

class widgets.**SmartSpinBox**(*parent*, *entry_type: str = 'float'*, *callback: callable = None*, ***options*)

Easy-to-use spinbox. Takes most options that work with a normal SpinBox. Attempts to call your callback function - if assigned - whenever there is a change to the spinbox.:

```
# create a callback function
def callback(value):
    print('the new value is: ', value)

# create the smart spinbox and grid
ssb = SmartSpinBox(root, from_=0, to=5, callback=callback)
ssb.grid()
```

Parameters

- **parent** – the tk parent frame
- **entry_type** – 'str', 'int', 'float'
- **callback** – python callable
- **options** – any options that are valid for tkinter.SpinBox

4.3 SmartCheckbutton

class widgets.**SmartCheckbutton**(*parent*, *callback: callable = None*, ***options*)

Easy-to-use check button. Takes most options that work with a normal CheckButton. Attempts to call your callback function - if assigned - whenever there is a change to the check button.:

```
# create the smart spinbox and grid
scb = SmartCheckbutton(root)
scb.grid()

# define a callback function that retrieves
# the currently selected option
def callback():
    print(scb.get())

# add the callback function to the checkbutton
scb.add_callback(callback)
```

Parameters

- **parent** – the tk parent frame
- **callback** – python callable
- **options** – any options that are valid for tkinter.Checkbutton

4.4 SmartListBox

class widgets.**SmartListBox**(*parent*, *options: List[str]*, *width: int = 12*, *height: int = 5*, *on_select_callback: callable = None*, *selectmode: str = 'browse'*)

Easy-to-use List Box. Takes most options that work with a normal CheckButton. Attempts to call your callback

function - if assigned - whenever there is a change to the list box selections.:

```
# create the smart spinbox and grid
scb = SmartListBox(root, options=['one', 'two', 'three'])
scb.grid()

# define a callback function that retrieves
# the currently selected option
def callback():
    print(scb.get_selected())

# add the callback function to the checkbutton
scb.add_callback(callback)
```

Parameters

- **parent** – the tk parent frame
- **options** – any options that are valid for tkinter.Checkbutton
- **on_select_callback** – python callable
- **selectmode** – the selector mode (supports "browse" and "multiple")

add_callback (*callback: callable*)
Associates a callback function when the user makes a selection.

Parameters **callback** – a callable function

4.5 BinaryLabel

class widgets.**BinaryLabel** (*parent*, *value: int = 0*, *prefix: str = ''*, *bit_width: int = 8*, ***options*)
Displays a value binary. Provides methods for easy manipulation of bit values.:

```
# create the label and grid
bl = BinaryLabel(root, 255)
bl.grid()

# toggle highest bit
bl.toggle_msb()
```

Parameters

- **parent** – the tk parent frame
- **value** – the initial value, default is 0
- **options** – prefix string for identifiers

clear_bit (*position: int*)
Clears the value at position

Parameters **position** – integer between 0 and 7, inclusive

Returns None

clear_lsb()
Clears the least significant bit :return: None

clear_msb()
Clears the most significant bit :return: None

get()
Return the current value

Returns the current integer value

get_bit(*position: int*)
Returns the bit value at position

Parameters **position** – integer between 0 and <width>, inclusive

Returns the value at position as a integer

get_lsb()
Returns the least significant bit as an integer :return: the LSB

get_msb()
Returns the most significant bit as an integer :return: the MSB

set(*value: int*)
Set the current value

Parameters **value** –

Returns None

set_bit(*position: int*)
Sets the value at position

Parameters **position** – integer between 0 and 7, inclusive

Returns None

set_lsb()
Sets the least significant bit :return: None

set_msb()
Sets the most significant bit :return: None

toggle_bit(*position: int*)
Toggles the value at position

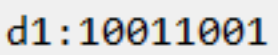
Parameters **position** – integer between 0 and 7, inclusive

Returns None

toggle_lsb()
Toggles the least significant bit :return:

toggle_msb()
Changes the most significant bit :return: None

4.6 ByteLabel



class widgets.**ByteLabel**(*parent*, *value: int = 0*, *prefix: str = ''*, *bit_width: int = 8*, ***options*)

Has been replaced with more general BinaryLabel. Still here for backwards compatibility.

CHAPTER 5

Tool Tips

5.1 ToolTip

class tooltips.**ToolTip**(*widget*, *text: str = 'widget info'*, *time: int = 4000*)

Add a tooltip to any widget.:

```
entry = tk.Entry(root)
entry.grid()

# createst a tooltip
tk_tools.ToolTip(entry, 'enter a value between 1 and 10')
```

Parameters

- **widget** – the widget on which to hover
- **text** – the text to display
- **time** – the time to display the text, in milliseconds

CHAPTER 6

Introduction

The `tk_tools` package exists in a space like other packages. In many cases, the `tkinter` interface leaves some API to be desired while, in other cases, it leaves out some room for fairly standard visualizations. This is a collection of widgets and tools that have been developed over the course of creating GUI elements as a means to simplify and enhance the process and results.

There are three categories of widgets:

- groups of widgets that are useful as a group
- visual aids using the canvas
- useful improvements on existing widgets

CHAPTER 7

Tkinter Setup

Each of the code examples assumes a structure similar to the below in order to setup the root environment.:

```
import tkinter as tk
import tk_tools

root = tk.Tk()

# ----------------------------------
# ----- your GUI widget(s) here -----
# ----------------------------------

root.mainloop()
```

CHAPTER 8

Indices and tables

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