vkb_led_jg_plugin_db

Introduction

The VKB Gladiator NXT flight stick has three LEDs: a blue/red in the base, a red near the hat switch, and a RGB (red, green, blue) LED at the top of the handle. These LEDs have programable levels of brightness and speeds of blinking. This Joystick Gremlin plugin allows these LEDs to be activated with buttons on the stick or any other device configured in Joystick Gremlin (JG).

> **Warning**: this code interfaces with your VKB device. I have found this code safe to use, but you assume all risks when applying your device.

Although there are only three LEDs, multiple buttons can activate the same LEDs in varying configurations. This plugin uses a database engine to create a file external to Joystick Gremlin to track the order of button activations and deactivations, as well as their associated LEDs. This process is described in more detail below.

> A database file, *VKB_LED_event_stack.db*, is created in the same directory that holds the plugin file. Do not delete or move this file while the Joystick Gremlin configuration is active, but it can be deleted afterward. A new file is created at each JG activation.

Credit Where Credit Is Due

This plugin could not function without the following fantastic packages and code examples:

- bitstruct written by Erik Moqvist & Ilya Petukhov located at https://pypi.org/project/bitstruct.
- pyvkb written by ventorvar located at https://github.com/ventorvar/pyvkb. The code for the LEDClass and the set_LEDs and LED_conf_checksum functions are slightly modified but essentially from this package. My modifications include simplifying the RGB colors to use the VKB 0-7 range and added directives to open and close the VKB device.
- pywinsub written by Rene F. Aguirre located at https://pypi.org/project/pywinusb.
- SQLite, a public domain database engine, integrated into Python, https://sqlite.org/index.html.
- vkb-msfs-led by tiberriusteng located at https://www.github.com/tiberiusteng/vkb-msfs-led was used for inspiration and coding examples.
- And, of course, Joystick Gremlin by whitemagic located at https://whitemagic.github.io/JoystickGremlin/.

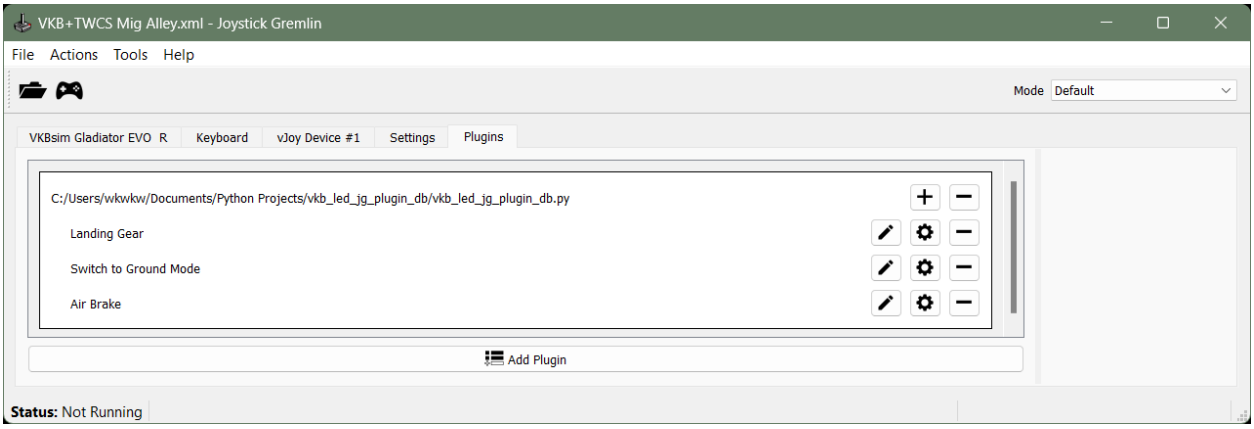
Installation Instructions

1. Save the bitstruct & pywinsub folders to the Joystick Gremlin programs directory. For me this is: C:\Program Files (x86)\H2ik\Joystick Gremlin.
2. Save the two SQLite files (_sqlite3.pyd and sqlite3.dll) and the one directory (sqlite3) to the same Joystick Gremlin directory.
3. Save vkb_led_jg_plugin_lib.py to the same Joystick Gremlin directory.
4. Save vkb_led_jg_plugin.py in a conveniently accessible directory.
5. In the file vkb_led_jg_plugin.py, the product variable is hard coded for a right-handed Gladiator NXT. This plugin SHOULD work (but has not been tested) with a left-handed Gladiator, both left and right-handed Omni throttles, as well as older Gladiators, all of which have a base LED (blue and red), a hat LED (red), and a RGB LED. If you do not have a right-handed Gladiator NXT, edit this file with a text editor and enter in the appropriate product id.
6. Open Joystick Gremlin, go to the Plugins tab, choose Add Plugin, and navigate to where you saved vkb_led_jg_plugin.py.
7. Select desired settings as described below.

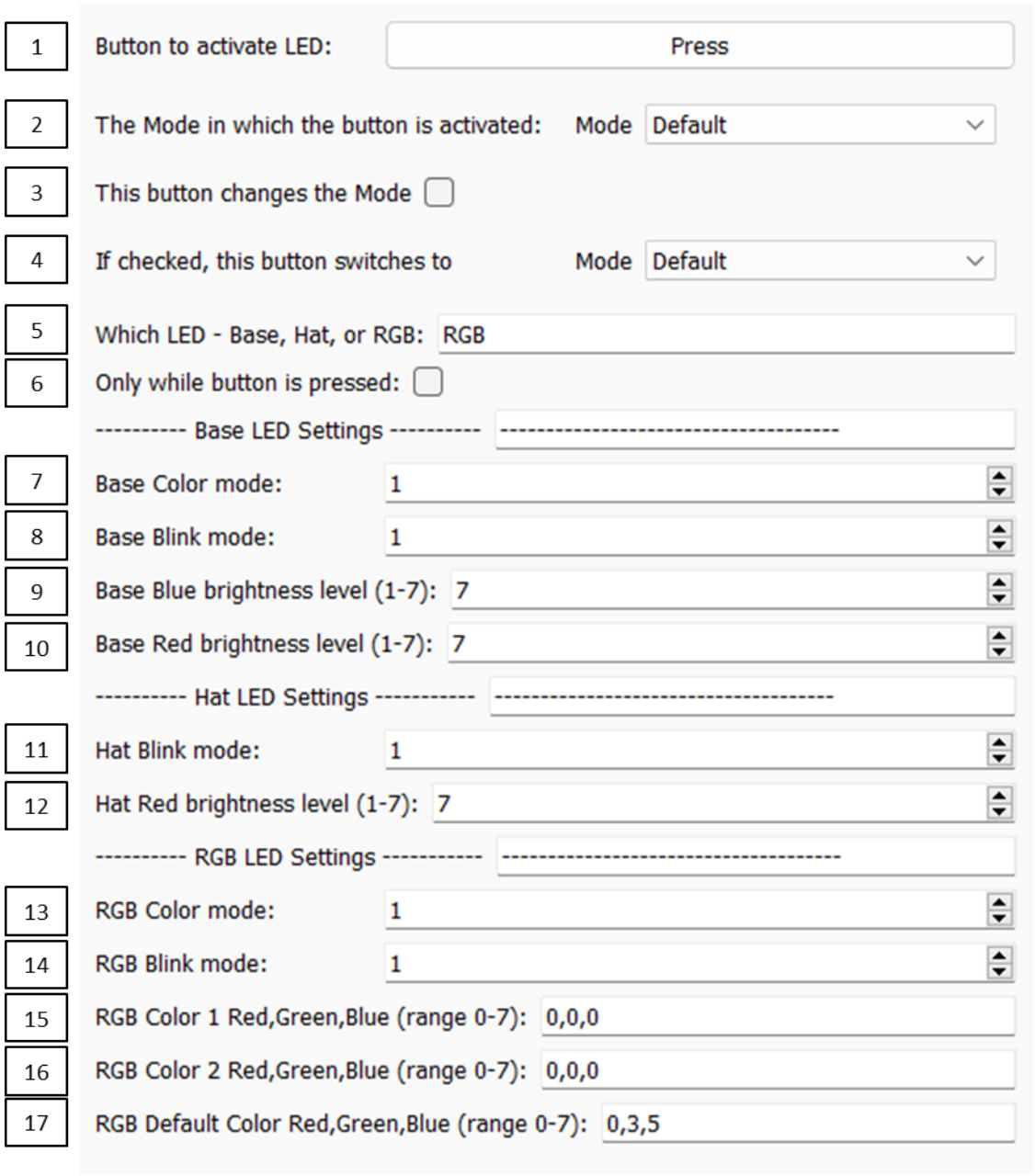
Setting Plugin Options

Each instance of this plugin allows one button to activate one LED. However, creating multiple instances of the plugin allow for multiple buttons to activate the same LED (for different simulator/game functions) or one button to activate multiple LEDs. The actual simulator/game functions are set in Joystick Gremlin and the cosmetics of lights are set here. For example, you can set the RGB LED to flash green when the landing gear are dropped, set it to blue when switching modes, and have the base LED blink red when the air brake is opened.

Below is a screen shot displaying three separate instances of the plugin. Each represents a pairing of a physical joystick button and a VKB flight stick LED.



The vkb_led_jg_plugin_db interface



1. Assign the LED to a button by clicking “Press” and then pressing the desired button on your device. The button can be on the VKB flight stick or any other device available in JG, a throttle for example.
2. Designate the mode that button will be active in. There will be choices only if the JG configuration has multiple modes. For example, the same button could have different functions depending on the mode, and thus, this same button could have different LED configurations depending on the mode.
3. Indicate whether this button switches modes. In JG a button can be assigned the Switch Mode action. Switching Modes has implications for the LED activation and a check here allows the plugin to act accordingly.
4. If the button Switches Modes, indicate the mode being switched to.

5. Select the LED to be activated by typing in “Base”, “Hat”, or “RGB”. This entry text is not case sensitive but it cannot be misspelled.
6. Check this box if the LED is lit only while the button is pressed, otherwise, the LED will stay “on” until the button is pressed again. This option will not be applied to buttons that switch modes -- a button that switches modes can only have an LED on or off.

The three LEDs have different possible configurations. The Base LED can be red, blue, alternating red and blue, or red and blue, with different brightness of color and speed of blinking (or constant). The Hat LED is red only but can vary in brightness and rate of blinking. The RGB LED can be a constant color or alternate between two colors at a given rate of blinking. The colors are defined by setting the red, green, and blue (RGB) components of color. The VKB RGB LED utilizes a simplified color scheme in that each red, green, and blue values can only range between 0 and 7 (instead of the hundreds or thousands of values a computer monitor may have). Because of the vast differences in these three LED configurations, there is a separate section for each LED in the interface. Only the section that applies to chosen LED will be used.

Base LED Settings

7. Enter a number between 1 and 5 to indicate the color or color combination to use:
    1 = Blue
    2 = Red
    3 = Blue then Red
    4 = Red then Blue
    5 = Blue and Red
8. Choose the blink rate:
    1 = Constant
    2 = Slow
    3 = Fast
    4 = Ultra-fast
9. Enter a brightness level for the blue LED, 1 to 7 where 7 is brightest. Only applies if the blue LED is activated.
10. Enter a brightness level for the red LED, 1 to 7 where 7 is brightest. Only applies if the red LED is activated.

Hat LED Settings

11. Choose the blink rate:
    1 = Constant
    2 = Slow
    3 = Fast
    4 = Ultra-fast
12. Enter a brightness level for the red LED, 1 to 7 where 7 is brightest.

RGB LED Settings

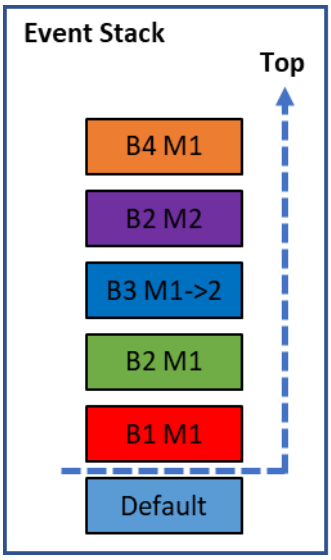
13. Select the color mode:
    1 = Color 1
    2 = Color 2
    3 = Color 1 then Color 2
    4 = Color 2 then Color 1

14. Select the blink rate:
    1 = Constant
    2 = Slow
    3 = Fast
    4 = Ultra-fast
15. Define Color 1 using values of 0 to 7 for red, green, and blue.

> RGB color values combine to form one color. Some examples:
>
> 7,0,0 = bright red
> 1,0,0 = light red
> 0,7,0 = dark green
> 0,0,3 = moderate blue
> 7,0,7 = purple
> 7,7,0 = yellow
> 0,7,7 = teal blue

16. Define Color 2 using values of 0 to 7 for red, green, and blue.
17. Define the color to be used when the event stack is empty (no buttons have been pressed). The default, default value is 0,3,5 because that is what the VKB stick use when first plugged in. If you want a different starting default color, use the VKB configuration software to set the new RGB value and then set this default value here to maintain it.

Event Stack Example



This plugin records the history of the on/off state of buttons and prioritizes the LED activation through the use of a stack. Note that a true "stack" is last-in-first-out, but this current process allows items mid-stack to be removed. For example, the figure to the right is a snapshot of the event stack. At the point in time of this snapshot, five buttons have been pressed. B1 changed the LED to red, then B2 changed the LED to green. B3 changed the LED to blue and switched the mode from M1 to M2. B2 has a function in the M2 mode and when pressed changed the LED to purple. Finally, B4 was pressed and changed the LED to orange. The top of the stack represents the current color and state of the LED.

Each of the following hypotheticals use the snapshot to the right as its starting point:

- If B4 was pressed again, it would be removed from the stack and the LED would change to purple.
- If B2 was pressed, the purple entry would be removed but the LED would stay orange.
- If B1 was pressed, the red entry would be removed and the LED stays orange. If B1 was pressed yet again, a B1 entry would be added to the top of the stack and the LED would change to red.
- Note that in order to remove the B2 Mode 1 green entry, the Mode 1 would have to be activated. Similarly, to remove B2 M2 purple, Mode 2 would have to be in play.

The purpose of the event stack to have the LED always set to the most recent (top of stack) color, but also remove entries of buttons as they are turned off. If you backed through the button order of the

snapshot (B4, B2 M2, B3, B2 M1, B1), the LED would change in that order as well: orange, purple, blue, green, red, and finally default blue.

Modes

In the examples above, the button that changes the mode switches from Mode 1 to Mode 2 with the first press, then reverses the switch from Mode 2 to Mode 1 with a second press. To accomplish this function you have to configure the button in JG to Switch Modes to Mode 2 while in Mode 1, and you have to configure this same button to Switch Modes from 2 to 1 while in Mode 2. However, with this plugin you only have to create one instance to allow the toggling of an LED on when switching from Mode 1 to Mode 2, and the LED off when switching from Mode 2 back to Mode 1. You configure such a toggling by assigning the LED to the button switching from Mode 1 to 2, clicking the checkbox to indicate that this button switches modes, and selecting the mode being switched to. The turning off of the LED during the switch back is automatically configured.

You could also create a chain of mode switching to activate more than 2 modes. For example, in JG you could have a button press in Mode 1 switch to Mode 2; then while in Mode 2 switch to Mode 3. While in Mode 3, the button could switch back to Mode 1 from 3. With the assumption that Mode 1 uses the default color settings, you only have to create two instances of this plugin: one for the switch from 1 to 2 and one for the switch from 2 to 3. The turning off of the LED (that is, setting it to the default state) is handled automatically when the button is pressed while in Mode 3 and the mode switches to Mode 1.

As an example, the default Mode 1 could have basic flying functions, Mode 2 could have air combat functions, and Mode 3 could focus on ground attack functions. The switch from 1 to 2 could activate the LED to slowly blink blue and the switch from 2 to 3 could make the blue blink fast, and finally when switching back to Mode 1 the LED is set to the default state.

There is a JG action to cycle through Modes. If there are more than 2 modes, this plugin will not be able to synchronize LED settings to each mode. This plugin requires the switching action to be attached to each button-mode separately.

Resetting the Flight Stick

The LED settings stored in the VKB device via VKBDevCFG are overwritten during the plugin's use, but those settings will be restored when the device is unplugged and re-plugged in.

The plugin does not interact with the flight simulator/game in anyway. If LEDs are lit when the simulation or game ends, you will have to push buttons to get back to a neutral state, or simply, unplug and re-plug the device back in.

Future Developments

If future versions of JG allow dropdown lists, I will use them to make entries easier in the user interface. I also may also replace the hard coding of the product id with a dynamic “button press.”