Domoticz Plugin

TrafficLight

(using Tinkerforge Building Blocks)

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Objectives

- To set the color of a Tinkerforge RGB Bricklet to red, yellow or green using a Domoticz Selector Switch Device.
- To learn how to write a Python Plugin for the Domoticz Home Automation System.
- To learn how to interact with Tinkerforge Building Blocks.
- To use this sample plugin as a template for other Domoticz plugins interacting with Tinkerforge Building Blocks.

Solution
A Domoticz Python plugin "Traffic Light" with a Tinkerforge RGB LED Bricklet.
The Tinkerforge RGB LED Bricklet is connected to a Tinkerforge Master Brick with WiFi extension.
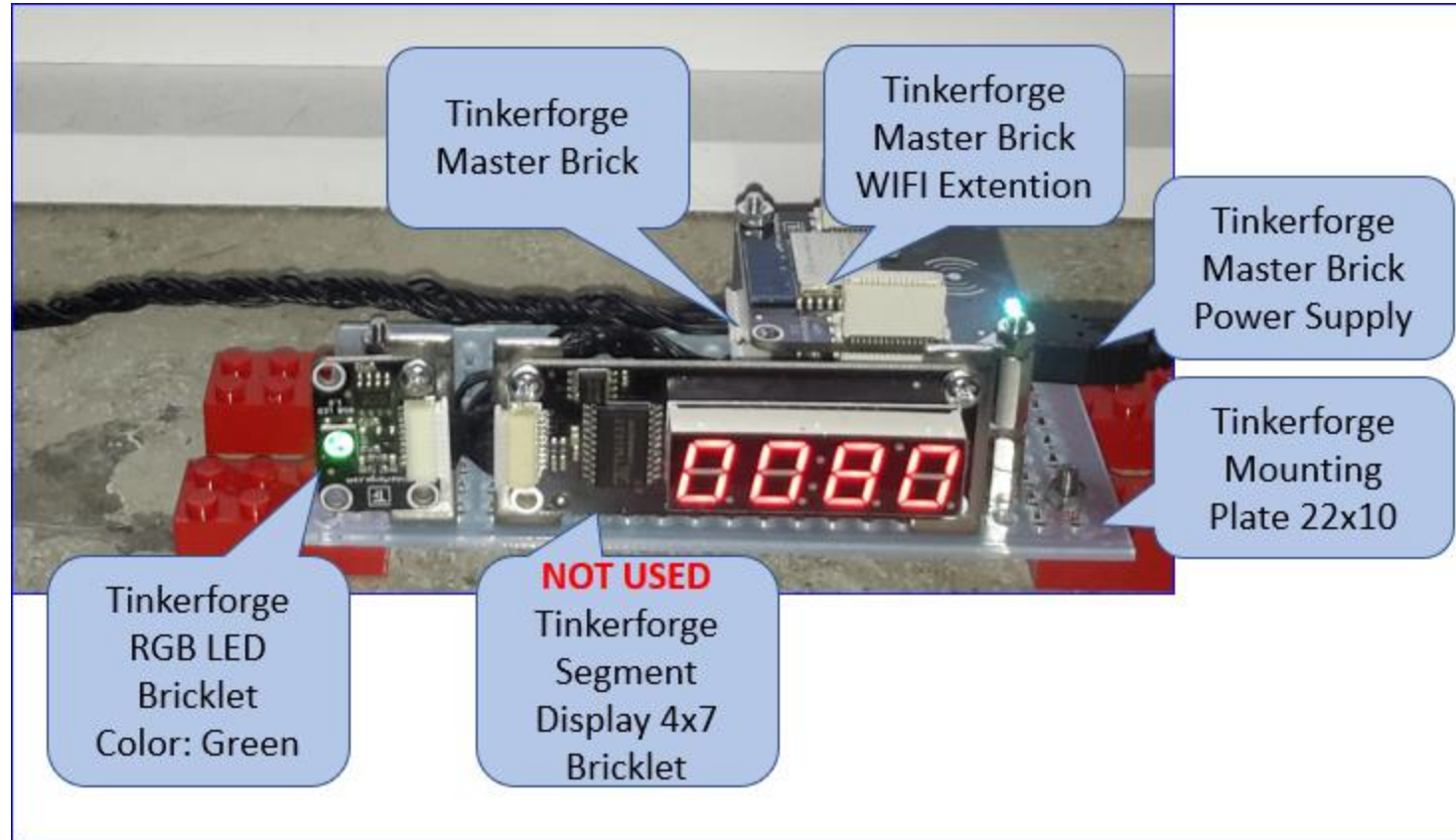
Hardware
* Raspberry Pi 3B+ (Info)
* Tinkerforge Master Brick 1.1 (Info)
* Tinkerforge WIFI Master Extention 2.0 (Info)
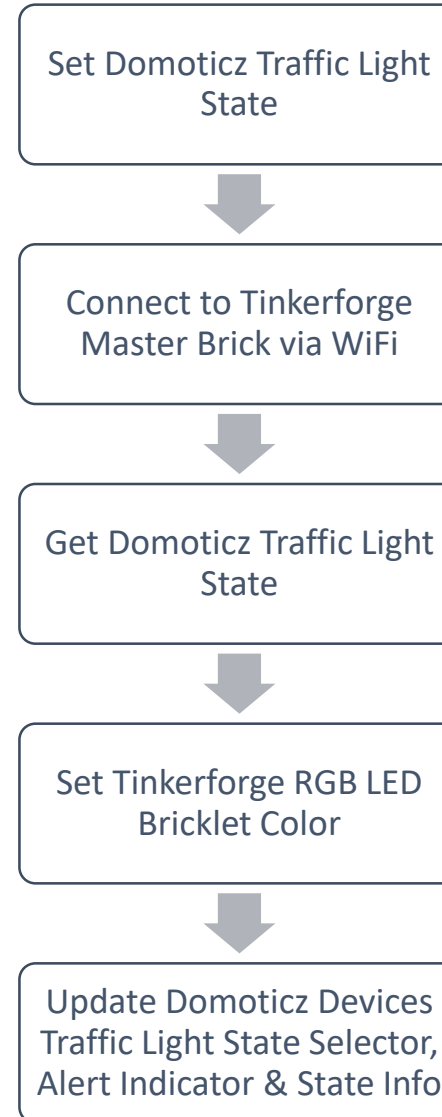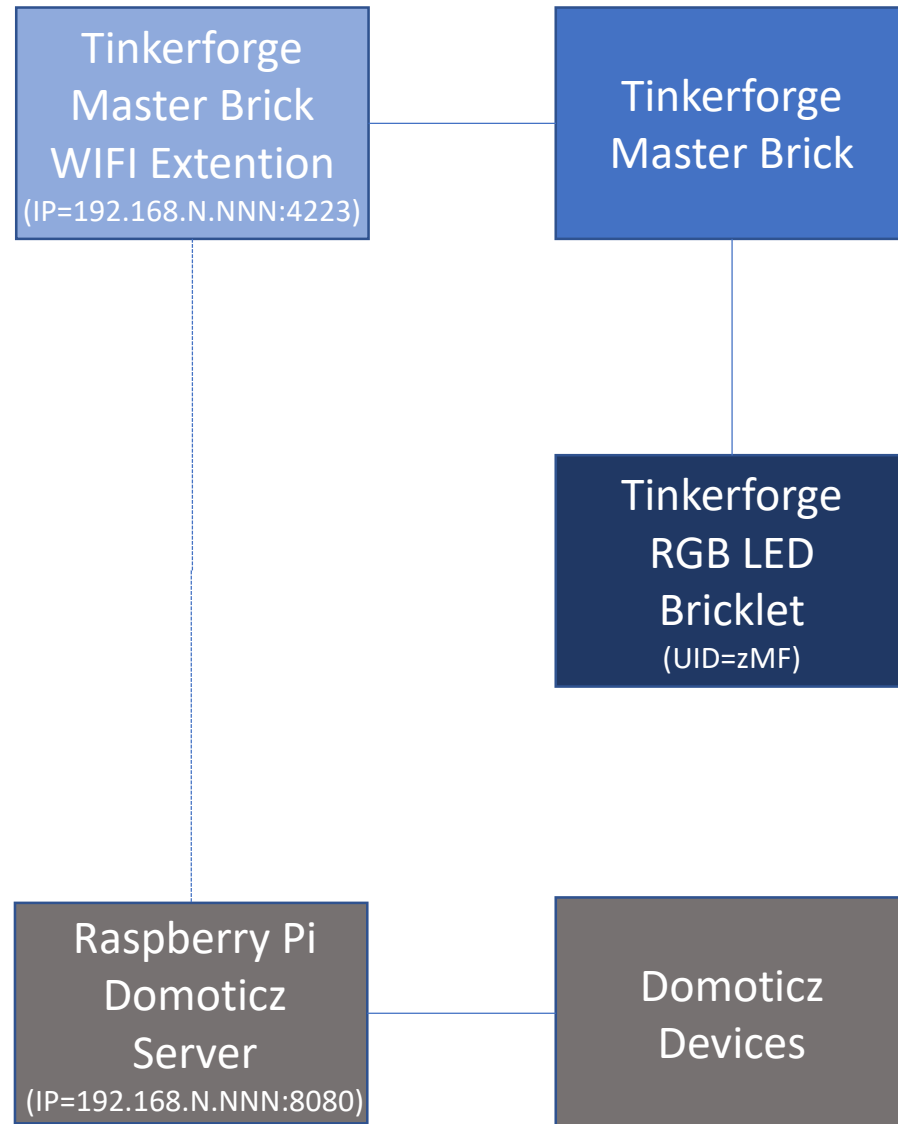* Tinkerforge RGB LED Bricklet (Info)

Software
Versions for developing & using this plugin.
* Raspberry Pi Raspian Linux 4.19.42-v7+ #1219
* Domoticz Home Automation System V4.1nnnn (BETA)
* Tinkerforge Python Binding v2.1.22
* Python 3.5.3
* Thonny 3.1.2 (Python IDE)

Prototype

Hardware & Communication

Tinkerforge Master Brick WIFI Extention
(IP=192.168.N.NNN:4223)

Tinkerforge Master Brick

Tinkerforge RGB LED Bricklet
(UID=zMF)

Raspberry Pi Domoticz Server
(IP=192.168.N.NNN:8080)

Domoticz Devices

Set Domoticz Traffic Light State

Connect to Tinkerforge Master Brick via WiFi

Get Domoticz Traffic Light State

Set Tinkerforge RGB LED Bricklet Color

Update Domoticz Devices Traffic Light State Selector, Alert Indicator & State Info

Domoticz Hardware Traffic Light

Enabled:	
Name:	Traffic Light
Type:	Traffic Light
Data Timeout:	Disabled

Specifying a Data Timeout will restart the hardware device if no data is received for the specified time.
Do not enable this option for devices that do not receive data!

Traffic Light

Set the color of a Tinkerforge RGB LED Bricklet to RED,YELLOW or GREEN via Domoticz Selector Switch device.
Features
• Traffic Light Color (R-G-B): RED=255-0-0; YELLOW=255-255-0; GREEN=0-255-0
• Traffic Light Brightness

Traffic Light Devices
• Set Traffic Light Color via Selector Switch with options RED, YELLOW or GREEN
• Display Traffic Light Alert Indicator
• Light Change Info

Configuration
Requires the HTTP address and Port of the Master Brick WiFi Extention and the UID of the Tinkerforge RGB LED Bricklet.

Host:	192.168.1.112
Port:	4223
UID:	zMF
Brightness:	100
Debug:	True

Domoticz Devices

Traffic Light - State Selector **RED**
Last Seen: 2019-05-28 08:43:36
RED YELLOW GREEN

Traffic Light - Alert Indicator
RED
Last Seen: 2019-05-28 08:43:36

Traffic Light - Change Info
Text   **Traffic Light changed from 30 to 10**
Last Seen: 2019-05-28 08:43:36

Domoticz – Add New Hardware Traffic Light

Notes
Read the code „plugin.py" for more information.

```
"""
<plugin key="TrafficLight" name="Traffic Light" author="rwbL" version="1.0.0">
    <description>
        <h2>Traffic Light</h2><br/>
        Set the color of a Tinkerforge RGB LED Bricklet to RED,YELLOW or GREEN via Domoticz Selector
Switch device.
        <h3>Features</h3>
        <ul style="list-style-type:square">
            <li>Traffic Light Color (R-G-B): RED=255-0-0; YELLOW=255-255-0; GREEN=0-255-0</li>
            <li>Traffic Light Brightness</li>
        </ul>
        <h3>Traffic Light Devices</h3>
        <ul style="list-style-type:square">
            <li>Set Traffic Light Color via Selector Switch with options RED, YELLOW or GREEN</li>
            <li>Display Traffic Light Alert Indicator</li>
            <li>Display Traffic Light Change Info</li>
        </ul>
        <h3>Configuration</h3>
        Requires the HTTP address and Port of the Master Brick WiFi Extention and the UID of the
Tinkerforge RGB LED Bricklet.
    </description>
    <params>
        <param field="Address" label="Host" width="200px" required="true" default="ip-address"/>
        <param field="Port" label="Port" width="75px" required="true" default="4223"/>
        <param field="Mode1" label="UID" width="75px" required="true" default="zMF"/>
        <param field="Mode4" label="Brightness" width="75px" required="true" default="100"/>
        <param field="Mode6" label="Debug" width="75px">
            <options>
                <option label="True" value="Debug" default="true"/>
                <option label="False" value="Normal"/>
            </options>
        </param>
    </params>
</plugin>
"""
```

Domoticz – Add new Hardware Traffic Light - Domoticz Log

The Domoticz Log after adding the new hardware. There are 3 new devices created and set to used.

	13	Traffic Light	00070001	1	Traffic Light - State Selector	Light/Switch	Selector Switch	Off
⚠	14	Traffic Light	00070002	2	Traffic Light - Alert Indicator	General	Alert	No Alert!
	15	Traffic Light	00070003	3	Traffic Light - Change Info	General	Text	

```
2019-05-27 09:43:31.992 Status: (Traffic Light) Started.
2019-05-27 09:43:32.550 (Traffic Light) Debug logging mask set to: PYTHON PLUGIN QUEUE IMAGE DEVICE CONNECTION MESSAGE ALL
2019-05-27 09:43:32.550 (Traffic Light) 'DomoticzHash':'fccd39bb'
2019-05-27 09:43:32.550 (Traffic Light) 'HardwareID':'7'
2019-05-27 09:43:32.550 (Traffic Light) 'Database':'/home/pi/domoticz/domoticz.db'
2019-05-27 09:43:32.550 (Traffic Light) 'Version':'1.0.0'
2019-05-27 09:43:32.550 (Traffic Light) 'HomeFolder':'/home/pi/domoticz/plugins/TrafficLight/'
2019-05-27 09:43:32.550 (Traffic Light) 'DomoticzVersion':'4.10826'
2019-05-27 09:43:32.550 (Traffic Light) 'Name':'Traffic Light'
2019-05-27 09:43:32.550 (Traffic Light) 'Mode6':'Debug'
2019-05-27 09:43:32.550 (Traffic Light) 'DomoticzBuildTime':'2019-05-24 10:04:40'
2019-05-27 09:43:32.550 (Traffic Light) 'Mode4':'100'
2019-05-27 09:43:32.550 (Traffic Light) 'StartupFolder':'/home/pi/domoticz/'
2019-05-27 09:43:32.550 (Traffic Light) 'Port':'4223'
2019-05-27 09:43:32.550 (Traffic Light) 'Key':'TrafficLight'
2019-05-27 09:43:32.550 (Traffic Light) 'Language':'en'
2019-05-27 09:43:32.550 (Traffic Light) 'Address':'ip-address'
2019-05-27 09:43:32.550 (Traffic Light) 'Author':'rwbL'
2019-05-27 09:43:32.550 (Traffic Light) 'UserDataFolder':'/home/pi/domoticz/'
2019-05-27 09:43:32.550 (Traffic Light) 'Mode1':'zMF'
2019-05-27 09:43:32.550 (Traffic Light) Device count: 0
2019-05-27 09:43:32.550 (Traffic Light) Creating new Devices
2019-05-27 09:43:32.551 (Traffic Light) Creating device 'State Selector'.
2019-05-27 09:43:32.552 (Traffic Light) Device created: Traffic Light - State Selector
2019-05-27 09:43:32.552 (Traffic Light) Creating device 'Alert Indicator'.
2019-05-27 09:43:32.553 (Traffic Light) Device created: Traffic Light - Alert Indicator
2019-05-27 09:43:32.553 (Traffic Light) Creating device 'Change Info'.
2019-05-27 09:43:32.554 (Traffic Light) Device created: Traffic Light - Change Info
2019-05-27 09:43:32.554 (Traffic Light) Pushing 'PollIntervalDirective' on to queue
2019-05-27 09:43:32.554 (Traffic Light) Processing 'PollIntervalDirective' message
2019-05-27 09:43:32.554 (Traffic Light) Heartbeat interval set to: 60.
2019-05-27 09:43:32.547 Status: (Traffic Light) Entering work loop.
2019-05-27 09:43:32.548 Status: (Traffic Light) Initialized version 1.0.0, author 'rwbL'
```

Domoticz Traffic Light - Devices

If the plugin starts first time, 3 new devices are created, with an initial state & info, set to used and manually added to the dashboard.

	13	Traffic Light	00070001	1	Traffic Light - State Selector	Light/Switch	Selector Switch	Off
⚠	14	Traffic Light	00070002	2	Traffic Light - Alert Indicator	General	Alert	No Alert!
	15	Traffic Light	00070003	3	Traffic Light - Change Info	General	Text	

Example of the Domoticz Web-UI Dashboard after setting the Traffic Light to RED via the State Selector Device.

Domoticz Traffic Light – State Changed from Off to RED

The initial state is Off.

The log shows changing the state to RED by pressing RED button on the State Selector Switch.

```
2019-05-27 09:51:50.997 Status: User: Admin initiated a switch command (13/Traffic Light - State Selector/Set Level)
2019-05-27 09:51:51.002 (Traffic Light) Processing 'onCommandCallback' message
2019-05-27 09:51:51.002 (Traffic Light) Calling message handler 'onCommand'.
2019-05-27 09:51:51.003 (Traffic Light) onCommand called for Unit 1: Parameter 'Set Level', Level: 10
2019-05-27 09:51:51.012 (Traffic Light) IP Connection - OK
2019-05-27 09:51:51.012 (Traffic Light) Traffic Light - State Selector-Traffic Light State New=10
2019-05-27 09:51:51.012 (Traffic Light) Traffic Light - State Selector-nValue=0,sValue=
2019-05-27 09:51:51.017 (Traffic Light) Traffic Light - State Selector-RGB LED Colors R-G-B:0-100-0
2019-05-27 09:51:51.018 (Traffic Light) RGB LED Brightness updated:100
2019-05-27 09:51:51.018 (Traffic Light - State Selector) Updating device from 0:'' to have values 2:'10'.
2019-05-27 09:51:51.030 (Traffic Light) Traffic Light - State Selector-nValue=2,sValue=10
2019-05-27 09:51:51.030 (Traffic Light - Alert Indicator) Updating device from 0:'No Alert!' to have values 4:'RED'.
2019-05-27 09:51:51.038 (Traffic Light) Traffic Light - Alert Indicator-nValue=4,sValue=RED
2019-05-27 09:51:51.038 (Traffic Light - Change Info) Updating device from 0:'' to have values 0:'Traffic Light changed from 0 to 10'.
2019-05-27 09:51:51.045 (Traffic Light) Traffic Light - Change Info-nValue=0,sValue=Traffic Light changed from 0 to 10
2019-05-27 09:51:51.148 (Traffic Light) TrafficLight Update: OK
```

Domoticz Traffic Light – State Change Error

Example Error Message triggered by changing a color by the Selector Switch.
Caused by the Master Brick not powered up. This results in a IP Connection failed error.


```
2019-05-27 14:48:37.140 (Traffic Light) onCommand called for Unit 1: Parameter 'Set Level', Level: 20
2019-05-27 14:48:37.101 Status: User: Admin initiated a switch command (13/Traffic Light - State Selector/Set Level)
2019-05-27 14:48:40.298 (Traffic Light) [ERROR] IP Connection failed
2019-05-27 14:48:40.299 (Traffic Light - Alert Indicator) Updating device from 3:'-[ERROR] Device Connection!' to have values 3:'[ERROR] Device Connection!'.
2019-05-27 14:48:40.307 (Traffic Light) Traffic Light - Alert Indicator-nValue=3,sValue=[ERROR] Device Connection!
2019-05-27 14:48:40.307 (Traffic Light) [ERROR] Device Connection!
```

Example Error Message triggered by changing a color by the Selector Switch.
caused by a wrong Tinkerforge RGB LED Bricklet UID.

Domoticz Traffic Light – Plugin Code Snippet onCommand

```python
def onCommand(self, Unit, Command, Level, Hue):
    try:
        ipcon = IPConnection()
        lb = BrickletRGBLED(Parameters["Mode1"], ipcon)
        ipconnected = 0
        try:
            ipcon.connect(Parameters["Address"], int(Parameters["Port"]))
            ipconnected = 1
        except:
            Domoticz.Debug("[ERROR] IP Connection failed")

        if ipconnected == 0:
            Devices[2].Update( nValue=3, sValue="[ERROR] Device Connection!")
            return

        oldtrafficlightstate = 0
        if Devices[1].sValue != "":
            oldtrafficlightstate = int(Devices[1].sValue)
        newtrafficlightstate = Level
        rgbvalue = lb.get_rgb_value()
        lbbrightness = int(Parameters["Mode4"])

        trafficlightcolor = "UNKNOWN"
        trafficlightalert = 0
        if newtrafficlightstate == 10: lb.set_rgb_value(lbbrightness, 0, 0); trafficlightcolor = "RED"; trafficlightalert = 4
        if newtrafficlightstate == 20: lb.set_rgb_value(lbbrightness, lbbrightness, 0); trafficlightcolor = "YELLOW"; trafficlightalert = 2
        if newtrafficlightstate == 30: lb.set_rgb_value(0, lbbrightness, 0); trafficlightcolor = "GREEN"; trafficlightalert = 1

        Devices[1].Update( nValue=2, sValue=str(newtrafficlightstate) )
        Devices[2].Update( nValue=trafficlightalert, sValue=trafficlightcolor )
        Devices[3].Update( nValue=0, sValue="Traffic Light changed from " + str(oldtrafficlightstate) + " to " + str(newtrafficlightstate) )
        ipcon.disconnect()
    except:
        if ipconnected == 1:
            ipcon.disconnect()
        Devices[2].Update( nValue=3, sValue="[ERROR] Check settings, correct and restart Domoticz")
```

This is just a snippet and not the latest code.
See „plugin.py".

Domoticz Traffic Light – Plugin Code Error Handling

Solution used to handle errors Master Brick Connection (ipconnection) or bricklet wrong UID.

```python
class BasePlugin:
    def __init__(self):
        # Flag to check if connected to the master brick
        self.ipConnected = 0
        return

    def onCommand(self, Unit, Command, Level, Hue):
        Domoticz.Debug("onCommand called for Unit " + str(Unit) + ": Parameter '" + str(Command) + "', Level: " + str(Level))
        # Flag to check if connected to the master brick
        self.ipConnected = 0
        try:
            # Create IP connection
            ipcon = IPConnection()

            # Create device objects using the UID as defined in the parameters
            # <ADD>

            # Connect to brickd using Host and Port
            try:
                ipcon.connect(Parameters["Address"], int(Parameters["Port"]))
                self.ipConnected = 1
                Domoticz.Debug("IP Connection - OK")
            except:
                Domoticz.Debug("[ERROR] IP Connection failed")

            # Don't use device before ipcon is connected
            if self.ipConnected == 0:
                Domoticz.Log("[ERROR] Can not connect to Master Brick. Check settings, correct and restart Domoticz." )
                return
        except:
            # Error - Important to close the connection - if not, the plugin can notbe disabled
            if self.ipConnected == 1:
                ipcon.disconnect()

            Domoticz.Log("[ERROR] Check settings, correct and restart Domoticz.")
```

Domoticz Traffic Light – Set State via HTTP

Set the Traffic Light (idx=13) State to GREEN by setting the level to 30:
http://ip-address:8080/json.htm?type=command&param=switchlight&idx=13&switchcmd=Set%20Level&level=30

Resulting in HTTP response
{ "status" : "OK", "title" : "SwitchLight" }

The plugin onCommand function is triggered and the devices are updated.
Check the Domoticz Web-UI:
- http://ip:8080/#/Dashboard
- http://ip:8080/#/Log

The Traffic Light Levels can be set to:
10=RED,20=YELLOW,30=GREEN

Domoticz Traffic Light – Development Screenshots

Thonny – Code Development
PuTTy – Terminal to restart Domoticz
WinSCP – Folder & File Management
Domoticz Web-UI Dashboard & Log