Domoticz Plugin

TrafficLight

(using Tinkerforge Building Blocks)

By Robert W. B. Linn

28.05.2019

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 hardware device "Traffic Light" controlling a Tinkerforge RGB LED Bricklet.
Three Domoticz devices are part of the hardware device. Typename are Selector Switch, Alert, Text
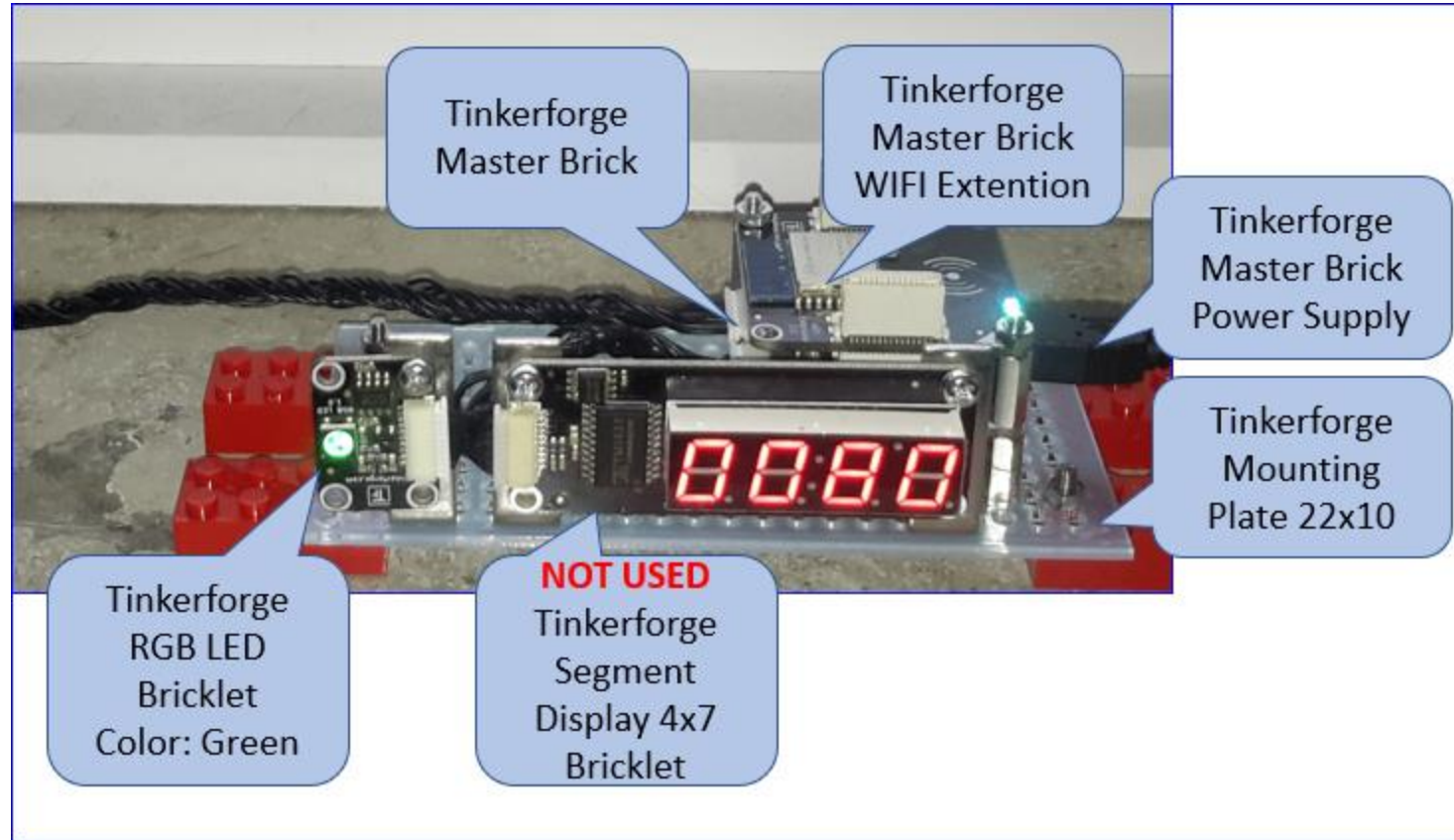The Tinkerforge RGB LED Bricklet is connected to a Tinkerforge Master Brick with WiFi extension.

Hardware
- Raspberry Pi 3B+ (Info)
- Tinkerforge Master Brick 1.1 (Info)
- Tinkerforge WIFI Master Extention 2.0 (Info)
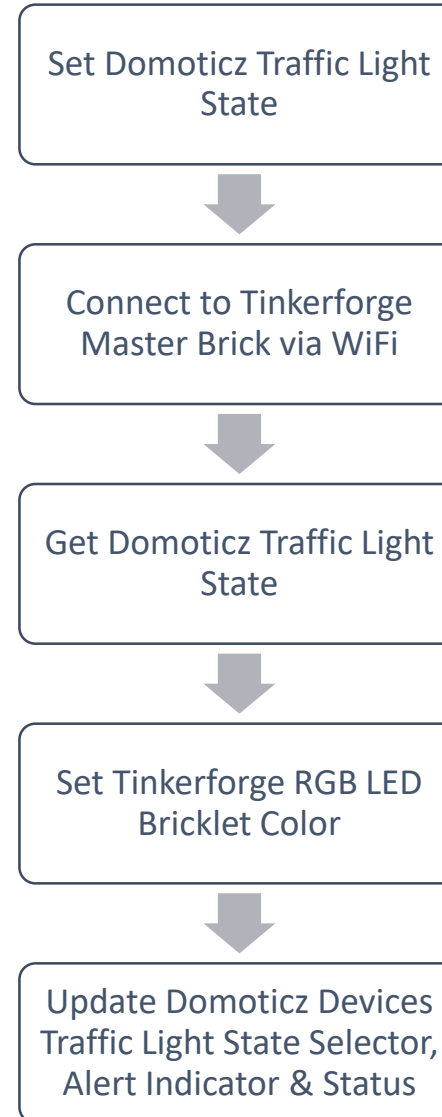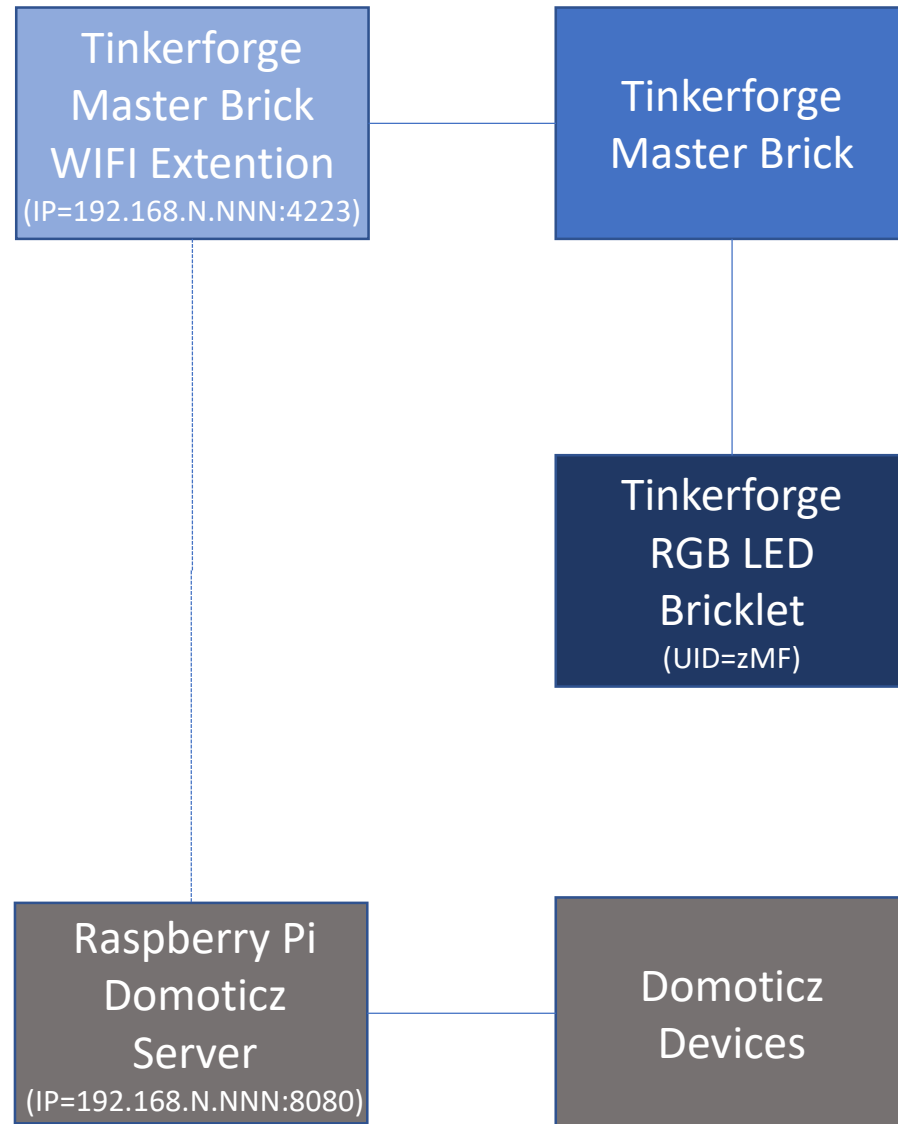- Tinkerforge RGB LED Bricklet (Info)

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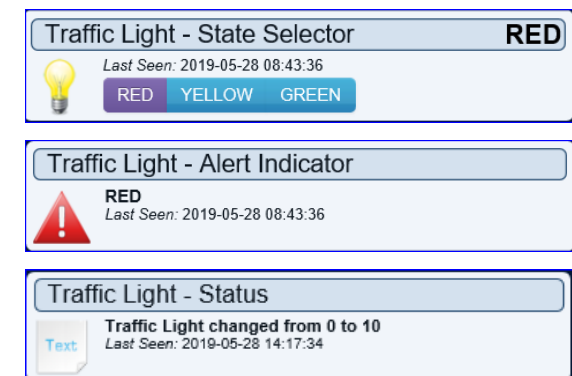- Python 3.5.3
- Thonny 3.1.2 (Python IDE)

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 & Status

Domoticz Hardware Traffic Light
(see next page)

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 - Status
Traffic Light changed from 0 to 10
Last Seen: 2019-05-28 14:17:34

Domoticz – Add New Hardware Traffic Light

Showing 1 to 1 of 1 entries (filtered from 4 total entries)

Update **Delete**

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
- Traffic Light State Selector - Set the traffic light color RED,YELLOW or GREEN Selector Switch
- Traffic Light Alert Indicator - Reflects the traffic light state
- Traffic Light Status - Shows lastest change or any error condition

Configuration
Requires the Tinkerforge Master Brick WiFi Extention HTTP address and Port and the Tinkerforge RGB LED Bricklet UID.
Use the Tinkerforge Brick Viewer to determine these parameter.
Version
20190528

Host: 1▬▬▬▬

Port: 4223

UID: zMF

Brightness: 100

Debug: True

```python
"""
<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>Traffic Light State Selector - Set the traffic light color RED,YELLOW or GREEN
Selector Switch</li>
            <li>Traffic Light Alert Indicator - Reflects the traffic light state</li>
            <li>Traffic Light Status - Shows lastest change or any error condition</li>
        </ul>
        <h3>Configuration</h3>
        Requires the Tinkerforge Master Brick WiFi Extention HTTP address and Port and the
Tinkerforge RGB LED Bricklet UID.<br/>
        Use the Tinkerforge Brick Viewer to determine these parameter.
        <br/>
        <h4>Version</h4>
        20190528
    </description>
    <params>
        <param field="Address" label="Host" width="200px" required="true" default="192.168.1.112"/>
        <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>
"""
```

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

Domoticz – Add new Hardware Traffic Light - Domoticz Log

There are 3 new devices created and set to used. Note that the screenshot already shows a change in state to RED.

	Idx ^	Hardware	ID ^	Unit ^	Name	Type ^	SubType ^	
⏻	13	Traffic Light	00070001	1	Traffic Light - State Selector	Light/Switch	Selector Switch	Set Level: 10 %
⚠	14	Traffic Light	00070002	2	Traffic Light - Alert Indicator	General	Alert	RED
	15	Traffic Light	00070003	3	Traffic Light - Status	General	Text	Traffic Light changed from 0 to 10

```
2019-05-28 14:12:22.842 (Traffic Light) Debug logging mask set to: PYTHON PLUGIN QUEUE IMAGE DEVICE CONNECTION MESSAGE ALL
2019-05-28 14:12:22.842 (Traffic Light) 'UserDataFolder':'/home/pi/domoticz/'
2019-05-28 14:12:22.842 (Traffic Light) 'DomoticzVersion':'4.10840'
2019-05-28 14:12:22.842 (Traffic Light) 'Database':'/home/pi/domoticz/domoticz.db'
2019-05-28 14:12:22.842 (Traffic Light) 'HomeFolder':'/home/pi/domoticz/plugins/TrafficLight/'
2019-05-28 14:12:22.842 (Traffic Light) 'Mode4':'100'
2019-05-28 14:12:22.842 (Traffic Light) 'HardwareID':'7'
2019-05-28 14:12:22.842 (Traffic Light) 'Mode6':'Debug'
2019-05-28 14:12:22.842 (Traffic Light) 'DomoticzBuildTime':'2019-05-28 08:12:58'
2019-05-28 14:12:22.842 (Traffic Light) 'Version':'1.0.0'
2019-05-28 14:12:22.842 (Traffic Light) 'Key':'TrafficLight'
2019-05-28 14:12:22.842 (Traffic Light) 'Address':'192.168.1.112'
2019-05-28 14:12:22.842 (Traffic Light) 'Language':'en'
2019-05-28 14:12:22.842 (Traffic Light) 'Author':'rwbL'
2019-05-28 14:12:22.842 (Traffic Light) 'DomoticzHash':'9497b1f73'
2019-05-28 14:12:22.842 (Traffic Light) 'Mode1':'zMF'
2019-05-28 14:12:22.842 (Traffic Light) 'StartupFolder':'/home/pi/domoticz/'
2019-05-28 14:12:22.842 (Traffic Light) 'Port':'4223'
2019-05-28 14:12:22.842 (Traffic Light) 'Name':'Traffic Light'
2019-05-28 14:12:22.842 (Traffic Light) Device count: 0
2019-05-28 14:12:22.842 (Traffic Light) Creating new Devices
2019-05-28 14:12:22.842 (Traffic Light) Creating device 'State Selector'.
2019-05-28 14:12:22.844 (Traffic Light) Device created: Traffic Light - State Selector
2019-05-28 14:12:22.844 (Traffic Light) Creating device 'Alert Indicator'.
2019-05-28 14:12:22.845 (Traffic Light) Device created: Traffic Light - Alert Indicator
2019-05-28 14:12:22.845 (Traffic Light) Creating device Status'.
2019-05-28 14:12:22.846 (Traffic Light) Device created: Traffic Light - Change Info
2019-05-28 14:12:22.846 (Traffic Light) Pushing 'PollIntervalDirective' on to queue
2019-05-28 14:12:22.846 (Traffic Light) Processing 'PollIntervalDirective' message
2019-05-28 14:12:22.846 (Traffic Light) Heartbeat interval set to: 60.
2019-05-28 14:12:22.348 Status: (Traffic Light) Started.
2019-05-28 14:12:22.839 Status: (Traffic Light) Entering work loop.
2019-05-28 14:12:22.840 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 - Status-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.

Traffic Light - Alert Indicator
⚠ **[ERROR] Device Connection!**
Last Seen: 2019-05-27 14:39:49

```
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.

Traffic Light - Alert Indicator
⚠ **ERROR**
Last Seen: 2019-05-28 14:23:18

Traffic Light - Status
Text **[ERROR] Check settings, correct and restart Domoticz.**
Last Seen: 2019-05-28 14:23:18

Domoticz Traffic Light – Plugin Code Snippet onCommand

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

                    if self.ipConnected == 0:
                            Devices[3].Update( nValue=0, sValue="[ERROR] Can not connect to Master Brick.")
                            Domoticz.Log(Devices[3].sValue)
                            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()
                    Domoticz.Log(Devices[3].sValue)
            except:

                    if self.ipConnected == 1:
                            ipcon.disconnect()

                    Devices[3].Update( nValue=0, sValue="[ERROR] Check settings, correct and restart Domoticz." )
                    Domoticz.Log(Devices[3].sValue)
```

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 parameter 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