Lab 05 – Python / SenseHat (2)

A) Boot/power-on Welcome Message

1. Start a shell/terminal window on the RPI. Then enter the following:

    ```
    sudo leafpad /etc/rc.local
    ```

    Enter your password, and leafpad (another very simple editor) will load rc.local

2. rc.local

    The commands is rc.local is run during boot. We will now use this file to run a python script when the systems boots.

    Add the highlighted text, save the file and exit the editor.

    ```
    !/bin/sh -e
    #
    # rc.local
    #
    # This script is executed at the end of each multiuser runlevel.
    # Make sure that the script will "exit 0" on success or any other
    # value on error.
    #
    # In order to enable or disable this script just change the execution
    # bits.
    #
    # By default this script does nothing.

    # Print the IP address
    _IP=$(hostname -I) || true
    if [ "$_IP" ]; then
      printf "My IP address is %s\n" "$_IP"
    fi

    python3 /home/pi/RPIBoot.py

    exit 0
    ```

3. Make sure to move the "**RPIBoot.py**" file in the **/home/pi** folder

    Reboot the RPI and watch the SenseHat.

    It may be quite useful to be able to run a program on power-on/boot.

B) SenseHat functionality – LED Matrix

Python Tutorial: https://docs.python.org/3/tutorial/index.html
SenseHat API: https://pythonhosted.org/sense-hat/api/

We will now use some of the "pixel" oriented features of the SenseHat API.

That is, we will use the following functions:
- set_pixels / get_pixels
- set_pixel / get_pixel
- clear / set_rotation

RGB colors

The pixel colors on the SenseHat are coded as (red,greed,blue) tuples. A full tuple consists of one byte for each of the rgb colors.

More on the RGB coding and colors:

- https://www.rapidtables.com/web/color/RGB_Color.html
- https://en.wikipedia.org/wiki/RGB_color_model

ColumnRow.py – part-1

Your task now is to write the following functions. You are strongly advised to read the SenseHat API documentation and to think through the problem before starting to write code (it is ok to tinker and test code to understand the API, but you don't generally want to solve problems in an ad-hoc way).

The template **ColumnRow.py** is a good starting place.

Also: (optional) it may be a good idea to change the orientation of the SenseHat. The default is that down is towards the HDMI port. See **set_rotation** in the SenseHat API for more info. Anyway, the coordinate system orientation is a choice.

1. Complete functions **get_row** and **set_row**
2. Complete functions **get_column** and **set_column**

Make sure you test your functions well.

- Document the testing that you have done

C) SD card image cloning

The micro-SD card can easily become corrupted. This is a problem, and we really want to avoid losing a complete setup.

It is therefore a good idea to make a clone of the micro-sd card you are using. This will be a complete bootable backup.

- Investigate and find programs that will let you clone the (micro-)SD card (laptop-side)
    - https://sourceforge.net/projects/win32diskimager/ is on option (there are others too)

- Note that there actually is an SD card copier program on your RPI.
    - It can copy the micro-SD card "image" to another micro-SD card (if you have and additional reader) or to a USB memory stick.

Investigate the above and ensure that you can clone your micro-SD card.