Massey University
School of Engineering and Advanced Technology
Computer Science and Information Technology

Discover Computing With the Raspberry Pi 3

Activity 2: Developing the LED Graphics Editor for the Sense HAT

Description and Aim of Activity 2

In this activity you will be given a basic LED Editor, as a Python program, that allows you to use the joystick on the Sense HAT or the Arrow Keys and the Enter Key on the keyboard attached to the Raspberry Pi 3 to draw graphics on the LED array of the Sense HAT. The aim of the tasks in Activity 2 is to improve the basic LED Editor by coding, in the Python language, additional features such as drawing with different colours, the delete or erase feature, and drawing horizontal lines.

Learning Objectives for Activity 2

By the end of this Activity, you should be able to:

1. Describe the basic features of a graphics editor;
2. Develop simple elements of an algorithm that detect joystick movements and presses and produce the desired visual effects of these actions on the LED matrix;
3. Develop simple elements of an algorithm that changes the colour of pixels on the LED matrix;
4. Develop simple elements of an algorithm that draws lines on the LED matrix;
5. Implement graphics editing primitives for the LED matrix in the Python programming language for the Sense HAT on the Raspberry Pi 3; and
6. Explain the concepts and basic features of a graphics editing software environment.

Activity 2: *The Starter Kit*

The Basic LED Editor: In each of the the tasks in this activity, you must always start by opening the Python program, `basic-led-editor.py`, which you must rename by addition that task number to the filename, e.g., `basic-led-editor1.py`. The given basic LED Editor runs to navigate using joystick or Arrow Keys and turn pixel to white colour on pressing down the joystick or pressing Enter Key on the keyboard. The basic LED editor allows you to draw on the LED matrix

Activity 2: *Tasks to be Done*

Task 0:
Study the program, `basic-led-editor.py`, focusing on the explanations given in the comments throughout the program code.

Using the new renamed program file, `basic-led-editor`**`N`**`.py`, where N is the task number, do the following tasks:

Task 1:
Modify to make pixel black or off when clicked thus implementing erasing or deleting colour from a pixel;

Task 2
Add an extra colour for drawing - this will include finding the proper RGB specification for the colour, orange, adding it to the color dictionary;

Task 3
Modify the basic LED Editor to be able to draw in different colours. You will modify the program so that one can navigate the LED matrix space and change color of a pixel though the sequence: white, blue, orange and then black/off when clicked.

Task 4
Given the functions `hline(x1,y1, w2,y2)` and `vline(x1,y1, w2,y2)`, modify the program to draw horizontal and vertical lines.