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Supporting the Professional Learning of School Leaders and Teachers

Raspberry Pi and Astro Pi

Session 1

Skills Workshop

OIDE and ESERO

This workshop has been designed as part of a collaboration between ESERO and Oide. We aim to introduce you to the Raspberry Pi and Astro Pi.

Schedule

Session 1 10:00 - 11:30	Introduction to the RPI & Sense HAT Emulator
Tea/Coffee 11:30 – 12:00	
Session 2 12:00 - 13:30	Working with the Sense HAT Internet of Things and ThingSpeak
Lunch 13:30 - 14:30	
Session 3 14:30 - 16:30	Working with the Raspberry Pi Camera, GPIO, Motion Sensor

Session Overview

PART 1. Introduction

PART 2. Hardware - About the Pi / Physical setup

PART 3. Software: Raspberry Pi OS Desktop + common OS commands + WiFi

PART 4. Introduction to the Sense HAT (Emulator)

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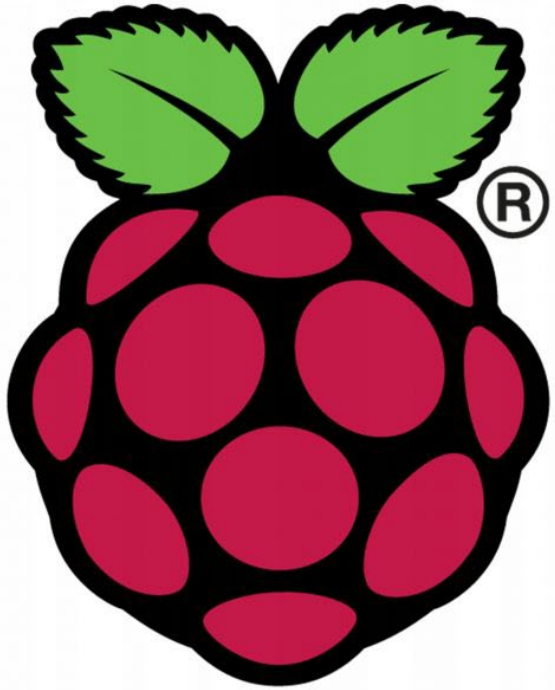
Supporting the Professional Learning of School Leaders and Teachers

The Raspberry Pi and Astro Pi

Part 1 - Introduction



Raspberry Pi

Introducing Oide

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Lárionad Ceannaireachta Scoile
CSL
Centre for School Leadership

An tSraith Shóisearach do Mhúinteoirí
JuniorCYCLE for teachers

NIPT
An Clár Náisiúnta Ionduchtaithe do Mhúinteoirí
The National Induction Programme for Teachers

PDST
Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

Supports Provided by Oide

- National Workshops
- Webinars
- School Support
- Scoilnet
- Skills Workshops
- Collaboratives
- Oide website
- CompSci

Key Messages

The LCCS specification can be used in many different ways.

Raspberry Pi can be used to achieve many LCCS learning outcomes across all three strands of the LCCS specification

LCCS can be mediated through a constructivist pedagogical approach.

Group work and group dynamics are a key feature in the teaching, learning and assessment of LCCS.

ALTs provide an opportunity to teach theoretical aspects of LCCS.

The Astro Pi project can be used to demonstrate and use a broad range of specialised skills and tools to gather, and evaluate data and develop appropriate projects that require investigative strategies

Purpose

To introduce the Raspberry Pi (RPI) as a platform for teaching, learning and assessment of LCCS (no prior RPI knowledge assumed)

To introduce the AstroPi project “Mission Space Lab” and provide an opportunity for teachers to create their own project.

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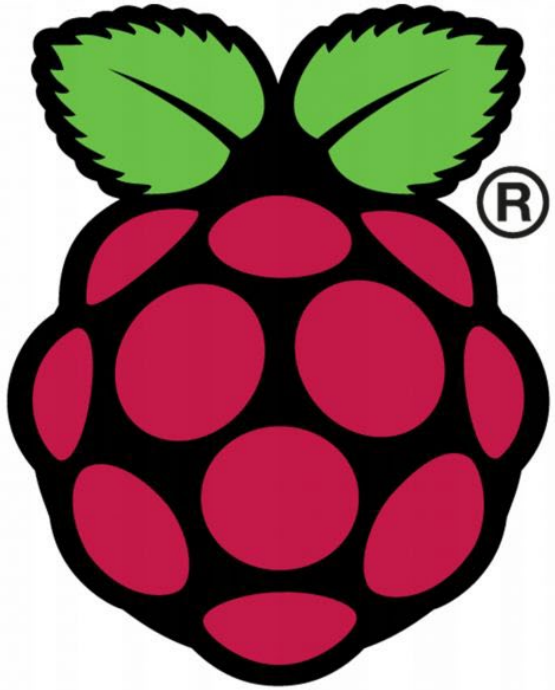
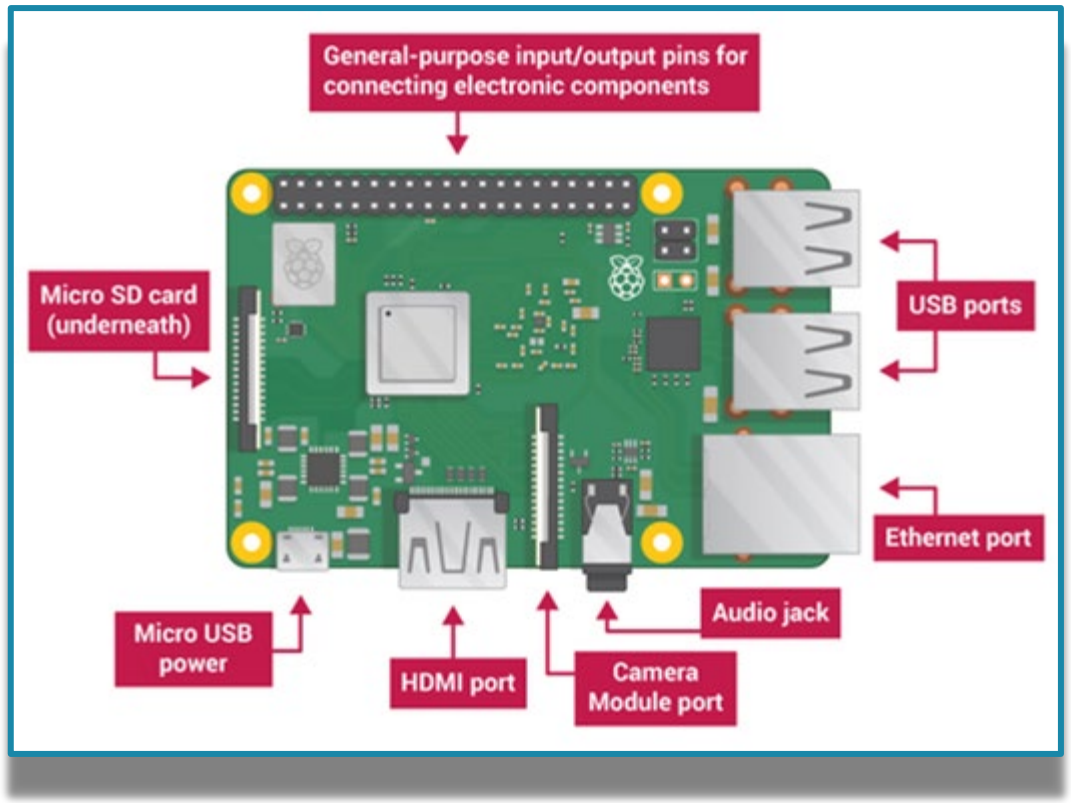
The Raspberry Pi and Astro Pi

Part 2 - Hardware



Raspberry Pi

The Raspberry Pi



Low cost, credit-card sized computer.

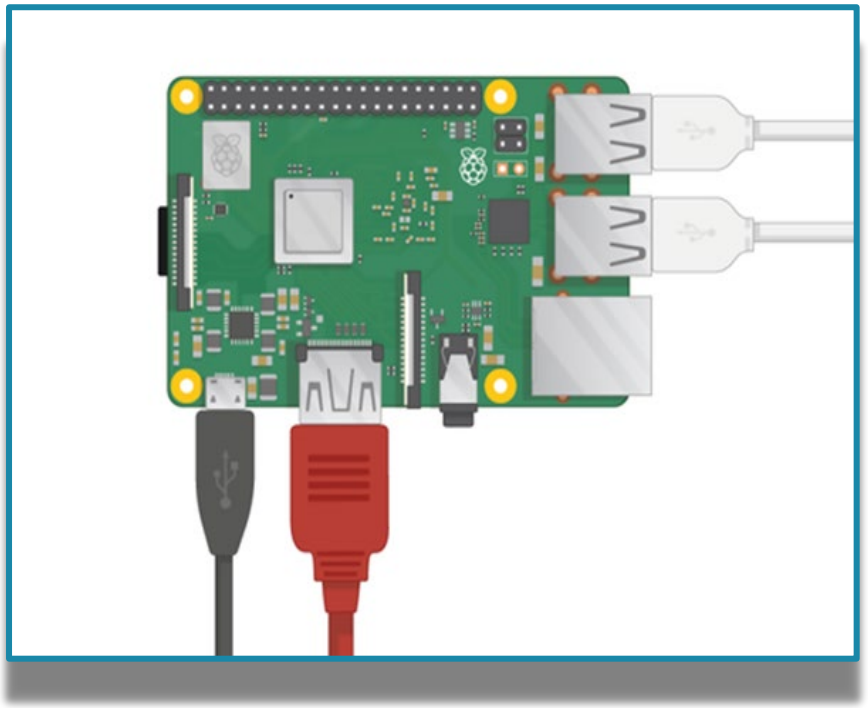
Several ports which allow you to control the Raspberry Pi and other devices.

ESA Astro Pi “unboxing” and setup

https://www.youtube.com/watch?app=desktop&v=W4aReo5icr4

Raspberry Pi Set Up

1. Insert an SD card with Raspberry Pi OS
2. Connect a monitor to the HDMI port
3. Connect a mouse & keyboard to the USB ports
4. Connect the power supply to the micro-USB port



A red LED will light up on the Raspberry Pi, and in a few moments you will see a desktop screen. Then you will be asked to add country, password, WiFi and check for software updates.

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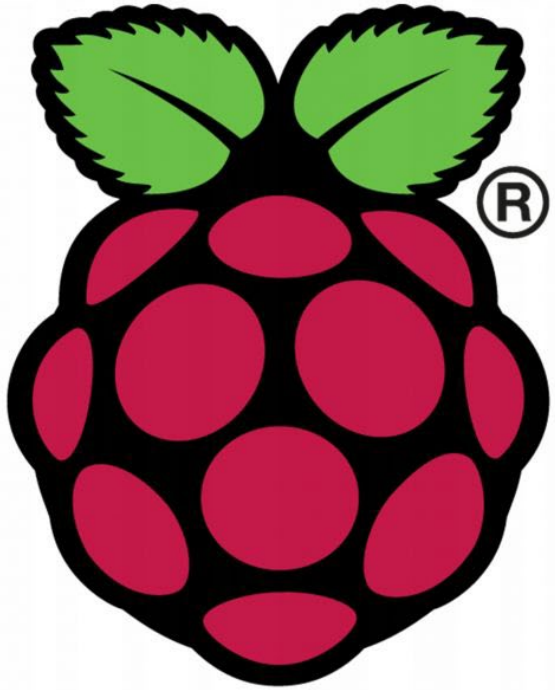
Part 3 - Software



Raspberry Pi

The Raspberry Pi Desktop

Terminal to type commands directly

File manager to browse the files on SD card & ext USB

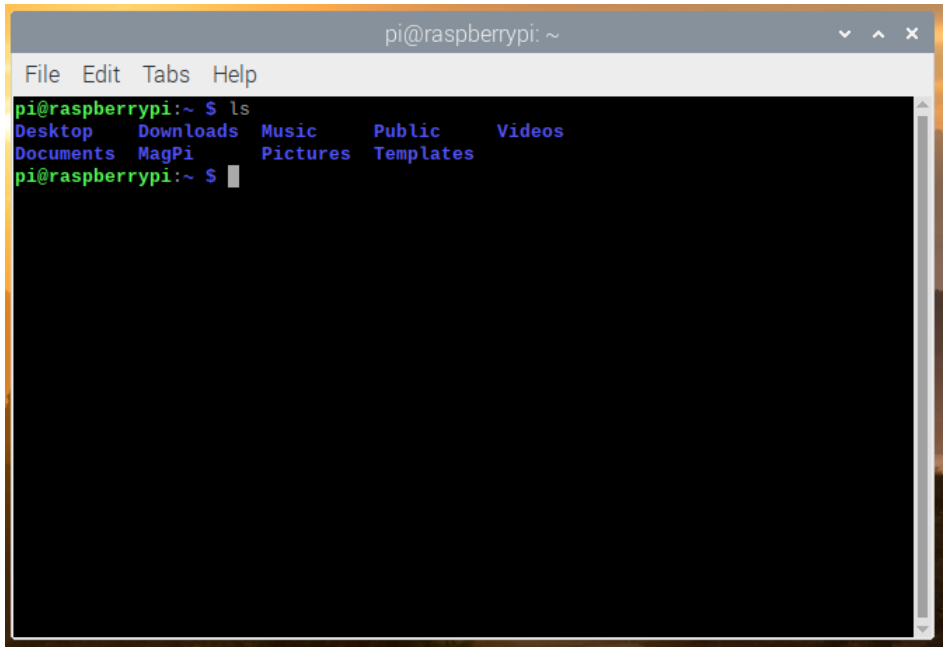
‘Chromium’ internet browser

Variety of lightweight open-source programs packaged with Raspberry Pi OS e.g. text, image & programming tools

This includes Thonny

The Command Line Interface (CLI)

→ Terminal to type commands directly



Commands are case sensitive

Common commands ….

- ls lists the files in the current directory
- ls –l lists the file details
- man <command> manual/help for a command
- pwd displays the current working directory
- pd change directory
- cat <filename> displays (types) a filename
- ps shows the process status
- kill <pid> terminates the process with process id <pid>

Activity

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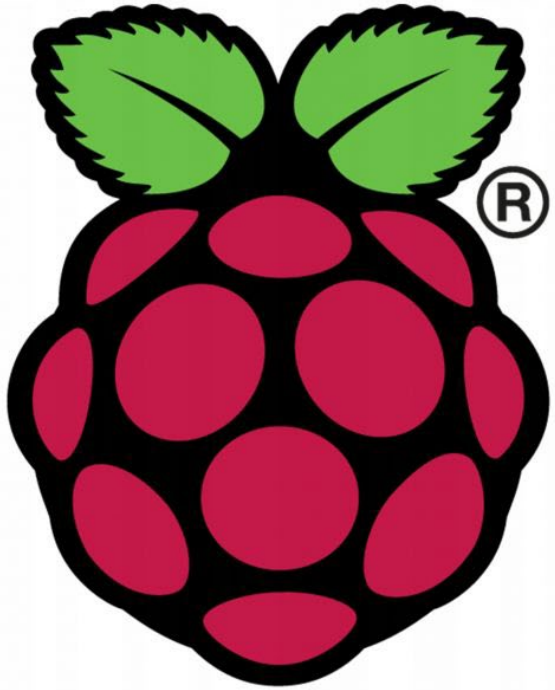
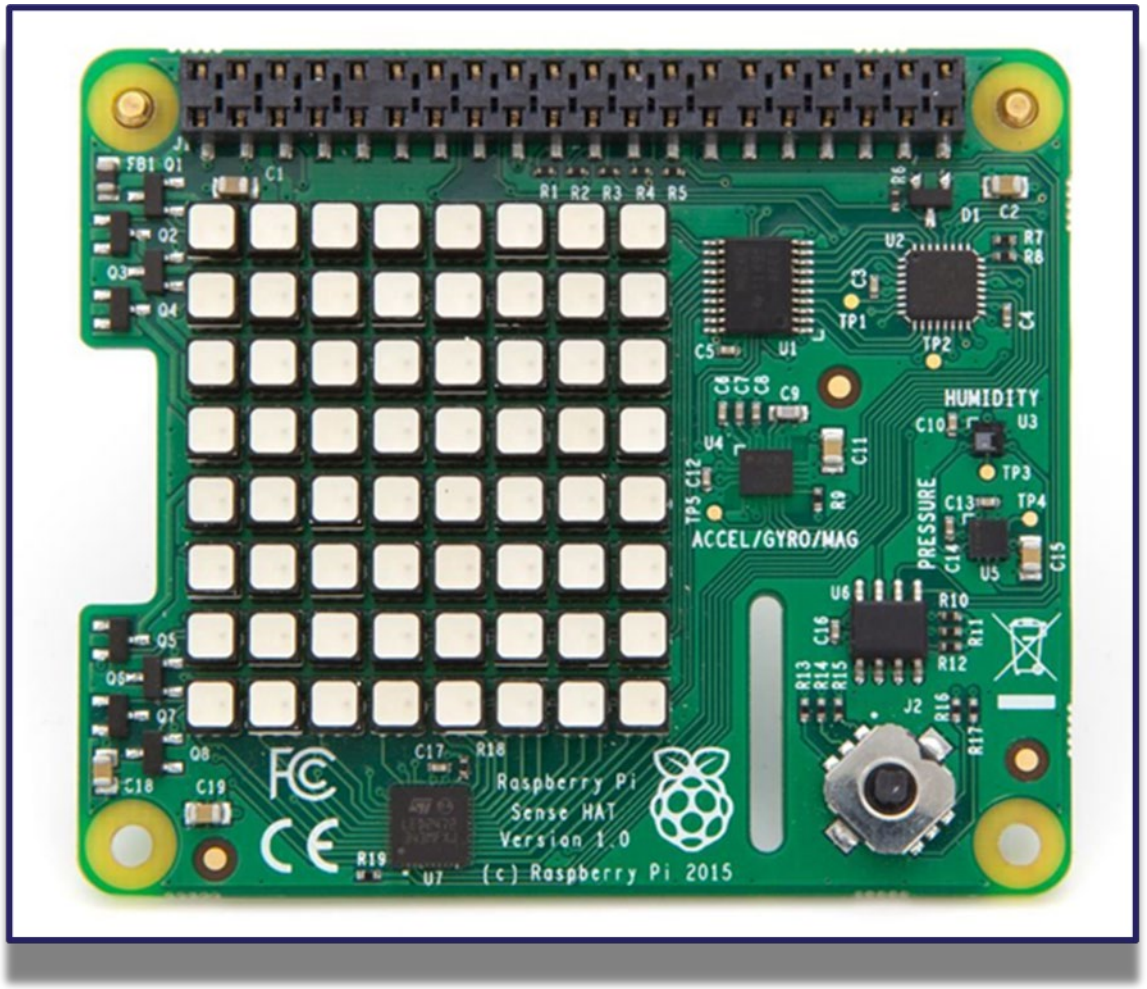
The Raspberry Pi and Astro Pi

Part 4 – Sense Hat (Emulator)



Raspberry Pi

1. The Sense Hat



Specially designed for Astro Pi space mission

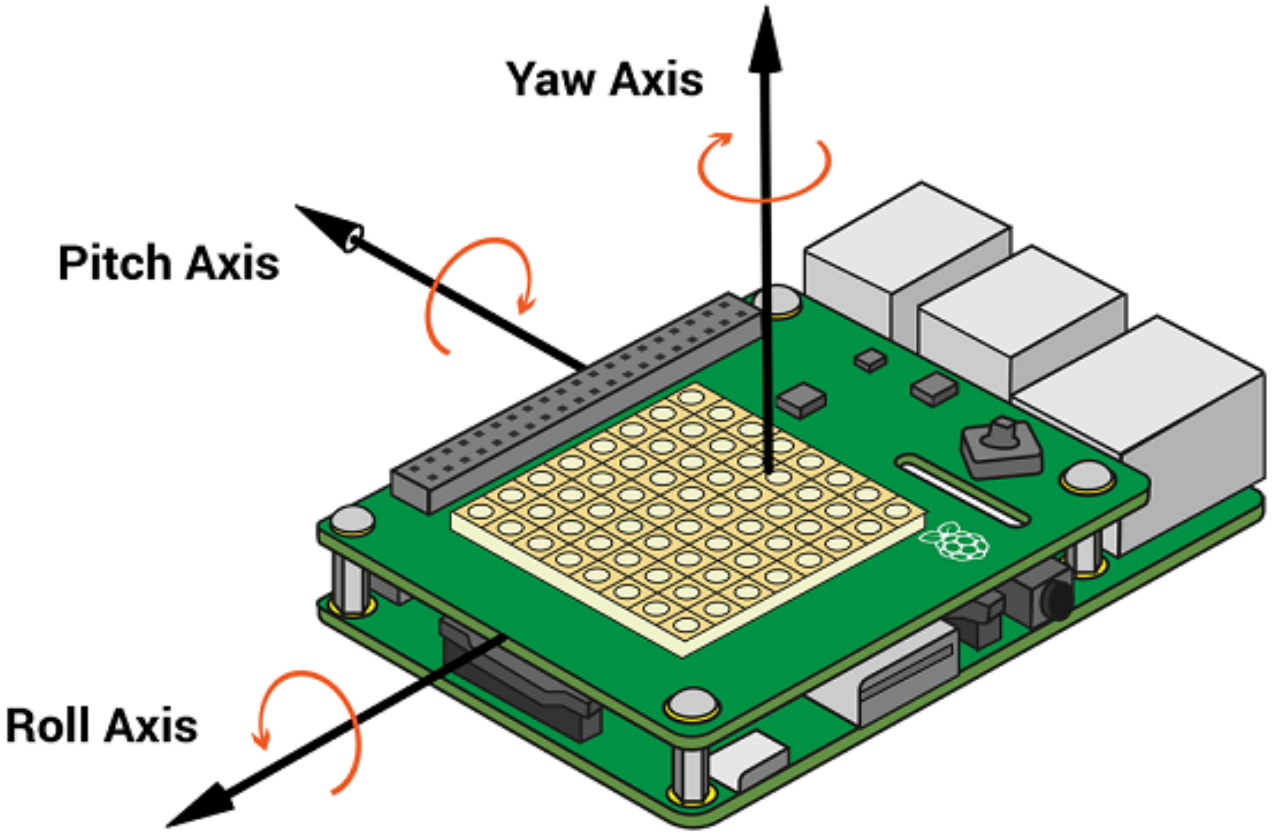
- 8x8 LED matrix
- On board sensors
- Joystick controller

ASTRO PI

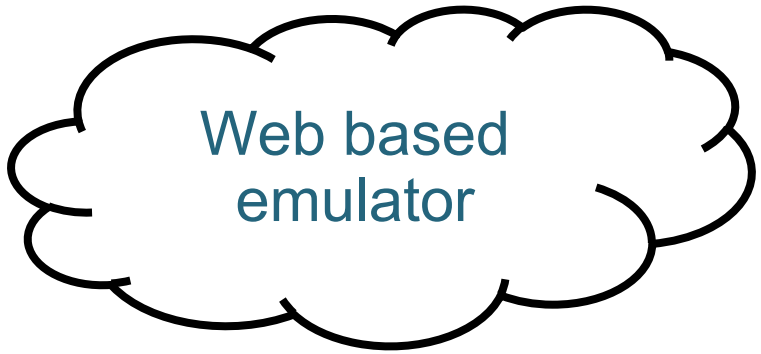
Built in Sensors

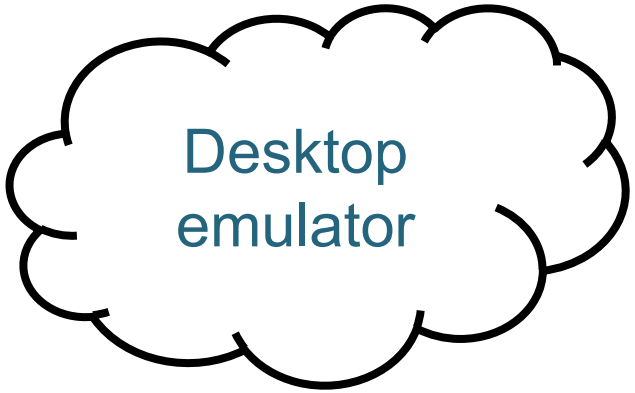
- Temperature sensor
- Humidity sensor
- Pressure sensor
- Accelerometer
- Gyroscope
- Magnetometer
- Light sensor

Movements



Sense Hat Emulators





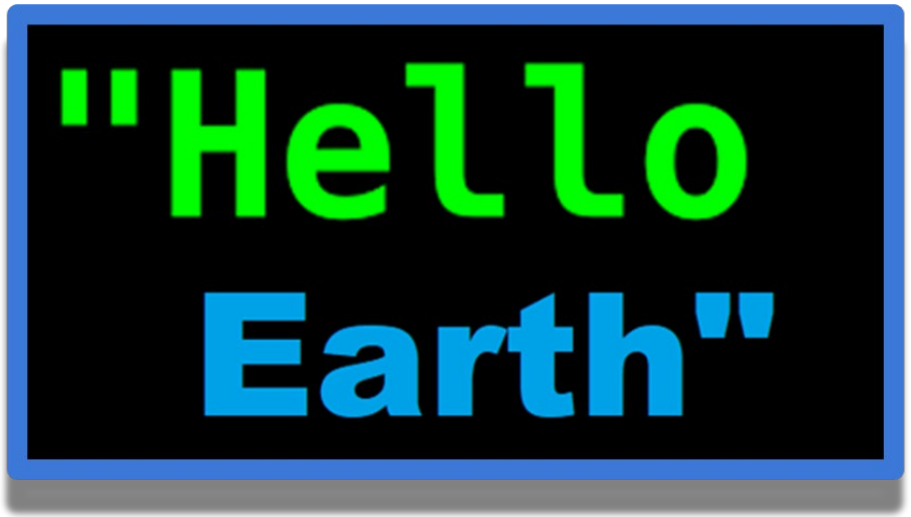
https://trinket.io/sense-hat

Need to change

from sense_hat import SenseHat

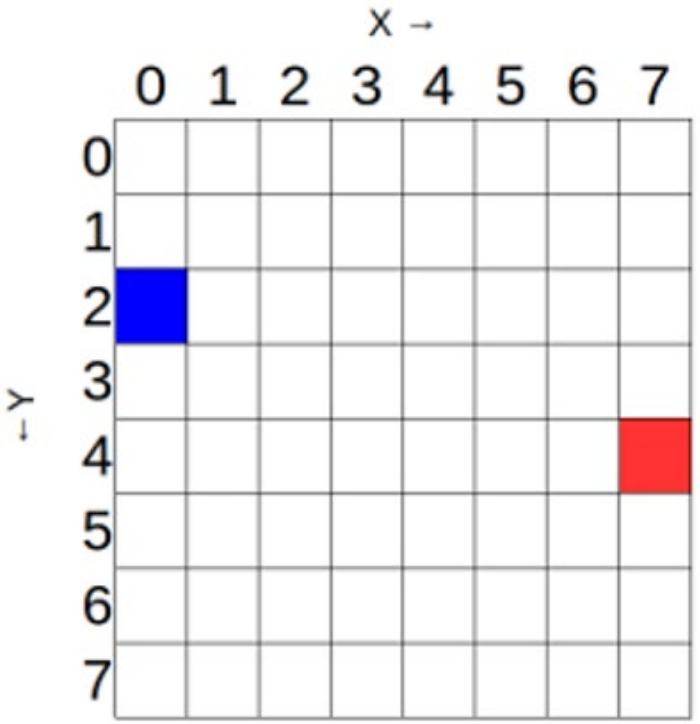
from sense_emu import SenseHat

2. Activity - Hello Earth to LED matrix




```
from sense_emu import SenseHat
sense = SenseHat()
sense.show_message("Hello Earth")
```

LED co-ordinate system



The Sense HAT's LED matrix uses a coordinate system with an x- and a y-axis. The numbering of both axes begins at 0 (not 1) in the top left-hand corner. Each LED can be used as one pixel of an image, and it can be addressed using an x, y notation.

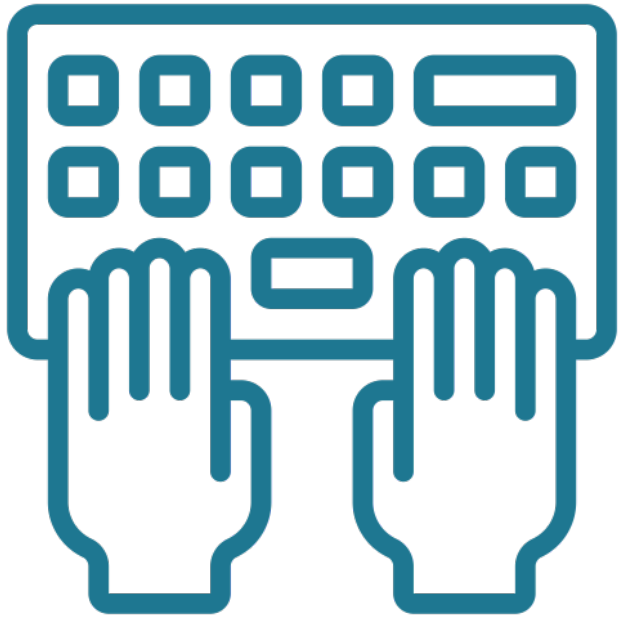
The blue pixel is at coordinates 0, 2.
The red pixel is at coordinates 7, 4.

You can set pixels (LEDs) individually using the `set_pixel()` method.

Programming Activities

Working with the Sense HAT emulator write programs to:

1. Draw a Smiley Face (Hint: `set_pixel`)
2. Draw a Heart (Hint: `set_pixels`)
3. Animate a Heart *or* Smiley Face



Break

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Department of Education