Project 4 – Disco Inferno

Input comes in many forms, from the humble keyboard and mouse to sensors and data collection. But what if a temperature sensor could be used to control the music?

For this project you will need

A Raspberry Pi B+, 2 or 3

The latest version of Raspbian

A Sense HAT

A speaker or monitor with audio capabilities.

## Building the hardware.

Attaching the Sense HAT to the Raspberry Pi requires little more than slotting it on top of the Raspberry Pi, ensuring that it connects with all of the GPIO pins.

When connected attach your peripherals and power up your Raspberry Pi to the desktop.

## Coding the project.

We start by going to the main menu, located in the top left of the screen, and click on

Programming » Python 3.

A new screen will open, in this screen click on File » New Window to open a new editor window. In the new editor window click on File » Save and call your work "Temperature-Control.py"

We start our code by importing a series of modules. These will enable us to use the Sense HAT in our project, enable audio playback using PyGame, a game creation tool for Python. Lastly we can control the pace of our project by using the time module.

*from sense\_hat import SenseHat*

*import pygame.mixer*

*import time*

PyGame requires initialising before it can be used, think of it as “turning on the amplifier” before you can hear any music.

*pygame.mixer.init()*

Next we shall create a function, called audio, that can handle the playback of any music file. We do this by creating a function with an argument, an extra parameter that we can pass to the function. In this case we give it a place holder name as (music). The function will load the audio file ready for playback and then we shall instruct PyGame to play the file once.

*def audio(music):*

*pygame.mixer.music.load(music)*

*pygame.mixer.music.play(1)*

We now use a variable, sense, to shorten the SenseHat() function, enabling easier use of the function.

*sense = SenseHat()*

To signify that the project is ready to start we shall scroll some text across the LED matrix of the Sense HAT, in this case we say that we are ready to party and that the text color is “Yellow”. Colours are mixed using three numbers, a mixture of Red, Green and Blue. So for example

Red 255,0,0

Green 0,255,0

Blue 0,0,255

White 255,255,255

Purple 255,0,255

Yellow 255,255,0

*sense.show\_message("Ready to party!!", text\_colour=[255,255,0])*

Now we shall create two variables that will contain the music to play based on the room temperature.

*cold = "./music/loop\_amen.wav"*

*hot = "./music/loop\_industrial.wav"*

We now start the main loop of our project, this is an infinite loop that will constantly run the code until we stop it. We first create a variable called temperature and then use it to store the current temperature taken using the Sense HAT built in temperature sensor. Next we print the temperature, but round it up to for ease of reference. We then pause for 1 second before proceeding further.

*while True:*

*temperature = sense.get\_temperature()*

*print(round(temperature))*

*time.sleep(1)*

We next create a conditional test that will check the current temperature. If the temperature is less than 33C then it will be “cold” and the audio for cold will be played. If the temperature is greater than or equal to 33C then the audio for hot is played. For both conditions, we scroll some text across the LED matrix in red for hot and blue for cold.

*if round(temperature) < 33:*

*audio(cold)*

*sense.show\_message("COLD", scroll\_speed=0.03,text\_colour=[0,0,255])*

*elif round(temperature) >= 33:*

*audio(hot)*

*sense.show\_message("HOT", scroll\_speed=0.03, text\_colour=[255,0,0])*

## *Complete code listing.*

* 1. *from sense\_hat import SenseHat*
  2. *import pygame.mixer*
  3. *import time*
  4. *pygame.mixer.init()*
  5. *def audio(music):*
  6. *pygame.mixer.music.load(music)*
  7. *pygame.mixer.music.play(1)*
  9. *sense = SenseHat()*
  10. *sense.show\_message("Ready to party!!", text\_colour=[255,255,0])*
  11. *cold = "./music/loop\_amen.wav"*
  12. *hot = "./music/loop\_industrial.wav"*
  13. *while True:*
  14. *temperature = sense.get\_temperature()*
  15. *print(round(temperature))*
  16. *time.sleep(1)*
  17. *if round(temperature) < 33:*
  18. *audio(cold)*
  19. *sense.show\_message("COLD", scroll\_speed=0.03,text\_colour=[0,0,255])*
  20. *elif round(temperature) >= 33:*
  21. *audio(hot)*
  22. *sense.show\_message("HOT", scroll\_speed=0.03, text\_colour=[255,0,0])*

## *Starting the project*

In Python, click on Run >> Run Module to start the code. You should hear a sound. If not ensure that you have selected the correct output by right clicking on the Sound applet, located in the top right of the screen. For speakers attached to the 3.5mm headphone jack, select Analog and ensure the volume is at maximum.

Now use a hairdryer or blow on the Sense HAT to change the music in the room.