Walking On A Tightrope Using Raspberry Pi 3 and Sense HAT

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Abstract

Walking on a tightrope is a game in which you have to tilt your Sense HAT to guide a character along a path. We are using a Raspberry Pi 3 with a Sense HAT for the hardware in this project. Python 3 and Sense HAT for Python 3 will be used for the software. This project teaches familiarity with the hardware and software and how to run and test your project. After we ran and tested our project we would adjust any complications and continue running and testing until the results were optimal.

Introduction

A Raspberry Pi is a small 64bit CPU the size of a credit card with 1GB RAM. It runs Linux OS from a micro SD card and powered by a USB cord. You are able to connect your keyboard, mouse, and monitor. You can also connect to 100 Base Ethernet, wireless LAN, and Bluetooth Low Energy. In addition, raspberry pi also has a 4 pole stereo output, composite video port, CSI camera port, and DSI display port.

The Sense HAT is an add-on board for the Raspberry Pi. The board allows you to make measurements of temperature, humidity, pressure, and orientation, and to output information using its 8x8 LED matrix.

This project brings hardware and software together, allowing people to learn from endless projects. Another important aspect of these projects is learning how to test and adjust errors.

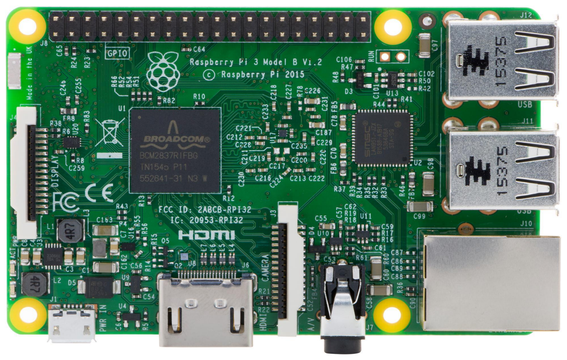

Figure 1. Raspberry Pi 3

Methods and Materials

Materials:
Hardware- Raspberry Pi 3, Sense HAT, Micro SD card with Raspberry Pi OS, Monitor
Software – Python 3, Sense HAT for Python 3

Methods:
- Connect Sense HAT to Raspberry Pi
- Connect Raspberry Pi to Monitor
- Install software
- Begin Code for Tightrope game
- Assure connection of Sense HAT in code through Sense HAT library: *from sense_hat import S*enseHat
- Establish variables
- Define colors for path and character
- Create an x and y coordinate path and a character
- Define pitch and roll for movement
- Determine how the character will move through if statements

Figure 2. Sense HAT connected with Raspberry Pi

Results

The character was able to move smoother with an up pitch between (200, 350), a down pitch between (20, 150), a left roll between (200, 355), and a right roll between (5, 150).
Our blue character was able to walk on the tightrope path successfully, however due to human error the results can vary if the person holding the Sense HAT device has a steady hands or not.

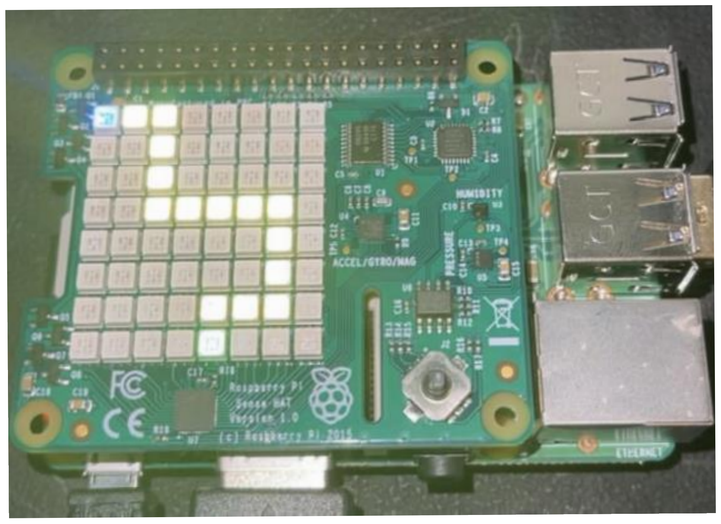

Fig 3. Tightrope playing on computer
(Blue square is the character, Yellow is the path)

Discussion

There was difficulty with the sensitivity of the tilting due to pitch and the roll in the code and the cause of human error. We had to be careful adjusting the pitch and roll; also making sure the Sense HAT was parallel to the ground from the start and the person holding the device had a steady hold, provided relief to the tilting sensitivity.

Conclusions

Raspberry Pi is a friendly way to dive into the STEM community. A Raspberry Pi with a Sense HAT can lead to many projects open to ingenuity. This project showcased the ability to use one of the features of sense hat, specifically taking advantage of orientation which allowed us to guide a character along a path.

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References

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https://projects.raspberrypi.org/en/projects/tightrope
https://www.raspberrypi.org/products/raspberry-pi-3-model-b/