Hacking on the Sense Hat with Javascript

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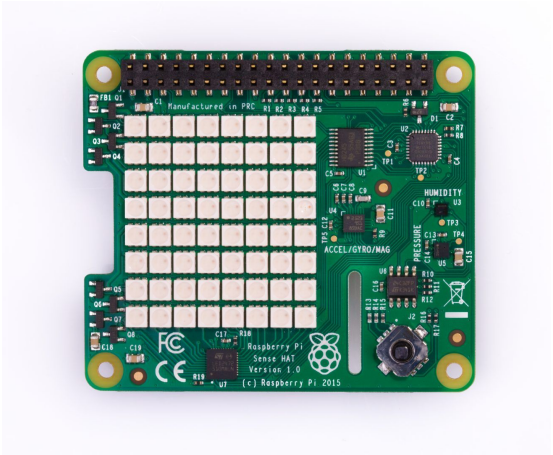
Sense Hat



Hardware

- RGB LED matrix
- Joystick
- IMU (Inertial Measurement Unit)
- Temp, humidity, pressure

Javascript Libraries

node-sense-hat

- https://github.com/resin-io-playground/node-sense-hat
- Pulls together three libraries
  - sense-joystick
  - node-imu
  - sense-hat-led

Using the joystick

Sense-joystick library

- https://github.com/resin-io-playground/sense-joystick
- Exposes an ‘event-emitter’ interface
- Register functions to call on events
- Press, release, click and hold events

```
1 var joystickLib = require('node-sense-hat').Joystick;
2
3 joystickLib.getJoystick()
4 .then(function(joystick) {
5     joystick.on('press', function(direction) {
6         console.log('Joystick was pressed in ' + direction);
7     });
8 });
```

Using the LED Matrix

sense-hat-led library

- https://github.com/aonghusonia/sense-hat-led
- Set pixels to RGB colours
- Perform full ‘screen’ fills

```
1 matrix = require('node-sense-hat').Leds
2
3 x = 3
4 y = 3
5 red = [255, 0, 0]
6
7 // Set a single pixel
8 matrix.setPixel(x, y, red)
9
10 // Switch off a pixel
11 black = [0, 0, 0];
12
13 matrix.setPixel(x, y, black);
```

Filling the Matrix

sense-hat-led library

- Pass an array of 8x8 colours
- Or clear with a single colour

```
O = [0, 0, 0]
X = [255, 0, 0]

cross = [
        X, O, O, O, O, O, O, X
        O, X, O, O, O, O, X, O
        O, O, X, O, O, X, O, O
        O, O, O, X, X, O, O, O
        O, O, O, X, X, O, O, O
        O, O, X, O, O, X, O, O
        O, X, O, O, O, O, X, O
        X, O, O, O, O, O, O, X
]

matrix.setPixels(cross)

// To fill with a single color instead
matrix.clear([127, 0, 0])
```

Sensors

IMU

- Acceleration
- Gyroscope
- Compass
- Fusion data (combination)

Environment

- Temperature
- Pressure
- Humidity

Shape of IMU output


```
{
  "timestamp": "2017-09-22T15:25:44.435Z",
  "accel": {
    "x": 0.03245199844241142,
    "y": -0.008539999835193157,
    "z": 0.9850279688835144
  },
  "gyro": {
    "x": -0.004564663860946894,
    "y": 0.009737887419760227,
    "z": -0.0030581841710954905
  },
  "compass": {
    "x": -24.05376434326172,
    "y": -17.263513565063477,
    "z": 32.1059455871582
  },
  "fusionPose": {
    "x": -0.05040844529867172,
    "y": 0.060639433562755585,
    "z": 2.530726909637451
  },
  "tiltHeading": 2.5467443466186523,
  "pressure": 1010.60986328125,
  "temperature": 37.18092346191406,
  "humidity": 25.106252670288086
}
```

Using the sensors

node-imu library

- Call getValue()
- Provide callback

```
imu = require('node-sense-hat').Imu

IMU = new imu.IMU()

IMU.getValue(function(error, data) {
        console.log('Accelleration is: ', JSON.stringify(data.accel, null, '  '))
        console.log('Gyroscope is: ', JSON.stringify(data.gyro, null, '  '))
        console.log('Compass is: ', JSON.stringify(data.compass, null,  '  '))
        console.log('Fusion data is: ', JSON.stringify(data.fusionPose, null, '  '))

        console.log('Temp is: ', data.temperature)
        console.log('Pressure is: ', data.pressure)
        console.log('Humidity is: ', data.humidity)
});
```

Resources

1. Node libraries: https://github.com/resin-io-playground/node-sense-hat
2. Python libraries: https://github.com/RPi-Distro/python-sense-hat
3. Snake Game: https://github.com/resin-io-playground/sense-snake
4. Code used in this presentation: https://github.com/CameronDiver/sense-hat-presentation