**VISA SensorTile Tutorial**

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**Introduction:**

This tutorial guides you on setting up the VISA SensorTile project.

**Parts:**

* Sparkfun Haptic Motor Driver – DRV2605L (<https://www.sparkfun.com/products/14538>)
* Vibration Motor – B1034.FL45-00-015 (<https://www.sparkfun.com/products/8449>)
* STM SensorTile with SensorTile Cradle Expansion Board - STEVAL\_STLKT01V1 (<https://www.st.com/en/evaluation-tools/steval-stlkt01v1.html>)
* US-100 Ultrasonic Distance Sensor (<https://www.adafruit.com/product/4019>)
* Adafruit PowerBoost 500 + Charger (<https://www.adafruit.com/product/1944>)

**Setting up the circuit:**

Utilize the following diagram and schematic to help setup the circuit.

**Diagram, schematic

Description automatically generated**

**Importing the VISA SensorTile project:**

1. Download the VISA SensorTile Source code
2. Inside STM32CubeIDE Go to File → Import → import ac6 System Workbench for STM32 Project then click “next.”

Graphical user interface, text, application

Description automatically generated

1. In the next screen you will select the visa\_sensortile project folder from your download.

Graphical user interface, text, application, chat or text message

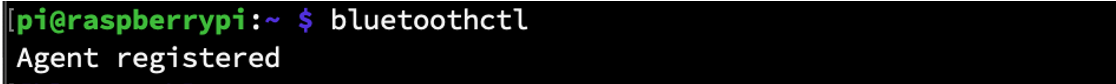
Description automatically generated

1. Click the “Finish” button. Your visa\_sensortile project is now imported and ready to be build and run.

**Running the VISA SensorTile project:**

For this portion I am using a Raspberry Pi 4 to interact with the VISA SensorTile over BLE.

1. Run the VISA SensorTile code.
2. On your BLE device start bluetoothctl and then use “scan on” to list all available BLE devices for pairing.



Text

Description automatically generated

1. Next type “info c0:cc:bb:aa:aa:aa” to get BLE related information about the SensorTile. Here we can see that the SensorTile, named STLB250, is neither paired nor connected.

Text

Description automatically generated

1. Next in order to pair the SensorTile with your Linux device type “pair c0:cc:bb:aa:aa:aa”

Text

Description automatically generated

1. You will be prompted for a password. Please enter the password “123456”. Upon successful pairing you will the BLE device’s services, descriptors and characteristics listed along with the confirmation “pairing successful.”

Text

Description automatically generated

1. Now if you type “info c0:cc:bb:aa:aa:aa” you will see that the device is both paired and connected.

Text

Description automatically generated

1. Now we must disconnect from the device so that we connect to it via gatttool. Type “disconnect c0:cc:bb:aa:aa:aa” and you should receive a confirmation that you’ve disconnected.

Text

Description automatically generated

1. Next exit bluetoothctl by typing “exit”.

A screenshot of a computer

Description automatically generated with medium confidence

1. On your BLE client device connect to the SensorTile’s mac address which is **c0:cc:bb:aa:aa:aa**.

Graphical user interface, text, application

Description automatically generated

1. To read data from the distance sensor you can issue the following command: **char-read-hnd 000e**. The last two bytes returned will be the distance in little endian order. So, for example, in the below screenshot you have a distance of 0x0102 which is 258 millimeters when converted to decimal.

Text

Description automatically generated

1. To stream distance sensor data over BLE you will need to modify the characteristic value of handle 0x000f as seen below. You can write 0100 to turn the stream on and 000 to turn it off.

Text

Description automatically generated

1. The haptic feedback can be controlled by modifying the characteristic value of handle 0x0012. This can take one of the following values. When you change the characteristic value, the haptic motor will give a vibration pattern unique to each hand movement.

|  |  |
| --- | --- |
| Characteristic Value | Hand Movement |
| 0000 | Turn off haptic feedback |
| 0100 | Move hand right |
| 0200 | Move hand left |
| 0300 | Move hand up |
| 0400 | Move hand down |
| 0500 | Move hand forward |
| 0600 | Move hand backward |

Text

Description automatically generated

1. If you want to see what the current characteristic value is for the haptic feedback handle you can issue the following command: **char-read-hnd 0012**. You will receive the current characteristic value returned in little endian format.

Text

Description automatically generated