

User Manual

Using the STS-VIS spectrometer in tandem with the Raspberry Pi 3 B+ as the core controller unlocked the opportunities for scalability in the future for mobile development into wearable technologies. Raspbian (Full) is the Linux based Operating System that was used to develop our projects user interface to control the various data acquisition functions of the STS-VIS spectrometer.

- Installing Raspbian (Full) comes with all necessary libraries required to operate our software with python-seabreeze at its core. At the Raspberry Pi's current configuration, it is already coded to automatically connect to the spectrometer by USB and begin acquiring relevant data upon completion of the patient's biographical information.
- The opening screen validates login security and new account creation to ensure that only authorized researchers are allowed to access spectrometer functions.
 - Login authorization and new account creation is handled by the Azure Cloud Database which provides extensive capabilities of data management methods and security. Once login handshake is authorized, the user will then be guided through the process of collecting necessary biographical information of the patient before being allowed to collect data.
- Upon completion of the patient's information, the UI display is then focused on a real-time updated graph of the current spectra being analyzed by the spectrometer with the ability to customize the wavelength, averages of spectra collected, intensity in microseconds (capture rate) and length of time in seconds for data to be collected.
- The foundation of this project was to allow our users to have the ability to customize the spectrometer's data acquisition to suit their varying needs and to have a user friendly experience when accessing and manipulating the raw data acquired.
- This is where Microsoft's Azure Cloud database comes in to provide a seamless experience from spectrometer to the cloud where researchers from anywhere in the world can access with proper permissions and utilize the acquired raw data to be processed with their own custom functions. The idea of open source development and custom applications of information gathered remained at the core of every feature we developed.

Installation

- 1.) Flash Raspberry Pi 3 B+'s SD card with the Raspbian (Full) Operating System
 - Raspbian (Complete) comes with all the necessary libraries to operate the spectrometer
- 2.) Open the terminal once Raspbian has booted (ctrl + alt + T) and run the following code:

```
# Ensure OS architecture is up to date
• sudo apt-get update && sudo apt-get upgrade
# Comes standard with the installation of Raspbian (Complete)
• sudo apt-get install pip3
• pip3 install seabreeze
# Necessary to provide OS development rules
• seabreeze_os_setup
• sudo apt-get install git
• git clone https://github.com/CPRGB/Senior\_Design\_2020.git
```
- 3.) Access the Senior_Design_2020 directory and run the commands
 - `cd git Data-recording-UI/`

- `python3 Controller.py`
- 4.) After sending the last command, the spectrometer's UI should open automatically
 - 5.) If the UI did not open, please refer to the next section concerning troubleshooting

Troubleshooting

- 1.) Verify that Raspbian (Full) version of the Operating System was installed. If any other version was installed then there are various dependencies that would require manual installation for the software to function. It is highly recommended that if Raspbian (Full) was not installed to begin the installation process from the beginning
- 2.) Remove the python-Seabreeze folder:
 - `sudo rm -r python-seabreeze`
- 3.) Re-clone pythong-seabreeze:
 - `pip3 install seabreeze`
- 4.) Ensure that the command: "seabreeze_os_setup" ran successfully as this would prevent the software from accessing the spectrometer
 - `seabreeze_os_setup`
- 5.) If none of the above works, the source reference material is available at:
 - [Seabreeze Documentation](#)

Maintenance

- 1.) Update the Raspberry Pi software and libraries weekly by running this in terminal:
 - `sudo apt-get update && sudo apt-get upgrade`
- 2.) Future Senior Design teams will be updating the spectrometer's User Interface that we developed. The location as to where they will post their updates is unknown at this time, however, the FIU CS Department would have knowledge on the Senior Team that was assigned this project to continue its development.