# Necessary Preparations before Use

The Tobii Spectrum SDK is designed to allow pupillometric recordings while performing an SI test. Because the Tobii Spectrum is very resource-demanding, especially when recording at high sampling frequencies (up to 1200Hz), the SI test implementation was designed using a Python binding. In this way, a simultaneous Python data collection and storage process runs alongside the Matlab SI test script. This strategy avoids slowing down the SI script or interfering with SI test timing, and is capable of storing the data (even after long recordings at high sampling frequencies) safely and quickly as a CSV file. However, it adds the complication of additional software requirements.

In order for the Python binding SDK to work, a few software extras are needed:

1. Python 2.7 or 3.5
2. “Numpy” and “Pandas” Python libraries
3. Tobii Spectrum Eye Tracker Manager

## Installing Python and Libraries

To install Python and the necessary libraries, it is recommended to use one of the below methods:

1. (**Recommended**) Use a Python distribution like Anaconda (<https://www.anaconda.com/distribution/>). Such a distribution is an “all-in-one” package that includes Python and a slew of useful libraries with established cross-compatibility, including Pandas and Numpy. Once Anaconda is successfully installed, make sure Matlab is associating the correct Python interpreter by typing pyversion into the Matlab console. If a different interpreter is selected, close and reopen Matlab and *before doing anything else*, type  
   pyversion <location of correct Python interpreter>, for example:   
   pyversion C:\\ProgramData\\Anaconda2\\python.exe.
2. Download Python directly (<https://www.python.org/downloads/>). Once it is installed, separately install Numpy and Pandas. Pandas can be installed using the “pip” command in such a fashion: open the command prompt (click on the Windows key and type “cmd”); in the Matlab command prompt, enter py 2.7 -m pip install Pandas (in the case of Python 2.7). Installing Numpy directly can be a bit more complicated and is described here: <https://www.quora.com/How-can-I-install-Numpy-SciPy-and-Matplotlib-in-Python-2-7>. Once Python and the necessary libraries are installed, make sure Matlab is associating the correct Python interpreter by typing pyversion into the console. If a different interpreter is selected, close and reopen Matlab and *before doing anything else*, type pyversion <Python version>, for example: pyversion 2.7.

## Tobii Spectrum Eye Tracker Manager

The Tobii Spectrum Eye Tracker Manager (<https://www.tobiipro.com/product-listing/eye-tracker-manager/>) is used to (1) verify connectivity of the Tobii Spectrum eye tracker, (2) easily change important eye tracker settings like sampling frequency, (3) calibrate the eye tracker, and (4) ensure proper eye tracking (e.g. head position relative to the tracker).

# Device Use:

1. Connect the Tobii Spectrum to the computer according to instructions provided in the Tobii Spectrum case. For the device to work, it is only necessary that the Ethernet cable and USB-C cables are connected to the computer.
2. Turn on the Tobii Spectrum. Wait about 1 minute for the device to turn on. Two sequential successions of three beeps indicates an error – see Note section below.
3. While waiting for the device to turn on, open the Eye Tracker Manager. If the device is connected properly, the device should appear in the Eye Tracker Manager within 1-2 minutes of turning it on.
4. Select the desired sampling frequency and follow the on-screen calibration instructions to calibrate.
5. Run the SI test on Matlab (being sure to follow the instructions outlined above for proper use of the Python binding) and select TobiiSpectrum under Eye Tracker Options. At this point, the device will automatically begin recording at the start of each list and finish either at the end of a list or upon clicking “Finish measurement”. Data is automatically stored in CSV file format in the “recordings\_TobiiSpectrum” folder within the SI test folder structure.
6. Turn off the device when finished and (optionally) disconnect the device from the computer.

## Note:

Some computers experience minor compatibility issues with the Tobii Spectrum. This may be indicated by two sequential successions of three beeps about 1 minute after turning on the Tobii Spectrum (presuming it is properly connected to the computer). In this case, try updating the device firmware using the Eye Tracker Manager with the firmware update file located in the Firmware 1.5.9 folder. If this does not solve the problem, contact Tobii support ([support@tobii.com](mailto:support@tobii.com)).