# Open Speech Platform: Getting Started Guide

http://openspeechplatform.ucsd.edu

December 31, 2018

**Abstract**

This document describes download, build, install and test steps for the Open Speech Platform (OSP) Release 2018c software. This work is supported by Nation Institute of Health, NIH/NIDCD grant R01DC015436, "A Real-time, Open, Portable, Extensible Speech Lab" to University of California, San Diego. Please visit OSP Forum - Getting Started to report bugs and suggest enhancements.

## 1 Release 2018c Installation

This section describes download, build and install steps for the realtime master hearing aid (RT-MHA) and the embedded web server (EWS). These two subsystems comprise OSP.

1. **Download 2018c**. Download the latest release from https://github.com/nihospr01/OpenSpeechPlatform-UCSD. You can either "clone the software on your computer" or "download ZIP file to your computer."

   (a) If you wish to clone, type `cd` in to your terminal, to make sure you are in the local directory. Then press clone in github, and copy the line of code generated into your terminal. Once it has cloned, type `cd nameofdirectory` (for example cd OpenSpeechPlatform-UCSD). Then, type `git pull` to get the latest version. This is the preferred approach.

   (b) When you download a .zip file from github, you will have to manually download newer versions with bug fixes.

2. **Install 2018c** Open a terminal. `cd ./Software/` and `./install`. This script does several things.

   (a) Identify the operating system (OS) on your computer – currently OS X and Linux.

   (b) Install software packages including portaudio (for realtime audio input/output); MySQL (a relational database), PHP (a server side scripting language) and other packages for LAMP software stack (LAMP stands for Linux, Apache, MySQL and PHP). The LAMP

(c) Build RT-MHA and EWS.

(d) Finally, it installs osp in `/usr/local/bin/osp` and a script to invoke ews in `/usr/local/bin/ews`.

If everything went well, your screen will look similar to Figure 1.

```
HariDesktop-2:osp-2018c-release-staging harinath$ cd ./Software/
HariDesktop-2:Software harinath$ ls -l
total 32
drwxr-xr-x   9 harinath  staff   306 Dec 24 08:36 ./
drwxr-xr-x  11 harinath  staff   374 Dec 22 18:24 ../
-rw-r--r--@  1 harinath  staff  6148 Dec 22 19:13 .DS_Store
drwxr-xr-x   8 harinath  staff   272 Dec 24 08:38 .idea/
drwxr-xr-x  26 harinath  staff   884 Dec 22 18:26 EWS/
drwxr-xr-x  11 harinath  staff   374 Dec 22 19:17 OSP/
-rw-r--r--   1 harinath  staff    76 Dec 24 08:36 README.md
-rwxr-xr-x   1 harinath  staff  1681 Dec 22 18:24 install*
drwxr-xr-x  10 harinath  staff   340 Dec 22 19:17 libosp/
HariDesktop-2:Software harinath$ ./install

This script will use 'sudo' throughout at various times, invoke this
as a user with sudo privileges and enter your user password when
prompted

/usr/local/bin/brew
Install brew
==> This script will install:
/usr/local/bin/brew

[snip]

To run open two terminal windows, then in first one run 'osp' and in
the second run 'ews'.
Now open a browser window and go to http://localhost:8000
or type '-h' in the terminal running 'osp'.

HariDesktop-2:Software harinath$
```

Figure 1: Terminal output after the `./install` command. You will need to enter your password at various times. *snip* represents a large portion of the terminal output was deleted. This process can take $30 - 90$ minutes, depending on your computer and network speed. The script ends with instructions on invoking osp and ews in the terminal.

## 2 Release 2018c Test and Validation

This section describes sanity tests to validate your versions of `osp` and `ews`.

1. **Connect USB Audio Headsets** There are many audio input/output options for OSX and Linux computers. One inexpensive option is the Andrea Communications 3D Surround Sound Recording CANS. They are supra-aural headsets, with left and right mics.

   (a) Plug the headsets in to an available USP port.

   (b) On Mac computers, **Open Audio MIDI Setup**: This can be found in `Finder | Applications | Utilities`, as shown in Figures 2 and 3.

   (c) Select 48,000 Hz option on both screens and levels to 1..0 as shown.

   (d) If you use a high end audio interface box (such as Zoom TAC-8) and if you have 98,000 Hz and 24 bit option, you should choose this.

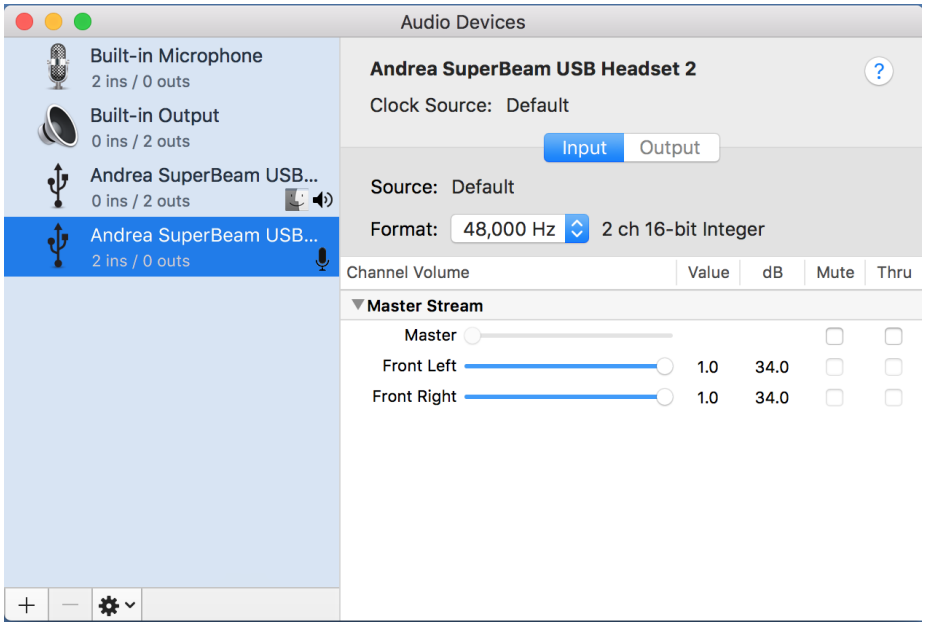


Figure 2: USB Audio Input Configuration.

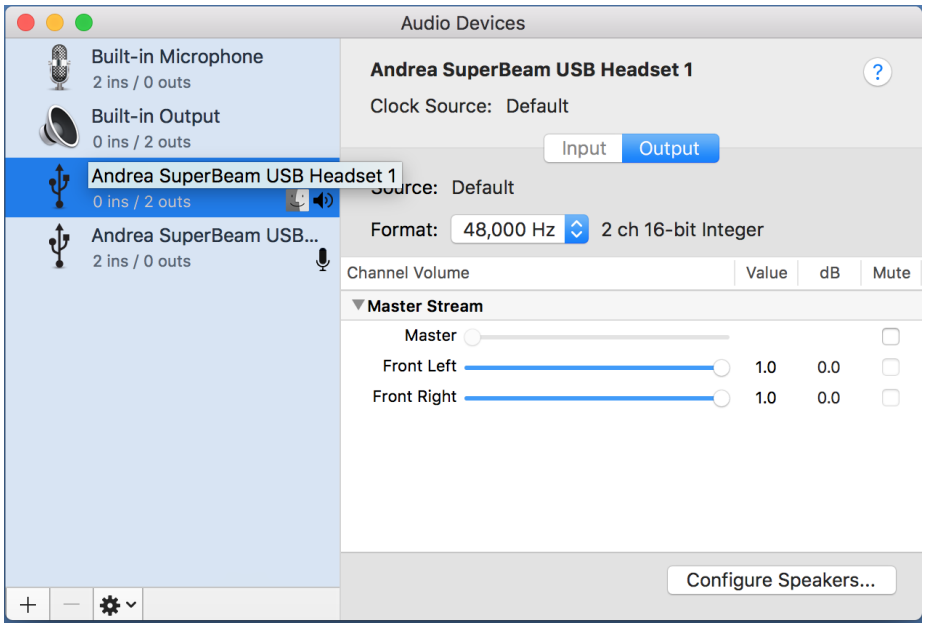


Figure 3: USB Audio Input Configuration.

2. **Test OSP**. Open a terminal and issue `osp` command. The screen will show information similar to Figure 4.

```
Garudadris-MacBook-Pro-6:~ hgarudadri$ osp
4 threads available
Done
Input device # 3.
    Name: Andrea SuperBeam USB Headset
      LL: 0.00458333 s
      HL: 0.0139167 s
Output device # 2.
   Name: Andrea SuperBeam USB Headset
     LL: 0.00335417 s
     HL: 0.0126875 s
Num channels = 2.
TCP Server created
```

Figure 4: Output of the terminal when you issue `osp` command.

(a) **-h** will generate help output as shown in Figure 5.

```
-h
Welcome to the Open Speech Platform
Usage:
  osp [OPTION...]

 Control Signals options:
      --samp_freq arg       Set the sampling frequency for the mic and
                            reciever (default: 48000)
      --input_device arg    Please indicate which device you want to use
for
                            input
      --output_device arg   Please indicate which device you want to use
for
                            output
      --multi_thread arg    Please indicate if you want OSP to run in
multiple
                            threads
  -q, --quit                Quit OSP
  -p, --print               Prints out the current user data structure
  -h, --help                Prints out the help
```

Figure 5: High level commands for **osp** using the command line interface (CLI).

(b) In this example, we focus on changing the overall gain of the system. Refer to Figure 6. **-p** will print the *complete state* of RT-MHA. Notice that the gain on the left and right channels is -20 dB, to account for overall gain of the system.

(c) Note that all the parameters in "parameter" can be changed with `--parameter value` in command in CLI.

(d) –**gain -15** will make the system sound louder by 5 dB.

(e) **-q** will exit RT-MHA.

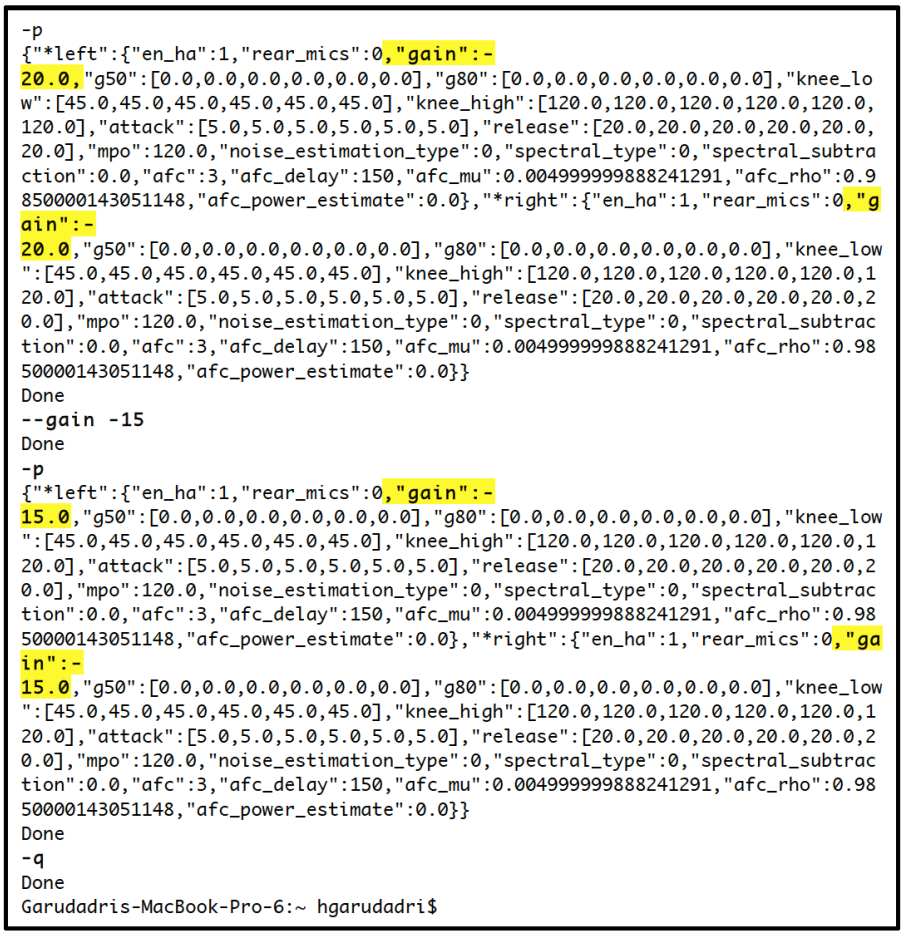


Figure 6: in the terminal.

(f) Make sure that the headsets did not go in to unstable operation so far. Then you can put the headsets on.

(g) Repeat –**gain -?** command and listen to external audio stimuli.

(h) Use -q to quit osp.

3. **Test EWS** Open two terminals side by side. In the first terminal, issue `osp` command. In the second terminal, issue `ews` command.

4. Open a browser such as Chrome. Go to `http://localhost:8000`

   (a) You will see the landing page as shown in Figure 7.

   (b) For testing EWS, click the Researcher Page. You will see the screen as shown in Figure 8.

(c) Choose CR/G65 tab in the Amplification page. You can now change gains in individual bands by typing them in the G65 row.

(d) In the (G65,All) cell, enter 5. The new values for RT-MHA will be highlighted. Press Transmit button and the state of RT-MHA will change to the new values. The highlighting will turn normal on changing the RT-MHA state successfully. Make sure that the headset is not whistling and then put it on. Your experience will be similar to that when you used –**gain -15** above.

(e) In the OSP terminal, use **-p** and notice the values for overall gain (−20), CR (1) and G65 (5) for both left and right channels.

(f) The Andrea headsets have additional low frequency gain. Depending the headsets you are using, your experience may be different. In the G65 row, for columns 250, 500 and 1000 Hz, enter −15, for a −15 dB attenuation. You will notice that the low frequency noise is significantly reduced.

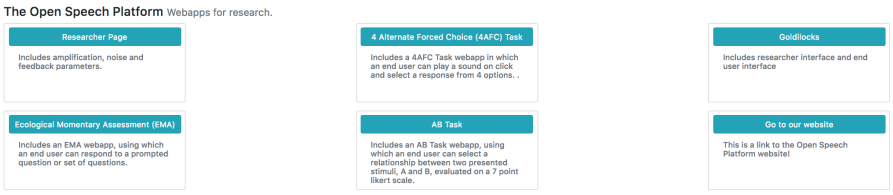


Figure 7: OSP Landing Page. Some of the apps are not yet connected to RT-MHA, but included here for early feedback on the user interface. These in progress web-apps are 4AFC and AB Task apps.

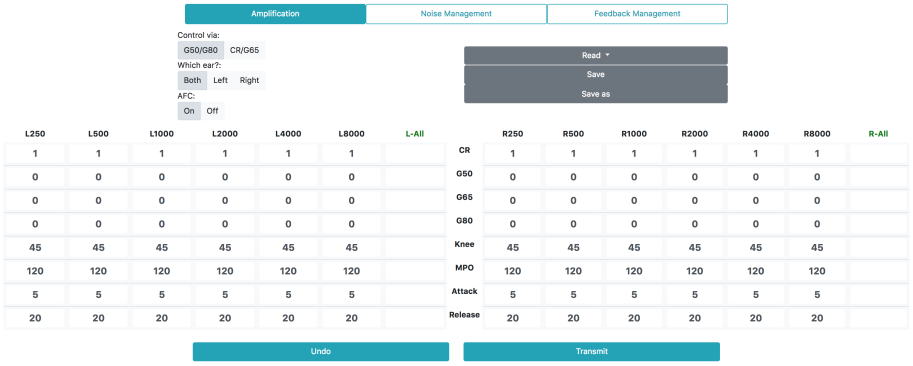


Figure 8: OSP Researcher Page. You can change Amplification, Noise Management and Feedback Management values from the first, second and third tabs, respectively.


Figure 9: OSP Web Apps in Console Mode. If you are using a browser such as Chrome, you can right click in the browser window and choose Inspect. In this mode, you can view exchange of information between RT-MHA and the app. You can also change the app to be formatted for laptop and mobile devices using the Toggle Device Toolbar.