**The Adjustable Audio Application Setup and User Instructions**

## Project Setup

Android Studio will be required to setup and run the project on an emulator. It is recommended that the Pixel 2 emulator with API 28 be used to run the application, however the Nexus 4 emulator has also been used to test and develop the application. The following setup instructions were tested on Android Studio version 3.6.2 on the Mac OS operating system. However, the instructions should be identical or very similar to older versions of Android Studio and different operating systems.

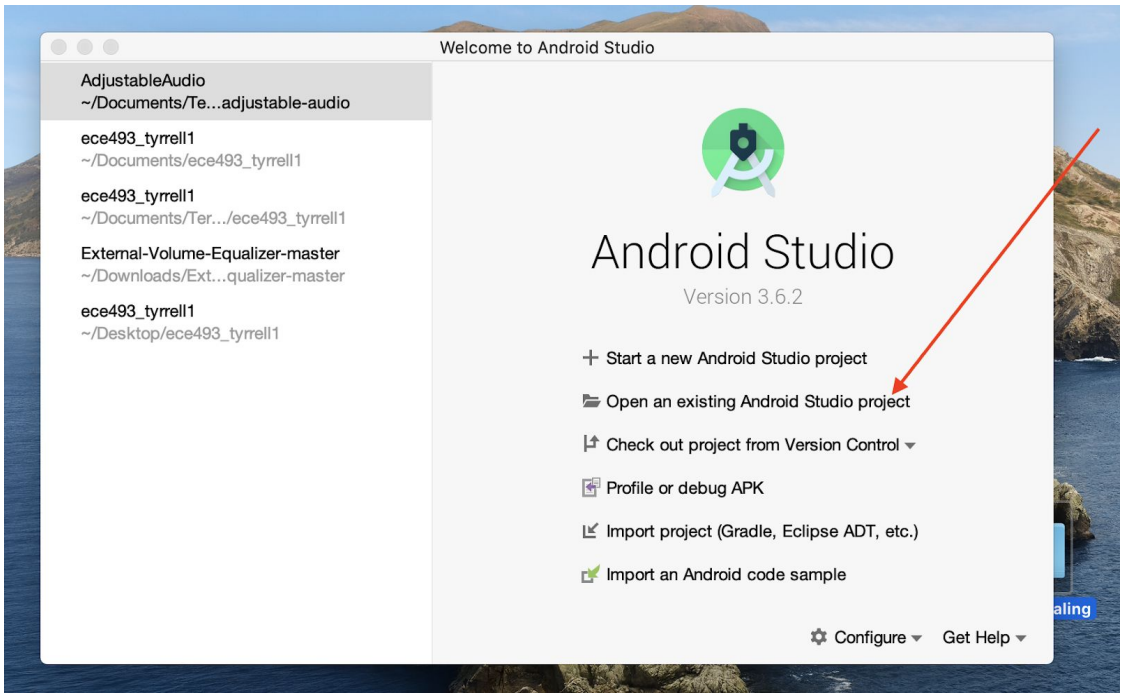
To retrieve the Adjustable Audio application from the departmental git server, please run the following command in a terminal window:

"git clone ece493_group5@gitrepo.ece.ualberta.ca:ece493_group5.git"

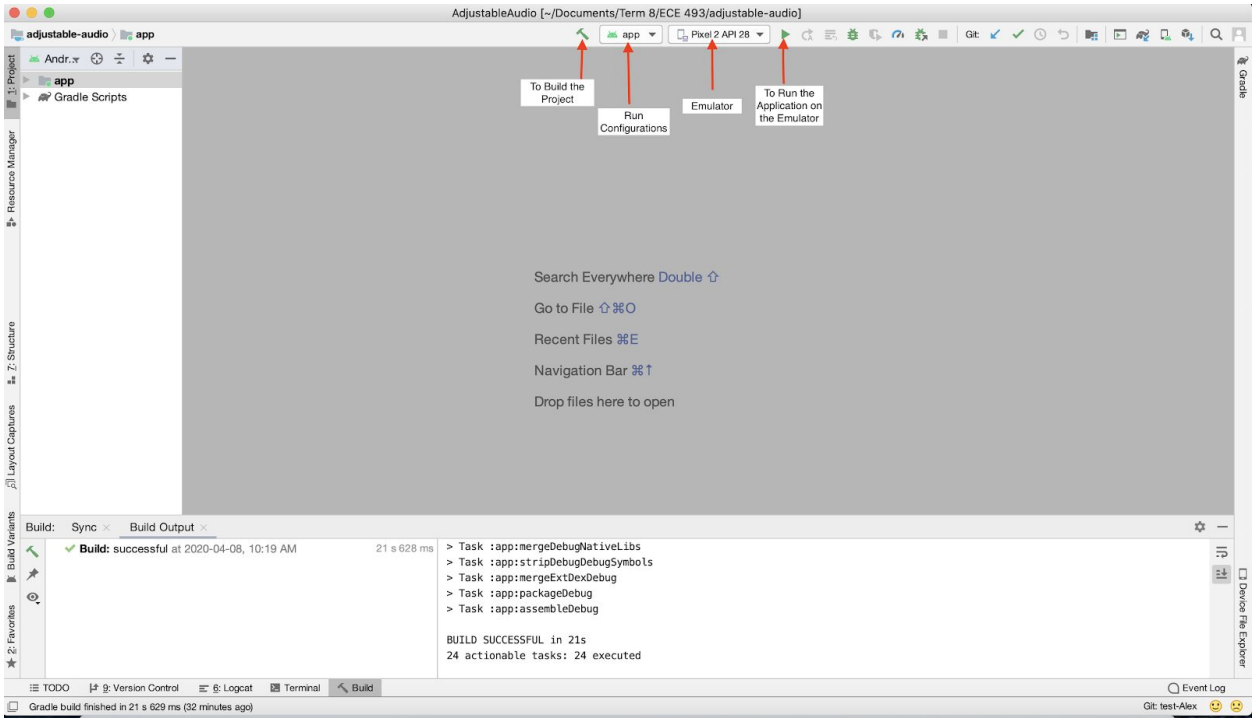
If the above server does not work, you may try the decimal notation form instead:

"git clone ece493_group5@129.128.208.11:ece493_group5.git"

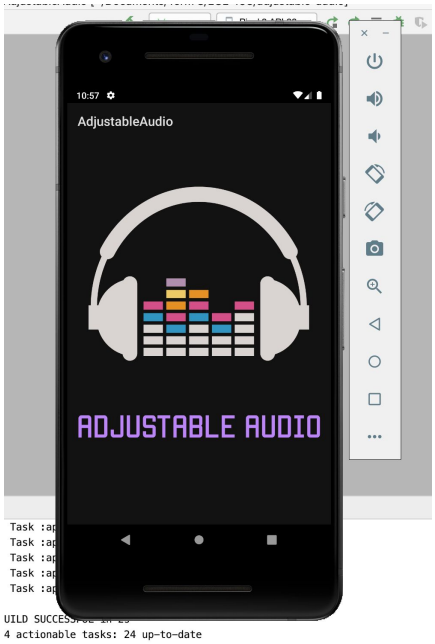
The command will clone the repository hosting the Adjustable Audio project onto the computer. Afterwards, please open the Android Studio application. When presented with the Android Studio menu, choose "Open an existing Android Studio project".



This option will open up the computer's file application. Navigate to the Adjustable Audio application folder and choose to open it. Android Studio will begin loading the project and display the Android Studio window. The window should look like the screenshot below:



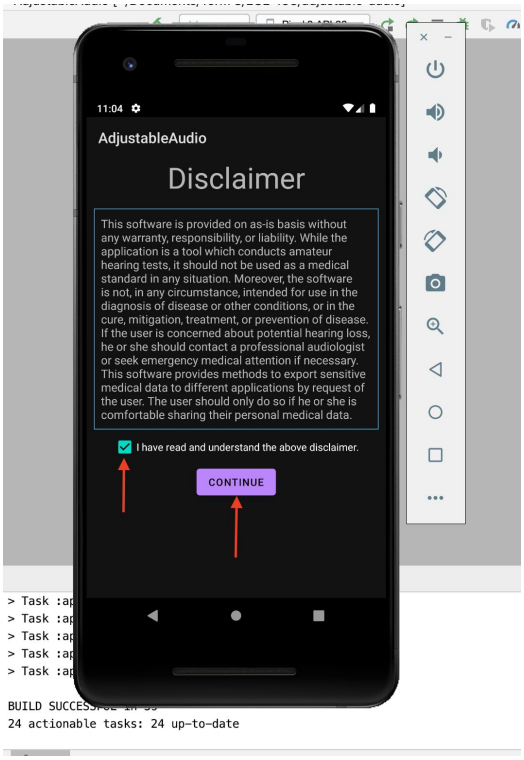

In the toolbar, the hammer can be used to build the project. The instructions to create an emulator can be found in Appendix A of this document. Ensure that the chosen emulator is selected in the drop down menu, and that the "app" configuration is selected. Afterwards, click the run icon to run the application on the emulator. Android Studio will rebuild the project, and install the Adjustable Audio application on the emulator.




To properly test the application, at least one audio file is required to be on the emulator. To upload an MP3 file onto the emulator from the computer, the file can just be dragged and dropped onto the emulator. Note that doing it this way will require you to restart your emulator after you have dragged your MP3 file. Additionally, an MP3 file can be downloaded directly on the emulator using the emulator's applications (Chrome, Google Play Music). As well, the user should attach a pair of stereo headphones to their computer to properly test the output of the Adjustable Audio application.

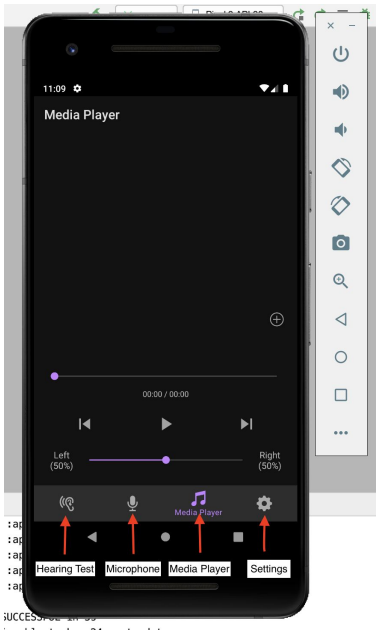
**User Instructions**

When the Adjustable Audio application runs for the first time, the user is shown a disclaimer statement. The disclaimer statement tells the user that the application should not be used as a medical standard. The user is required to read the statement, and confirm they have read it by clicking the checkbox. Only after the checkbox is clicked can the user continue to the rest of the application after clicking the "Continue" button.

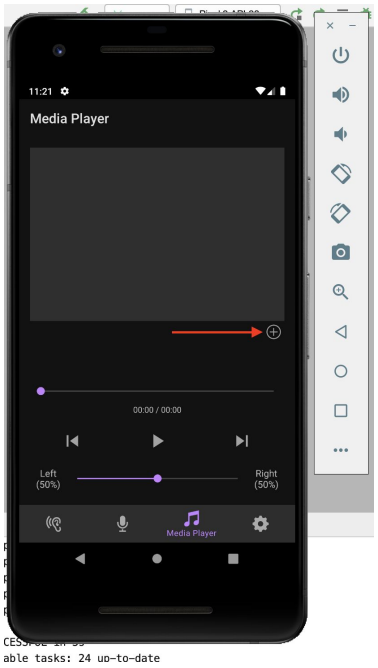



After clicking the “Continue” button, the user is shown the media player fragment. The user is required to grant permission for the Adjustable Audio application to access photos, media and files on the device, and to record audio. Without these permissions, the application’s capabilities are very limited. Please grant these permissions.

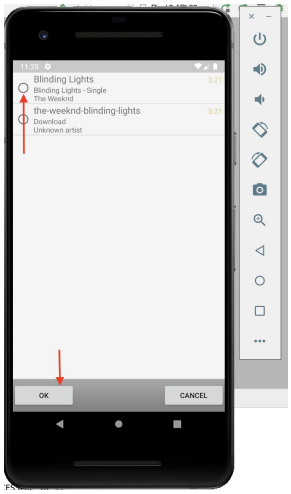
At the bottom of the page is a navigation bar with four different icons. The user can use the icons to switch between fragments. In the below screenshot, are labels for the different fragments for each icon.



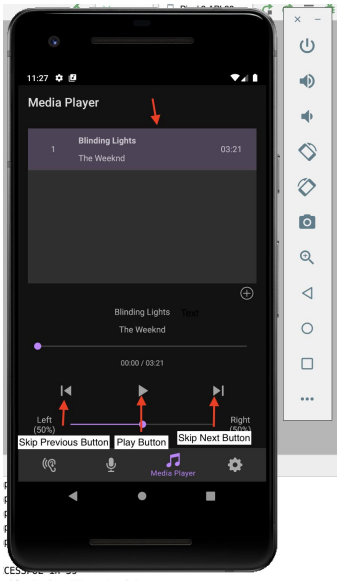

For the media player, the user can add music by pressing the floating “+” button.



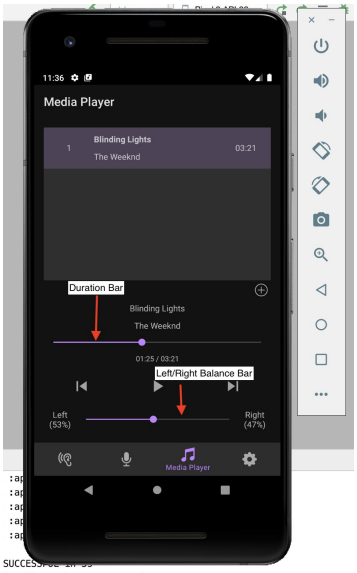

When the button is pressed, the Android’s file system is opened. The user can then select an audio file to add to their music queue, and press the “OK” button.



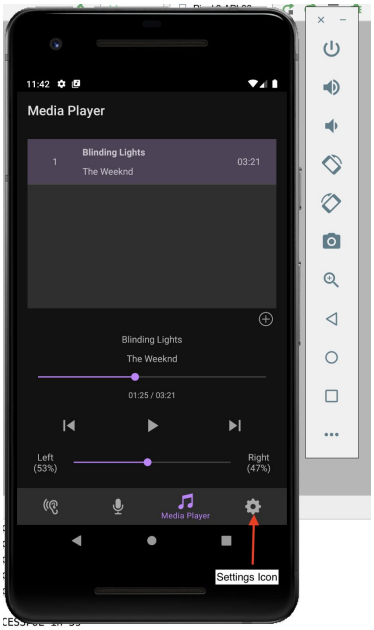

The selected audio file can be seen in the music queue. To play the audio file, please click the play button as identified in the below screenshot. As well, the audio file can be paused by selecting the pause button that replaces the play button when the audio file is playing.There is also a skip previous button and skip next button as well. To properly test those, it is recommended that the music queue has more than one song in it.



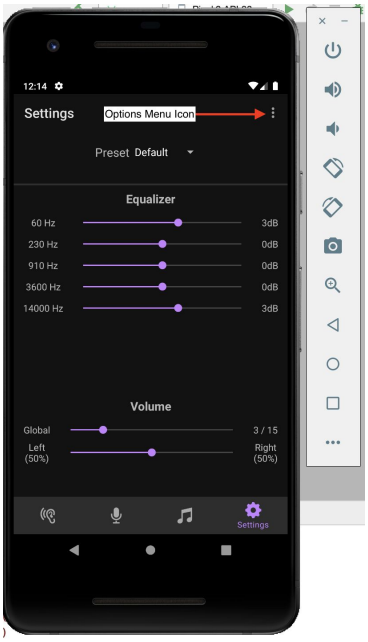

Additionally, the user can skip within the song by dragging the bar showing the elapsed duration of the audio file. The left/right audio balance can also be changed using the left/right audio balance bar. When the user manipulates the audio balance, the output of the media player should shift between two ear buds.




To navigate to the audio settings component of the application, select the settings icon from the navigation bar.

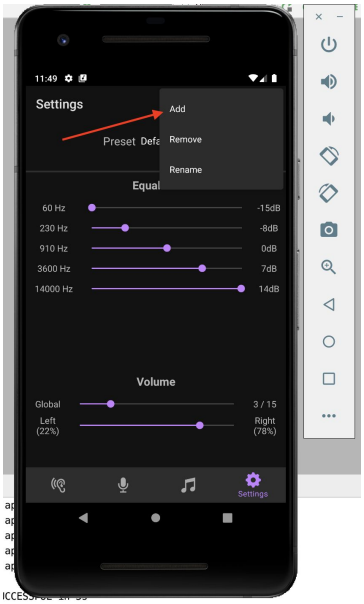



The application will display the Settings fragment. On this user interface, the user can change the decibel level of certain frequency ranges, the ratio of the left/right audio balance and the overall system volume for music.

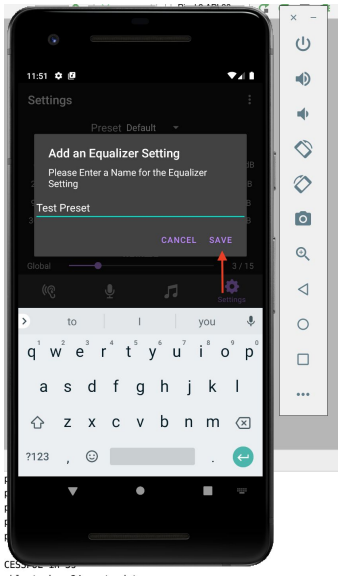



The best way to test the equalizer and volume sliders is to play a song through the media player (see above). Then manipulate the sliders on the settings fragment, and notice how the audio output changes volume through the headphones.

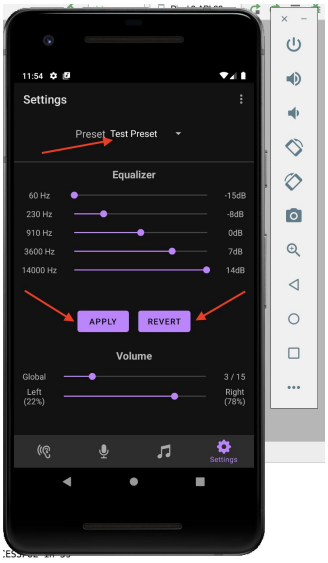
To add a preset, the user can manipulate the sliders to his/her desired position. Then, the user can select the options menu (as shown in the above screenshot), and the “Add” option.




After selecting the “Add” option, a dialog will appear. The user should provide a name to the input of the dialog, and press the “Save” button.

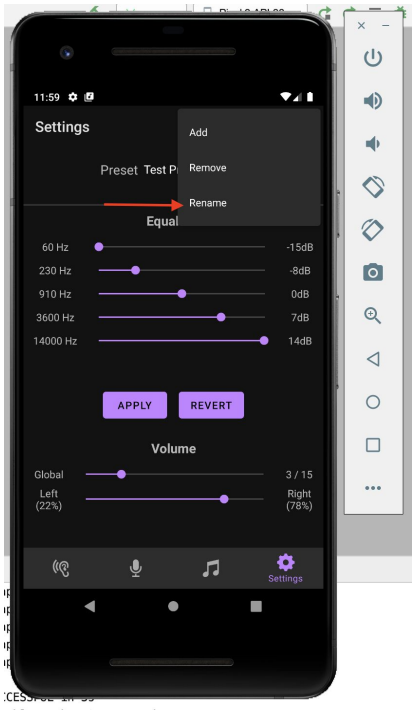



The “Save” button will create the preset and automatically switch the user to their preset. A preset consists of the equalizer and the left/right audio balance. It does not include the global volume. Notice that the “Apply” button and “Revert” buttons appear after switching to a preset that is not the system’s default preset.

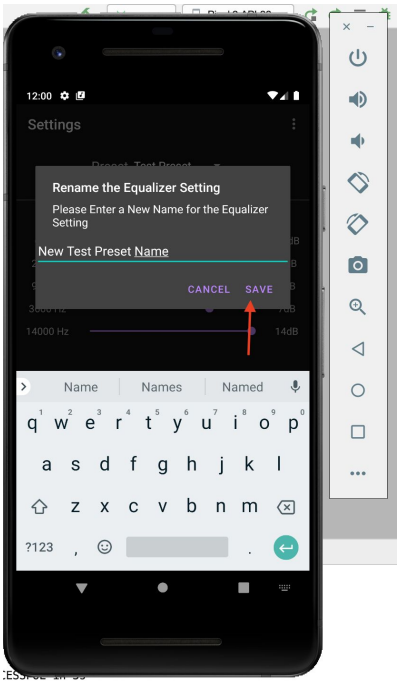



The user can manipulate their preset using the sliders. If the user wishes to save any changes to the preset, they must click the “Apply” button (as shown in the above screenshot). If they wish to discard any changes and reset back to their preset, the user can click the “Revert” button (as shown in the above screenshot).

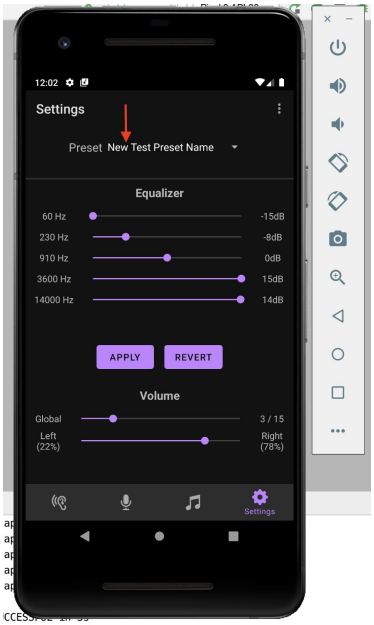
To rename a preset that is not the application’s default preset, the user can click the options menu (as shown above) and  select the “Rename” option.



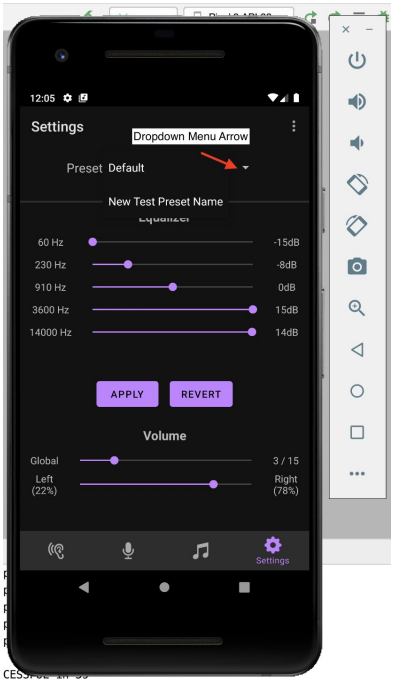

After choosing the “Rename” option, the application will show a dialog. The user can enter a new name for the preset in the input of the dialog. The user can click the “Save” button to save the new name to the preset.




Notice that the new preset name is displayed at the top of the screen.

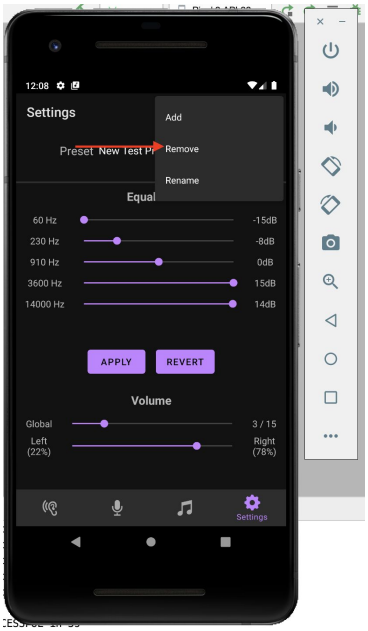



To switch between presets, the user can select the dropdown menu arrow at the top of the screen and a list of their presets will be displayed. The user can then select which preset they wish to use by clicking on the preset's name. The system will then apply the preset to any audio output from the application.

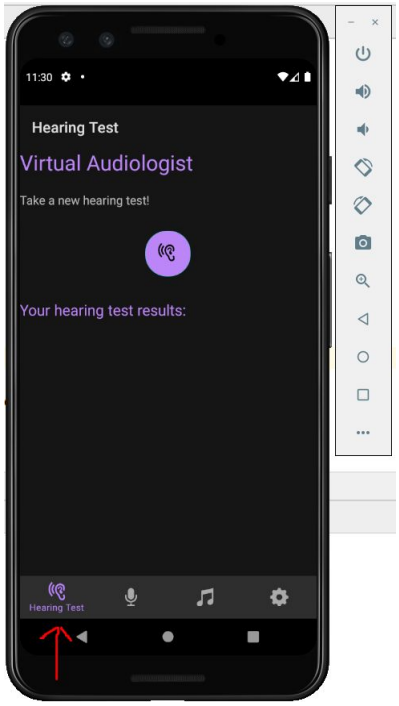



To remove a preset that is not the application's default preset, the user should have the preset selected. The user should select the options menu (as shown above), and select the "Remove" option. After selecting "Remove", the application will delete the preset and switch to another

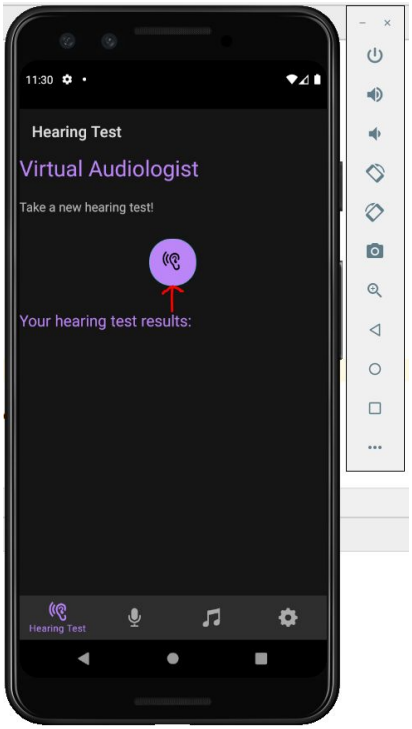
preset. To verify that the preset is removed, please select the dropdown menu arrow (as shown in the above screenshot) and verify that the preset is no longer shown there.



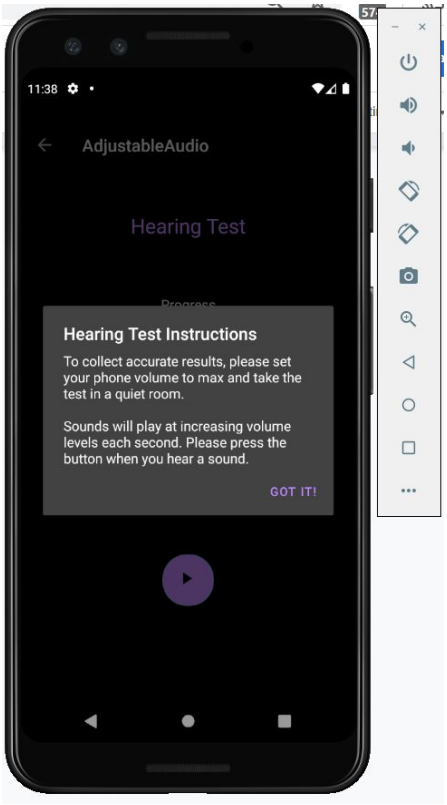

To move to the hearing test component of the application, select the hearing test navigation bar icon.




The hearing test component contains a list of hearing test results and a button to start a new hearing test. To start a new hearing test, press the purple ear icon button

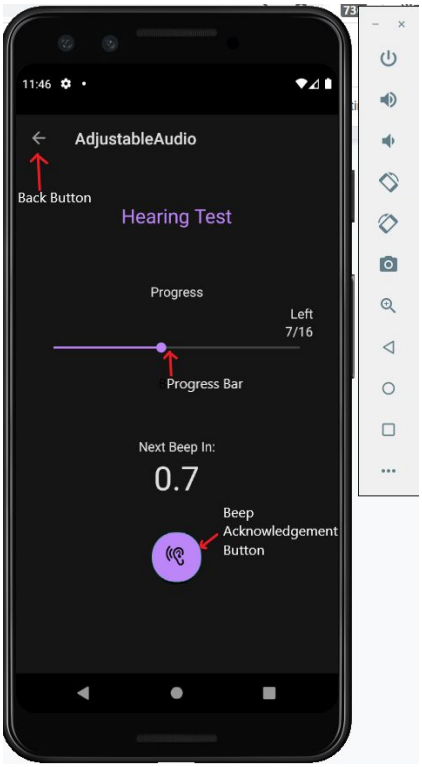



After pressing the button, a hearing test starts, and instructions are shown. Once the instructions are understood, press the “Got It” button.

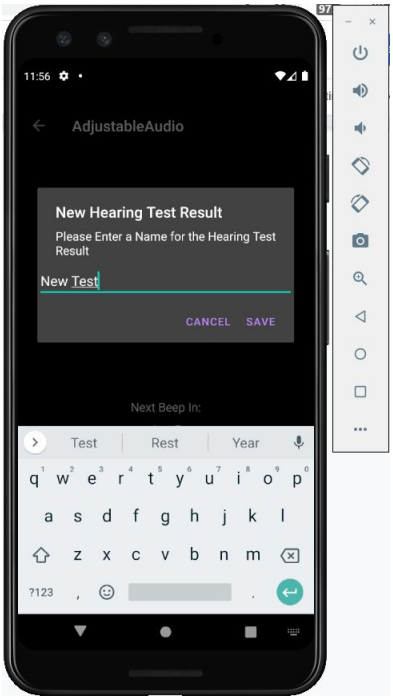


Once the instructions are closed, press the start button to start the hearing test

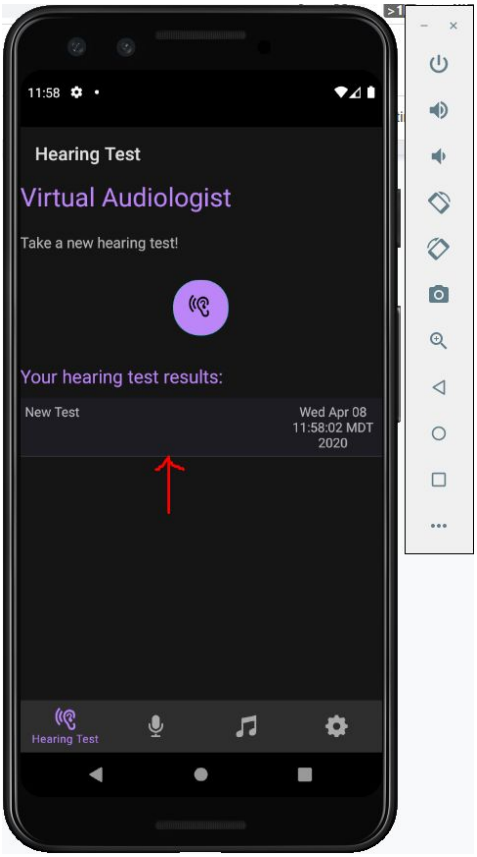
The hearing test will then start. Sounds will play first in the left ear. The volume will be quiet at first, and increase each time the countdown expires. Once a sound is heard, press the sound acknowledgement button. The test progress bar will fill up as sounds are heard. After all 16 frequencies are tested on the left ear, the test will restart for the right ear. To exit the test, select the back button on the phone, or the back button near the top left of the screen.



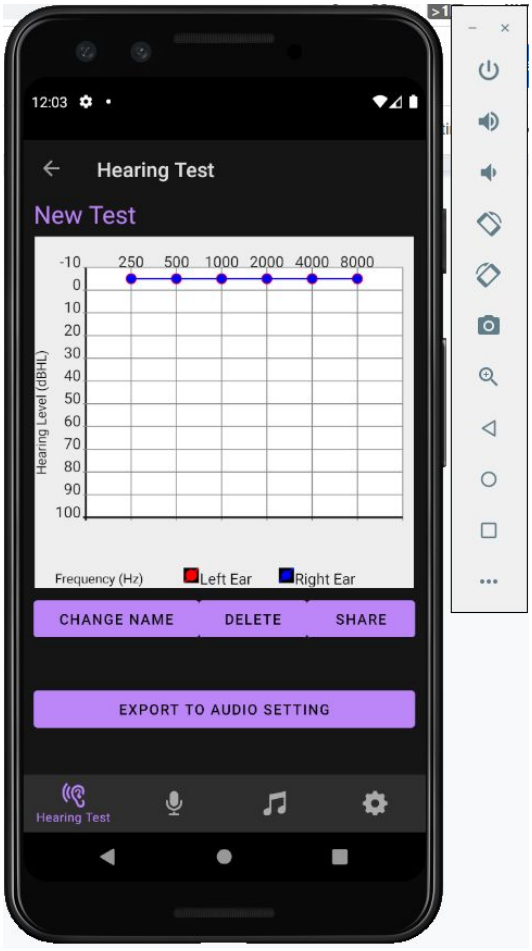

Once the test is completed, enter a name for the test, or press cancel to use the default name



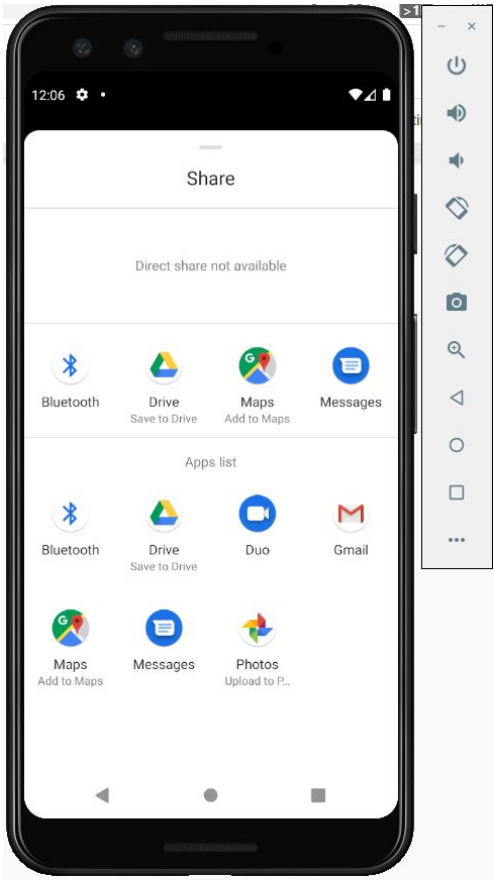
After completing the test, the list will be populated with your new test result. Press the test result in the list to view the hearing test result.



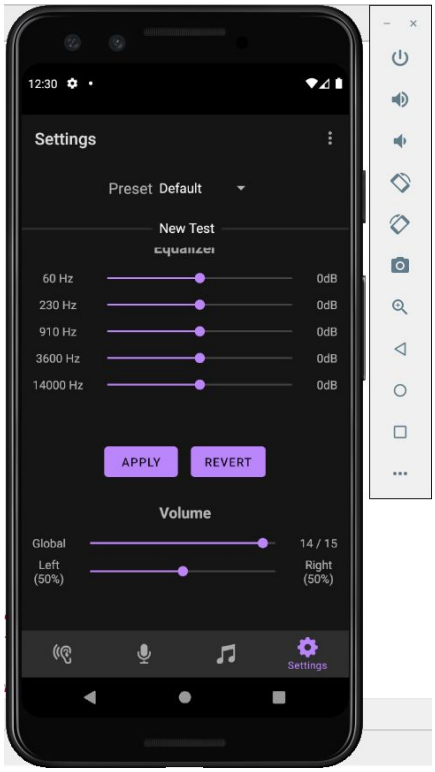

After selecting the hearing test result, a new fragment showing a generated audiogram is shown for the hearing test result. From this fragment, the user can choose to rename, share, delete or export the setting to an audio setting, and pressing the back button will return the user to the previous screen.



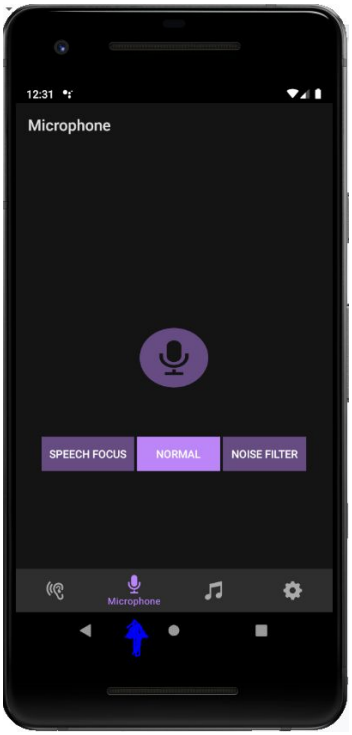

If a user chooses to share, the following menu will appear. Choose the desired destination to start the sharing process. Note that this will require a registered email on the android device to export via email. By selecting the gmail icon in the share list, a user can start the process of connecting an email to the gmail app.



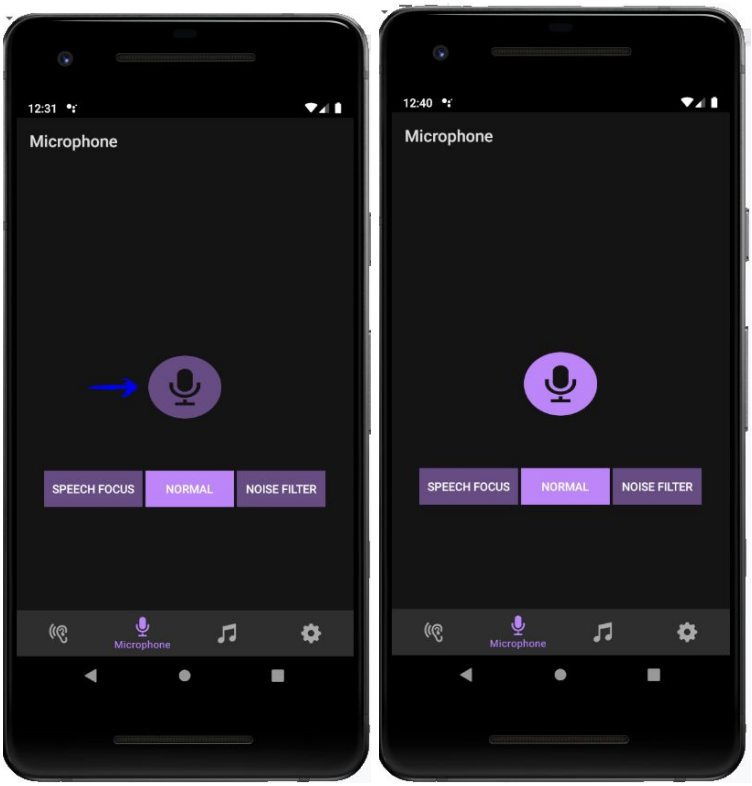

If the “export to audio setting” button is selected, a new audio setting will be created. Navigate to the settings fragment, and select the dropdown list to see that the list is populated with the converted hearing test result. Select the new result to apply it to your audio.




The microphone player can be viewed by pressing the microphone navigation icon.

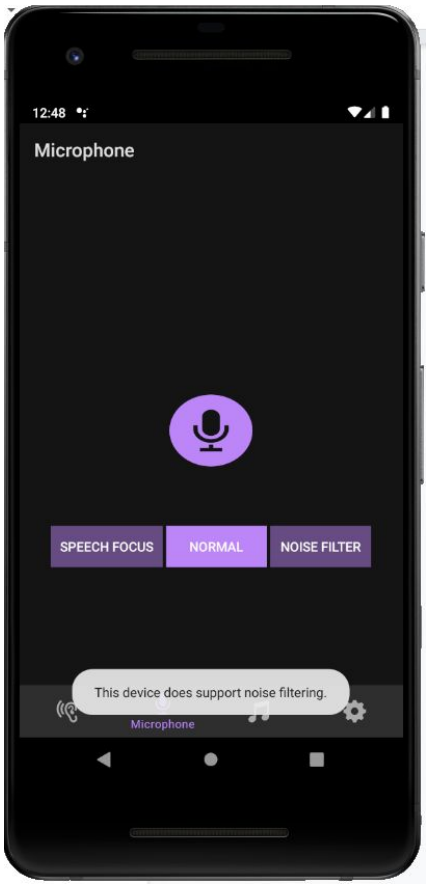


In the microphone player, you can playback the microphone by pressing the microphone icon button at the center of the screen. This will cause the icon to be highlighted and the microphone will be played back. Pressing the microphone icon again will turn off the microphone playback and cause the icon to be unhighlighted.

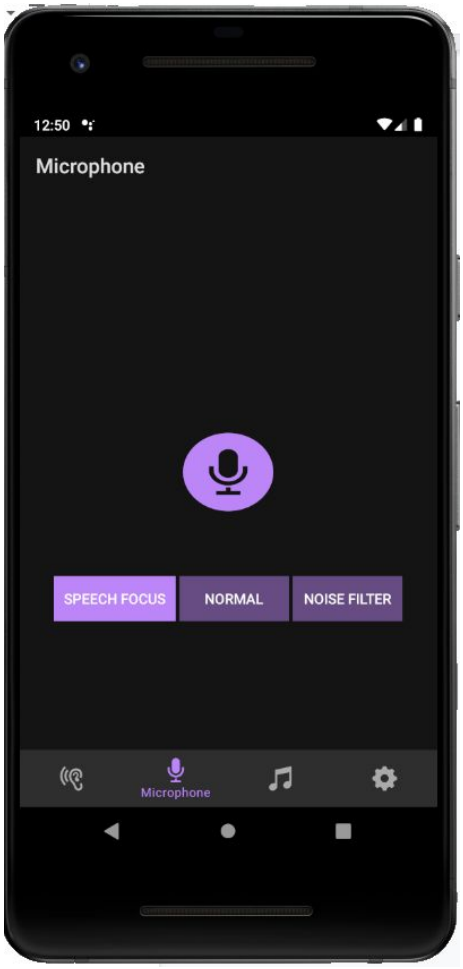



There are 3 modes available with the microphone: *Normal, Noise Filter,* and *Speech Focus*. Only one of these modes can be selected at a time. The default mode is the Normal mode, which will playback the microphone input unfiltered.

The noise filter mode will filter out background noise (such as static) and acoustic echoing from the microphone playback. This mode is not available on all devices (or any emulators) and a toast will appear if this is the case.

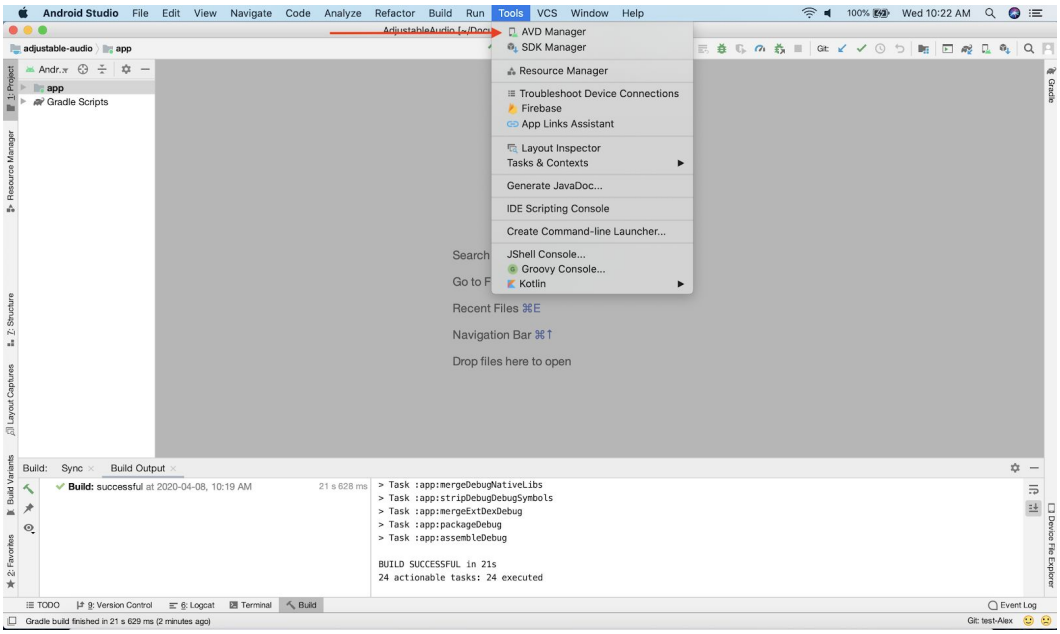



Finally, the Speech Focus mode will only playback the microphone input when a voice is “detected”.

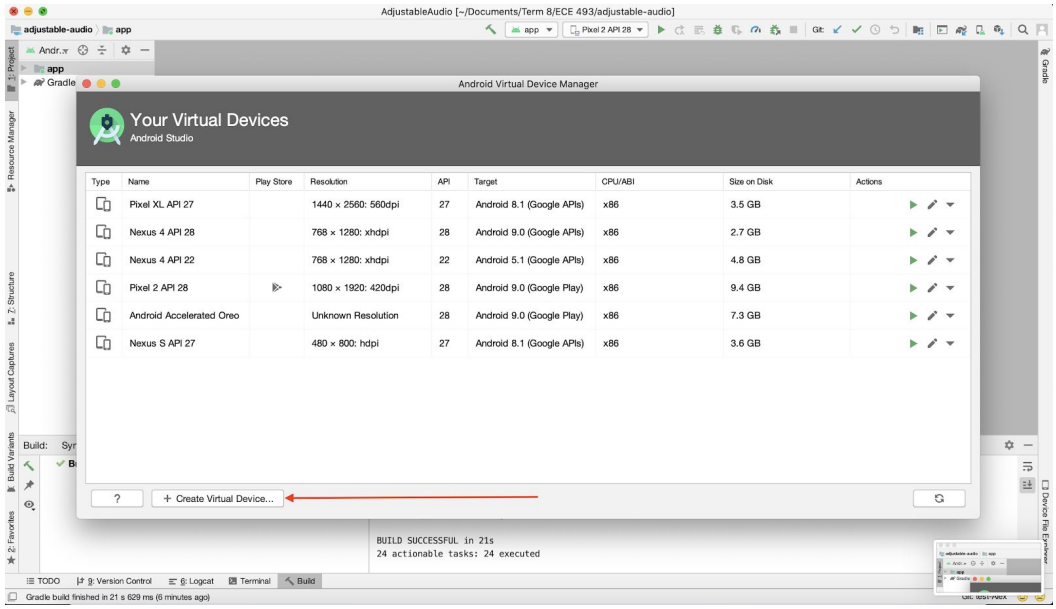



**Appendix A: Create a Pixel 2 Emulator**

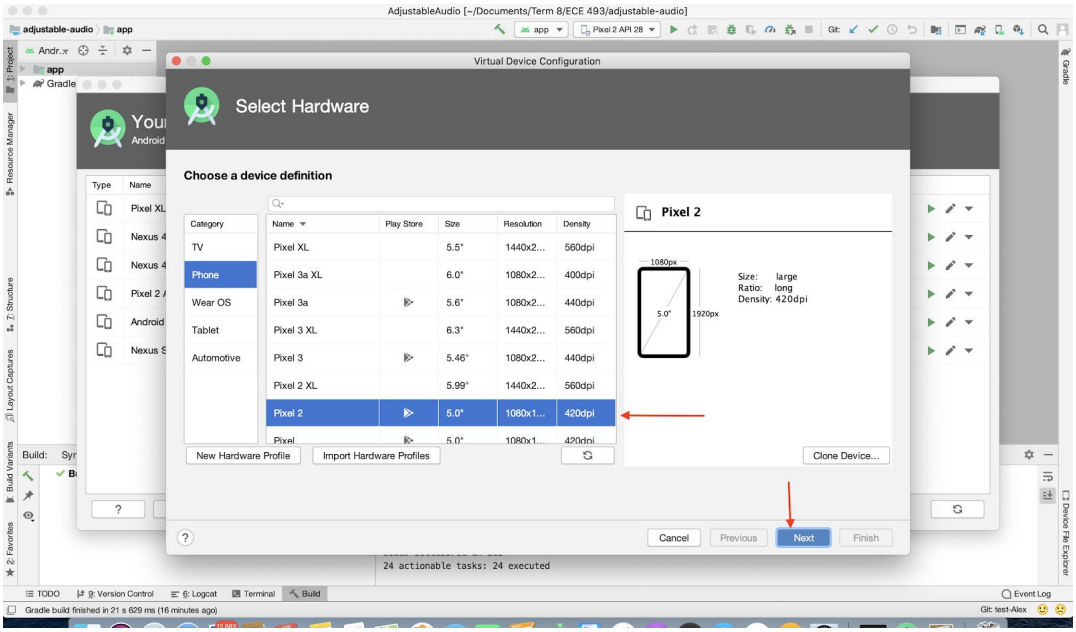
Please choose the tools menu and then click on the AVD Manager option.



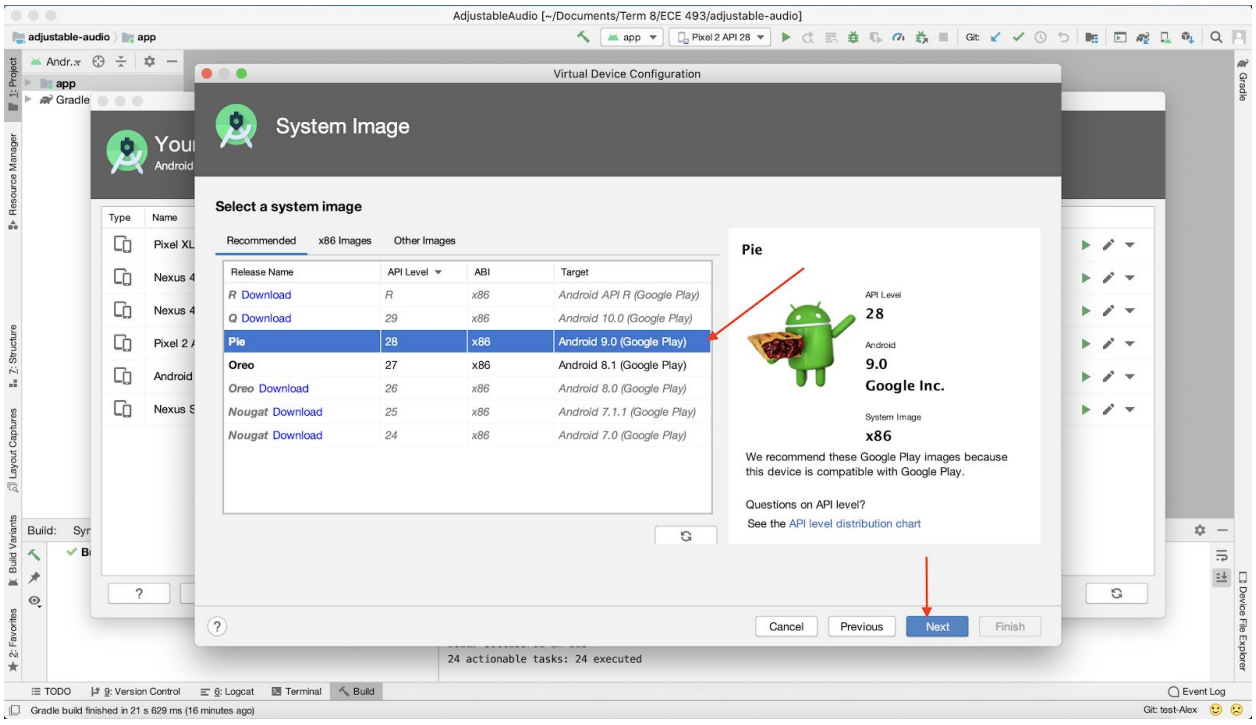

The AVD Manager screen will appear and click on the “Create New Virtual Device” button.



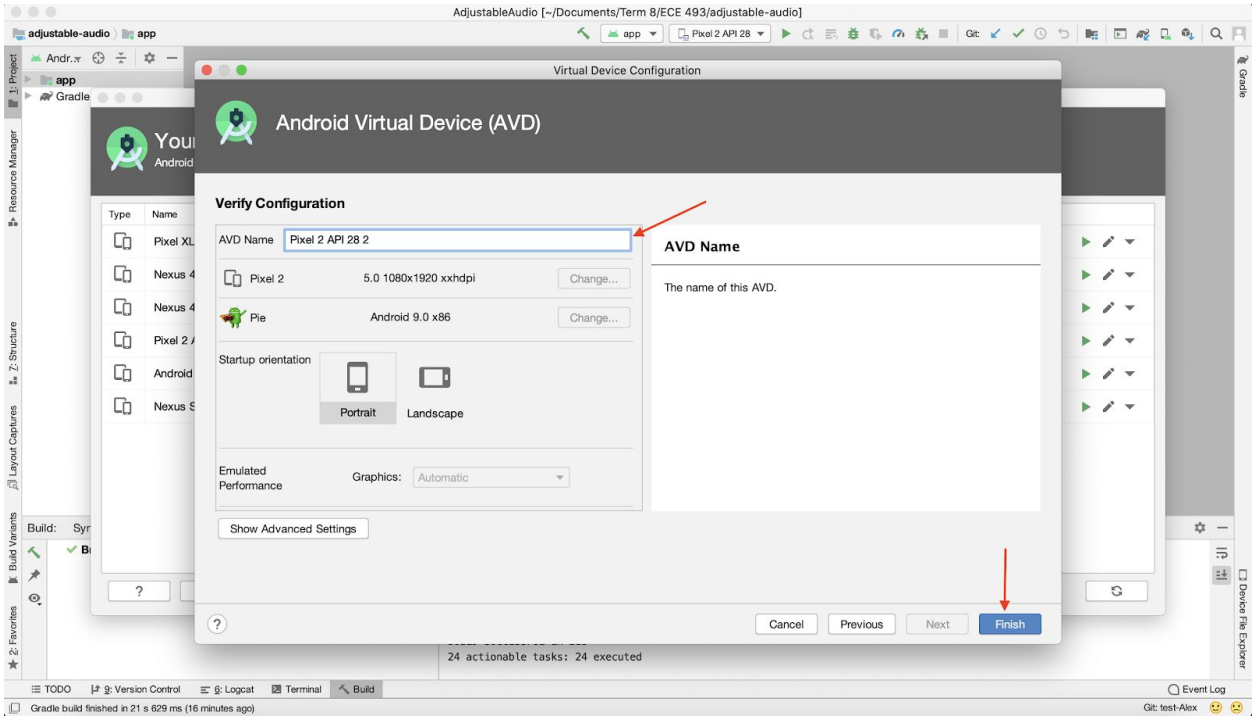

The Virtual Device Configuration wizard will appear, with the option to choose the hardware. Ensure that Pixel 2 is chosen, and click the “Next” button.



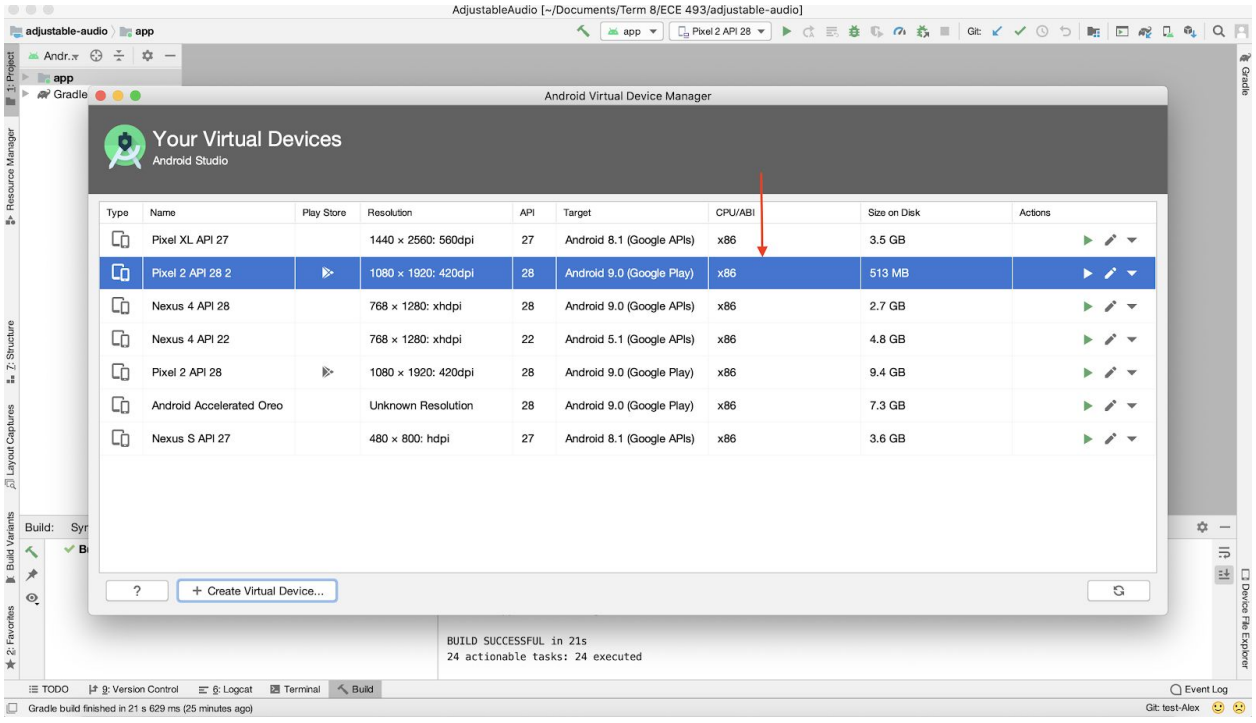

Next, a system image will be required. The Adjustable Audio application supports API 22 to 29, but has been tested extensively on API 28. For the purposes of these instructions, API 28 will be chosen. Depending whether an emulator has been created before with API 28, it may need to be downloaded. After ensuring the chosen API is selected, please click the “Next” button.




The final step to configure an emulator is to give it a name. Afterwards, the “Finish” button can be clicked.




Android Studio will then create the virtual device (emulator). It should appear in the list of virtual devices available.

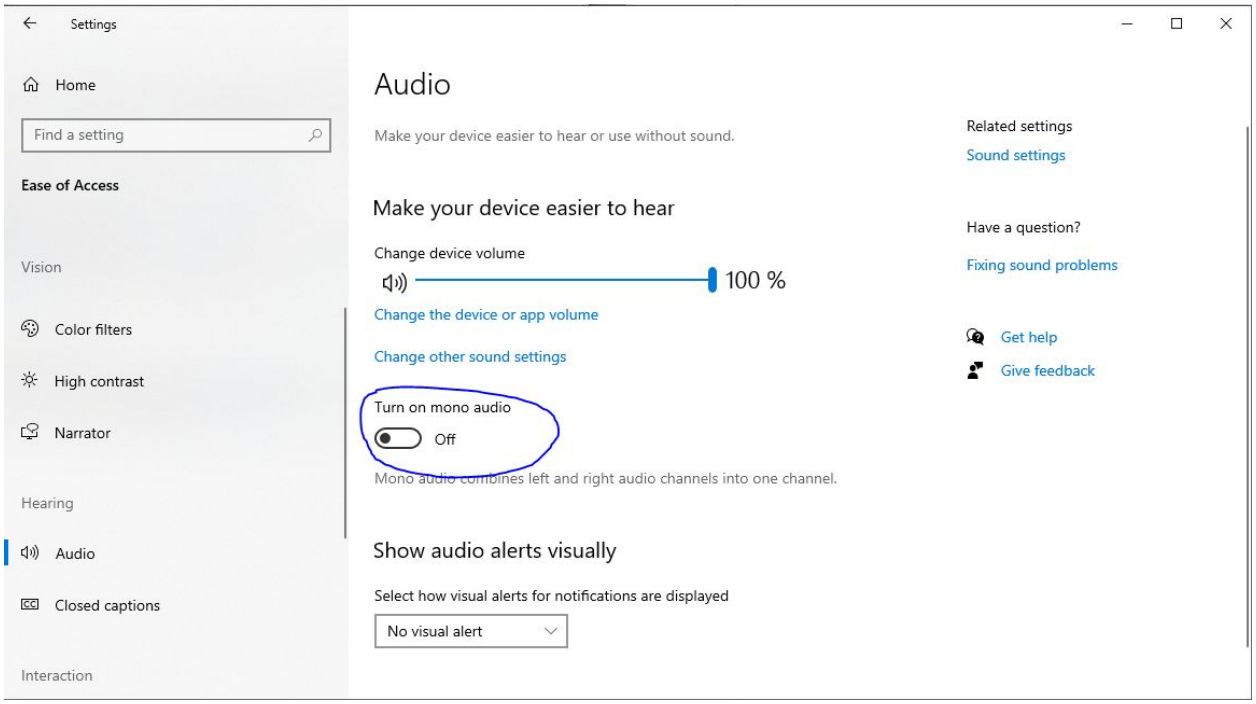



Congratulations! A virtual device has been made.

## Appendix B: Enabling Stereo Audio on Windows 10

Stereo Audio is required to test the left and right audio balance functionality. To ensure you have stereo audio enabled:

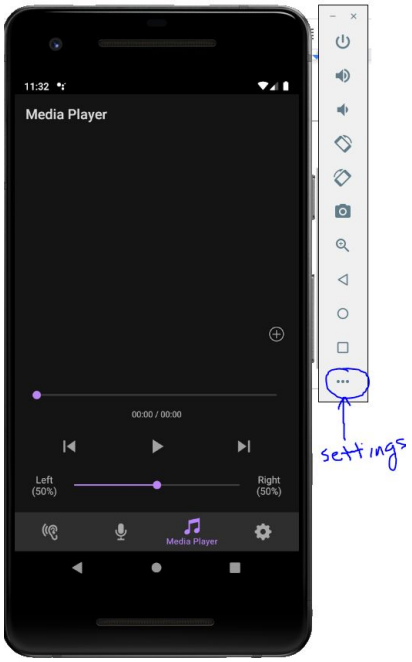
1. Open Settings.
2. Go to Ease of Access and click Audio under Hearing on the left.
3. On the right, turn off the mono option (if it isn't already off).



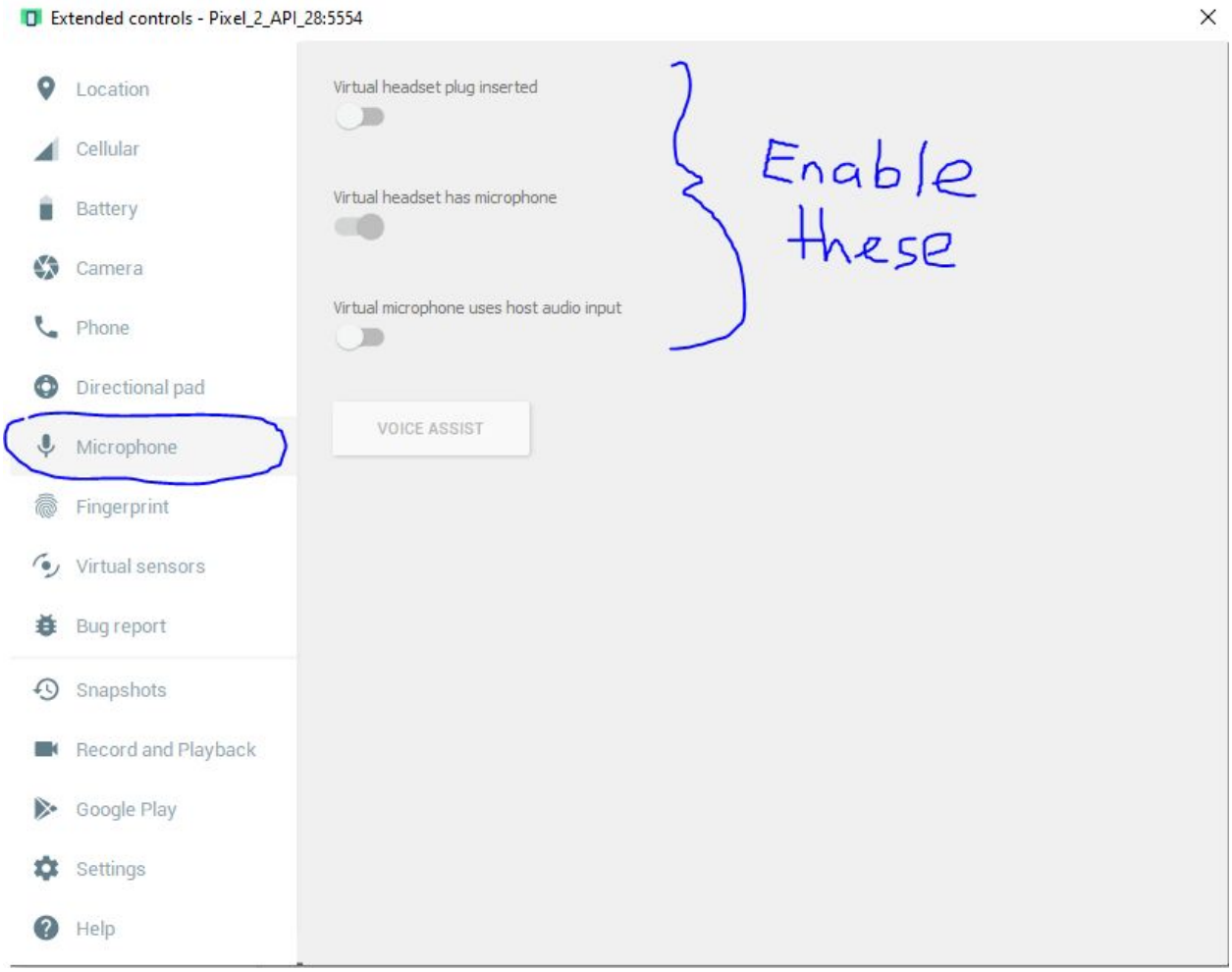

## Appendix C: Using the PC's microphone with the Android Emulator

It is possible to use your PC's microphone with the Android Emulator. The following steps will enable the microphone to be used in the emulator:

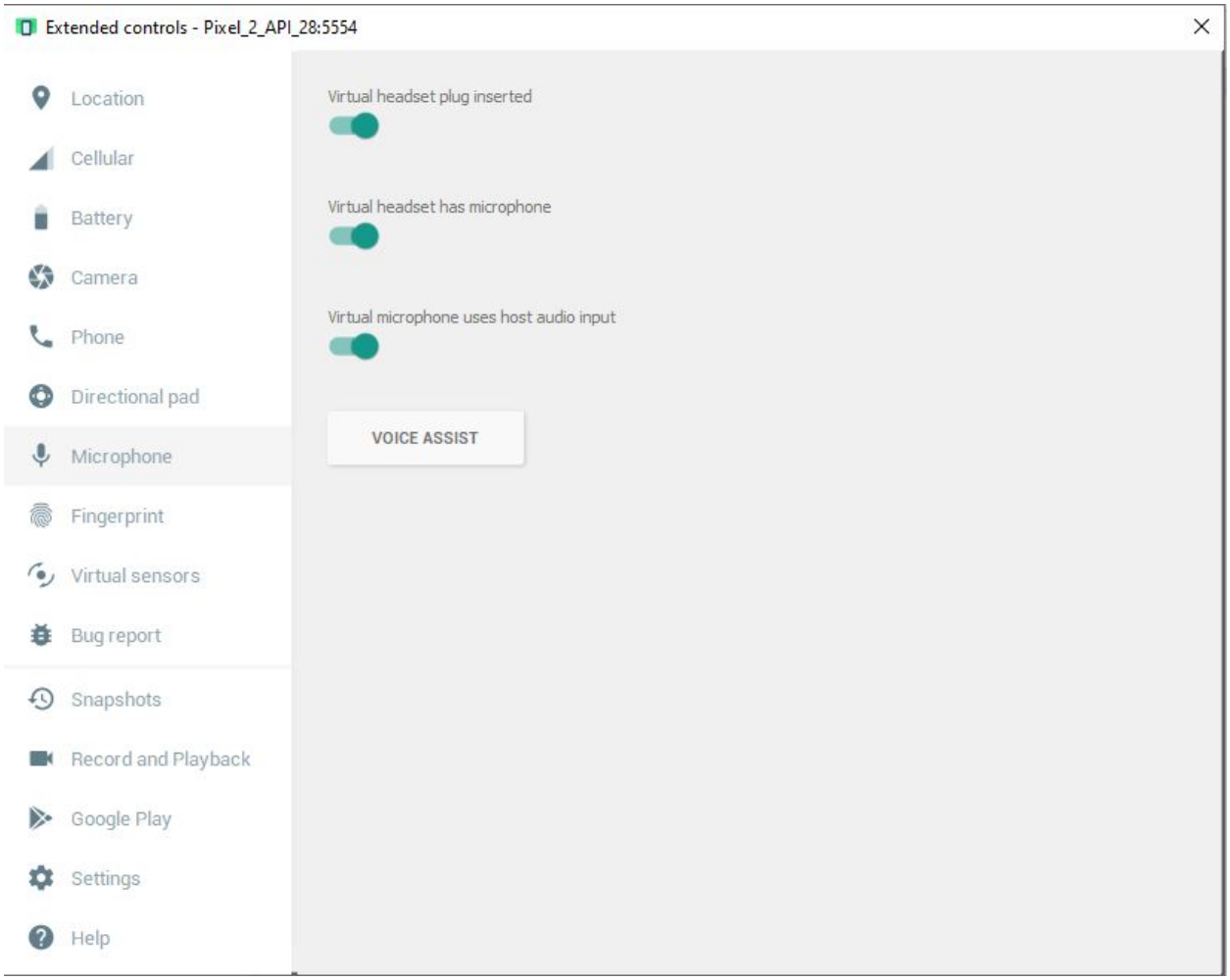
1. Open your emulator.
2. Open the Settings menu by pressing the button with the 3 dots (...)




3. Under Settings, select the Microphone option.



4. Enable the option “Virtual headset plug inserted”, “Virtual headset has microphone”, and “Virtual microphone uses host audio input” options.




Your microphone should now be playable from within the emulator.