DESIGN OF A SMARTPHONE APPLICATION TO MEASURE THE RESPONSE OF AN ACOUSTIC GUITAR

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Introduction

The acoustic frequency response and impulse response of loudspeakers can be measured using a variety of commercially available applications; in the field of musical instrument measurements there is not as wide variety of choice to use. Therefore, this poses an opportunity to produce an application and user interface for smartphones/portable devices that will implement techniques, to accurately measure the frequency response and impulse response of a musical instrument. To ensure accuracy within the testing, the use of an external actuator and sensor will be connected to the device to therefore transmit the impulse response and corresponding frequency response can be measured and displayed within the app environment and allow for multiple devices to use the same equipment to achieve the same results. This set up it will allow users to benefit from a cheap and simple measurement system offering some of the features of more expensive equipment.

Aims and objectives

- Create an application to measure the acoustical response of a DUT such as; frequency response and impulse response.

- Ensure the user has full control over the sine sweep parameters.

- To record the response from the DUT and be able to show this graphically.

- To have the ability to export these results to allow for comparison within another software.

The application will offer a user multiple options of measurements (for example, sine-sweep and impulse response) and also provide the capability to compare previous tests by,exporting the data to an external source. The ability to export the collected data in multiple formats will allow for the contribution to an online database of guitar impulse responses.

Testing methods
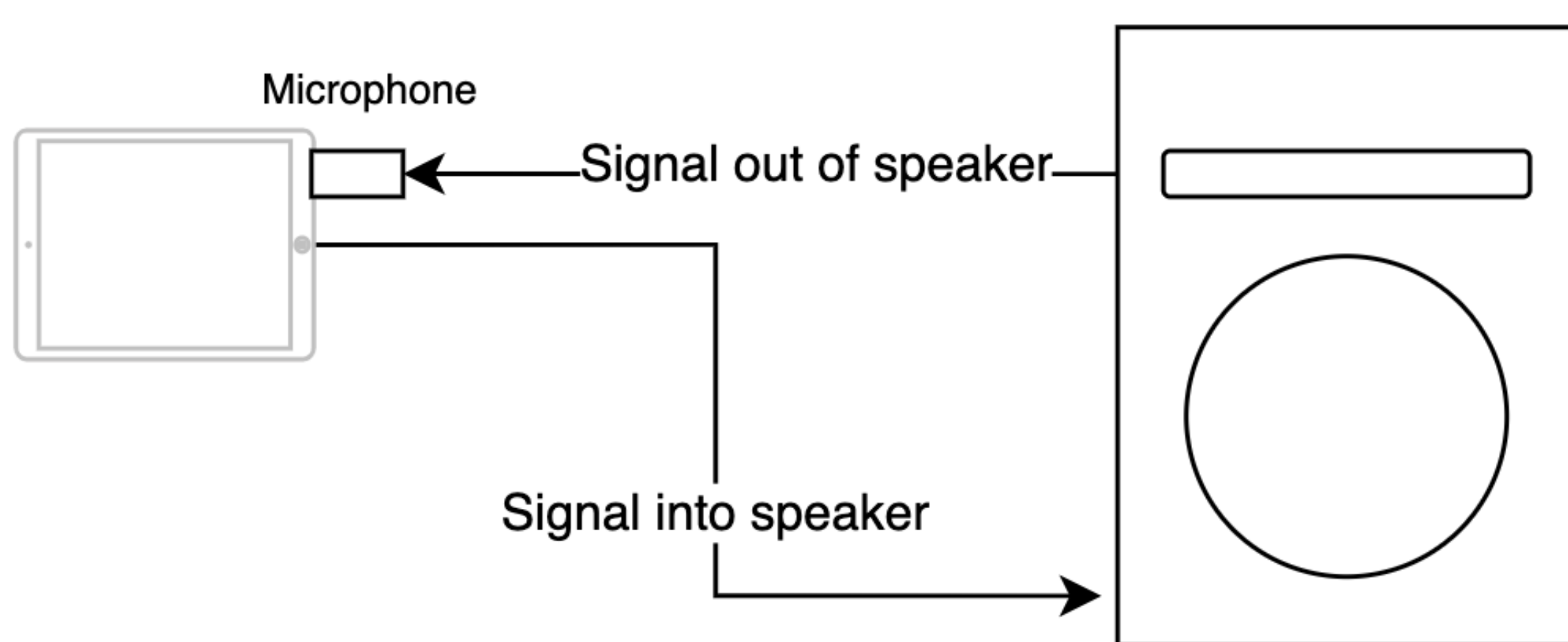
Testing set up for validating the application

After firstly creating the application using MATLAB App designer, we are able to run the application as a web app and therefore have it on a portable device. The most influential test run within this project was to gather data using the iPad running this application (see photo to the left) against a signal generated in aurora and recorded using audacity. From this test we were able to prove the validity of this application against a well used way of testing these acoustical parameters.
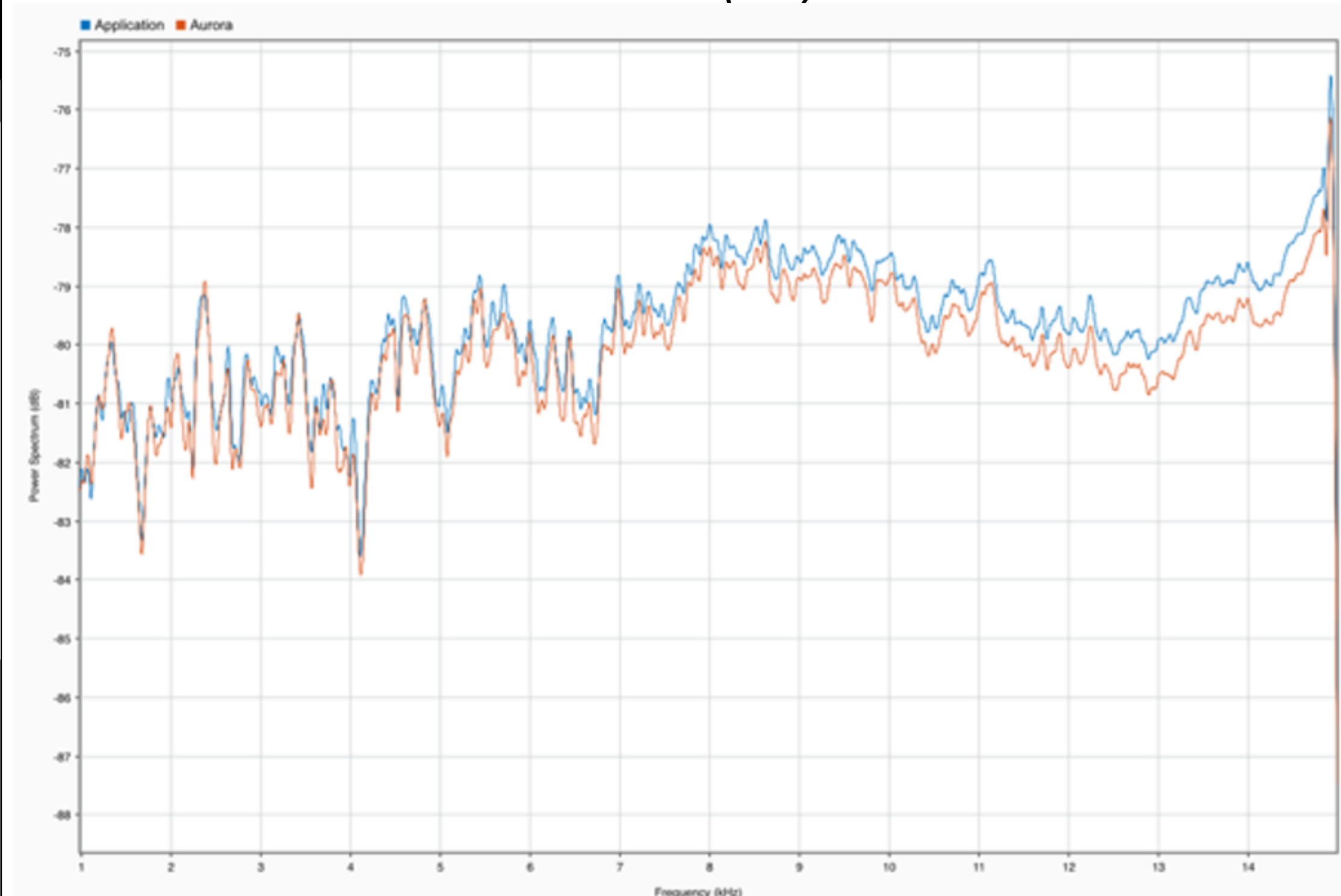
Results
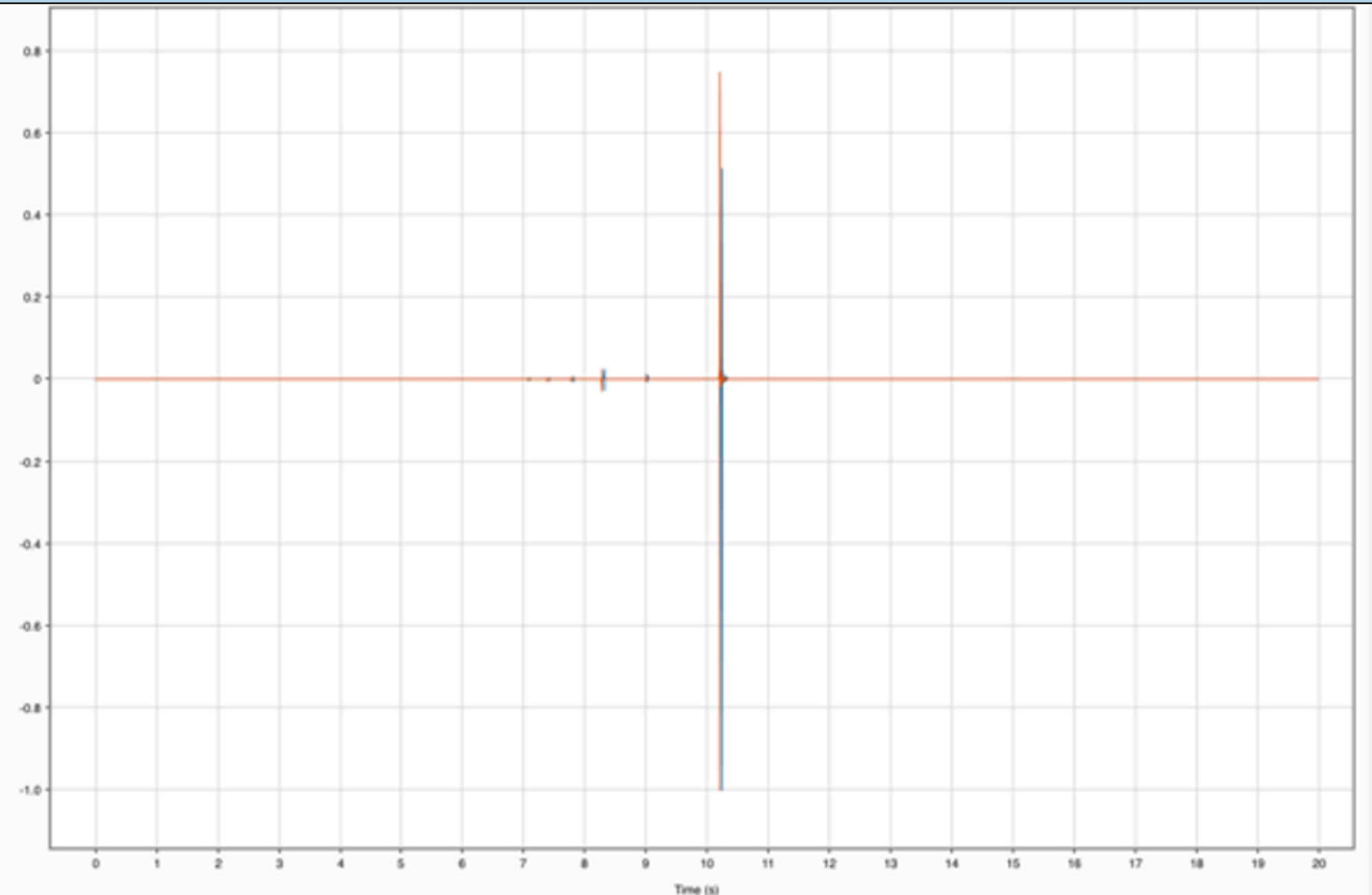
Impulse response of the Application (Blue) Vs Aurora (Red)
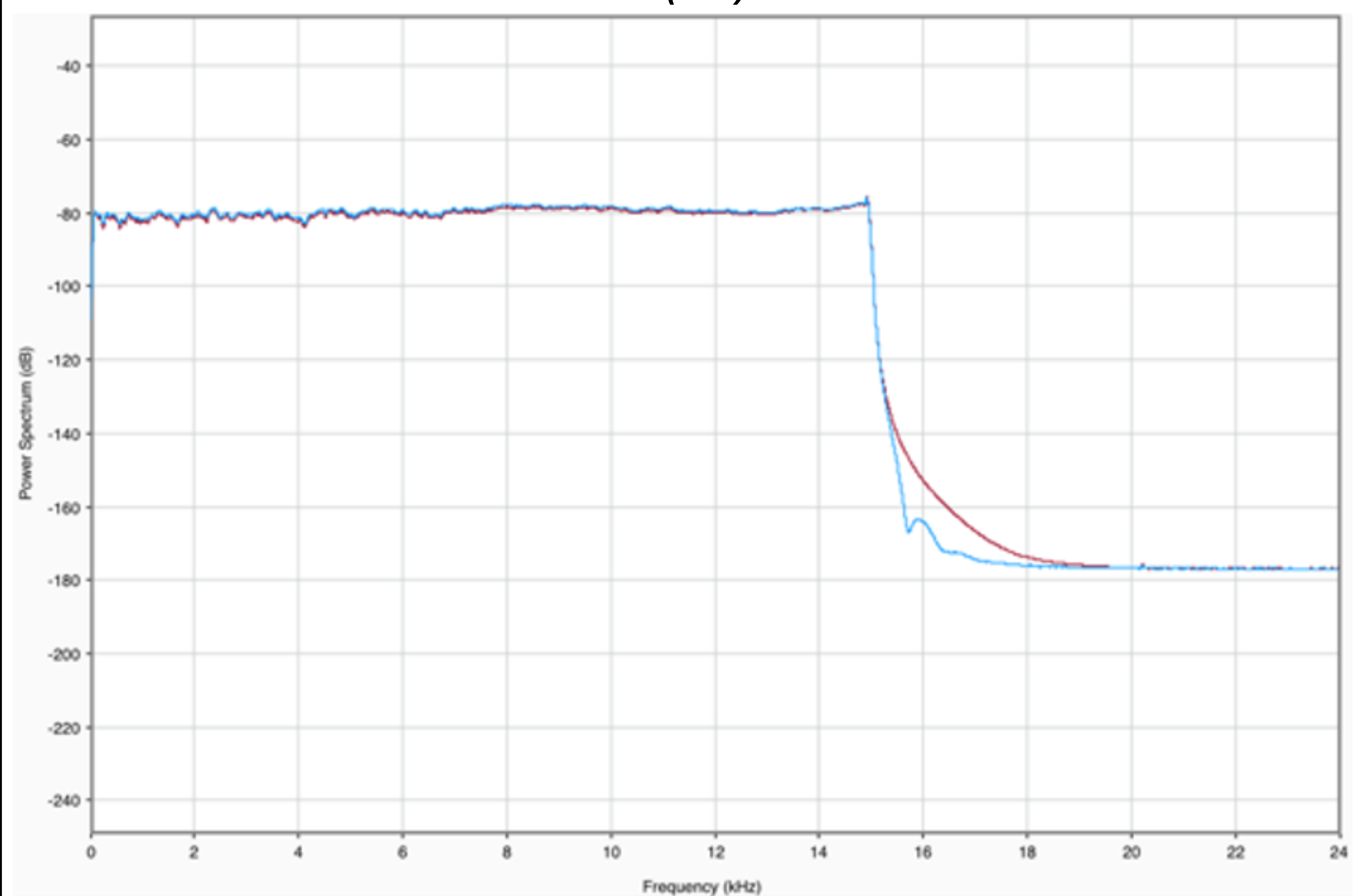
Frequency response of the Application (Red) Vs Aurora (Blue)

Frequency response iof the Application (Blue) Vs Aurora (Red) n a 13dB window.

Conclusion

The task of creating a smartphone application to measure acoustical response has been achieved albeit still in a web application state to demonstrate the fundamentals. Moreover, comparisons have been drawn between both the created application and Aurora and have been validated through multiple testing stages.

Acknowledgements