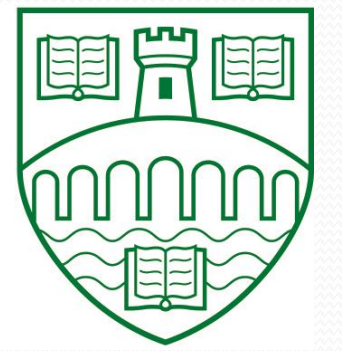


Development of a Violin Scale Tutor

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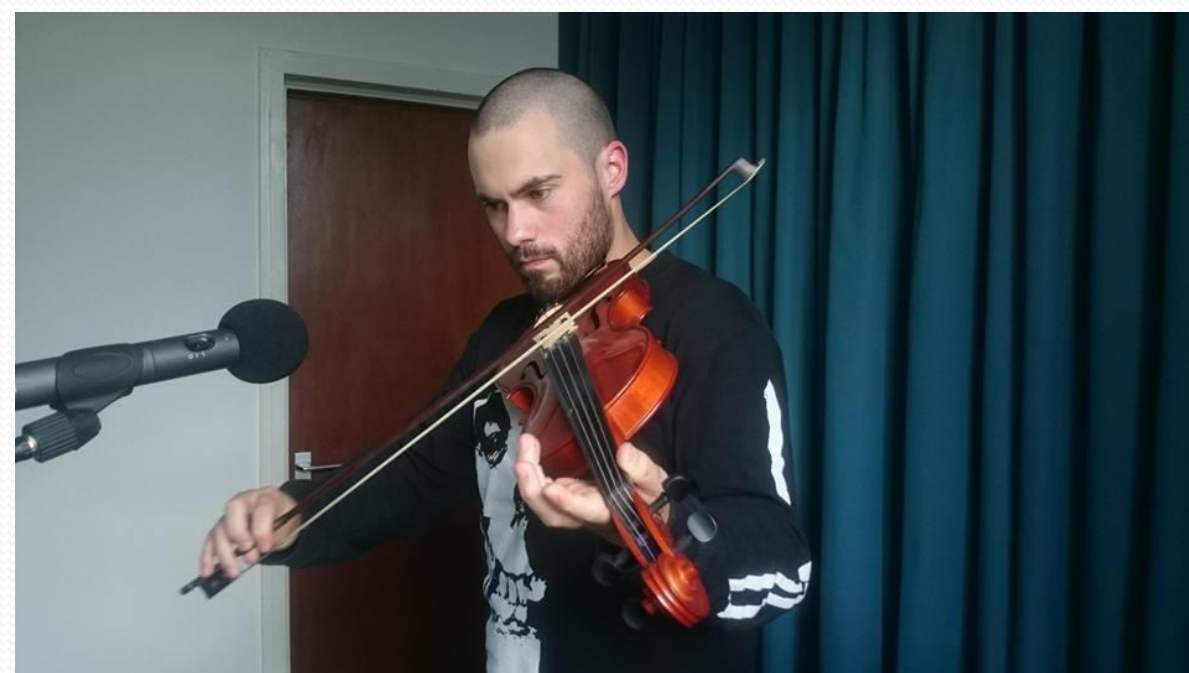
MSc in Information Technology

Project Outline

Playing a violin requires placing fingers at precisely the correct place on the string in order to create the correct note, it is different from fretted instruments where the string length is fixed.

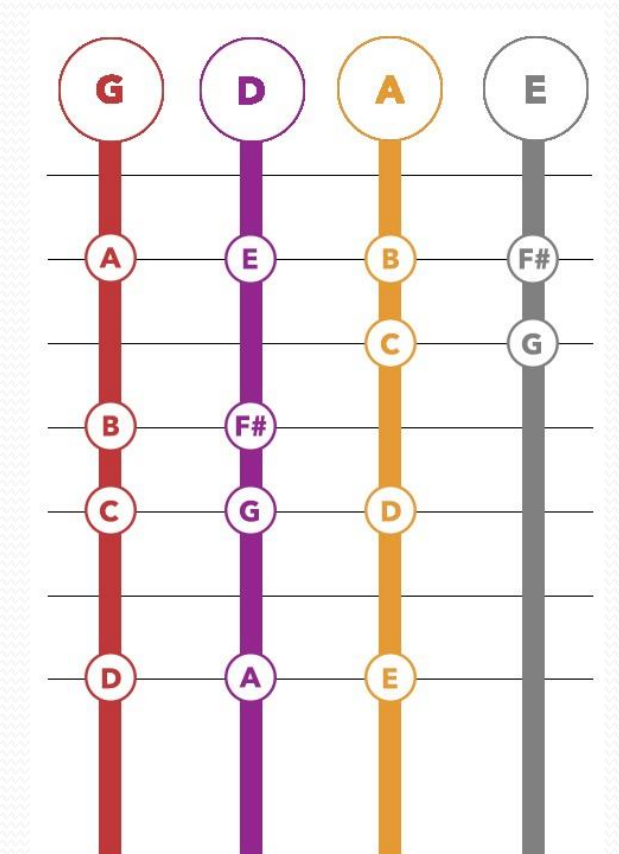
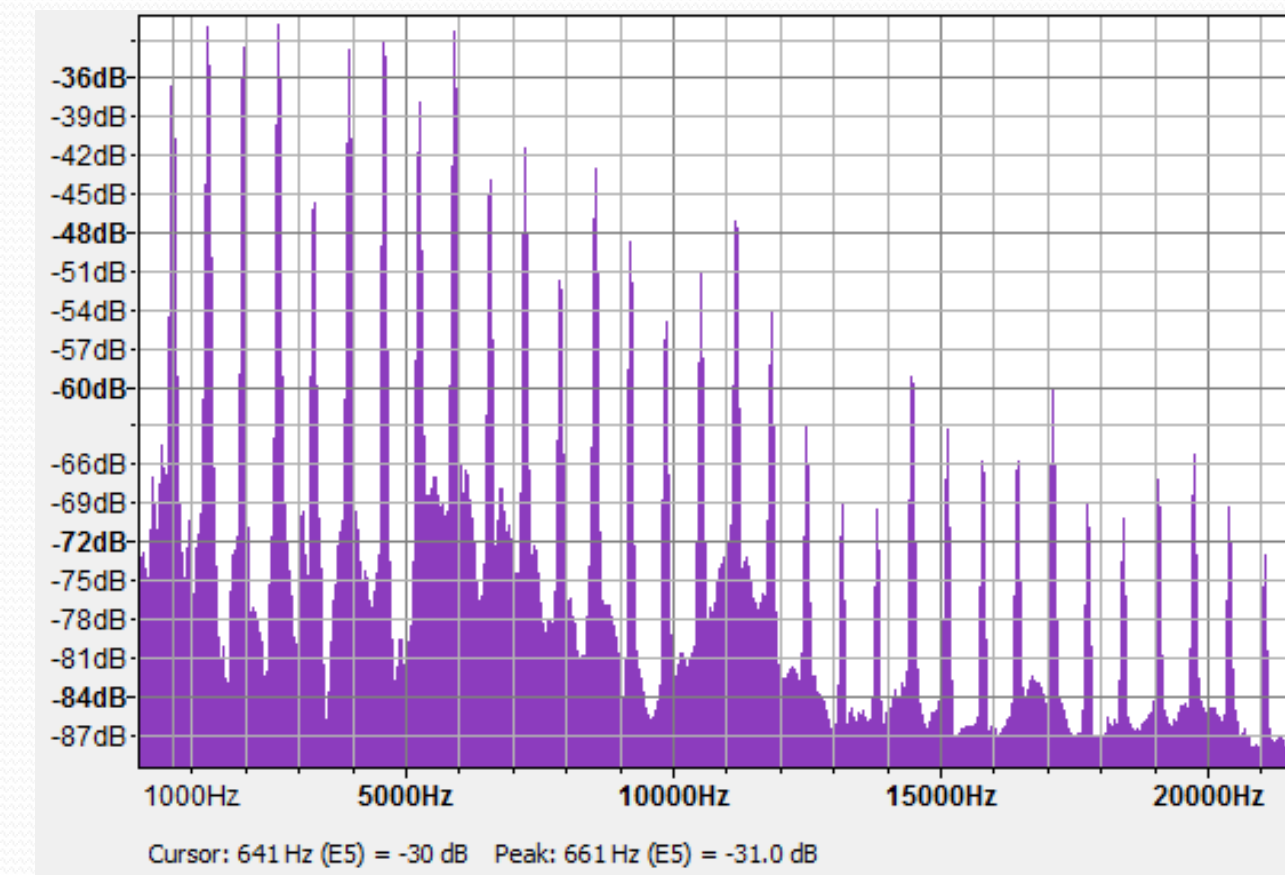
To achieve the correct note the strings must be correctly tuned (G4,D4,A5,E5) and the player's finger must be correctly placed on the fingerboard so that the length of the bowed string is appropriate for the note intended.

The aim of the project is to build an android application that takes in the sound from the violin via a phone/tablet microphone and calculates the note being played, on a regular basis (perhaps each 0.2 seconds). This can be used initially to tune the violin, show the student which notes they are playing and then be extended to allow the student to play a sequence of notes (such as a diatonic or chromatic scale), and to find out how accurately the intonation has been achieved.



Programs and Languages Used

Android Studio
Audacity
XML
Java



Development

Sound is measured in frequency (Hz) with each note on the violin producing its own unique frequency. The picture above shows a recorded note (E5) with frequency 661HZ. This is achieved through the "Fast Fourier Transform" algorithm, an analysis which converts a signal from its original domain (often time or space) to a representation in the frequency domain and vice versa.

Using audio recording software (Audacity) each note correctly played on the violin can be processed and represented as a frequency. This can be stored to be matched against a new input (phone microphone) to determine what note is currently being played.

Using this information the app can provide a graphical representation of the strings. This can teach students where to position their fingers so they can play in tune. This will enable students to practise independently.

Future Implementations

Currently the app focuses on tuning and scales exclusively but could be potentially expanded to determine correct tuning of sheet music as well. It could also be further expanded to be used as an all encompassing home musical tutor to teach beginners and intermediate players reducing the need for private lessons.