Ear Trainer

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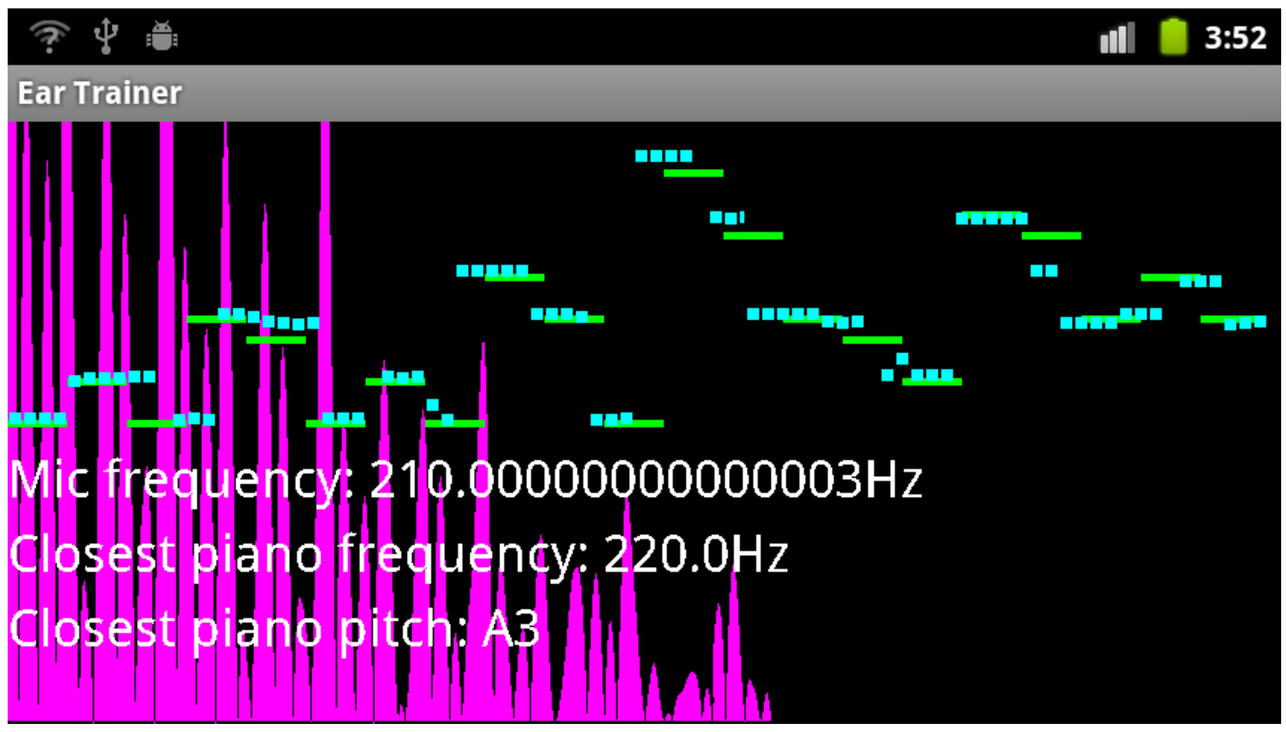
Do you sing off key?

Ear Trainer can help you visualize the pitches you are singing.



Autocorrelation signal

Pitches of the "Happy Birthday" song

Pitches as sung or played on an instrument

How it works:

- Pitch detection via autocorrelation.
- Autocorrelation is a measure of a signal's self-similarity at a given time lag.
- Signal is perfectly correlated with itself at time lag zero. Second highest peak denotes when a repeating signal begins to repeat itself.
- Inverse of the period between time lag zero and the second highest peak is used to determine the frequency of the pitch being sung.

Test yourself:

1. The relative pitches of the "Happy Birthday" song are displayed as a series of green lines from left to right across the screen.
2. When you begin singing, a series of cyan colored dots will appear on the screen to allow you to see how closely your singing matches the green lines.

Future work:

- Devise a method for note detection that will allow the cursor to automatically move to the next note upon detection of a new note rather than needing to wait for the cyan dots to march across the screen.
- Be able to choose from a menu of available songs.
- Sideways scrolling of the green lines to allow for longer songs to be displayed.

References:

PhD thesis on *Fast, Accurate Pitch Detection Tools for Music Analysis:*
http://www.cs.otago.ac.nz/research/publications/oucs-2008-03.pdf
Autocorrelation: https://en.wikipedia.org/wiki/Autocorrelation
Autocorrelation: http://dsp.stackexchange.com/a/388
FFT code: http://code.google.com/p/android-spectrum-analyzer/