WithStrings Audio Analyzer Manual

1. Description

Audio Analyzer acquires a signal from the device's microphone and displays its
time-history and Fourier amplitude frequency spectrum (using a FFT algorithm).
Sampling of the time history starts when the amplitude of the audio acquired at
the microphone is greater than the adjustable trigger level slider. The length of
acquisition is adjustable from 0.05 seconds to 1 second. Vertical scales for each
of the graphs are independently adjustable or can be set to auto-scale. A cursor
for each graph has three settings: off, find peak or find value using a slider.
Linear or logarithmic amplitude and frequency displays are available on the
frequency graph. Data from the graphs are 4096 (time) or 2048 (frequency) points
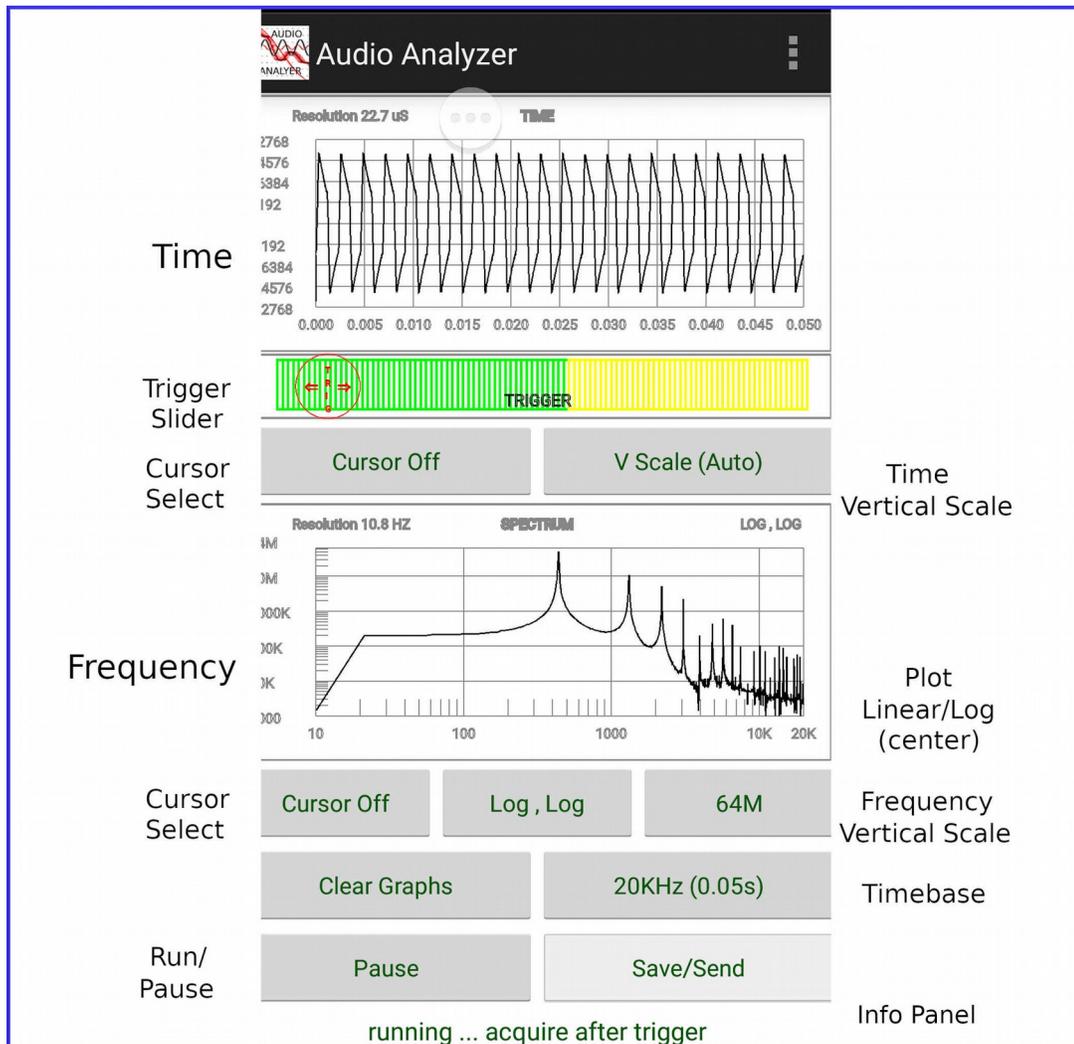that can be saved to a spreadsheet compatible formatted file.

Figure 1. Audio Analyzer User Interface

2. Operation

Launch the application. Audio Analyzer will display a screen similar to figure 1.
The cursors are initially off, frequency range is set to 20Khz, and vertical
scales are set to Auto mode. Pressing the **Run** button will start acquisition if the
input amplitude is greater than the trigger level. Adjust the **Trigger** level for
the desired sensitivity by moving the red circle on the trigger slider.

The **Freq(Time)** button produces inverse results on the time and frequency graph. A
wide frequency setting of 20Khz will produce a very small time sampling window of
0.05 seconds. Conversely a 1Khz frequency range will produce a sampling window of
1 second.

A **Cursor** is available for each graph. Pressing the cursor button one time will set
it to peak mode. The peak (positive) will be shown on the graph with cross-hairs
on the graph; its x,y coordinates are displayed in blue font on the upper right
side of the graph. Pressing the cursor button again will allow the cursor cross-
hairs to be dragged to any data point on the graph. The x,y coordinates of this
point are displayed in blue font on the upper right side of the display.

Vertical scales are adjustable for each graph. **Auto** mode will find the best scale
to display all of the datum on the graph. Pressing the scale button will set the
vertical scale to one of several predefined scales. **Clear** will erase data and
clear both time and frequency graphs.

The **Lin , lin** chart type button when set to log mode shows the data equaling the
log of the value. The x axis can also be displayed in log mode. These modes are
ideal to find small frequency peaks or roll off rates. Note the axis labels are
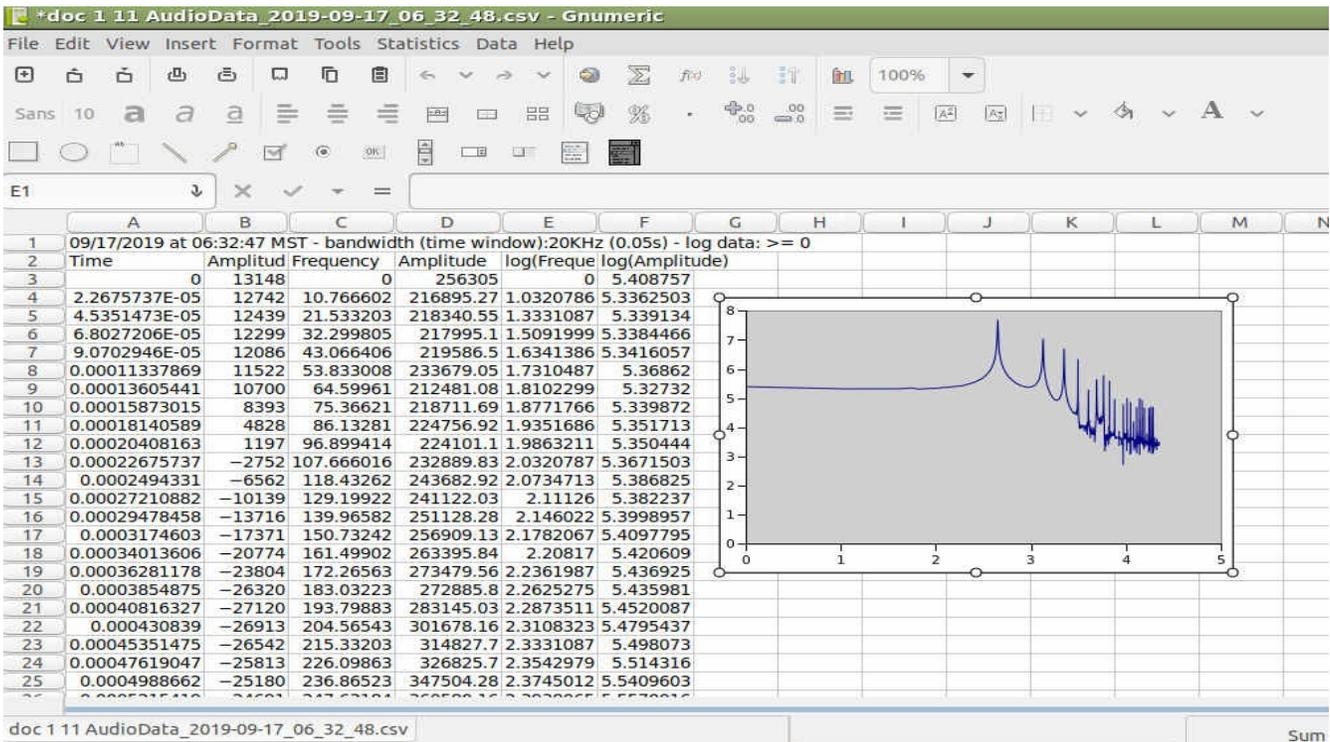not log values.

Figure 2. Saved data shown in a spreadsheet.

The **Save/Send** button will capture the time and frequency graph to a comma separated variable file in the following directory:
.../Android/data/com.withstrings.audioanalyzer/files. Note all data in this directory will be erased if the app is un-installed. The data file has the format shown in figure 2. When the save button is pressed a dialog will appear where the file just produced can be sent elsewhere by one of the email apps on the device.

There are six columns in the exported chart shown in figure 2. The first two are from the time graph showing time and audio amplitude. The next two columns are frequency and amplitude from the Fourier amplitude spectrum. The following are the log of the frequency and amplitude.

3. Characteristics

Operating System: Android: Minimum Version 5.1 (API 22) Lolipop
Permissions: RECORD_AUDIO
Max Acquisition Rate: 44100 samples/s, Number of Samples: 4096 @ 20KHz(0.05s)
Min Acquisition Rate: 2756 samples/s, Number of Samples: 4096 @ 1KHz(1s)
Settings:
      Run/Pause
      Trigger Slider: 0 to 100% of sampled RMS value.
      Time Graph Vertical Scales: 32K, 16K, 8K, 4K, 2K, 1K
      Freq Graph Vertical Scales: 64M, 32M, 16M, 8M, 4M, 2M
      Freq/Time Scales: 20KHz(0.05s), 10KHz(0.1s), 5KHz(0.2s), 2KHz(0.5s),
      1KHz(1s)
      Frequency Plots: x axis: linear or log; y axis: linear or log
      Cursor: Off, Peak, Slider (Time and Frequency Graphs)
      Save/Email: Data writes to the following file in Pause mode:
            .../Android/data/com.withstrings.audioanalyzer/files. The file can also
            be sent via email at the time the Save/Email button is pressed.
Identity: $\sin(u)\sin(v) = 1/2[\sin(u-v) + \sin(u+v)]$
Graphics Design: N. Dynamite
Inspiration: Fr. McKenzie
Crashes: Yes