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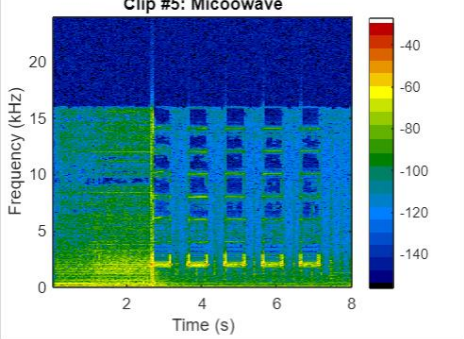
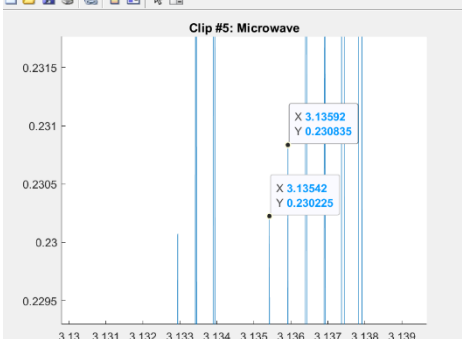
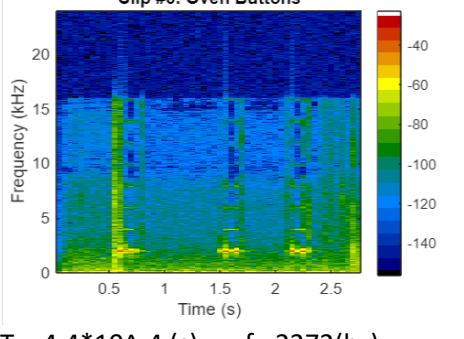
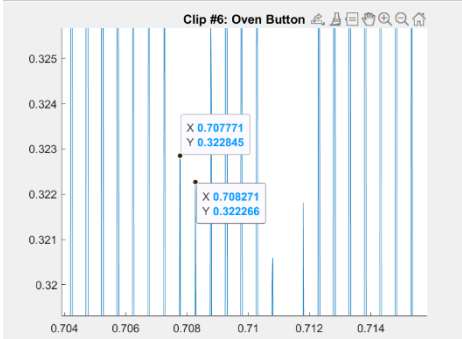
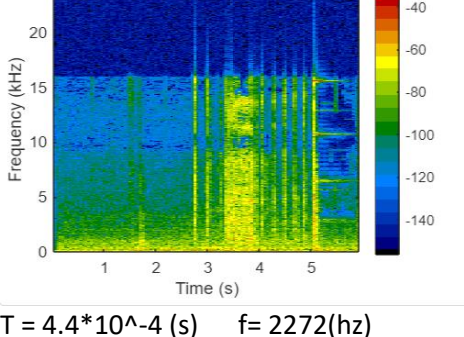
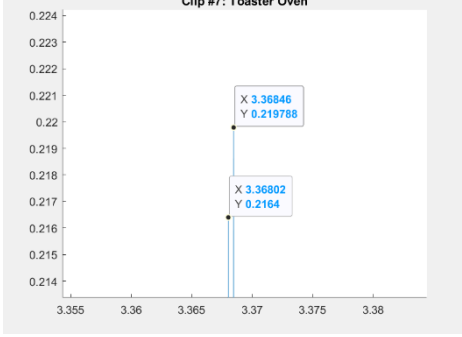
ECE180 – Lab 3: Things that go beep.

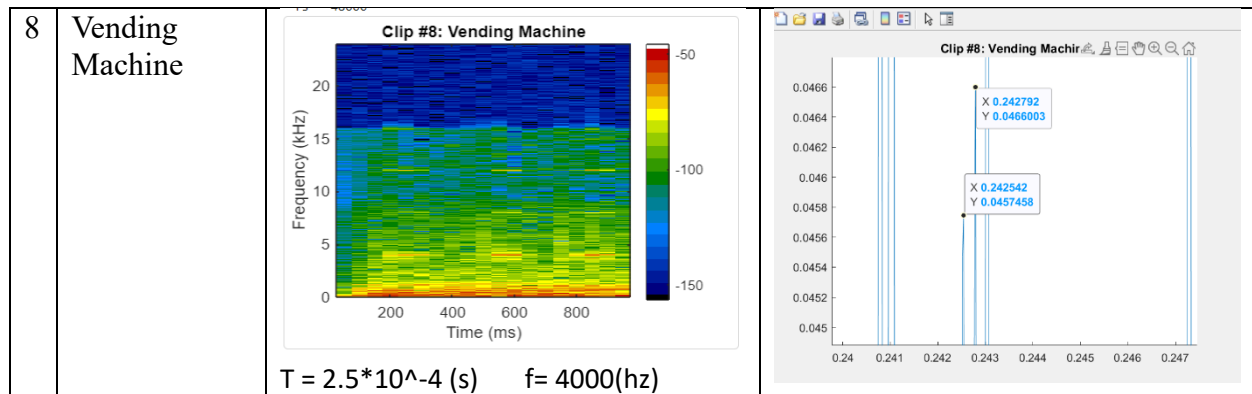
19th September 2023

Recording and Uploading Procedure: (7 of our clips were recorded)

- 1) Recorded clips using the “Voice Memos” iOS application on a cell phone.
- 2) Uploaded those clips to a drop, making it accessible on our computers.
- 3) Using <https://cloudconvert.com/m4a-to-wav>, we converted the .m4a files generated by the application into .wav files usable by MATLAB

Data:

#	Name	Time-Domain	Spectrogram
5	Microwave	<p>Clip #5: Micoowave</p>  <p>$T = 5 \cdot 10^{-4} \text{ (s)}$ $f = 2000 \text{ (hz)}$</p>	
6	Oven Buttons	<p>Clip #6: Oven Buttons</p>  <p>$T = 4.4 \cdot 10^{-4} \text{ (s)}$ $f = 2272 \text{ (hz)}$</p>	
7	Toaster Oven	<p>Clip #7: Toaster Oven</p>  <p>$T = 4.4 \cdot 10^{-4} \text{ (s)}$ $f = 2272 \text{ (hz)}$</p>	



Conclusions

#5 Microwave

- Yes. This one is the most visually obvious with the spectrum graph. Right at the beeps we can see the yellow bursts in the 2-3 kHz frequency. The frequency calculated through the frequency was 2000hz, a little less than the Fletcher Munson Curve, however, due to background noise and calculation errors there is a much higher change that the beep follows a Fletcher Munson Curve.

#6 Oven Buttons

- Yes. It appears that the frequency is at about 2-3 kHz when viewed from the spectrum graph and numerically comes to about 2.7 kHz. This recording we were able to record the beeping clearly, managing to turn off any background air conditioning/fans. However, it does appear that harmonics are present in the produced sound. When the 2.7 kHz frequency is heard, there are also others higher frequencies being heard. It appears that there is also 4.2, 5.7, 7.2, and so on. Indicating the likelihood of stacked harmonics. We believe it is reasonable to assume that the beeping is a product of the Fletcher Munson curve.

#7 Toaster Oven

- The file is flawed, but the ding is still distinguishable by a yellow spike to the right after $t = 5 \text{ s}$ in the time-domain graph. The audio file picked up the fans going off in the background, however, if you look at the spikes to the right, they follow a frequency of about 4000 Hz which is in the range of a Fletcher Munson Curve. Since the audio file is flawed, it was challenging to collect an accurate period however the one we calculated gave us close being 2272 Hz.

#8 Vending Machine

- Yes, the audio picks up on the cooling system from the cooling fans from within the Vending machines, but nonetheless we can see the $\sim 4 \text{ kHz}$ bursts in the spectrum

graph. This also matches the frequency we calculated from a period that also gave us 4000Hz.