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% ENGR 130 Module 3.1 Report
% Section E
% October 6, 2023
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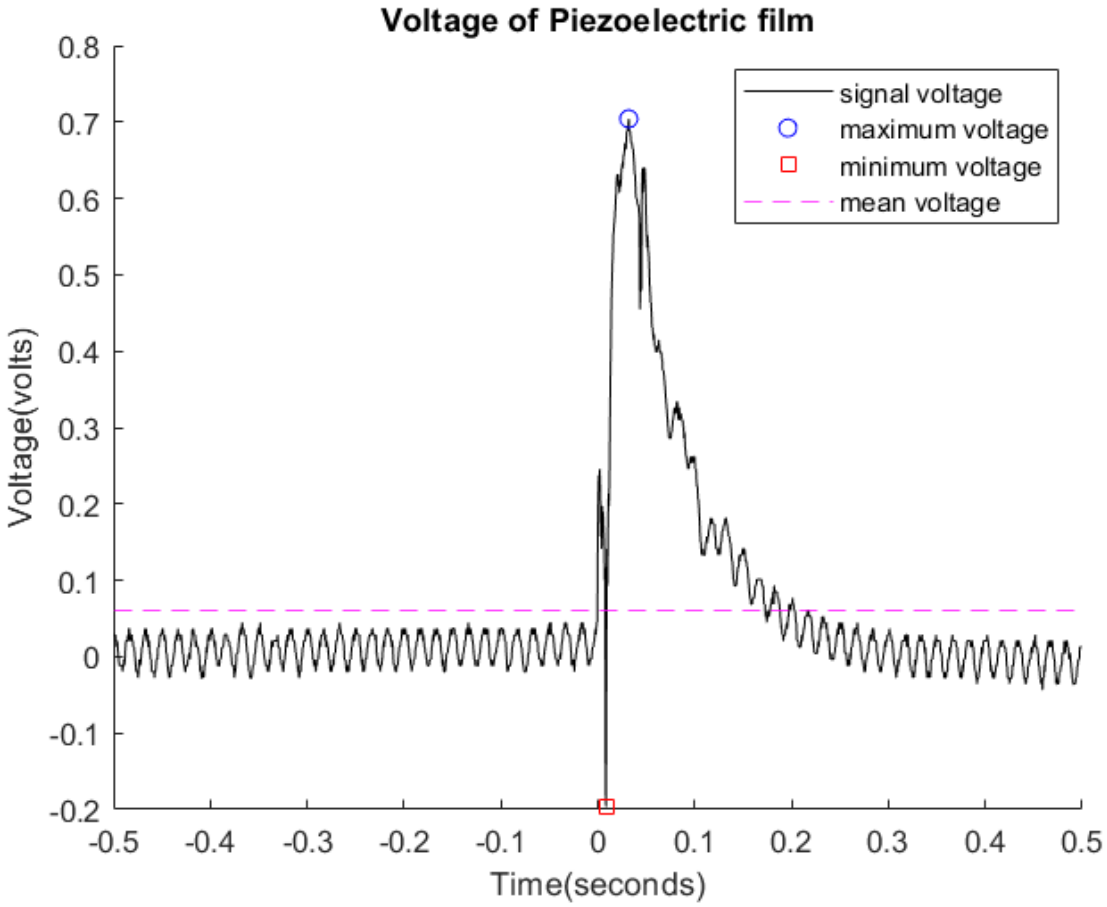
Lab 1

1) The amplitude of the demo signal is 2.51 volts with a frequency of 1 kHz.
2) The amplitude of the signal is 3.2 volts with a frequency of 4.78 mHz.

Lab 2

1)



2) Our calculated mean voltage does seem to align with our figure. Due to the many data points centered around y=0, it seems logical that the mean would tend to be closer to 0. The high peak would cause the mean to be pulled slightly in the positive direction, which is exactly what is seen by the magenta dotted line on the graph above.

3) Repeated disturbances to the film, like being dragged across the table, caused an extremely noisy electrical reading on the oscilloscope. We also noticed that knocking on the piezoelectric film on the ‘wrong’ side displays a negative reading. This graph has identical peak amplitudes, just reflected over the y-axis. This suggests a positive and negative side to the film. From our test and the presentation given by Professor Carter about piezoelectrics, we can infer that they may be used in electric instruments because of their vibration causing an electrical signal that can be then sent to other devices like amps.

Engineering Design Process Sheet **Module 3**

Fill out this worksheet as you work through the design of your knock detecting spy device. You will submit this typed and completed worksheet as part of your module report.

Part A: Define Problem
Write a description of the problem in your own words.

The problem is to use the piezoelectric film as well as the arduino to build a sensor that is able to detect a knock.

Part B: Determine Specifications & Requirements
Ask at least two clarification questions.

1. **Will part of the project be hiding the device in something and if so is one of the criteria the size of the device?**

2. **Will we need to be able to analyze a wide variety of knock signals ranging from soft to loud knocks?**

Part C: Identify Design Decision Criteria
Thinking about what would be helpful for the intended user of your product, create a list of at least two criteria by which you will evaluate your design concepts. Indicate whether they are equally important or whether one should be weighted more heavily than the other. Explain why you chose these criteria.

1. **The sensitivity of the device. This is important for differentiating between accidental taps and purposeful knocks.**

2. **The size of the device, this is important because users may need/want a device of certain size specifications.**

Part D: Generate Design Concepts
List as many ideas as you can for designs and features.

- **Lighting up an LED to tell the user that there is someone knocking**
- **Sounding an alarm with active buzzer when there is someone knocking**
- **If there is a knock a message appears on a computer.**
- **Make a passive buzzer play a tone and have the user return a similar knock**
- **Make a motor vibrate if there is a knock.**

	ENGR 130 Module Planning		Module	3	Section	E	Team	1	
			Scheduled		Actual				
#	Task	Deadline	Start	End	Start	End	Primary	Secondary	% Complete
1	Setup oscilloscope and check probe for Lab 1	10/3	10/3	10/3	10/3	10/3	Jonathan	n/a	100
2	Build LED circuit in Lab 1	10/3	10/3	10/3	10/3	10/3	Angel	Madhav	100
3	Double-check LED circuit of Lab 1	10/3	10/3	10/3	10/3	10/3	Madhav	n/a	100
4	Manipulate oscilloscope during Lab 1 circuit work	10/3	10/3	10/3	10/3	10/3	Jonathan	n/a	100
5	Type team's code for Lab 1	10/3	10/3	10/3	10/3	10/3	Trevor	Madhav	100
6	Discuss questions for Lab 1	10/3	10/3	10/3	10/3	10/3	All	n/a	100
7	Type team's answers to Lab 1 questions	10/9	10/3	10/3	10/3	10/3	Angel	Jonathan	100
8	Setup oscilloscope and check probe for Lab 2	10/5	10/5	10/5	10/5	10/5	Trevor	Madhav	100
9	Work with piezofilm in Lab 2	10/5	10/5	10/5	10/5	10/5	Angel	All	100
10	Manipulate oscilloscope during Lab 2	10/5	10/5	10/5	10/5	10/5	Trevor	Jonathan	100
11	Type team's code for Lab 2	10/5	10/5	10/5	10/5	10/5	Angel	n/a	100
12	Discuss questions for Lab 2	10/5	10/5	10/5	10/5	10/5	All	n/a	100
13	Type team's answers to Lab 2 questions	10/9	10/5	10/7	10/5	10/6	Jonathan	n/a	100
14	Assemble module report 3_1	10/9	10/5	10/7	10/6	10/6	Trevor	n/a	100
15	Proofread module report 3_1	10/9	10/5	10/7	10/6	10/6	All	n/a	100
16	Submit module report 3_1	10/9	10/5	10/7	10/6	10/6	Trevor	n/a	100
17	Build circuit for Lab 3	10/10	10/10	10/10	10/10		Trevor	Jonathan	0
18	Double-check circuit for Lab 3	10/10	10/10	10/10	10/10		Angel	n/a	0
19	Triple-check circuit for Lab 3	10/10	10/10	10/10	10/10		Madhav	n/a	0
20	Work with piezofilm in Lab 3	10/10	10/10	10/10	10/10		Angel	n/a	0
21	Type team's code for Lab 3	10/10	10/10	10/10	10/10		Madhav	n/a	0
22	Read through design specs for Lab 4	10/10	10/10	10/10	10/10		All	n/a	0
23	Work through design worksheet	10/10	10/10	10/10	10/10		Jonathan	Angel	0
24	Type team's responses to design worksheet	10/10	10/10	10/10	10/10		All	n/a	0
25	Discuss questions for Lab 3	10/10	10/10	10/10	10/10		All	n/a	0
26	Type team's answers to Lab 3 questions	10/10	10/10	10/10	10/10		All	n/a	0
27	Finalize purpose of gadget	10/12	10/12	10/12	10/12		All	n/a	0
28	Research potential components of gadget	10/12	10/12	10/12	10/12		All	n/a	0
29	Sketch initial concept for gadget hardware	10/12	10/12	10/12	10/12		Trevor	Jonathan	0
30	Write algorithm for gadget code	10/12	10/12	10/12	10/12		Jonathan	Madhav	0
31	Type initial version of gadget code	10/12	10/12	10/12	10/12		Madhav	Jonathan	0
32	Draft slide for gadget presentation	10/12	10/12	10/12	10/12		Trevor	Jonathan	0
33	Assemble circuitry for gadget	10/12	10/12	10/12	10/12		Angel	n/a	0
34	Test logic of code for gadget	10/12	10/12	10/12	10/12		Madhav	n/a	0
35	Test gadget circuitry and code together	10/12	10/12	10/12	10/12		Jonathan	n/a	0
36	Improve gadget	10/12	10/12	10/12	10/12		Trevor	n/a	0
37	Finalize slide for gadget presentation	10/12	10/12	10/12	10/12		All	n/a	0
38	Present gadget for first half of sharing time	10/12	10/12	10/12	10/12		Trevor	Madhav	0
39	Present gadget for second half of sharing time	10/12	10/12	10/12	10/12		Jonathan	Angel	0
40	Discuss questions for Lab 4/ remainder of worksheet	10/12	10/12	10/12	10/12		All	n/a	0
41	Type team's answers to Lab 4 questions/worksheet	10/12	10/12	10/12	10/12		All	n/a	0
42	Assemble module report 3_2	10/16	10/12	10/15	10/12		Madhav	n/a	0
43	Proofread module report 3_2	10/16	10/12	10/15	10/12		All	n/a	0
44	Submit module report 3_2	10/16	10/12	10/15	10/12		Madhav	n/a	0

	Last updated	10/6/2023
	updated by	Jonathan