

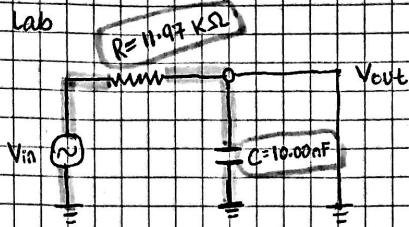
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Progress Report: Low Pass RC lab

Data set names for organization and some theory for reference

Low Pass Filter Lab

① build low pass circuit



$R = 11.97 \text{ k}\Omega$
 $C = 10.00 \text{ nF}$

$f_{\text{cut-off}} = \frac{1}{2\pi RC}$

$R = 11.97 \text{ k}\Omega$
 $C = 10.00 \text{ nF}$

Vin ① sine wave form
 ② triangle wave form
 ③ square wave form

②

④ frequency \ll cut-off
 ⑥ frequency \approx cut-off
 ⑧ frequency \gg cut-off

Model based on finite difference method

$$V_{out}(t) = \frac{V_{in}(t) + \frac{RC}{\Delta t} (V_{out}(t - \Delta t))}{\frac{RC}{\Delta t} + 1}$$

① sine wave ② $f \ll \text{cut-off}$

$V_{in} = V_{max} \sin(2\pi f t)$ $f = 2 \text{ kHz}$

① get V_{in} and V_{out} data from oscilloscope
 ② export data from oscilloscope into .txt
 ③ parse text file with python as manufacturing needs
 ④ Plot V_{in} vs t , V_{out} vs t and model vs t

[date ref] cut-off = 1.3296 kHz

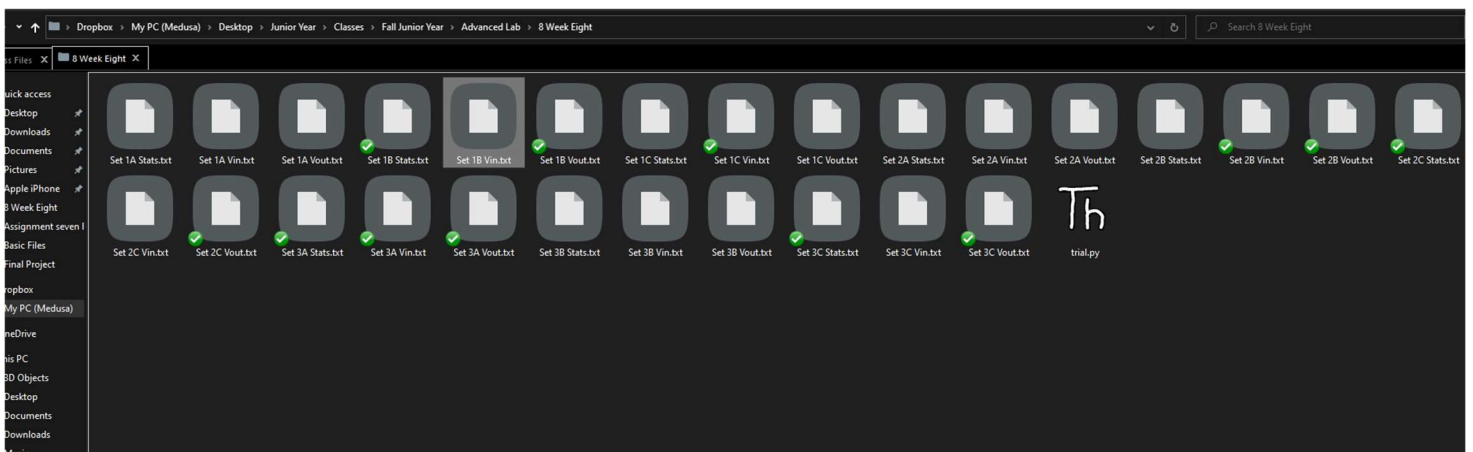
Set 1a	sine wave	$f \ll$ cut-off	$\approx 0.1 \text{ kHz}$
Set 1b	sine wave	$f \approx$ cut-off	
Set 1c	sine wave	$f \gg$ cut-off	
Set 2a	triangle	$f \ll$ cut-off	
Set 2b	triangle	$f \approx$ cut-off	
Set 2c	triangle	$f \gg$ cut-off	
Set 3a	square	$f \ll$ cut-off	
Set 3b	square	$f \approx$ cut-off	
Set 3c	square	$f \gg$ cut-off	

Data taken from oscilloscope

Set 1A Stats.txt - Notepad

File	Edit	Format	View	Help
Type	Value			
Frequency	103.41 Hz			
Period	9.670 ms			
Vavg	-42.3 uv			
Vpp	3.68 mv			
Vrms	1.22 mv			
Vmin	-1.92 mv			
Vmax	1.76 mv			
Rise Time	2.670 ms			
Fall Time	2.690 ms			
Pos.PulseWidth	4.800 ms			
Neg.PulseWidth	4.870 ms			
Pos.Duty	50 %			
Neg.Duty	50 %			
Vamp	3.44 mv			
Vtop	1.68 mv			
Vbase	-1.76 mv			
Vover	2.33 %			
Vpre	4.65 %			
Vtoptime	820.0 us			
Vbasetime	1.050 ms			
Vrisewidth	3.200 ms			
Vfallwidth	3.430 ms			
CMean	-70.7 uv			
VCrms	1.25 mv			
Slew rate	1.08 uv/us			

File	Edit	Format	View	Help
NO.	Time		Voltage	
1	-16.00 ms		4.88 mv	
2	-15.99 ms		4.88 mv	
3	-15.98 ms		4.88 mv	
4	-15.97 ms		4.88 mv	
5	-15.96 ms		4.96 mv	
6	-15.95 ms		4.88 mv	
7	-15.94 ms		4.88 mv	
8	-15.93 ms		4.96 mv	
9	-15.92 ms		4.96 mv	
10	-15.91 ms		4.88 mv	
11	-15.90 ms		4.88 mv	
12	-15.89 ms		4.96 mv	
13	-15.88 ms		4.96 mv	
14	-15.87 ms		4.80 mv	
15	-15.86 ms		4.80 mv	
16	-15.85 ms		4.88 mv	
17	-15.84 ms		4.88 mv	
18	-15.83 ms		4.88 mv	
19	-15.82 ms		4.72 mv	
20	-15.81 ms		4.88 mv	
21	-15.80 ms		4.80 mv	
22	-15.79 ms		4.88 mv	
23	-15.78 ms		4.80 mv	
24	-15.77 ms		4.80 mv	
25	-15.76 ms		4.80 mv	
26	-15.75 ms		4.72 mv	
27	-15.74 ms		4.80 mv	
28	-15.73 ms		4.88 mv	
29	-15.72 ms		4.72 mv	
30	-15.71 ms		4.72 mv	
31	-15.70 ms		4.72 mv	



Experimentation with the code and matplotlib + first successfully constructed plot from file

