Physics 111A
Lab 9b

Problem R9.1:

The sine wave is discernible with Gaussian noise levels less than 10
The spectral RMS vertical peak is discernible up to noise levels less than 30
With averaging depth set to around 80, the spectral RMS can be read up to level 40 with a sharp peak at 100Hz

Problem R9.2:

a) #1 - Abraham Lincoln, discernable at level 100, barely at level 140.
#2 - Barak and Michelle Obama, outline visible at level 90, faces visible at level 60, recognizable at level 40.

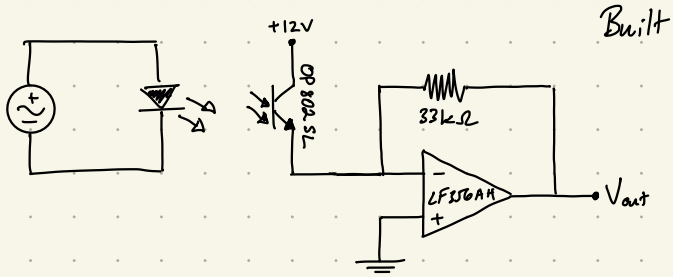
b) #3 - A face begins to appear at level 100 with continuously regenerative noise on. It is easier to discern the face in the image with the setting on because shadows appear more stationary in contrast to the particles in rest of the image.
#4 - A picture of MLK Jr. appears at noise level 110. With colored noise, noise regeneration makes the image only slightly more discernable.

c) #6 - Mona Lisa appears at level 150
#7 - Statue of Liberty appears at level 100
Images are easier to recognize from a distance since our eyes average out the noise.

d) #7 - a man can be seen at level 100 with noise regeneration and color noise on.
They can be discerned to be a basketball player at level 100.
#8 - a person on a bike can be seen at level 130.

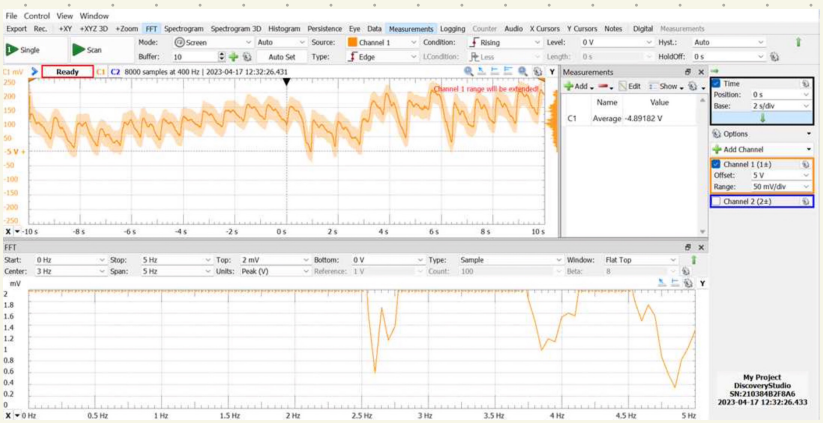
Problem R9.3:

a)

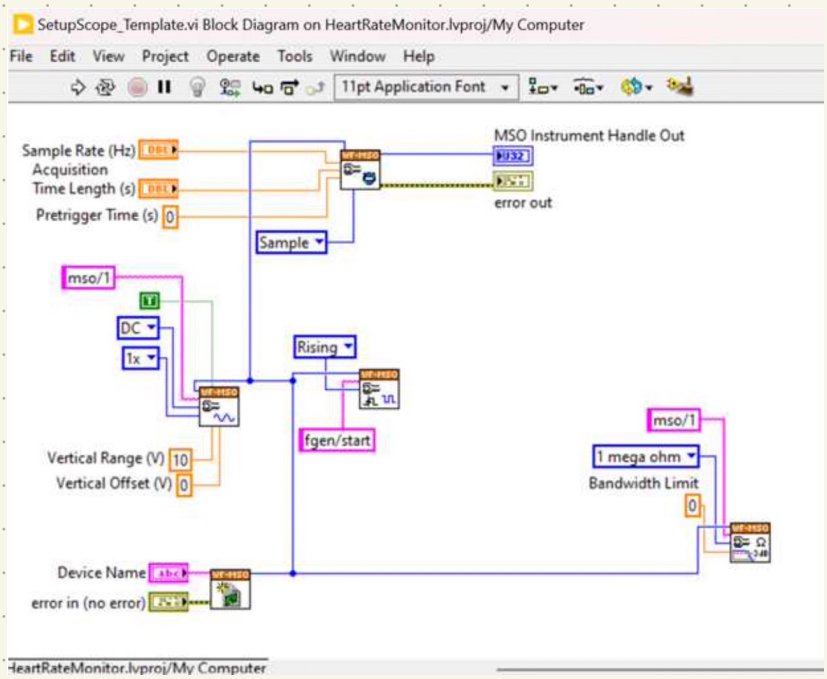


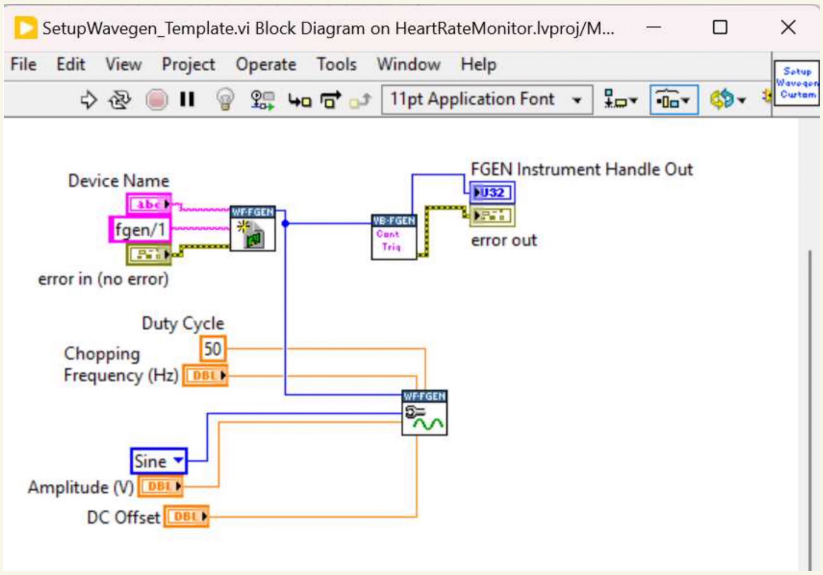
Built a heartrate monitor following the circuit provided

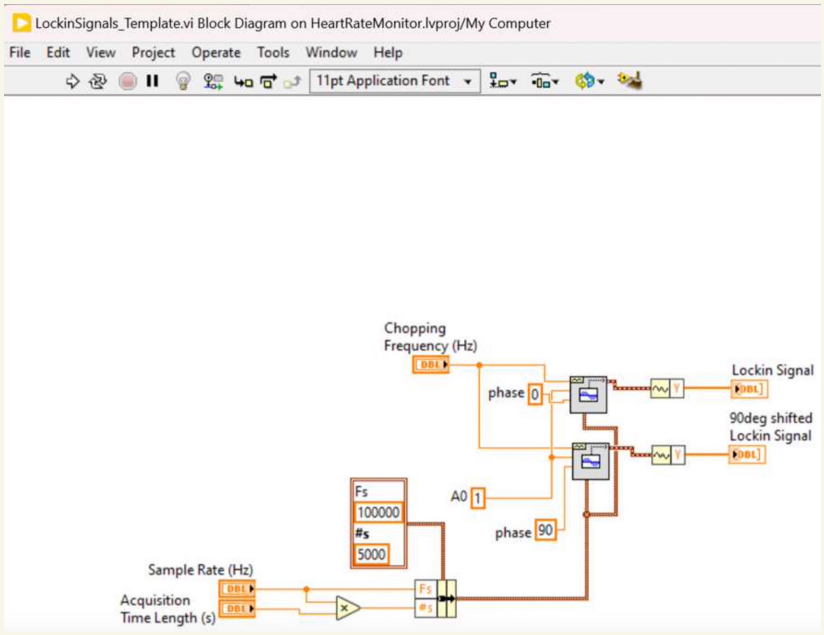
b)



Problem R9.4:


SetupScope_Template.vi Block Diagram on HeartRateMonitor.lvproj/My Computer
File Edit View Project Operate Tools Window Help
11pt Application Font
Sample Rate (Hz)
Acquisition
Time Length (s)
Pretrigger Time (s)
0
MSO Instrument Handle Out
error out
Sample
mso/1
DC
1x
Rising
fgen/start
Vertical Range (V)
10
Vertical Offset (V)
0
mso/1
1 mega ohm
Bandwidth Limit
0
Device Name
error in (no error)


SetupWavegen_Template.vi Block Diagram on HeartRateMonitor.lvproj/M...
File Edit View Project Operate Tools Window Help
11pt Application Font
Device Name
fgen/1
error in (no error)
FGEN Instrument Handle Out
error out
Duty Cycle
50
Chopping
Frequency (Hz)
Sine
Amplitude (V)
DC Offset


LockinSignals_Template.vi Block Diagram on HeartRateMonitor.lvproj/My Computer
File Edit View Project Operate Tools Window Help
11pt Application Font
Chopping
Frequency (Hz)
phase
0
Lockin Signal
90deg shifted
Lockin Signal
Fs
100000
#s
5000
A0
1
phase
90
Sample Rate (Hz)
Acquisition
Time Length (s)