Name: Onochie Tobechukwu Francis
Matric number: 17/ENG06/067
Department: Mechanical engineering
Course code: ENG 342

A. Filtering is very important in engineering systems, take a UAS(unmanned Aircraft System) for instance.The lack of RF filtering can affect the performance of the UAS in a number of ways:

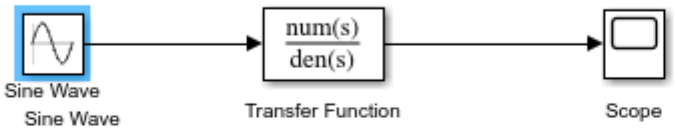
- Communication range is reduced due to the desensitization of the radio receiver by RF signals in the environment. This interference may be caused by a multitude of sources, including other aircraft operating in the area, dense WiFi activity or other communication systems on the UAS platform.

- Interference produced by the communication system desensitizes other communication systems on the UAS platform, reducing the communication range of those systems.

- Interference produced by the communication system may interfere with the reception of GPS signals by the UAS platform, reducing the accuracy of the GPS tracking, or worst case, causing total loss of GPS reception.

B. Designing a Low-Pass Filter with 0.005Ω resistor and 0.01F capacitor

A 100V Amplitude was selected with a frequency of 1Hz for the Sine Wave Source.



C. Determining the Cut-off frequency

The cut-off frequency is calculated by F= ½*(pi*R*C)

When R= 0.005Ω and C= 0.01F

F= 0.5*pi*0.005*0.01=3189.099 Hz

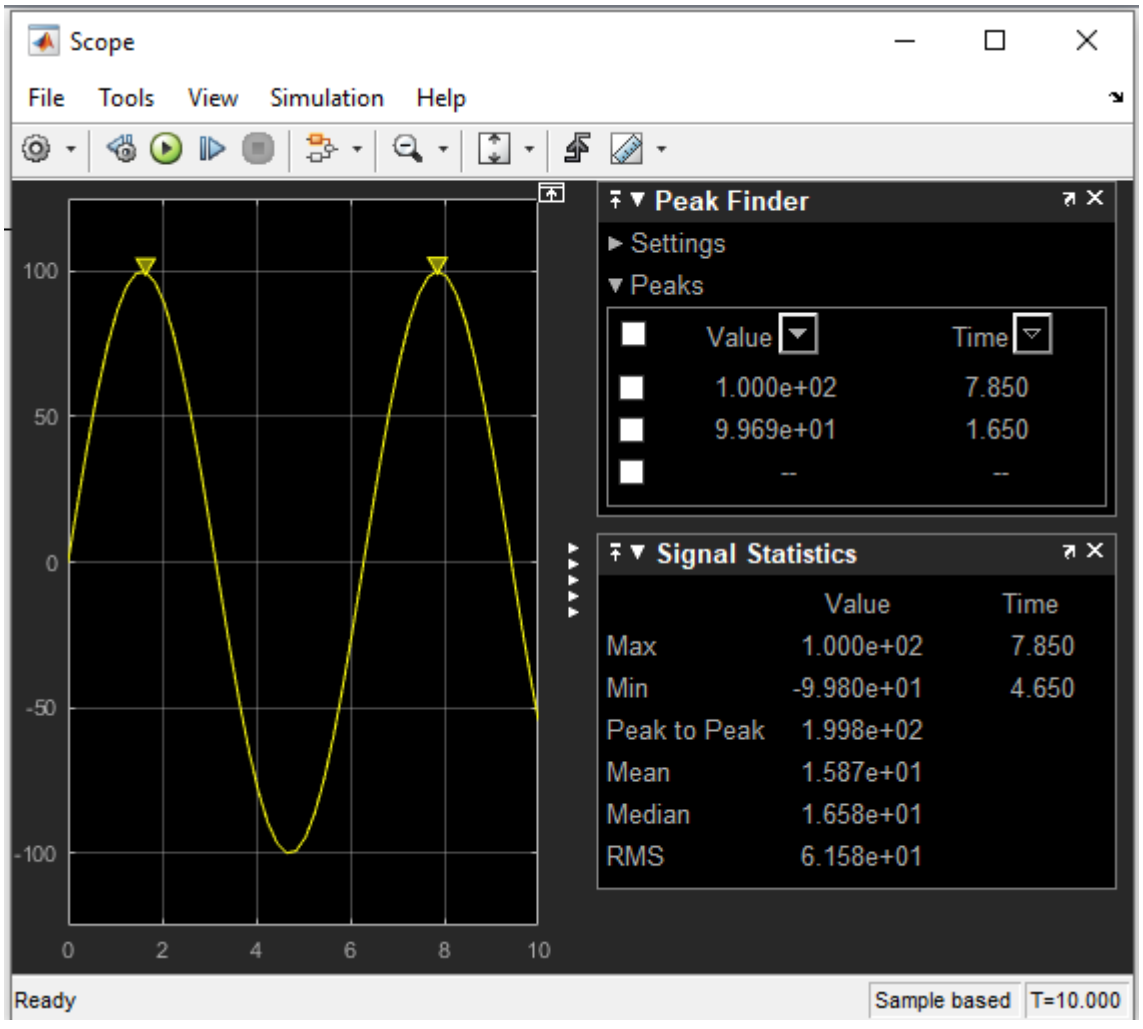
D. Design Output

The transfer function equation for the circuit is given as

(1/RC)/(S + 1/RC)

When R= 0.005Ω and C= 0.01F

Transfer Fcn=(1/0.005*0.01)/(S + (0.005*0.01))= (20000)/(s+ 20000)



A. **<u>If two signals of 5 KΩ and 2 KΩ are pass through the filter at different intervals. Discuss your observation</u>**

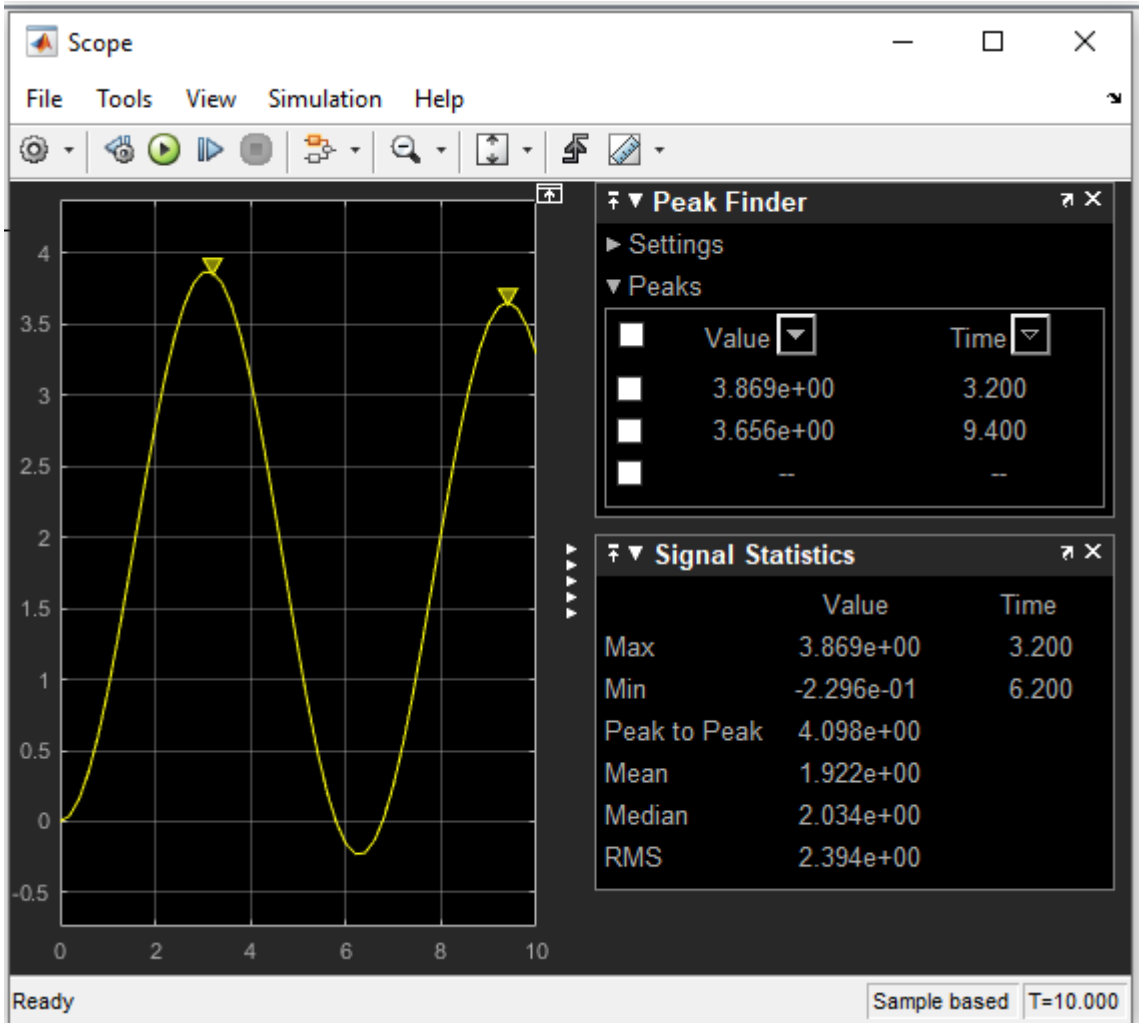
When the signal of 5 KΩ is passed through the filter, the following result is obtained:

The equation for the transfer function of the circuit is given as

(1/RC)/(S + 1/RC)

When R= 5000Ω and C= 0.01F

Transfer Fcn=(1/5000*0.01)/(S + (5000*0.01))= (0.02)/(s+ 0.02)



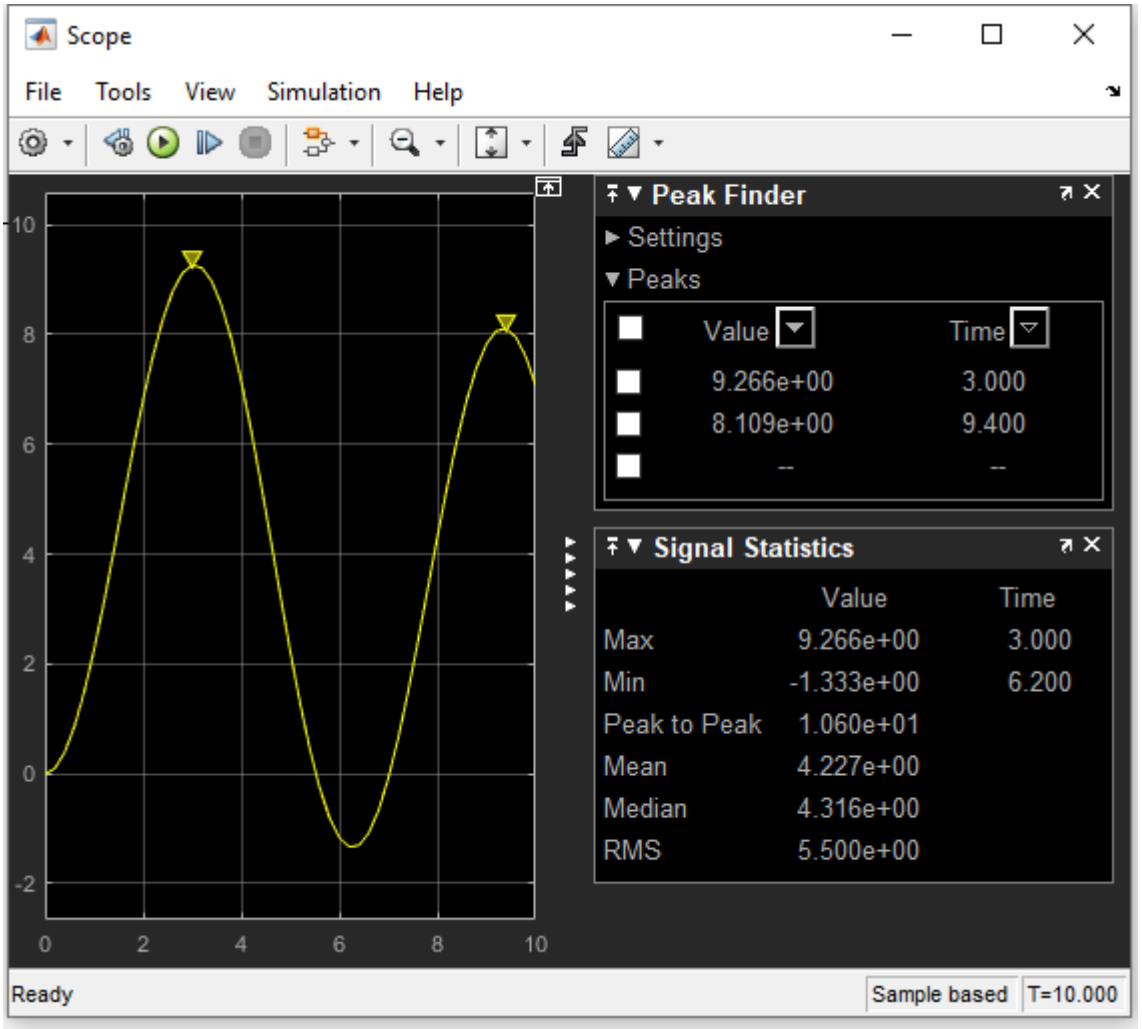
Observations: The signal is attenuated to 3.869 ohms

When the signal of 2K ohms is passed through the filter the following results are obtained: The transfer function equation for the circuit is given as

(1/RC)/(S + 1/RC)

When R= 2000Ω and C= 0.01F

Transfer Fcn=(1/2000*0.01)/(S + (2000*0.01))= (0.05)/(s+ 0.05)



Observations: The signal is attenuated to 9.266 ohms