Fs = 1000;

duration = 1;

t = linspace(0, duration, Fs \* duration);

beat = @(t, t0) ...

0.1\*exp(-((t - (t0 - 0.2)).^2)/(2\*0.01^2)) + ...

-0.15\*exp(-((t - (t0 - 0.05)).^2)/(2\*0.005^2)) + ...

1.0\*exp(-((t - t0).^2)/(2\*0.01^2)) + ...

-0.2\*exp(-((t - (t0 + 0.025)).^2)/(2\*0.005^2)) + ...

0.3\*exp(-((t - (t0 + 0.2)).^2)/(2\*0.02^2));

x = zeros(size(t));

rr\_interval = 60 / (70 + randi(10));

for i = 0:rr\_interval:duration

x = x + beat(t, i + 0.4\*rand());

end

x = x.';

y = sgolayfilt(x,0,5);

[M,N] = size(y);

Fs = 1000;

TS = timescope('SampleRate',Fs,...

'TimeSpanSource','Property',...

'TimeSpan',1.5,...

'ShowGrid',true,...

'NumInputPorts',2,...

'LayoutDimensions',[2 1]);

TS.ActiveDisplay = 1;

TS.YLimits = [-1,1];

TS.Title = 'Noisy Signal';

TS.ActiveDisplay = 2;

TS.YLimits = [-1,1];

TS.Title = 'Filtered Signal';

Fpass = 200;

Fstop = 400;

Dpass = 0.05;

Dstop = 0.0001;

F = [0 Fpass Fstop Fs/2]/(Fs/2);

A = [1 1 0 0];

D = [Dpass Dstop];

b = firgr('minorder',F,A,D);

LP = dsp.FIRFilter('Numerator',b);

Fstop = 200;

Fpass = 400;

Dstop = 0.0001;

Dpass = 0.05;

F = [0 Fstop Fpass Fs/2]/(Fs/2);

A = [0 0 1 1];

D = [Dstop Dpass];

b = firgr('minord',F,A,D);

HP = dsp.FIRFilter('Numerator',b);

tic;

while toc < 30

x = .1 \* randn(M,N);

highFreqNoise = HP(x);

noisySignal = y + highFreqNoise;

filteredSignal = LP(noisySignal);

TS(noisySignal,filteredSignal);

end

release (Ts)