Contents

Fun With Filters!!!

```
function extend (filename)


% So far, I have had little trouble with MATLAB and the sensor app interface,
% and I have been able to make some good progress on filtering and viewing
% data. Thus far I have not really implemented any step counting algorithms.
% Although I have implemented a Short-Time-Digital-Filter (stdf.m) that
% uses a FIR filter designed by the FDATool and applies a general Hanning
% Window. You can see from both the sample and frequency domain plots
% that the stdf works pretty well.


if (nargin == 0)
        filename = 'data/walking_from_cc_11_11.txt';
end

close all;
```

parse and resample sensor data

```
androidAPP(filename);
load data.mat;
n = 1:accData(1, end);
extended = zeros(3,length(n));
count = 0;
for i = 1:length(accData)
    while (accData(1,i) > count)
        count = count + 1;
        extended(1,count) =  accData(2,i);
        extended(2,count) =  accData(3,i);
        extended(3,count) =  accData(4,i);
    end
end


writing file.....
```

Compute squares, magnitude, un bias

```
x2  = extended(1,1:10000).^2;
y2  = extended(2,1:10000).^2;
z2  = extended(3,1:10000).^2;
```

```
mag = sqrt(x2+y2+z2);
```

Build filters

```
% Equiripple Lowpass filter designed using the FIRPM function.
% All frequency values are in Hz.
% Fs = 1000;  % Sampling Frequency

% Fpass = 1;               % Passband Frequency
% Fstop = 140;             % Stopband Frequency
% Dpass = 0.057501127785;  % Passband Ripple
% Dstop = 0.0001;          % Stopband Attenuation
% dens  = 20;              % Density Factor
d140 = drop140();
```

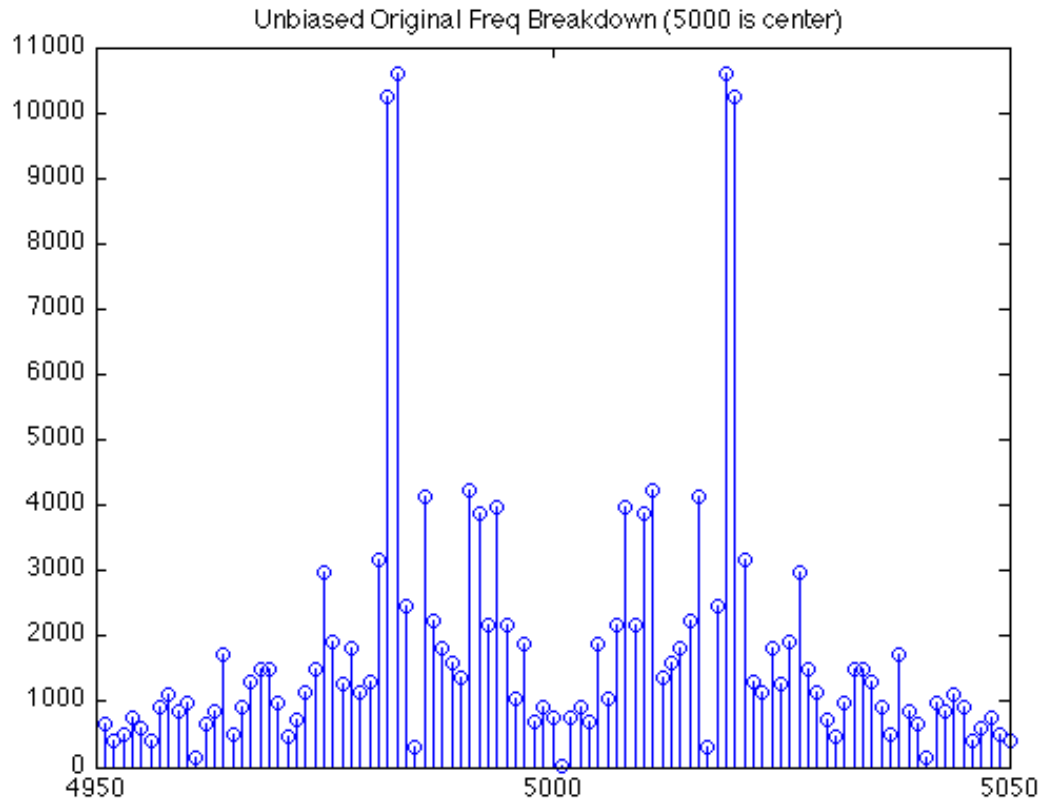
Populate struct array

```
pStruct(1).name = 'original';
pStruct(1).x    = extended(1,1:10000);
pStruct(1).y    = extended(2,1:10000);
pStruct(1).z    = extended(3,1:10000);
pStruct(1).mag  = mag;

pStruct(2).name = 'STDF 140HZ filter, N = 500';
pStruct(2).x    = stdf  ( d140, pStruct( 1 ).x,   500);
pStruct(2).y    = stdf  ( d140, pStruct( 1 ).y,   500);
pStruct(2).z    = stdf  ( d140, pStruct( 1 ).z,   500);
pStruct(2).mag  = stdf  ( d140, pStruct( 1 ).mag, 500);
```

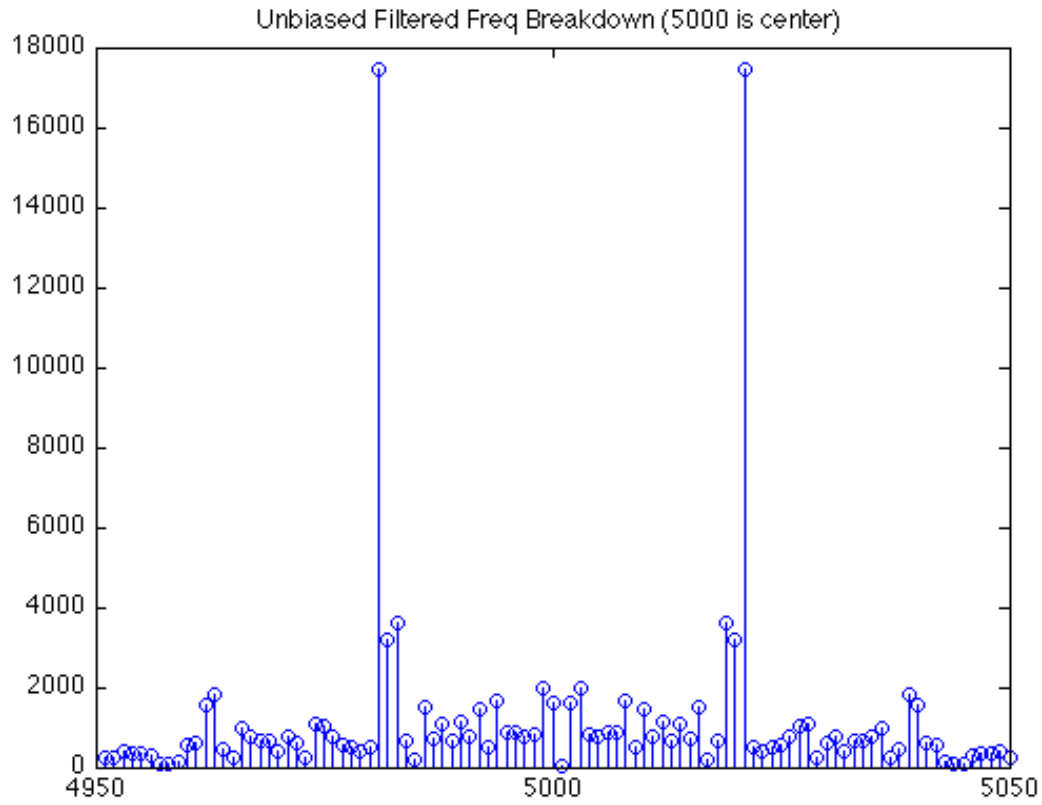
Frequency of Unbiased Original Magnitude signal

```
figure;
norm_mag = mag - mean(mag);
Mag = fftshift(fft(norm_mag));
stem(abs(Mag));
axis([4950 5050 0 11000]);
title('Unbiased Original Freq Breakdown (5000 is center)');
```



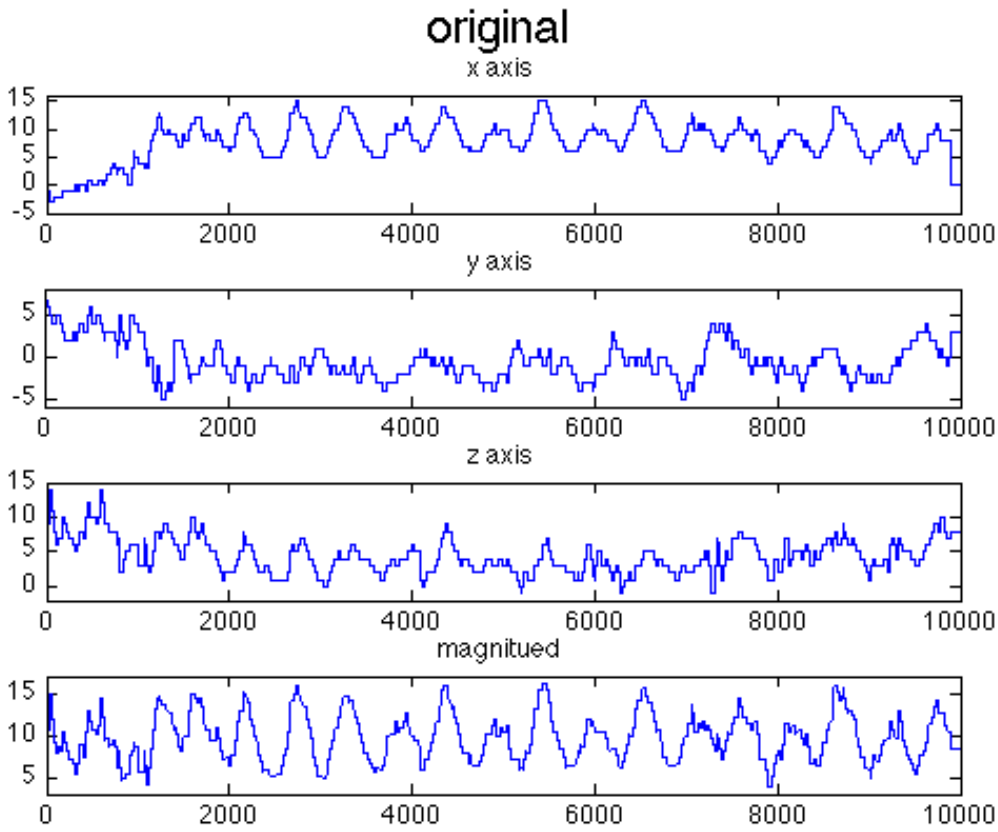
Frequency of Unbiased LowPass Filtered (140 Hz Knee) Magnitude signal

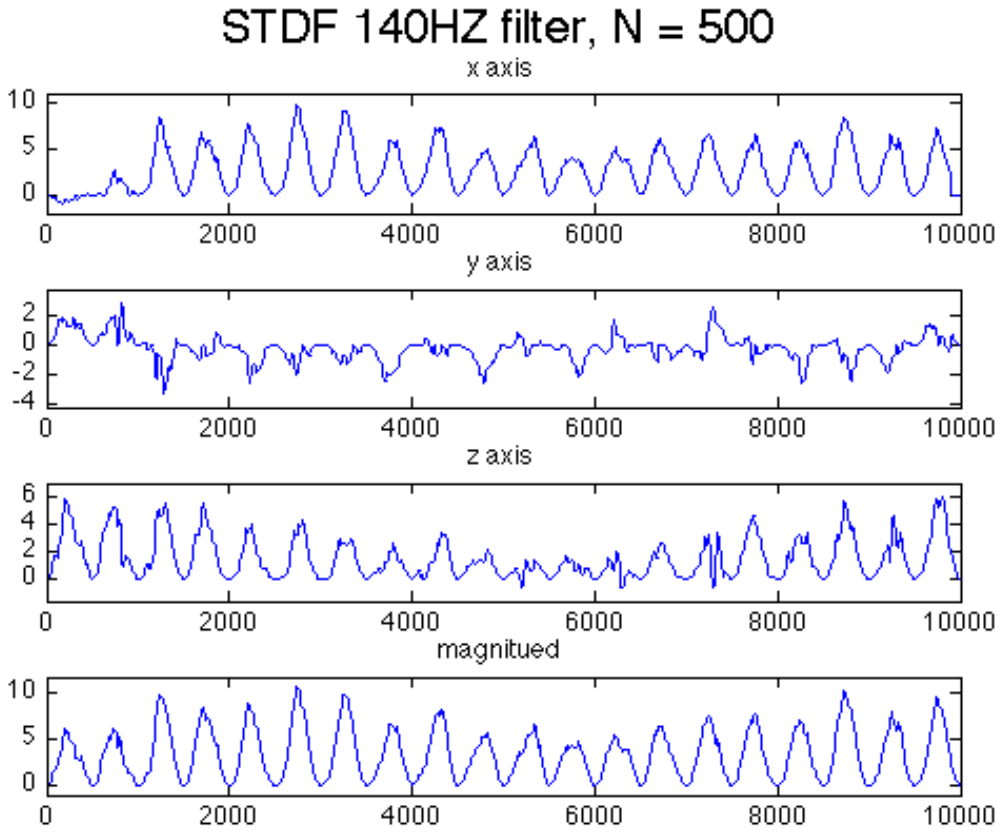
```
figure;
filt_norm_mag = pStruct(2).mag - mean(pStruct(2).mag);
filt_Mag = fftshift(fft(filt_norm_mag));
stem(abs(filt_Mag));
axis([4950 5050 0 18000]);
title('Unbiased Filtered Freq Breakdown (5000 is center)')
```



Plot

```
plotStruct(pStruct,2);
```


original
x axis
y axis
z axis
magnitued


STDF 140HZ filter, N = 500
x axis
y axis
z axis
magnitued

```
end
```

Published with MATLAB® 7.10