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Zero Crossing With Signal Strength (MATLAB code)

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%Zero Crossing with Signal Strength Algorithm%
clc
%Reading the Data File in .csv Format
fileName='walk.csv';
start=1;
stop=1600;
fs=100;
m=stop-start+1;
t=0:1/fs:(m-1)*(1/fs);

Gx=csvread(fileName, start, 3, [start,3,stop,3]);
Gyro=Gx;

%/////////////////////////////////Defining Variables/////////////////////////////////
in=[0,0,0,0,0,0,0,0];
Ou=[0,0,0,0,0,0,0,0];

global counter1;
counter1=0;

global counter2;
counter2=0;

global var_k;
var_k=0;

global i;
i=0;

global gyro_up_peak;
gyro_up_peak=0;

global gyro_down_peak;
gyro_down_peak=0;

%Variable Set by the Training Algorithm
global threshold1;
threshold1=0.05;

%Variable Used to Update Step Count
global maincount;
maincount=0;

global gyro_count_enable;
gyro_count_enable=0;
%/////////////////////////////////End of Variable Definition/////////////////////////////////
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%//////////////////////Gyroscope-X axis Data Filtering with Butterworth Lowpass
Filter at 2Hz////////////////////
for i=start:stop
in(1)=in(2);
in(2)=in(3);
in(3)=in(4);
in(4)=in(5);
in(5)=in(6);
in(6)=in(7);
in(7)=Gyro(i);

Ou(1)=Ou(2);
Ou(2)=Ou(3);
Ou(3)=Ou(4);
Ou(4)=Ou(5);
Ou(5)=Ou(6);
Ou(6)=Ou(7);

filt1(i)=((in(1)+in(7))*0.000000000853160)+((in(2)+in(6))*0.000000005118957
)+((in(3)+in(5))*0.000000012797393)+((in(4))*0.000000017063191 )+((Ou(1))*(-
0.7844171769))+((Ou(2))*(4.8969248914))+((Ou(3))*(-
12.7416173292))+((Ou(4))*(17.6873761799))+((Ou(5))*(-
13.8155108061))+((Ou(6))*(5.7572441862));
Ou(7)=filt1(i);

i=i+1;

%Detecting a Zero Cross
%Gyro Countdown
if((Ou(7)<0) && (Ou(6)>0)&& (gyro_count_enable==1))
counter1=1;
counter2=0;
var_k=i;
    if(gyro_up_peak >threshold1)
        maincount=maincount+1;
    end
end

%Detecting a Zero Cross
%Gyro Countup
if((Ou(7)>0) && (Ou(6)<0) && (gyro_count_enable==1))
counter2=1;
counter1=0;
var_k=i;
    if(gyro_down_peak <-threshold1)
        maincount=maincount+1;
    end
end

%Detecting Upward Peak
if((Ou(7)<Ou(6)) && (Ou(6)>Ou(5) && (counter2==1)))
    gyro_up_peak = Ou(6);
end

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%Detecting Downward Peak
if((Ou(7)>Ou(6)) && (Ou(6)<Ou(5) && (counter1==1)))
    gyro_down_peak = Ou(6);
end

%Sample Time Out
if(((counter1==1)&&(i<var_k+15))||((counter2==1)&&(i<var_k+15)))
    gyro_count_enable=0
else
    gyro_count_enable=1
end

end
maincount
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%End Of The Main Algorithm%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%Plotting the Gyro-X axis data
figure;
plot(t,filt1);
grid;
xlabel('Time (s)');
ylabel('Gyro-X(rad/s)');
title('Gyro Sensor X-axis Reading');

```