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LAMPIRAN

Script Matlab

Data Akuisisi

```
%Script to run data acquisition using National Instrument NI 9234
%Created: Oct 2016, Berli Kamiel

clear all;
clc;
close all;


tic;

s = daq.createSession('ni');
s.DurationInSeconds = 30;    % waktu merekam untuk 1 file
Dur = s.DurationInSeconds;
s.Rate = 17066;    % sampling rate (kecepatan sampling Hz)
s.addAnalogInputChannel('cDAQ1Mod1', 'ai0', 'Accelerometer');
s.addAnalogInputChannel('cDAQ1Mod1', 'ai1', 'Accelerometer');
%s.addAnalogInputChannel('cDAQ1Mod1', 'ai2', 'Accelerometer');
%s.addAnalogInputChannel('cDAQ1Mod1', 'ai3', 'Voltage'); %
Tachometer
%s.addAnalogInputChannel('cDAQ1Mod2', 'ai0', 'Microphone');
%s.addAnalogInputChannel('cDAQ1Mod2', 'ai1', 'Microphone');

s.Channels(1).Sensitivity = 100.1E-3; %mV/g Type 4507B
serial:11165
s.Channels(2).Sensitivity = 97.60E-3; %mV/g Type 4507B
serial:11026
%s.Channels(3).Sensitivity = 99.56E-3; %mV/g Type 4507B
serial:10984
%s.Channels(4).Sensitivity = 94.50E-3;
%s.Channels(5).Sensitivity = 9.40E-3;  %mV/Pa Model 130B40
serial:41741
%s.Channels(6).Sensitivity = 8.60E-3;  %mV/Pa Model 130B40
serial:41842

for i=1:50          % banyaknya file yg direkam

data = s.startForeground();           % start recording vibration
data
data_ch1 = data(:,1);
data_ch2 = data(:,2);
%data_ch3 = data(:,3);
%data_ch4 = data(:,4);
%data_ch5 = data(:,5);
%data_ch6 = data(:,6);

rootname = 'D:\T4\';      % drive tujuan dan nama file
```

```
extension = '.mat';
% ekstension utk nama file
namafile = [rootname,'pompa_normal',num2str(i),extension];
data_all = [data_ch1 data_ch2];
eval(['save ', namafile ,' data_all']);

pause(3)             % jeda waktu antar rekaman file
pesan = ['Acquiring and saving data at loop number: ',num2str(i)];
disp(pesan)
end

toc
```

Ploting FFT normal

```
clear
clc
close all

%load data(lokasi);
load('D:\TA4\pompa_normal38.mat');
y=data_all(:,1);
%y=data_all(:,1);
sampling_rate=17066; %kecepatan sampling Hz
recording_time=30;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)


NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y = fft(y,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);


% plot amplitude time domain
figure
plot(y(1:2*17067))
title('Time Domain')
xlabel('Sample')

% Plot single-sided amplitude spectrum.
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 1000 0 0.8]); %Sampling Rate Normal 17066
title('Spectrum')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
```

Ploting FFT variasi tutupan katup

```
clear
clc
close

load('D:\katup1A\pompa_bukaan138.mat')
y1=data_all(:,1);
load('D:\katup2A\pompa_bukaan245.mat')
y2=data_all(:,1);
load('D:\katup3A\pompa_bukaan345.mat')
y3=data_all(:,1);
load('D:\katup4A\pompa_bukaan430.mat')
y4=data_all(:,1);


sampling_rate=17066; %kecepatan sampling Hz
recording_time=30;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y1 = fft(y1,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y3 = fft(y3,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y4 = fft(y4,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);


% Plot single-sided amplitude spectrum.
subplot (2,2,1)
plot(f,2*abs(Y1(1:NFFT/2+1)))
axis ([0 1000 0 0.8]);
title('Spectrum Tutupan 360 Derajat (1 putaran penuh)')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
subplot (2,2,2)
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 1000 0 0.8]);
title('Spectrum Tutupan 720 Derajat (2 putaran penuh)')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
subplot (2,2,3)
plot(f,2*abs(Y3(1:NFFT/2+1)))
axis ([0 1000 0 0.8]);
title('Spectrum Tutupan 1080 Derajat (3 putaran penuh)')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
```

```
subplot (2,2,4)
plot(f,2*abs(Y4(1:NFFT/2+1)))
axis ([0 1000 0 0.8]);
title('Spectrum Tutupan 1440 Derajat (4 putaran penuh)')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
```

Ploting subplot time-frequency domain kondisi normal

```
clear
clc
close

load('D:\TA4\pompa_normal38.mat')
y1=data_all(:,1);
load('D:\TA4\pompa_normal38.mat')
y2=data_all(:,1);


sampling_rate=17066; %kecepatan sampling Hz
recording_time=30;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)


NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);


% plot amplitude time domain
figure
subplot(1,2,1)
plot(y1(1:17066))
title('Time Domain Normal')
xlabel('Sample')
ylabel('Amplitude')


% Plot single-sided amplitude spectrum.
subplot (1,2,2)
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 600 0 0.8]);
title('Spectrum Normal')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
```

Ploting subplot T-F kondisi variasi tutupan katup

```
clear
clc
close

load('D:\katup1A\pompa_bukaan138.mat')
y1=data_all(:,1);
load('D:\katup1A\pompa_bukaan138.mat')
y2=data_all(:,1);
load('D:\katup2A\pompa_bukaan245.mat')
y3=data_all(:,1);
load('D:\katup2A\pompa_bukaan245.mat')
y4=data_all(:,1);
load('D:\katup3A\pompa_bukaan345.mat')
y5=data_all(:,1);
load('D:\katup3A\pompa_bukaan345.mat')
y6=data_all(:,1);
load('D:\katup4A\pompa_bukaan430.mat')
y7=data_all(:,1)
load('D:\katup4A\pompa_bukaan430.mat')
y8=data_all(:,1)


sampling_rate=17066; %kecepatan sampling Hz
recording_time=30;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)


NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y4 = fft(y4,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y6 = fft(y6,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y8 = fft(y8,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);


% plot amplitude time domain
figure
subplot(5,2,1)
plot(y1(1:17066))
title('Time Domain Tutupan 360 Derajat (1 putaran penuh)')
xlabel('Sample')
ylabel('Amplitude')
subplot(5,2,3)
plot(y3(1:17066))
title('Time Domain Tutupan 720 Derajat (2 putaran penuh)')
```

```
xlabel('Sample')
ylabel('Amplitude')
subplot(5,2,5)
plot(y5(1:17066))
title('Time Domain Tutupan 1080 Derajat (3 putaran penuh)')
xlabel('Sample')
ylabel('Amplitude')
subplot(5,2,7)
plot(y7(1:17066))
title('Time Domain Tutupan 1440 Derajat (4 putaran penuh)')
xlabel('Sample')
ylabel('Amplitude')

% Plot single-sided amplitude spectrum.
subplot (5,2,2)
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 600 0 0.8]);
title('Spectrum Tutupan 360 Derajat (1 putaran penuh)')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
subplot (5,2,4)
plot(f,2*abs(Y4(1:NFFT/2+1)))
axis ([0 600 0 0.8]);
title('Spectrum Tutupan 720 Derajat (2 putaran penuh)')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
subplot (5,2,6)
plot(f,2*abs(Y6(1:NFFT/2+1)))
axis ([0 600 0 0.8]);
title('Spectrum Tutupan 1080 Derajat (3 putaran penuh)')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
subplot (5,2,8)
plot(f,2*abs(Y8(1:NFFT/2+1)))
axis ([0 600 0 0.8]);
title('Spectrum Tutupan 1440 Derajat (4 putaran penuh)')
xlabel('Frequency (Hz)')
ylabel('Amplitude')
```