LAMPIRAN

Lampiran 1: *Script Matlab Pengambilan Data Akusisi.*

```
%Script acquisition Matlab R2017a using National Instrument NI9234
%Created: July 2018, Niko Prastomo
clear all;
clc;
close all;
tic;
s = daq.createSession('ni');
s.DurationInSeconds = 10;
Dur = s.DurationInSeconds;
s.Rate = 17066;
s.addAnalogInputChannel('cDAQ1Mod1', 'ai0', 'Accelerometer');
s.Channels(1).Sensitivity = 100.10E-3; %mV/g Type 4507B
serial:11165
for i=1:50
data = s.startForeground(); % start recording vibration data
data_ch1 = data(:,1);
rootname = 'E:\Tugas_Akhir'; % drive tujuan dan nama file
extension = '.mat'; % ekstension utk nama file
namafile = [rootname,'Normal_',num2str(i),extension];
data_all = [data_ch1];
eval(['save ', namafile ,' data_all']);
```

Lampiran 2: *Script Matlab Plot Data Domain Waktu*

```
clear
clc
%Direktori tempat data mentah getaran berada
load('D:\Hafiz\DataskripHafiz\1_NORMAL\TRENINGBARU\TUGASAKHIRNORMAL_115.mat')
y1=data_all(:,1); %diberi nama dengan variabel baru dan berbeda untuk masing-masing variasi bukaan katup

load('D:\Hafiz\DataskripHafiz\2_Kaya\1.TRAININGBARU\TUGASAKHIRRusak_115.mat')
y2=data_all(:,1);D:\Hafiz\DataskripHafiz\2_Kaya\1.TRAININGBARU

load('D:\Hafiz\DataskripHafiz\3_Miskin\1.TRAININGBARU\TUGASAKHIRRusak_115.mat')
y3=data_all(:,1);


% plot amplitude time domain
figure
subplot(5,1,1)
plot(y1(1:170660))
axis([0 5000 -5 5])
legend('Normal')
xlabel('Sampel')
ylabel('Amplitudo')


subplot(5,1,2)
plot(y2(1:170660),'r')
axis([0 5000 -5 5])
legend('Kaya Bahan Bakar1')
xlabel('Sampel')
ylabel('Amplitudo')


subplot(5,1,3)
plot(y3(1:170660),'g')
axis([0 5000 -5 5])
legend('Miskin Bahan Bakar')
xlabel('Sampel')
ylabel('Amplitudo')
```

Lampiran 3*: Script* Matlab Ekstraksi Parameter Statistik Domain Waktu

```
clc
close all
clear

%Normal
for d=(1:400)
signal_in=['D:\Data TA dan MATLAB\Data Tugas Akhir\2. Data Pakai 500\1.
Training\1. Normal\Tugas_AkhirNormal1_',int2str(d),'.mat'];
load (signal_in)

a=data_all(:,1);
R(d)=rms(a);
S(d)=std(a);
P(d)=((max(abs(a))-min(abs(a)))/2);
K(d)=kurtosis(a);
V(d)=var(a);
C(d)=peak2rms(a);
M(d)=mean(a);
x=1:400;

Normaltrai=zeros(400,7);
R=R';                    %Transpose RMS
S=S';                    %Transpose Standar Deviation
P=P';                    %Transpose Peak Value
K=K';                    %Transpose Kurtosis
V=V';                    %Transpose Variance
C=C';                    %Transpose Crest Factor
M=M';                    %Transpose Mean
end

%Kaya Bahan Bakar
for di=(1:400)
signal_in=['D:\Hafiz\DataskripHafiz\2_Kaya\1.TRAININGBARU\TUGASAKHI
RRusak_11',int2str(di),'.mat'];
load (signal_in)

b=data_all(:,1);
R1(di)=rms(b);
S1(di)=std(b);
P1(di)=((max(abs(b))-min(abs(b)))/2);
K1(di)=kurtosis(b);
V1(di)=var(b);
C1(di)=peak2rms(b);
M1(di)=mean(b);
```

```
x1=1:400;

Kaya Bahan Bakarr=zeros(400,7);
R1=R1';                    %Transpose RMS
S1=S1';                    %Transpose Standar Deviation
P1=P1';                    %Transpose Peak Value
K1=K1';                    %Transpose Kurtosis
V1=V1';                    %Transpose Variance
C1=C1';                    %Transpose Crest Factor
M1=M1';                    %Transpose Mean
end

%Miskin Bahan Bakar
for dii=(1:400)
signal_in=['D:\Hafiz\DataskripHafiz\3_Miskin\1.TRAININGBARU\TUGASAK
HIRRusak_1',int2str(dii),'.mat'];
load (signal_in)

f=data_all(:,1);
R2(dii)=rms(f);
S2(dii)=std(f)
P2(dii)=((max(abs(f))-min(abs(f)))/2);
K2(dii)=kurtosis(f);
V2(dii)=var(f);
C2(dii)=peak2rms(f);
M2(dii)=mean(f);
x2=1:400;

MiskinBahanBakar=zeros(400,7);
R2=R2';                    %Transpose RMS
S2=S2';                    %Transpose Standar Deviation
P2=P2';                    %Transpose Peak Value
K2=K2';                    %Transpose Kurtosis
V2=V2';                    %Transpose Variance
C2=C2';                    %Transpose Crest Factor
M2=M2';                    %Transpose Mean
end
```

Lampiran 4: *Script* Matlab Plot Grafik Ekstraksi Parameter Statistik Domain Waktu

```
%Standard deviation
figure
s=14;
c='r';
scatter(x,(S),s,c,'v');
hold on
s=14;
c='b';
scatter(x1,(S1),s,c,'x');
hold on
s=14;
c='g';
scatter(x2,(S2),s,c,'o');
hold on
s=14;
c='c';
scatter(x3,(S3),s,c,'+');

axis([0 100 0 1.5])
title('Grafik Standar Deviasi')
xlabel('Sampel'),ylabel('Amplitudo')
legend ('Normal','KayaBahanBakar','MiskinBahanBakar')

%Peak value
figure
s=14;
c='r';
scatter(x,(P),s,c,'v');
hold on
s=14;
c='b';
scatter(x1,(P1),s,c,'x');
hold on
s=14;
c='g';
scatter(x2,(P2),s,c,'o');
hold on
s=14;
c='c';
scatter(x3,(P3),s,c,'+');

axis([0 100 0 3.5])
title('Grafik Peak Value')
```

```
xlabel('Sampel'),ylabel('Amplitudo')
legend ('Normal','KayaBahanBakar','MiskinBahanBakar')

%Kurtosis
figure
s=14;
c='r';
scatter(x,(K),s,c,'v');
hold on
s=14;
c='b';
scatter(x1,(K1),s,c,'x');
hold on
s=14;
c='g';
scatter(x2,(K2),s,c,'o');
hold on
s=14;
c='c';
scatter(x3,(K3),s,c,'+');

axis([0 500 2.5 4])
title('Grafik Kurtosis')
xlabel('Sampel'),ylabel('Amplitudo')
legend ('Normal','KayaBahanBakar','MiskinBahanBakar')

%Variance
figure
s=14;
c='r';
scatter(x,(V),s,c,'v');
hold on
s=14;
c='b';
scatter(x1,(V1),s,c,'x');
hold on
s=14;
c='g';
scatter(x2,(V2),s,c,'o');
hold on
s=14;
c='c';
scatter(x3,(V3),s,c,'+');

axis([0 100 0 2])
title('Grafik Varians')
```

```
xlabel('Sampel'),ylabel('Amplitudo')
legend ('Normal','KayaBahanBakar','MiskinBahanBakar')

%Crest factor
figure
s=14;
c='r';
scatter(x,(C),s,c,'v');
hold on
s=14;
c='b';
scatter(x1,(C1),s,c,'x');
hold on
s=14;
c='g';
scatter(x2,(C2),s,c,'o');
hold on
s=14;
c='c';
scatter(x3,(C3),s,c,'+');

axis([0 100 4 6])
title('Grafik Crest Factor')
xlabel('Sampel'),ylabel('Amplitudo')
legend ('Normal','KayaBahanBakar','MiskinBahanBakar')

%Mean
figure
s=9;
c='r';
scatter(x,(M),s,c,'v');
hold on
s=9;
c='b';
scatter(x1,(M1),s,c,'x');
hold on
s=9;
c='g';
scatter(x2,(M2),s,c,'o');
hold on
s=9;
c='c';
scatter(x3,(M3),s,c,'+');

axis([0 100 -0.01 0.01])
title('Grafik Mean')
```

```
xlabel('Sampel'),ylabel('Amplitudo')
legend ('Normal','KayaBahanBakar','MiskinBahanBakar')

axis([0 500 0 1.5])
title('Grafik RMS')
xlabel('Sampel'),ylabel('Amplitudo')
legend ('Normal','KayaBahanBakar','MiskinBahanBakar')
```

Lampiran 5: Script *Matlab Principal Component Analysis* (PCA)Domain Waktu

```
vector_ch123(:,:,1)=Normaltrai
vector_ch123(:,:,2)=Kayabahanbakar
vector_ch123(:,:,3)=miskinbahanbakar

for i=1:3
eval (
['[LOADING_ch',int2str(i),',SCORE_ch',int2str(i),',latent_ch',int2str(i),',T2_ch',int
2str(i),'] = princomp(zscore(vector_ch123(:,:,',int2str(i),')));']);
eval ( [ '[norm_vector_ch123(:,:,',int2str(i),'),MU(i,:),SIGMA(i,:)]=
zscore(vector_ch123(:,:,',int2str(i),'));' ])
eval ( ['loading(:,:,',int2str(i),')=LOADING_ch',int2str(i),';'])
eval ( ['score(:,:,',int2str(i),')=SCORE_ch',int2str(i),';'])
end
```