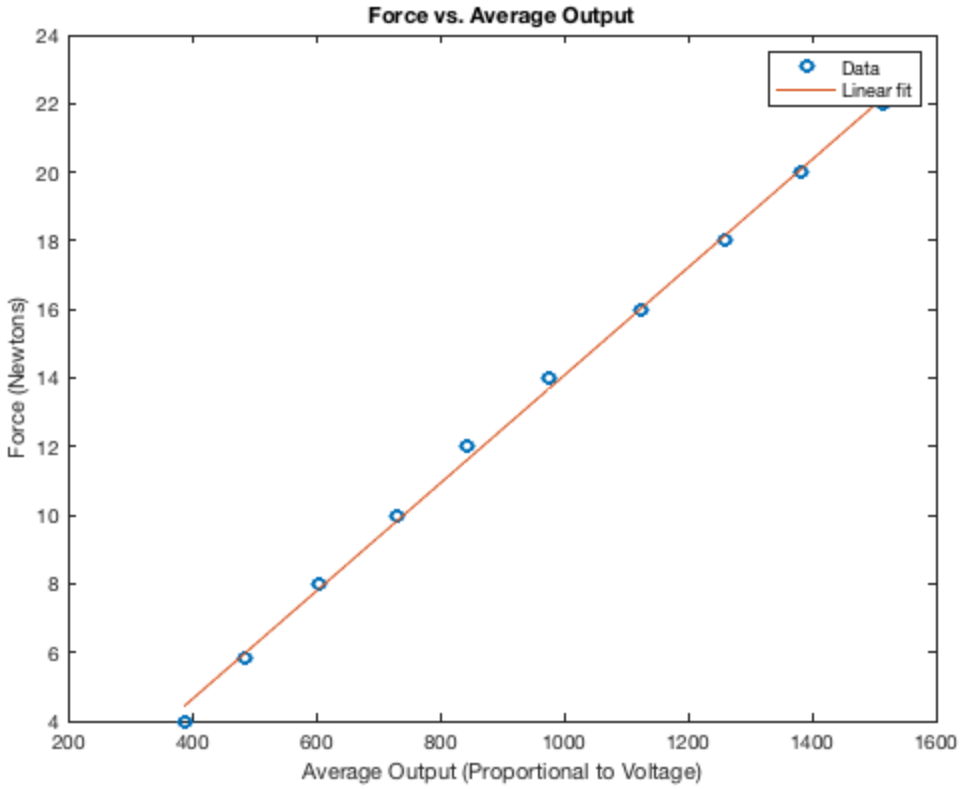
```
%{

Testing done at calibration_factor = 1000;

This code does the following:
- Import raw data from force device
- Convert string to number
- Plot data and linear fit
- Calculate R-squared

Lesson learned: don't print unwanted strings in Arduino serial monitor


RESULTS: R-squared is 0.9983 so it is very strong correlation.


Note: in case the corrcoef function is giving the wrong value, maybe
 double
checking the R-sqared value with Excel might be a good idea.

%}

T = readtable('01_29_20_MTS_analysis.xlsx'); %import data
rawdata = T.Variables; %convert table to 141x22 cell array


%readings at serial monitor as cell array
cell_array = [rawdata(:,2) rawdata(:,4) rawdata(:,6) rawdata(:,8)...
    rawdata(:,10) rawdata(:,12) rawdata(:,14) rawdata(:,16)...
    rawdata(:,18) rawdata(:,20) rawdata(:,22)];
%type rawdata in command window to inspect which row belongs to which
 load


pure_array = erase(cell_array,"Reading: "); %remove unwanted string
 from cell array
array = str2double(pure_array); %convert cell array to matrix


%variable 'array' is a matrix. make a vector for each load increment:
array0 = array(:,1);
array4 = array(:,2);
array6 = array(:,3);
array8 = array(:,4);
array10 = array(:,5);
array12 = array(:,6);
array14 = array(:,7);
array16 = array(:,8);
array18 = array(:,9);
array20 = array(:,10);
array22 = array(:,11);
```

```
%DATA IS TIDY.
%BEGIN ANALYSIS:

%calculate average values:
ave0 = mean(array0);
ave4 = mean(array4);
ave6 = mean(array6);
ave8 = mean(array8);
ave10 = mean(array10);
ave12 = mean(array12);
ave14 = mean(array14);
ave16 = mean(array16);
ave18 = mean(array18);
ave20 = mean(array20);
ave22 = mean(array22);

%make vectors:
ave_output =
 [ave4;ave6;ave8;ave10;ave12;ave14;ave16;ave18;ave20;ave22];
force = [4;5.85;8;10;12;14;16;18;20;22];

%generate linear fit data
linear_eq = polyfit(ave_output,force,1);
linear_fit = polyval(linear_eq,ave_output);

%plot data
plot(ave_output,force,'o',ave_output,linear_fit,'-')
title("Force vs. Average Output")
xlabel("Average Output (Proportional to Voltage)")
ylabel("Force (Newtons)")
legend('Data','Linear fit')

%display r-squared value
disp(' ')
disp('R-squared is:')
R_matrix = corrcoef(ave_output,force);
R = R_matrix(2,1);
Rsq = R^2;
disp(Rsq)

%display linear equation
eqtn = ['   y=' num2str(linear_eq(1)) 'x' num2str(linear_eq(2))];
disp('Linear equation is:')
disp(eqtn)
```

```
R-squared is:
    0.9983

Linear equation is:
   y=0.015734x-1.6638
```



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