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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ENGR 132
% Program Description
% Using the given data, we were asked to plot the IEP3 vs power and
 OEP4 vs
% power. Then plot the predicted volume v. power for each design and
 then
% compare them to ask the given questions.
%
% Assigment Information
%   Assignment:     PS 03, Problem 2
%   Author:         Ranjan Behl, rbehl@purdue.edu
%   Team ID:        008-14
%   Contributor:    Name, login@purdue [repeat for each]
%   My contributor(s) helped me:
%     [ ] understand the assignment expectations without
%         telling me how they will approach it.
%     [ ] understand different ways to think about a solution
%         without helping me plan my solution.
%     [ ] think through the meaning of a specific error or
%         bug present in my code without looking at my code.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

INITIALIZATION

```
Data = csvread('Data_volume_power.csv',2,0);% imports the given volume
 data
Power = Data(:,1);%creates a column vector that has the first column
 of data
```

```matlab
DesignOEP4 = Data(:,2);% creates a column vector that has the second
 column of data
DesignIEP3 = Data(:,3);% creates a column vector that has the third
 column of data
```

CALCULATIONS

```matlab
VolumeOEP4 = (67.1 *log(Power) - 1.3);% calculating the predicted
 volumes for OEP4
VolumeIEP3 = (77.7 *log(Power) - 7.3);% calculating the predicted
 volumes for IEP3
```

FORMATTED FIGURE

```matlab
%a & b
plot(Power,DesignOEP4,'-or');% ploting the original data for the OEP4
 headphone design
hold on
plot(Power,DesignIEP3,'-.pb');% ploting the original data for the IEP3
 headphone design
hold on
plot(Power,VolumeOEP4,':xg');% ploting the model prediction for the
 OEP4 design
hold on
plot(Power,VolumeIEP3,'--+k');%ploting the model predication for the
 IEP3 design
grid on
%c
title("Volume of the OEP4 and IEP3 designs vs Power input");% creating
 a descriptive title
xlabel("Power(mW)");% labeling the x axis
ylabel("Volume(dB)");% labeling the y axis
legend("DesignOEP4","DesignIEP3","VolumeOEP4","VolumeIEP3");% creating
 a legend
legend('location','northeastoutside'); % changing the legend location
 so it doesnt cover up the graph
```

Volume of the OEP4 and IEP3 designs vs Power input

Legend:
- DesignOEP4
- DesignIEP3
- VolumeOEP4
- VolumeIEP3

X-axis: Power(mW)
Y-axis: Volume(dB)
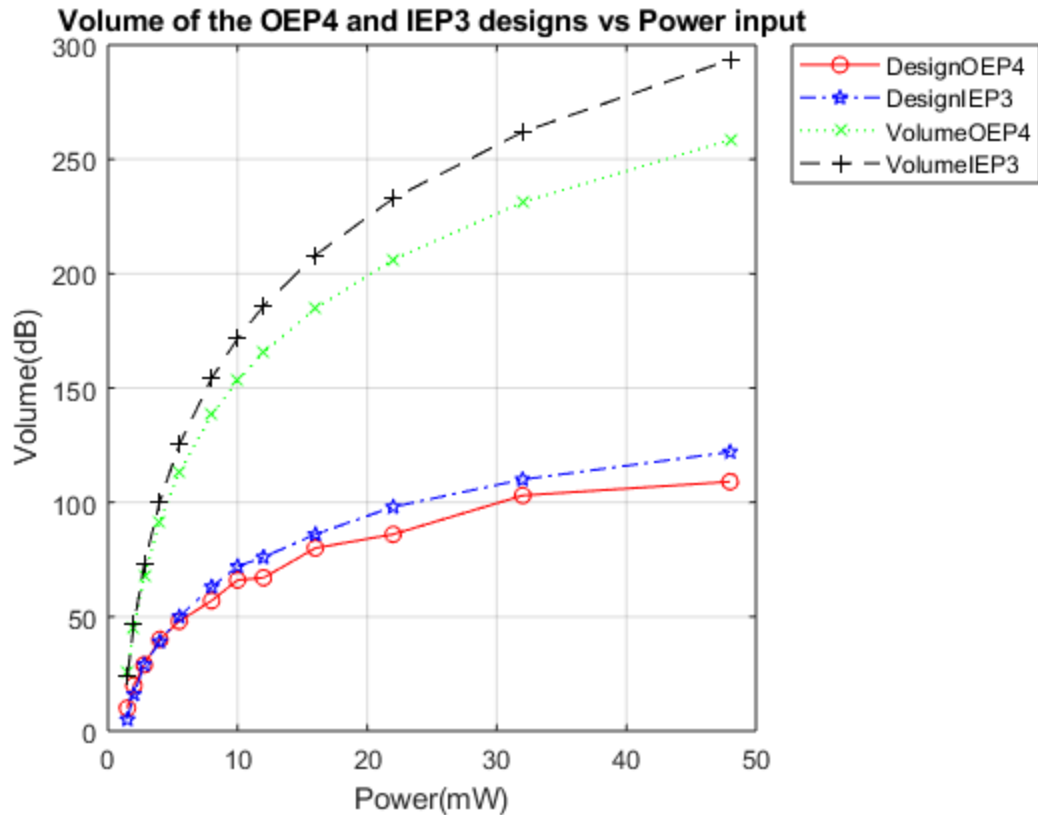
ANALYSIS

-- Q1

The IEP3 design is the better model as it contantly produces more volume than the OEP4 design as shown by the graphs.

-- Q2

The IEP3 design is the most sensitive because it has the largest increase on volume with a increase in power. This can be seen on the plot where the IEP3 line value is greater than around 30 when relating to the the OEP4 line, this occurs at a power value of 40 mW.

-- Q3

At 60db the IEP3 design will have the better battery life as seen in the graph where the IEP3 Design graph is higher than the OEP4 design. At 30db both designs are good as the will have a similar battery life as seen graphs in which at 30db both designs overlap.

ACADEMIC INTEGRITY STATEMENT

I have not used source code obtained from any other unauthorized source, either modified or unmodified. Neither have I provided access to my code to another. The script I am submitting is my own original work.

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