ENGR 122          Homework 7

NOTE: Use engineering format for problem 2 and non-engineering format for problems 1, 3, 4, 5, 6, and 7. This is an individual assignment (although you can share raw data for problem number 1).

1. Recall the data that you collected during the last class.
   (a) Complete the table below.
   (b) Show hand calculations for one data point, where the calculations include all relevant units.
   (c) Provide a plot of “potential energy change of the weight” and “electrical energy input” (both on y-axis) versus “pulse width.” Be sure to label each of these curves on your plot.
   (d) Plot “system efficiency” versus “pulse width.”

<table>
<thead>
<tr>
<th>PULSOUT Argument</th>
<th>PULSOUT Width (m)</th>
<th>Height Change (cm)</th>
<th>Lift Time (s)</th>
<th>PE Change of Weight (J)</th>
<th>Voltage (V)</th>
<th>Current (A)</th>
<th>Electrical Power (W)</th>
<th>Electrical Energy (J)</th>
<th>System Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1540</td>
<td>1.54</td>
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</table>

2. A battery supplies a DC electric motor with 6V and 1A. The motor is attached to a gearbox and pulley system that lifts a 20 oz weight at a rate of 1 inch per second. Determine the efficiency of the system. Please present your answer using a Mathcad worksheet.

3. Learn about the applications of RF transmitter/receiver pairs. Please find at least three applications and write a short description of how each one works and how each one is beneficial.

4. Generate bug #7 for your “Bug List.” Remember that a bug can be something that doesn’t work quite right or that could be improved, something that bothers you, or things that you notice others struggling with. For your homework, please name the bug, write up at least a two sentence description of the bug, and provide pictures when it makes sense to do so. You don’t need to try to find a solution to the problem at this point. Try to think of bugs in different categories as you build your bug list. For example, find bugs related to major life activities (recreational, occupational, tasks of daily living, transportation, communication, learning) and bugs affecting special people groups (disabled, senior adults, children).

5. Review the Ten faces of Innovation presentation from the last class. Considering your personality and skills, which of the “Ten Faces” do you think best describes you? Why?

6. Make a list of every sensor that you have implemented this year, every sensor we have implemented in ENGR 122 classes, and every sensor you have learned about when completing your homework.

7. Read the short article entitled “The re-emergence of DIY vs Big Organizations” at the following link:
   http://procrastineering.blogspot.com/2011/03/re-emergence-of-diy-vs-big.html

Write a paragraph describing your opinion about this article. Please describe the main point or points of the article in your own words before providing your opinion.

8. Due on Class 9 Make an enclosure such as a box out of foam board – it’s OK to be creative with the shape. The box should have six sides so it is completely enclosed. This will build some of the skills that you may need when creating your prototype later in the quarter. Use the presentation entitled “foam core” on the Class 6 schedule for
directions. Please make sure you have something under your foam board so you don’t damage desktops and other surfaces around campus (or cut outside on a concrete surface).

You can do this project in teams of two or individually. Please bring your foam board creation to class 9 to show your instructor, and include a SolidWorks drawing of what you create with your homework. We will likely run out of foam board in Ruston, so if you go home over the weekend, you might want to pick up a piece. A business that makes signs would probably sell you a piece, or you could get it at Walmart, Office Depot, the University Bookstore, Hobby Lobby, etc.