Final Design Specification Assignment

Previous Work: Every time you edit Beaversource for submission, it is vital that you make any requested changes from the last time the BeaverSource was reviewed. For this assignment, make sure you made any changes needed from the Preliminary Specification assignment.

Section 2 – System Requirements and Acceptance Tests
After reviewing the suggested changes to your engineering requirements from the preliminary specification assignment, now it is time to select 10 engineering requirements that will actually be evaluated. While you should make a system that meets all of the requirements, we will only be asking for you to prove 10 of them. You get to pick which 10, and we assign how much each is worth. Out of 100 points, we will assign a value to the requirements you choose based on how hard we think each item is and how long it will take. This means you should pick requirements that are about even in difficulty to spread out the work.

Once your team has picked the requirements, you need to enter them using the BeaverSource macro you placed into section 2. You need to be logged in to use the macro. Fill out the appropriate fields and submit the 10 you want to be evaluated on. You can make as many changes as you would like until the end of the term. After your final paper submission, the requirements will become locked and no further changes are allowed.

Your mentor/customer (instructor is you don’t have one of these) MUST review the requirements you have entered prior to the assignment being due. They must email the instructional staff at ece44x-ta@engr.oregonstate.edu stating that they agree with 10 system requirements. You will get 0 points for this section if the email is not received.

Section 4.n – Block Designs
In previous specification assignments, the grading has focused on the system level and the scores were for the group. For this assignment the focus is on individual design. At the top of each of the blocks in your design (4.1-4.n) should be the heading ‘Responsible Party:’ with the name of the person who will be graded for the block. This person can get help from others, but they alone will be graded on the quality of the work.

We randomly pick ONE block to review for each responsible party. Please make sure each block represents a high quality of work.

Section 4.n.1 – Block Diagram and Interface Definition
This is a high level view of the block as the world interfaces to it. This section is a single block (black box) that shows all inputs and outputs to your system for the block, and a table describing them. The block and the interfaces listed should match EXACTLY the ones listed in section 4 for the top level diagram. However, only include the ones that are important to this block. You are responsible for ensuring your interfaces are completed and fully detailed. You are responsible for making updates to section 4.0 so that they match.

When drawing the blocks for this and other block diagrams, please use black and white drawing with minimal color. Do not use background images or colors. Please use only ‘plain’ arrows; this is not a marketing pitch.

Section 4.n.2 – Design Details
The design details contain the actually schematics, mechanical drawings, or Pseudocode/State Diagrams for the block. The format for these details can be your choice but needs to be neat and complete. You may hand draw everything if you would like (in fact it is recommended) so long as your scans are very easy to read.

Common mistakes here are to forget reference designators and values for passive components and part numbers for active components. If we need to look to the BOM to find out what a part is, the schematic/drawing is not sufficient. Additionally, be sure it is very clear where the signals labeled on your block diagram connect in your design details. Use IDENTICAL names when labeling the design details.

If your project is a research project, design details can be the processes you plan to attempt to complete this block. Give special care to having enough detail to explain the research so that the grading staff can understand the research.
Code blocks are of special interest, so ensure that you have completely described your code’s operation. This may include one or more flow charts, state diagrams, structure lists/descriptions, UML diagrams for objects, function descriptions, and pseudo code blocks.

**Section 4.n.3 – Design Validation**
The design validation section is the most important part of each block. In this section, you must make a compelling argument that the block design you have presented will perform as expected COMPLETELY. You can use many mechanisms to do this including, prototyping the design, SPICE simulation, heat analysis, hand calculations, mechanical CAD drawings showing parts fitting together, and discussion of software ‘corner cases.’

Usually this section is not complete enough. When you think you have done enough analysis and validation, you should do more. At a minimum if you have not included every part on your BOM at least once in your validation, it is not enough.

When you are evaluating a board or kit you plan to purchase, you must validate that it fits your needs. Pay special attention to voltages and current on every connection as well as the connector styles. When dealing with systems that need to process multiple inputs and outputs, you need to validate the amount of data flowing in and out of the system and that it can handle it all at the data rate expected.

**Section 4.n.4 – Block Testing**
The block testing section should contain a step by step test that concludes in a single PASS or FAIL condition. This single condition may be composed of other smaller tests, but there must be a single unified PASS/FAIL. The block test should fully test all of the properties of the interface definition for that block. This will include all voltage ranges, all varieties of inputs, and that all outputs meet their specs. (See section 7.2.2 in textbook) The format of the tests should be step-by-step with enough detail for someone not in your group to correctly perform the test. Be careful that the block test needs only the block the section with a minimum of external other blocks to be connected. You don’t want your test to be dependent on another block being completed and functional!

**Section 4.n.5 – Bill of Materials**
Each block needs to have a bill of materials (BOM) section. This section lists each and every parts used in the construction of the block. If the block is a mechanical block, it should list screws, and raw materials and other mechanical parts. Code blocks are exempt from this requirement. Pay attention to the rubric as to what information should be included on each BOM item.

Report Out – After finishing the writing of the Preliminary Specification, your group needs to send an email with a 500 word summary of progress to date to the email for the course TAs (ece44x-ta@engr.oregonstate.edu) and if your group has one, your mentor/sponsor.