ESE 381 Embedded Microprocessor Systems Design II
"Project Design Documentation Overview" *(2015-F)*

Introduction:

The laboratory portion of ESE-381 is associated with the design and prototyping of a complete embedded system. Unlike the ESE-380 laboratory, ESE-381 lab sessions do not involve weekly experiments and associated write-ups. The writing requirement for ESE381 is much more concentrated, and occurs at the end of the semester.

Also in contract to ESE380, the ESE381 laboratory activities are be centered around five to seven design modules. Each design module is typically conducted over a two week period.

As such, the overall goals of each design module is to implement a sub-system of the overall design. After a number of design modules have been completed, a design group's focus will generally shift from hardware design and implementation, to software and application program design and debugging.

Design Module Execution

As indicated above, each design module usually involves a two week cycle. At the start of the first week, prelab checks will be performed. At this time, items such as C-program source code, asm-code listings, schematic diagrams, state diagrams, block diagrams, etc., will be checked and very briefly reviewed. During the second week of the two week cycle, verifications and signoff signatures must be attained and work associate with the current design module completed.

Uncompleted portions of a design module, for which a signature is not obtained during the required two week interval, must be completed at another arranged time before the next design module commences. See the Lab Engineer to determine what times are possible for such 'catch-up' activities.

Documentation and Manual Descriptions:

As mentioned, unlike the ESE-380 weekly laboratory write-ups, ESE381 requires students create and submit two custom documents/manuals. The first is a full and complete *User's Guide*. The second is full and complete *Theory Of Design* document.   A cover page, table of contents, and BINDING are required for each of the two manuals.

The User's Guide is a separate document, which must be neatly bound, and quite professional looking in presentation. This guide must clearly and completely describe how to use and operate the system. This is NOT a <u>technical</u> document, but a <u>user</u> document.   Front panel and a rear panel layout diagrams must be included and annotated. A full and detailed description of how to use the items and controls shown is also required. Bullet or list form presentations and operating procedures are best (and NOT paragraph-form descriptions).

If appropriate, the *User's Guide* should include system installation instructions, troubleshooting tables, operating (NOT program) flow diagrams, etc. In short, this guide is not technical, is for a user, and should be easy to read and follow. This is a firm requirement.

The second manual, the *Theory Of Design* document, is a separately bound manual that must clearly and completely describe the entire system theory and design **<u>in great detail</u>**.   Essentially, instead of weekly theory write-ups, this manual is a complete one-time system theory of operation/design write-up. There should be a notable volume of detailed theoretical descriptive text, and many references to the figures, schematics, block diagrams, program code portions, and so on, which should be weaved into the text descriptions of the document. Figure numbers and names are required. The *Theory Of Design* document must include the following:

- Annotated front and rear panel diagrams;

- High and low level block diagrams;

- Software and operational flow charts;

- State diagrams and state tables (if FSM included in design)

- Industry standard schematic diagrams;

- Program source code files (if asm code included, NO .asm files, just listings);

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It should be understood that these documents should be written in such detail, that after a careful review by a skilled technical individual, that individual will be able to upgrade the design, say to add additional features, or repair the design should it cease to function properly.

It is highly recommended that Visio or another drawing program be used for drawing the block diagrams, flow diagrams, front panel, rear panel, and other views of the designed system. Visio is available in the ECE CADLab and the ESDL. All diagrams and inserted portions of schematics and program source sections should be assigned **figure numbers** and **figure titles**. This is required!

Summary

Each ***design team*** must submit one bound *User's Guide* manual and one bound *Theory Of Design* manual. A cover page, table of contents, and BINDING are required for each of the two documents.

The user's guide should be on the order of 10 to 20 pages in length, including the embedded figures, and be ***quite unique when compared to other design groups User's Guides***.

A typical *Theory Of Design* document should be in the range of 50 to 100 pages, including the above listed items such as text discussions, text descriptions, various diagrams, flowcharts, program source files, datasheets, etc. Again, this document must be quite unique when compared to other design groups work.

No late submissions will be accepted after the due date deadline, which is always Friday, the last day of classes, by Noon time (12 PM).

Neatness and presentation will certainly affect the grades received for these documents.

Please review this overview document, as your design team is creating and reviewing these documents.