CSE598B Codesign of Embedded Systems

Spring, 1999

Class: 303 Cushing Hall (until a smaller room becomes available)
Tuesdays and Thursdays 12:30pm - 1:45pm

Instructor: Dr. X. Sharon Hu
326D Cushing Hall, 631-6015, hu@cse.nd.edu

Office Hours: Tues. 10:30pm - 11:30pm
Thur. 2:00pm - 3:00pm

Required Texts:
Papers selected from the journals and conferences in the topic areas.

Recommended Reference Texts:

Course Objectives
At the conclusion of this course, you should be able to

- Describe the composition and various components of a generic embedded system, including embedded processor architectures, memory and I/O devices, real-time operating systems and software development.

- Analyze the performance of simple embedded systems with respect to both hardware, software and overall system. List advantages and disadvantages of different designs for a given specification. Identify major sources of potential discrepancies between reported performance and actual performance.

- Derive detailed hardware and software specifications from a high level specification. Carry out the design process for both the hardware and software components of simple embedded systems.

- Apply the hardware/software codesign concepts to modeling and specification, partitioning and performance estimation of embedded systems. Use real-world criteria for trading off various quality measurements.

- Analyze and compare different algorithms for real-time scheduling and hardware/software partitioning when used for different system requirements and architectures. Apply the given algorithms to improve system architectural designs. Devise scheduling and partitioning algorithms for specific design problems.
Course Policies and Procedures:

- The lectures will be presented on transparencies and/or on a white board. Active participation by students are strongly encouraged.

- There will be one in-class test and one take-home exam. The tentative in-class test date is March 18th.

- Only under unusual circumstances (medical excuse or prior instructor approval) can a make-up tests be considered. Otherwise, a zero point will be counted towards your grade.

- Unless otherwise instructed, you must work in groups on the homework, handing in one solution per assignment. The instructor will assign the groups.

- On each homework assignment, each group should designate a coordinator to make sure everyone understands who is supposed to be doing what, a recorder to prepare the final solution set, a checker to check the final solution for correctness, and a team process monitor, who records and turns in with the assignment a statement of what the group did well and what (if anything) needs improvement. (One person may assume more than one role if necessary.) These roles should rotate on every assignment. On each assignment, put the names and roles of the participating group members and the assignment number on a cover sheet.

- Homework should be turned in prior to the start of the class on the due date. No late homework will be accepted. Homework solutions will not be posted, and you are responsible for finding out how to solve the problems before or after they are due.

- When necessary (i.e., you believe the amount of effort from each team member is different), for each homework assignment, complete an "Individual Effort Rating for Team Members" (see attached). Note that the ratings should reflect each individual’s level of participation and effort and sense of responsibility, not his or her academic ability. These results may be used to adjust homework grade for individual effort.

- Teams having problems working together should make every effort to resolve them by themselves. If that doesn’t work, see the course instructor for help. Students who consistently fail to pull their weight can as a last resort be fired by unanimous decision of the rest of their team, and the students repeated carrying the load for their teammates can as a last resort quit. Students who either are fired or quit must find another group willing to take them on.

- There will be one design project. The class will split into two teams (hardware design team and software design team). A system level specification will be provided and each team must prepare an associated sub-specification as well as the detailed design. Design reviews will be conducted in class and a formal design report will be required. More details will be provided in the project handout.

- Class presentation is an important part of this class. You will be given several papers throughout the semester and are required to digest them and present them in class. You are also expected to raise questions when others present. The guidelines for this exercise will be distributed with the papers.
Grading Guidelines:

- Inquiries about graded homework and tests will be accepted only if made within one week after they are handed back. Such inquiries should be made in writing, which clearly explains the complaints. Only after reviewing the written complaints, can the instructor make any grade adjustments.

- Grade components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Class Participation</td>
<td>15%</td>
</tr>
<tr>
<td>Design Project</td>
<td>25%</td>
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<tr>
<td>Quizzes and Test (1)</td>
<td>35%</td>
</tr>
<tr>
<td>Final</td>
<td>15%</td>
</tr>
</tbody>
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- The assignment of letter grades will use the following scale: A: ≥ 90, A-: ≥ 85, B+: ≥ 80, B: ≥ 75, B-: ≥ 70, C+: ≥ 65, C: ≥ 60, C-: ≥ 55, D: ≥ 45 and F: < 45. Minor adjustments to the above scale might be made if deemed necessary by the instructor after considering some unforeseen circumstances. However, any deviation from the scale will only improve the letter grades.

- There will be a “gray area” between each two letter grades in the final distribution, so that two people getting the same weighted average grade could get different letter grades. If you are in one of these gray areas, whether you get the higher or a lower grade depends on (i) your participation in the class activities and (ii) whether your test performance has been improving or declining.