ME 8843: ADVANCED MECHATRONICS

Instructor: Professor I. Charles Ume
Phone: 404-894-7411
Office: MARC Building, Room 453
Office Hours: Wednesday 4:00 pm to 5:00 pm, or by appointment
Class Meets: TR 9:35 am to 10:55 am
Class Location: Instructional Center 107
E-Mail: charles.ume@me.gatech.edu
ME 8843
ADVANCED MECHATRONICS

Focusing on semester long Team Projects, designing and building intelligent machines and smart products.
Web Pages:
Course:  http://www.me.gatech.edu/mechatronics_course
Lab: http://www.me.gatech.edu/mechatronics_lab

Prerequisite:
ME 4447: Microprocessor Control of Manufacturing Systems
ME6405: Introduction to Mechatronics or Equivalent

Text:
1. Mechatronics, by Sabri Cetinkunt, published by Wiley
2. Basic Microprocessors and the 6800, by Ron Bishop
3. CPU12RG Reference Guide
4. MC9S12C Family Reference Manual
5. MC9S12C32 Device User Guide
7. Every group of 3 students is required to purchase an Axiom CML-12C32 and bread board.
Reference Text


3. *Design with Microprocessors for Mechanical Engineers* by Stiffler

4. *6801, 68701, and Microcomputer Programming and Interface*, by Andrew C. Stauggard

5. *Design with Microcontrollers*, by John B. Peatman


7. *Mechatronics: Mechanical System Interfacing*, by D. M. Auslander

# Syllabus:

<table>
<thead>
<tr>
<th>Lecture Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechatronic Systems (Jan. 8)</td>
</tr>
<tr>
<td>Transducers, Sensors, and Sensor Fusion (Jan. 13)</td>
</tr>
<tr>
<td>Actuators, and Mechanical Drives (Jan. 15)</td>
</tr>
<tr>
<td>Power Rectifiers (Jan. 29)</td>
</tr>
<tr>
<td>Fluid Power (Prof. Book-Jan. 20 and 22 in MRDC 2407)</td>
</tr>
<tr>
<td>Motion Control (Prof. Singhose-Feb. 3)</td>
</tr>
<tr>
<td>Modeling of Mechatronic Systems (Prof. Sadegh-Feb. 5)</td>
</tr>
</tbody>
</table>

## Final Project

The major emphasis in this course is final group project.
**Grading:**

Short Test 1  
15% (Jan. 27)

Short Test 2  
15% (Feb. 10)

(Given next class meeting following last lecture)

Final Project Deliverables:  
Due January 22

• Proposal and Timeline  
7.5% (Feb. 12)

• First Interim Report  
15% (Mar. 10)

• Midterm Presentation  
7.5% (Mar. 31)

• Second Interim Report  
7.5% (Mar. 31)

• Final Presentation and Report  
40% (Apr. 21)

Since this is a team project intensive course, periodic evaluations are needed to ensure all groups are on track towards completing their projects. Each group will submit a 1-2 page project proposal and timeline on **January 22nd**.
Final Project:

It is the responsibility of each group to purchase the materials for their final project. You are encouraged not to spend more than $25.00 per student in your final project. Consider your final project as a low cost proof-of-concept, and not the final product.

1. This must be done in groups of three students. It is your responsibility to choose your partners.

2. Your group will meet as often as necessary to decide on the project that you would like to work on, and to work on it from its conception until it is finished.

3. Your grade in the project will be determined by your individual contribution and presentation, the creativity/novelty/quality of your project, your project web site and final report.

4. A 1 – 2 page proposal of your final project is due exactly two weeks from the first day of classes.
Final Project (Continued):

5. There are sample final projects on the Mechatronics Lab web page: http://www.me.gatech.edu/mechatronics_lab

6. The final project presentation will be on Apr. 21
   - The presentation schedule will be made available about one week before the presentation date.
   - You are required to hand in your final report prior to your presentation.
   - Each group must develop a web page for their final project.
Interim Report Requirements:

1. Interim Reports should demonstrate the progress made since the last report/demonstration and provide a means for the students and instructor to assess the status of the final project. Refer to the timeline submitted with the project proposal when discussing your progress.

2. The report should cover the following topics (1-2 pages):
   - A recap of your project goals and objectives
   - A critical assessment of the progress your group has made
   - Major accomplishments since the last report/presentation
   - Difficulties and hardships encountered
   - Next steps to be taken by your group
Notes:

1. This schedule is subject to change at the discretion of the instructor.

2. You are responsible for materials covered during your absence. There are no make-up lectures or tests. You will get zero for any test you missed, unless you made a prior arrangement with me and took it earlier.

3. You must always clean up before you leave the Lab.

4. Reviews of a test grade must be done within one week after the test is returned.

5. Regular attendance is required in this class.

6. No make-up projects or assignments will be given for grade enhancement.
Grading Forms
# ME 8843: Advanced Mechatronics Final Project Evaluation Worksheet

## Project Title:

## HCS12 Subsystems (Each Group Must Use at Least Four)

<table>
<thead>
<tr>
<th>Analog to Digital Converter</th>
<th>Serial Peripheral Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Timer</td>
<td>On-Chip EEPROM</td>
</tr>
<tr>
<td>Pulse Accumulator</td>
<td>Pulse Width Modulation</td>
</tr>
<tr>
<td>Parallel Input/Output</td>
<td>Maskable/Nonmaskable Interrupts</td>
</tr>
<tr>
<td>Serial Communication Interface</td>
<td></td>
</tr>
</tbody>
</table>

## Group Member’s Name | Comments on his/her Efforts

1. ________________ -- ____________________________
   ____________________________% Individual Effort

2. ________________ -- ____________________________
   ____________________________% Individual Effort

3. ________________ -- ____________________________
   ____________________________% Individual Effort

4. ________________ -- ____________________________
   ____________________________% Individual Effort

---

Advanced Mechatronics, Georgia Tech
### Other Measures of Success:

<table>
<thead>
<tr>
<th>Category</th>
<th>Superb</th>
<th>Good</th>
<th>Average</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usefulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uniqueness/Creativity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aesthetics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Gained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Website</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:__________________________________________________________
______________________________________________________________
______________________________________________________________
______________________________________________________________

Total Score (30): _________  Grader: ___________________________  Date: __________