ME430: Mechatronics
Project Information

Project Introduction:

The biggest part of Mechatronics is the quarter project. You are to design, construct, test, refine, and demonstrate a project which uses a PIC microcontroller to sense some activity, then control an action in response to the activity that was detected.

Week	Task	Due	Pts
1 (no meeting)	Group Brainstorming	Finish in class	1
2	3 Ideas	3 pages @ meeting	3
3	Project Proposal	Print Project Proposal @ meeting	1
4 (no meeting)	Revised Project Proposal and on-line shopping	Submit Revised Project Proposal w/ shopping list on Angel as a single Word document	10
5	Approval of your shopping list then place order	Open most up to date Revised Proposal in Word	1
6 (short meeting)	Assigned your Core Component	Show receipt of placed purchases	1
7 (short meeting)	All parts received	Bring everything in a box to your meeting	3
8	Completed ME core component	Big Date! Demonstrate your assigned ME core component	15
9	Completed CS/EE core component	Big Date! Demonstrate your assigned CS/EE component	15
10 (no meetings)	Finished Project	Big Date! Demonstration Day	40
Due Before Final	Project Documentation	Project Documentation or Wiki Update due	10

Completion of this project will include the following components:

Group Brainstorming. A brainstorming session will be used to generate a list of possible project ideas. Each group is to put together a list of at least 12 different possible projects. (worksheet later in document)

Drawings of 3 Ideas. During your first project meeting (details later)

Project Proposal and Shopping List: After the 3 different ideas have been developed and discussed with the instructor, the team will submit a project proposal during the week 3 project meeting. There will be three stages to the Project Proposal: the initial draft submitted during the week 3 project meeting, the revised proposal with scanned images and complete shopping list submitted as a single word document on Angel for week 4, and then finally getting approval to purchase parts in the Week 5 meeting.

Weekly Meetings: Teams will meet with the instructor throughout the quarter. The meeting will be a short 5-10 minute meeting. Each meeting will be worth a different number of points, but the following rubric will always be used for all project grades:

10 = Excellent	Team exceeded project goals and expectations
9 = Very Good	Team is in good shape and doing very well
8 = Satisfactory	Team has met the requested ideas at a satisfactory level
7 = Ordinary	Team is okay but isn't at the appropriate project status level
6 = Marginal	Team is not in real trouble yet but behind target status
5 = Deficient	Team is behind project goals
4 = Unsatisfactory	Team has little to show for their "week" of effort
3 = Superficial	Team has thrown something together at the last minute
2 = Gave Excuses	Team had nothing to give other than an excuse
1 = Dim-Witted	Team had nothing to give and couldn't think up an excuse ☺
0 = Not Present	Team not present for meeting

Project Demonstration: The working project needs to be completed by the week 10 demonstration day so that it can be shown in class. Each team will be given 5 to 10 minutes to demonstrate their project. While the demonstration may be made informally, it should still be planned and run smoothly. Each presentation should include the following parts.

1) Get a picture taken by professor
2) Introduce yourself and partner
3) Start with an overview of the project's device/system to be built.
4) Describe (briefly) how the project works (people will want to see it not hear about it).
5) Demonstrate the working prototype
6) Identify a couple of things you learned by working on this project.
7) Allow other students/professor to inspect and try out your project.

Written Project Documentation or Wiki Article: Due on Angel after the project demonstrations but before the final. (Details later).

Group Brainstorming for Project Ideas (Week 1/Day 1):

We're going to do some brainstorming, a less structured approach for generating new design ideas that promote creative thought and free expression without criticism.

Description of the brainstorming process.

1) Used for small groups although it works best for around 4 to 6.

2) Without stymieing free expression, a group leader starts the session by stating the problem clearly, sets the tone and tempo of the session, and provides a stimulus if or when things begin to drag. Many sessions follow the problem statement with one or two minute silence to think about the problem.

3) Members are asked to call out ideas, but there is no discussion of the ideas. Free expression is essential. Any evaluation of an expressed idea is to be avoided. Nothing should be said to discourage a team member from speaking out.

4) Team members are encouraged to build on ideas generated by others (hitchhike) as new thoughts or ideas germinate based on others suggestions.

5) Members of the groups should be treated as equals. Try not to feel a need to impress, support, or defy another member of the group.

6) Recorders are necessary. Everything that is said should be recorded mechanically or manually. Use of a flip chart lets everyone see the ideas generated.

By setting this format for open thought and expression, different avenues or nontraditional design concepts may occur. The goal is to generate as many possible different traditional and nontraditional design ideas in a short amount of time. Typical brainstorming sessions run for about half an hour.

Names of Group members:

_____ _____

_____ _____

_____ _____

Generation of 12 project ideas:

You need to generate at the very least 12 possible projects you would consider developing as a project for mechatronics. More is better.

1)_____

Description:

2) _____

Description:

3) _____

Description:

4) _____

Description:

5) _____

Description:

6) _____

Description:

7) _____
Description:

8) _____
Description:

9) _____
Description:

10) _____
Description:

11) _____
Description:

12) _____
Description:

One person in the group needs to turn in a copy of at least 12 developed ideas to your instructor. More ideas are always welcome.

Drawings of 3 Ideas for Week 2

Each team is to pick 3 ideas to develop in a bit more detail.

Each of your three ideas should fit on a single page so you will bring 3 pages with your 3 ideas to the project meeting.

Development of each concept is to include:

- -- Title for the project
- -- Drawing of what the project might look like (80% of the page)
  - -- This is probably the most important part to me
  - -- Include what it would look like plus show motors and other electronics
  - -- Try to make it clear what you're up to
- -- A list of inputs that your project will sense
- -- A list of outputs that your project will control
- -- A brief (two sentence) description of what your project is and how it works

By the time you have completed this development, you should now have a sense of how difficult each of the three projects would be and how much effort would be required to complete each. Your instructor will help with this difficulty evaluation during your Week 2 project meeting.

The way most people do this is with the written parts done in Word then leaving a big gap in the middle of the page. Then after they print it out, they go draw freehand in pencil. That's pretty much what I'm looking for.

Bring these 3 pages to your first project meeting with the instructor in week 2.

Project Proposal for Week 3

For this step you need to decide what you want to build for your project and prepare a project proposal for review and discussion. Your instructor will review your project proposal at your next team meeting and discuss the details of the project proposal.

Your team is not required to pick your project from your 3 ideas. It can be something totally new. A Project Proposal can be over 1 page and needs the following sections:

-- Title page
  Team number, names, project title, other such info that looks pretty
-- Single page summary
  -- Similar to the single page for the 3 ideas
  -- A list of inputs that your project will sense
  -- A list of outputs that your project will control
  -- A description of what your project is and how it works
-- Parts required list (the major change from the 3 ideas)
  A rough draft list of everything you need to purchase
  (For next time you'll have a picture of the specific part you plan to order)
  (Finishing the week 4 assignment early is always welcome if you want.)
-- The pie in the sky extras
  Any project has a core functionality then additional things that might be fun to add. The last page of the week 3 proposal is things you'll add if time permits. Let me know some things you might try to do if you can get the core functionality together early. Pictures are always welcome.

By the time you have completed this development, you should have a much better sense of how difficult your project might be. It's time to start deciding if it's too much or needs more bells and whistles. Most students do too much actually. Think about keeping the project in scope.

The project proposal will have three phases this is phase 1. You should bring a printed version of your Project Proposal to your group meeting for week 3. After your group meeting you should make revisions and start shopping for where you will purchase parts. Phase 2 will be your week 4 submission and phase 3 will be your week 5 meeting. Make sure to keep your project proposal up to date with any changes as you go. Your project proposal will be the start of your final project documentation at the end of the class.

Keeping an eye on points you can see that most the project proposal you submit this week is really only a draft and the real points come with the week 4 submission. It builds on this week so all your hard work will pay off if this week is solid.

Project Proposal for Week 4

For this week in the project you will update/revise your Week 3 Project Proposal and convert it to an electronic format. You will submit your completed project proposal electronically on Angel as a **single** Word file. This project proposal should include anything requested in the week 3 requirements plus a shopping list. So you need to scan in any drawings of your project from week 3 or make the drawing in an electronic format. At any rate, the only thing you turn in is a single Word document. That document is due by 5pm at the end of Day 12. There is, however, no Week 4 project meeting, just submit the Final Project Proposal.

A well formatted shopping list should look like this. This is only a small portion of this groups shopping list. Make sure to include a power supply!

Name	Quantity	Link to Purchasing Location	Picture	Unit Cost	Total Cost
DOOR LOCK ACTUATOR	2	http://www.allelectronics.com/make-a-store/item/DLA-1/DOOR-LOCK-ACTUATOR/-/1.html		5.50	$11.00
NERF N-STRIKE MAVERICK	2	http://www.hasbro.com/nerf/default.cfm?page=viewproduct&product_id=15953		7.99	$15.98
		etc			
				TOTAL	**$46.32**

Make the links clickable so that the instructor can navigate to the webpage where you plan to purchase each item. Word uses Crtl+click to go to the web page. If setup as a link

The last phase is approval of your complete shopping list. Bring your computer and current project proposal to the week 5 meeting. Hopefully the instructor has gotten a chance to look at your Angel document before then. It's wise to combine your purchase with another group (or two or three groups) to save on shipping.

Note on submitting large file sizes to Angel:
Compress your images within Word before submitting the file to Angel to reduce the document file size. If you do not know how to do that do a Google search for something like "word compress images".

Also… you are NOT allowed to purchase anything from the EE stock room. They stock parts for use in ECE classes only. This being an ME class, we are not to purchase any of their inventory.

Week 5 Meeting

The week 5 meeting is simply a chance to discuss your week 4 project proposal and figure out any last questions before placing an order. Place orders ASAP! Read week 7 grading system to encourage you to order early and hound shippers if it doesn't ship right away. Be wary of back order items and make sure you get a "Your items have shipped" email within a few days.

Week 6 Meeting

The Week 6 meeting is a quick one. You need to show me a receipt so that I know you've placed your order for project parts. Then you will get a core ME component assignment. The core ME component assignment is usually to build the mechanical structure of your project or some motor actuator component. Your PIC and breadboard will be busy with your labs, so you will start with the ME work due week 8.

Week 7 Meeting

I want to see your parts! Bring in everything you ordered and we'll see if we got what we thought we ordered. Building materials not required. Your grade **WILL** be based on what parts have actually arrived. So this grade is based on things you did back in week 5. If you ordered parts right away and made sure you got a "Your items have shipped email" then it should be no problem. It is a major problem to have items delayed. Get on shipper early is the only solution.

Week 8 Meeting

Big day! You need to demonstrate your core ME component assignment from week 6. You've had two weeks to work on this assignment, so it should be looking good. You will also be assigned your CS/EE core component during this meeting.

Week 9 Meeting

Big day! Finished the assigned CS/EE core component part of the project. This is a demo. The instructor will **not** look at your code. It is a demo of what you have working. Excuses and pointing to the screen at code that "should" work is not the same as a functional demo. ☺

Week 10

No meeting just the project demonstrations. It is very important that your demo work in the **programming** mode not just the debugger. You should not even need to bring in your computer. During project demonstrations you will be expected to give your full attention to the other teams presenting. There will not be time in class for you to tinker with last minute fixes. Come in ready to demo your programmed project.

Plan for that day:

1) Get a picture taken by professor
2) Introduce yourself and partner
3) Start with an overview of the project's device/system to be built.
4) Describe (briefly) how the project works
   People will want to see it not hear about it.
5) Demonstrate the working prototype
6) Identify a couple of things you learned by working on this project.
7) Allow other students/professor to inspect and try out your project.

Project Documentation

For the project documentation you will have 1 of 2 possible tasks (you will do one or the other, not both):

1. Standard written project documentation submitted on Angel
2. An addition to the Gems of Wisdom Wiki based on a task in your project

At some point during the project or during the 10th week your team will been assigned a task either project documentation or a Gems of Wisdome Wiki entry.

For the teams assigned Written Project Documentation:
1) Written Project Documentation: If you are submitting project documentation, you must start with your project proposal document and update that file. Leave all of the important information from your original project proposal and update all changes.

You are expected to have either a detailed drawing or a photograph of your final project with labeled details.

I'm not too tough about the project documentation. I will grade it during the final, so submit it before the final begins. It'll be submitted electronically only on Angel. Usually I'm okay with a simple paragraph or two explanation (whatever is necessary to explain your project) and a few good pictures! I'm big on pictures with labels! Very informal compared to ME421. :))

The must have pictures, include:

1. Picture of project as a whole
2. Picture of you with your project
3. Close up pictures of interesting sub-parts of your project

I'll be taking pictures during to project demonstration day that you can use.

In my mind the main purpose of the document is for you. I want you to have something to remember.

For teams assigned a Gems of Wisdom explanation on the Angel Wiki:
2) You should click on Lessons -> Gems of Wisdom wiki and look at the template. Write your information and try to stick to the template layout as appropriate. This is intended to help future students with projects please write every detail they might possibly need to use your assigned component.

If you are doing a wiki entry please read the entries by Isaac Weintraub for formatting and adding pictures. Go to the Angel wiki under the lessons tab, type in "Isaac" into the search box. You should find "Adding Images and Formatting to Wisdom WIKI". Read that document and add pictures and quality formatting to your wiki entry.