Junior Design Initial Notes

**Administrative:**

* Put safety glasses in backpack
* Get graphing composition notebook
* Use Microsoft outlook for planning meetings?
* Create objectives for each day and make a checklist
  + Record expectations vs reality
  + Why did errors occur
  + How did fix errors
* Do multiple trials and record
* Read grading rubric for notebook, bot, and reflections

**Things to Remember:**

* Safety glasses when soldering
* Use a picture of the protoboard for schematics
* Demonstrate technical functionality of hardware and software design to verify a detailed spec for each phase
* Don’t use any parts or software not on approved course list
* Datasheets of components are on Trunk
* Don’t use the serial communication protocol on the Arduino for bot to bot communication, but can use it for design and debug
* Will need to produce a sales invoice (pg 14)
* Physical design needs to be appealing
* Engineering notebook contains: assignments, design drawings, analysis, schematics, parts, time, role, costs, and reflections on experiments and failures
* There will be an executive summary for 2 of the phases, cannot exceed 2 written pages (pg 15)
* Paired with another team for the swarmbot community
* Will be paired with a third team as outsource partner for collision detection system for our bot
* Provide bot spec for customer and collision-detection spec for outsource partner
* Must be provided with cost estimate from other team and invoice for collision-detection system from outsource partner
* Cost of outsourcing is part of our bot’s cost
* Schematic🡪prototype🡪debug

**Steps for First Week:**

1. Read the project description file first:  EE31\_2019\_Project\_Description.pdf  
   2. Look over the two files EE31\_Syllabus\_Spring 2019.xlsx and the Assignments 2018\_Due Date Listing.pdf to get a sense of the deliverables for the class  
   3. Read the pre-studio for Phase 1A: EE31\_2019\_PreStudio Phase 01A.pdf  
   4. Read the design spec for the design Phase 1A: EE31\_2019\_Project\_Design Phase 01A.pdf  
   5. Read the pre-studio for Phase 1B:  EE31\_2019\_PreStudio Phase 01B.pdf  
   6. Read the design spec for the design Phase 1B: EE31\_2019\_Project\_Design Phase 01B.pdf  
   7. Get a bound notebook, do the pre-studios in your notebook working in your teams.  **If the pre-studios take longer than a hour**, you are missing the intent--email me your questions how to move through it more quickly  
   8. Start working on planning your design for what you need to do in the studio (lab) on Tuesday afternoon. This should take an hour or so to plan it out.  Maybe 90-minutes.  **If you are lost and it is taking longer**--email me as you are missing the intent. Tuesday afternoon's class--at least my expectation--is for all of you to be working building the state machine so you can demonstrate the functionality.  The TAs and I will be walking around seeing what is happening so we can guide and help answer your questions. Hopefully, you can demo by the end of class, and if not on Thursday.  The next lecture is not as long as the today's.  
   9. Come to class on Tuesday ready to design, build, and hopefully demo.

**Teams:**

Aeneous- Emily C, Kevin, Jordan

Corbeau- Danielle, Benny (CONTRACTOR)

Erythraean- Kelsey, Ben

Greige- Sabrina, Oliver (CLIENT)

Ianthine- Mateo, Peter, Emily M

Vitellary- Kevin D, David (COMPANION)

Smaragdine- Chris, Ashwin

Mazarine- Chanel, Bennett

Zinnobar- Danny, Liam, Alek

Rhodopsin- Tanner, Jason

**Challenges:**

Challenge 1: pg 10

1. Each bot follows path
2. Communicate with TCC to issue and follow commands
3. Recover from collision, prevent accidents, provide alerts
4. Signal completion of task or status
5. Communicate w other bots to decide position and signal start, finish, other info
6. 90 seconds for acceptance test

Challenge 2: pg 12

* position itself, perform an activity, re-position to original location
* instruction taken from companion bot

Challenge 3: pg 12

- novel functionality to enhance behavior of bot or swarmbot community

Challenge 4: pg 12

- perform in simulated night conditions without collision

Challenge 5: pg 12

- move at 1.24 inches/section for 20 seconds in straight line

Challenge 6: pg 12

-Go beyond

**Collision Detection Sub-system**

* write collision detection spec

1. Determine the objectives of the sub-system to be delivered: identify the critical requirements for delivery date, performance, how to accommodate changes in the design, sub-system level function, form, fit, acceptance test and debug, repair, and cost.

2. Define the inputs, the sub-system detailed functionality, and the outputs.

3. Identify the needs for each team, the constraints, and alterable items. Identify the operational requirements to which the outsourced sub-system must be interfaced.

4. Identify alternative methods/deliverables that will satisfy the stated objectives if obstacles and risks present themselves in the course of the design and development activities.

5. Write a specification for the performance and form/fit/function of your team’s collision-detection sub-system. Have the outsource team sign and date the spec which indicates their understanding and acceptance of your team’s spec.

6. Obtain a cost estimate from the outsource team and a final invoice of the cost of the collision-detection sub-system.

7. If companies do not perform, grievances can be worked out via the legal system. If any team is dissatisfied with the performance of the outsource partner, the legal process for redress is simulated by presenting the information to the instructor who will make a decision on the situation

* If the actual development cost exceeds the cost estimate, this impacts the collision detection design team as additional cost to their own bot (you must recover this cost somehow and who else but the customer will pay for your mess up) and could impact your grade.

**Additional Assignments**

Pre-studio assignment:

* Similar to pre-lab
* Need to get it signed off before working in the lab

Band Pass Filter assignment:

* For coms sub-system need to do MATLAB 2nd order bpf
* theoretical band pass filter analysis, MATLAB computations and m-file code, transfer function, frequency spectrum figures, and electrical schematics
* record approach individually in notebook

Weekly Project Status Assignment:

* summarize what team accomplished each week
* one powerpoint slide per week
* What tasks need to be completed this week?
* What are the risks?
* How are we behind?
* What do we need to do to catch up?

Project Management Assessment:

* Mark class poster with completion date estimates and revision
* Estimate expected completion date for each phase, if miss date then there is one chance to revise estimated completion date for $2000

Project Video:

* 90 second video of project posted on trunk, audience is prospective engineering student
* Include:
  + The customer challenge and relevant context
  + The problem definition of your junior design project
  + The impact or value of solving this problem to society
  + The coursework and engineering subject matter most relevant to you which enabled your team to solve the problem
  + Any new competencies your team gained as part of developing the solution • A demonstration of your swarmbot
  + How the project helped your team to understand what an electrical or computer engineer does
  + The video is to be submitted no later than Friday April 27, 2018 at 5 pm. The video is required to be submitted in an mp4 file format
  + The videos will be graded on how well you address each of the bullets, captivate the interest of the intended audience, the genuineness of the video, and the quality of the video presentation.

**Grading Scheme**

1. How well you define the problem
2. How well you interact with your teammates
3. How well you ask questions
4. Observations made by the instructor during your time in the studio sessions during class time or outside of class when the TAs will be in the lab for additional help
5. Your individual work product – your assignments and engineering notebook
6. How well you are able to answer questions about your design concept, your design work, and your team’s project work. If you do not understand, say you do not know. You then have time to get back to the instructor or TAs with the appropriate answer.
7. How well you participate as a teammate and team player – your work product is important. The instructor and TAs will take note of your daily work in the design EE31 Page 21 of 36 studio, your understanding of the design problem, the engineering problem, the technical concepts, and how you document your progress in your engineering notebook.
8. How well your swarmbot solves the problem

**Key Objectives**

* Understand customer requirements
* Understand project requirements
* Research for engineering topics
* Critique others and accept critique
* Physical design
* Physical size (as small as possible)
* Adaptable and flexible design
* Engineering plan
* Energy (optimize battery life)
* economical
* competitively priced
* documentation
* teamwork
* collaboration
* iteration

First Meeting Topics to Cover:

* Decide on a meeting schedule
  + Tyler will be in the lab in the evenings
  + Use Microsoft outlook for meetings?
* Decide on a system to format notes
* Make a general organizational plan for each meeting
* Do pre-studio 01A
* Discuss strengths and areas for improvement
* Discuss communication strategy
* Discuss how we each work in teams
* Decide on a tentative project timeline—use excel?
* Look again at what teams we have to work with and when we want to contact them
  + Reach out to them right away?
* Make a plan for recording progress toward each challenge

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| --- | --- |
|  | **Assignment** |
|  | Read pre-studio |
|  | Complete pre-studio   * Identify expectations * Identify objectives * Define timelines * Do research * Identify materials and spec sheets needed |
|  | Project management poster |
|  | Executive summary |
|  | Complete studio   * Record observations * What went wrong, why, how did we fix it * Record specs |
|  | Weekly project status assignment |