Proposal Writing

ECE 2031

Design Proposal Assignment

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Why Do a Design Proposal?

- Open-ended design problems are a key part of your engineering education, and a proposal is “Step 1” of such a problem
  - And a requirement of this ABET-accredited curriculum

- You will have to think about an even more open-ended problem for your senior design project
  - This is an easier “practice run”

- No matter what career you pursue, you will very likely write or help write proposals.
Audience for a Proposal

- Engineers always have a customer – someone who is paying for the design
  - Management/marketing of the same company that employs the engineer
  - The firm who hires them for a single job, if they are independent consultants
  - Another large company, using the engineer’s company for “outsourcing”
  - A government agency, including DoD, DoE, DoT (both state and federal), etc.

- Customers (often called sponsors) write Requests for Proposals (RFPs)

- Responders (often called offerors or proposers) write proposals, which are usually evaluated competitively by the customer
Writing Your Proposal

● Your audience is Dr. Collins and Kevin
  ○ We know about the DE2Bot, SCOMP, etc.
● The RFP for this semester’s project will be all of the project specification:
  ○ Project lectures, proposal assignment sheet, etc.
● The proposal you write will address how your team plans to address the given requirements
● Your proposal will follow the format explained on the proposal assignment sheet
Think About the Big Picture

● What have we asked you to do for the project?
  ○ What are the technical requirements?
  ○ What are the demonstration requirements?

● Why do we want you to do this?
  ○ Your technical work serves a future purpose.
  ○ Your demonstration is the bulk of what we will actually see of your project.
Proposal Detail

● Each team’s proposal will be DIFFERENT – focus on YOUR unique aspects
  o Your software and any modified hardware
  o Application demonstration (lots of flexibility here)
  o What else?

● Proposals may have similar background information
  o DE2 board features, Robot hardware, etc.
  o But this should be short and concise

● Assume the reader has basic knowledge of the hardware
  o Don’t waste space writing about how the robot works - how to control the motors, sonar, etc.
  o However, do not immediately jump into your design without SOME background for context
  o The reader does not know what your software will look like, what strategy you will use in the demo, your team organization, etc.
Organizing Your Proposal

- All proposals will include the following sections/headings:
  - Executive Summary (ES)
  - Introduction
  - Technical Approach
  - Management Plan

- Additionally, some sections will contain relevant, descriptive subheadings
  - Subheadings will be determined by each team
  - Your goal is to make information easy to find
Executive Summary

- The entire proposal condensed into one paragraph – write it last!
- Allows an “executive” to quickly judge whether or not your proposal is worth consideration
- Briefly define the problem being addressed
- Briefly discuss the approach that will be used to solve the problem and explain the strength of the approach
- Consider it a separate document
  - Don’t refer to the rest of the document
What Makes a Good ES

● If it’s not in the ES, the reader will assume it’s not in the paper
  ○ Everything that you think will increase your chances of winning the contract should be in the ES
● Save intricate technical details for the body
  ○ Think “big picture”
  ○ If the reader wants more specific information, they know they can find it in the rest of the document
● Feasibility is just as important as technical merit
  ○ Realistic technical goals, AND realistic scheduling
Introduction

- Briefly describe the design problem and the project requirements
  - Show that you understand what you are asked to do
- Briefly describe your team’s solution to the problem
  - Enough that the document headings make sense
- Avoid too much detail that the reader should already know
  - Not important: how odometry works
  - Important: what you do with the odometry
Technical Approach

- This section contains all the “what” and “how” of your design
  - By far the largest section.
  - It should be technically detailed!
- Explain your team’s methods of fulfilling all of the design requirements, and why that’s the best approach.
  - Do not just state your intentions. How will you achieve them? Why that way? How do you know it’s possible?
- You should “sell” your idea as being effective, intuitive, robust, or any other desired traits
- Use descriptive subheadings
Technical Approach Topics

- Explain the intended design and operation of your software / algorithm / strategy
  - Again, focusing on what YOU are doing
  - Include traditional flowcharts or UML activity diagrams to describe program flow

- Describe how you plan to use the DE2 and robot hardware features
  - What devices are you going to use, and how will they work? How will you handle real-world concerns?

- If you plan to make any hardware modifications, what are they and how will they help you?
Technical Approach Topics for Demo

- How do you foresee the entire demo process playing out?
  - You will have lots of flexibility here. Be creative, but don’t promise the world if you can’t deliver.

- How does your plan maximize the effectiveness of your demo?
  - Trade-offs between difficulty and design time.
A Gantt chart will make up the bulk of this section of the proposal

- “Show” the plan for the rest of the semester
- Use Visio or any available tool to make a Gantt chart

Still need a small amount of text in the document to give the chart context

- Major tasks
- Division of labor
- Milestones
Realistic Timelines

- Do not force your plan in to the available time.
- If you run out of time on the Gantt chart, you will run out of time in the project as well.
  - In that case, simplify your proposed design instead of trying to make your current plan fit.
  - It’s better to be realistic than to have to explain why you didn’t complete your proposed design.
- Consider how long something will actually take, double it, then add that time to the Gantt chart.
Management Plan – Contingency

• Include your contingency plan, accounting specifically for how you will handle any problems that arise
• “If X does not work, Y will be used because it is already working and is easy to integrate.”
• Balance your contingency plan between “everything might fail” and “nothing will fail.”
Manage Your Time

- The proposal can only be written once you have a well-defined plan for your project.
- Experiment **before** proposing.
- You only have one week of project work before the proposal is due, and two weeks after.
  - Your proposal should reflect that 1/3 of your project is *already complete*.
  - Brainstorm, design, and plan outside of lab so that you can use your time with the robot effectively
  - Robots will be in high demand during open hours