CS ME EE 75

Preliminary Design Review (PDR)

Due: finals week, fall 2018

In any large engineering project, an important step in the design process is the *Preliminary Design Review* (PDR). The PDR is conducted after preliminary design efforts have been initiated, but before the detailed design phase has begun. The goal of the PDR is to ensure that the overall *system architecture* chosen by the design team is adequate, and highly likely to meet the design objectives while satisfying the system design constraints. The PDR is also aimed at finding weaknesses in the design or design process at an early stage, where they can be easily addressed. The PDR should also pinpoint where additional work is needed before detailed design, analysis, and prototyping begins.

Each team's PDR will be conducted in 20 minute sessions with the course instructor. These sessions will be scheduled during finals week. During these sessions we will review your preliminary designs and analyses while also trying to identify areas where further work is needed. For these reviews, you should prepare *at least* the following:

- *Diagram(s) of your concept.* Describe visually the **architecture** of your overall system. From your diagrams we should be able to grasp the key properties of your proposed solution and how all of the parts work together as a system. More detailed sketches of the critical components are welcome.

- *Mock-ups of key components.* A "mock-up" is a very simple prototype that answers a question about a system component: *what will it look like, how will it function, or what role will play in the overall system?* Mock-ups need not be elaborate: cardboard, styrofoam, and tape are suitable mock-up materials. A CAD drawing can sometimes serve as a mock-up. Parts of a mock-up need not have the same type of embodiment as the final design. E.g., a wheel mock-up could be glued to the mock-up body, and need not rotate. However this mock-up wheel would show the placement and relative size of the wheel as compared to other system components.

- *Preliminary Analyses.* If you have carried out preliminary computations related to speed, mass, energy requirements, or computing requirements of your solution, include a summary. Detailed calculations can be included via appendices. Your presentation of the preliminary analyses should focus on how they affected your design.

- *Summary of any experiments.* Have you carried out any experiments to help make design decisions? Experiments

can include mock-ups, thought experiments, or a more detailed study of a specific component or concept. If you have carried out experiments, describe them and summarize your conclusions.

- *Open Questions*. Are there issues that still need further investigation? Are further analyses needed? Are you still considering multiple design options for some key components?
- *Risk assessments*. Are there items in your design that you are not confident about? Where can your development process go wrong? Is there a critical component in your design whose failure would jeopardize your system?

This information can be presented in many possible formats. Each team should select a format that best fits their design and the team's personality. For example, the written PDR materials could be a set of PowerPoint slides, or a stapled set of 8x11 sheets of paper. Since we need to keep your PDR materials for a few days for grading purposes, you may want to copy any items, such as analyses, that you may need.

We will grade your PDR as follows:

- *Quality of the proposed solution.* Will your design solve the intended problem? Is it likely to yield good performance? Is it practical? Can it be readily implemented? Will it be robust?
- *Quality and appropriateness of preliminary studies*. We are not necessarily looking for reams of analysis at this point. But did you carry out analyses that could help you make good design decisions?
- A *demonstrated understanding* of the strengths and weakness of the proposed solution, and the remaining tasks that must be completed to finalize the initial design and prototyping phases. Also, and understanding of the risks involved in your project.