Roller Coaster Design Project

Lab 01: Coaster Project Introduction
Introduction

The roller coaster design project uses a nylon ball, two parallel plastic tube tracks, and PVC pipes and connectors in the construction of a scale model roller coaster. In addition, the coaster feature an open-design ‘Add-On’ project.
Coaster Project Objectives

- **Project Management and Teamwork**
  - Time management, task scheduling, communication, etc.

- **Design Process and Cycle**
  - Project proposal process
  - Identifying requirements/constraints, brainstorming, initial designs, build/test/analyze, final design, etc.

- **Project Documentation**
  - Project notebook, design review phase documents, final reports, etc.
Coaster Project Timeline
## Important Dates

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<td>RFP Release</td>
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<td>Initial Proposals Due</td>
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Coaster RFP

- **RFP = ‘Request For Proposal’**
  - Document prepared and released by any entity looking for bids to have engineering work done
  - For this class, the instructor releases the RFP and is the ‘client’

- **Every team produces a Proposal in response to the RFP**
  - Proposals should consider all information in RFP
  - Proposals should address any questions, concerns, or needs laid out in the RFP
  - General outline given on the next slide
General Proposal Outline

▪ Introduction
  • Quick summary of what the team is planning. Sell your idea!

▪ Background
  • Show the client you know and understand their industry

▪ Project Description
  • Overview of your coaster layout, key features, points of interest to client. Sell your creativity!
  • Overview of what your proposed add-on will do. Motivation for such an add-on. Sell your ideas!

▪ Project Requirements
  • Summary of what your team will need to get the job done. This includes a list of needed resources, a budget for same, and a detailed timeline
  • Summary of what your team brings to the table that will make the project a success (Sell yourselves!).

▪ Addressing Key Issues
  • Answer any and all questions posed in the RFP that are not otherwise addressed

▪ Closing
  • Formal Sign-off and point-of-contact information
The Design Documents serve two primary purposes:

- They convert the proposed coaster and add-on into a formal target for your group to work towards.
- They serve as an agreement between your group and your instructor as to what work you will do in your project, and what will be considered a successful completion of the project.

The Initial Design Document is a draft of the Final Design Document:

- After turning in the initial document, comments from the instructor should be considered in the final document.
Parts Orders

- There are three opportunities for your group to order parts for your coaster throughout the semester
  - R&D, Primary and Final parts orders
  - Details can be found in the primary project document

- At this time, parts may only be ordered from digikey.com or amazon.com

- You may use your own parts in your coaster, however they still count against your total budget (see RFP, project document)
Project Reviews

- There are two project reviews during the semester. These serve as opportunities for your instructor to evaluate your progress
  - Reviews happen during lab time
  - They will be brief - no more than a few minutes
  - They are graded based on acceptable progression of the project as defined in your proposal timeline
System Test

- **The last day of class, coasters will be graded during the system test**
  - Every group will be given three runs, with the highest scoring run counting
  - Details on grading can be found in the main project document on the EEIC course page
  - Additional points can be earned via the optional coaster contest held during finals week. See the main project document for more details
Coaster Contest

- During finals week, all 1182 groups from all sections at OSU Marion may optionally participate in the Coaster Contest. Full details found in main project document.
  - Event is open to the public
  - An brief oral presentation is required to participate
  - Dress will be business casual
  - Date is TBD at this time
Project Notebook

- The primary document for the 1182 class is the project notebook
  - Should be present at all group meetings (including class!)
  - Acts as a record of all group activity (brainstorming, code generation, lab activities, etc)
  - Significant contributor to your final grade
  - Subject to pass/fail spot checks
  - Due on the reading day before finals week
Coaster Kit Components
Coaster Kit Components

- **Shared Components**
  - Speed Sensor Reader
  - Development Arduino Boards
  - Development Servos

  These components are to stay in the classroom at **ALL** times

- **Kit Components**
  - PVC Pipes & Fittings
  - Track
  - Speed Sensors and cables
  - Nylon Balls
  - PVC Pipes
Arduino Kits

- Every student must have an Arduino development kits as detailed in the project document
  - May be purchased new (check Amazon) or used
  - Must include sensors (at least 2) and motors (at least 1), as well as more basic components (at least some LEDs, resistors and switches)
  - Should be brought to all labs and build sessions
  - Ask if you have any questions or are looking for an exception to these requirements!
3-D Printing

- The lab has two 3-D printers available for your use
- Parts must be submitted to instructor electronically, with clear indication of print parameters
- Part cost must be approved by group prior to printing
- Parts are printed in the order they are received
- Parts may be rejected for poor quality, excessive printing/size, etc
- Be aware that prints can take a long time (hours).
Questions?