EGR 215 Project Directions

A key part of the Engineering profession is to apply what you learn in school to complex situations. In this class, you will be asked to analyze the motion of a rigid body that goes beyond the examples of the text. You can come up with your own example or choose from a list that will be made available. Just make sure that your project studies the motion of a rigid body that includes rotation and translation. Your project may include some experimental data. Part of the project is to present your analysis to the class.

Possible project ideas

- Check the design projects at the end of the chapters in our text.
- Shortest time path: What should be the shape of a ramp between two points A and B, so that a ball slides down the ramp from A to B in the shortest amount of time? This is an old problem solved by Newton. Work through the solution, build the ramp, and compare with a straight ramp. How does your analysis change if the ball rolls down the incline?
- Falling chimney: theory + experimentation (toy blocks). See Phys. Teach. **43**, 360 (2005)
- Design a collision experiment: theory + experimentation. See Am. J. Phys. **58**, 696 (1990).
- The physics of the Tippe top. See Am. J. Phys. **45**, 12 (1977).
- The physics of billiards. See Phys. Teach. **37**, 24 (1999) and references within
- Falling dominos. See Am. J. Phys. **51**, 182 (1983), http://www.youtube.com/watch?v=y97rBdSYbkg
- Other ideas: bowling, boomerang, amusement park (what are the engineering limits?).
- Any other idea that you might have (e.g. by browsing the web), as long as the analysis illustrates the concepts covered in the class for the motion of a rigid body.

Project timeline

- Week 1-4:
  - Make a team of two or three (teams may be randomly selected)
  - Select your project
  - Consult with me
- Week 5-6
  - Do an analysis on paper
  - Consult with me
- Week 7-8
  - Build a prototype (if needed), perform experiments
  - Consult with me

    - Turn in a first analyis

- Week 9-10
    - Get ready for your presentation
    - Consult with me

- Week 11
    - Shine in front of the class by presenting your project: make it clear, understandable, and present your work within the allotted time (about 20 minutes).
    - Turn in a report describing your project (~5 pages) made of
        - an introduction that describes your project (include a list of all of the references that you might have used).
        - drawings, sketches, figures, etc.
        - all relevant calculations
        - Evaluate this project: What did you learn from it? Was it worth the effort? This could include things you learned about your theoretical calculations and your practical results, etc…
    - Your report may be your powerpoint presentation.