References:
Wikipedia: Rube Goldberg machine
YouTube: Rube Goldberg Honda Commercial

Introduction:
The thought process behind engineering problem solving is another highly important and relevant skill and a well-developed ability to solve problems will be expected of you in your future career. This lab explores that skill and provides the student an opportunity to apply creativity in an attempt to solve an engineering-type problem in an unusual, if not comical, manner.

Background:
Ruben Goldberg was an American engineer and cartoonist who was well known for depicting unusually elaborate, complex, well over-engineered solutions to simple tasks. Review the Wikipedia article on Rube Goldberg machine, specifically the “Origin” paragraph. You will also see the illustration of one of Rube’s most famous depictions: the self-operating napkin. “Rube Goldberg machines” have captured many a student’s and engineer’s attention since the 1980s, even to point of an annual national collegiate completion. To see a more “commercial” (no pun intended) version of such a machine, watch the YouTube Rube Goldberg Honda Commercial to see how to press the key fob button to lower the Honda’s lift gate!

Objectives:
• To apply engineering design thought processes in a team setting to propose and orally present a solution to an engineering-type problem.

Procedure:
1. Pair up with another lab team to form a design team of four students for this lab.
2. Choose one of the problems below and brainstorm possible solutions to the problem. You are free to use debate and team-management methods as well as Internet research to develop and refine your solutions.
3. On a team-basis choose one solution and further develop/refine it creating drawings and/or sketches as appropriate.

You will be given one hour to complete the above three steps.

4. At the end of one hour, each design team will orally present their solution using the developed sketches/drawings in support of their presentation (via overhead projection in the lab).
5. Each team must also submit a “design exercise summary” including:
   - appropriate coversheet with all student names
   - problem selected
   - bulleted list of solution components
   - sketches/drawings produced

Constraints:
1. Being that we are E.T. majors at CalU, your solution is not confined to just physics. You may additionally employ computers, electronics, robotics, and mechanical components in your solution.
2. Each team member must participate in the oral presentation, presumably to explain their contribution to the solution. An outline for your oral presentation is:
   - student introductions: name & major
   - problem selected
   - description of solution
- Q&A

Evaluation:
Each design team will be evaluated and graded (on a 50-point scale) based on the following criteria:
- “Rube-ness” of solution 😊
- Level of creativity
- Inclusion of “CalU pride” (for bonus points)
- Implementation feasibility
- Participation of each team member
- Handling of Q&A

Problem choices:
1. catch a mouse
2. sort coins
3. toss and top a pizza
4. open a can of soda and pour it into a glass
5. run a flashlight without batteries
6. insert paper into a printer
### Lab 4 Evaluation Rubric

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<th>Rubeness (0-10)</th>
<th>Creativity (0-10)</th>
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