Student-Led Design Challenge

Overview
In this project, you are asked to use what you have learned to create an original design. As is the case for all engineering designs, your design must adhere to constraints and be evaluated according to predefined criteria.

Design Constraints
A design constraint is a limitation on the conditions under which a design is developed, or on the requirements of that design. In this project, we have both types of constraints.

Limitations on the design development:
• You may use any of the materials provided in class:
  o Arduino boards
  o Breadboards
  o Wires
  o Components (e.g., speakers, sensors, LEDs, switches, etc.)
  o Stuffies (donated by my daughter)
  o Construction paper (donated by my daughter)
  o Paints (donated by my daughter)
  o Sewing kits
• You may spend no more than $10 on materials that you acquired outside of class

Design Requirements
Our in-class Arduino projects have demonstrated both the hardware and software aspects of each “function” listed below. Each function is given a complexity rating. Your final design must have a cumulative complexity rating of 6 or higher. This can be accomplished by incorporating multiple functions and/or multiple instances of a single
function. (Note: You can not gain additional complexity points by reading or writing multiple messages on the serial port, or by playing multiple songs on the speaker.)

- Flashing a single LED (complexity rating 1)
- Reading a single switch (complexity rating 2)
- Using a single potentiometer (complexity rating 2)
- Using PWM to fade a single LED (complexity rating 2)
- Writing and reading from the serial port (complexity rating 1)
- Using a single light sensor (complexity rating 3)
- Playing music on a speaker (complexity rating 2)
- Using PWM to control a single DC motor (complexity rating 4)
- Sending and/or receiving infrared light (IR) signals (complexity rating 3)
- Controlling a single servo (complexity rating 4)

If you are interested, there are exercises available for the following:

- Using a single distance sensor (complexity rating 2)
- Using a single pressure sensor (complexity rating 3)
- Building a speaker (just for Glenn) (complexity rating 2)

**Design Criteria**

*Design criteria* are the explicit goals that a design must achieve in order to be successful. In this project, the design criteria are also the grading criteria; they are listed below. You must describe how your design satisfies these criteria during the demonstration of your design on at our final lab meeting.

**Technical complexity (40%)**:
- Your design must be distinct from any single in-class exercise. It should be a composite of functions presented in different exercises.
- Your design must satisfy the design constraints.
- Design complexity ratings over 6 will be awarded extra points.

**Aesthetics (20%)**
- Your design must be visually interesting.
- Its appearance must be consistent with its function.

**Originality (20%)**
- Your design must be distinct from any other design in the class.
- There should be some aspect of your design that is completely original.

**Functionality (20%)**
- Your design must perform some function consistently and without error.

**Due Date**

Demo of Completed Design: Dec 2 during our final lab meeting
Grading
Completed Design: 25 points

Helpful Hints
If you stuck for ideas, check out the Arduino examples on these electronic resources:

- Arduino Playground
- Instructables
- Makezine
- Tod Kurt’s spooky Arduino
- Tod Kurt’s Bionic Arduino
- YouTube