**Happy Feet**

**Description**

The objective of the competition is to design, build, and demonstrate homemade footwear that can accomplish increasingly complex tasks while worn. Participants will be introduced to and should think critically about the engineering design process and core topics in mechanical engineering as well as topics in environmental science.

**Engineering Concepts**

There are several factors that engineers account for when designing shoes, for example, material type for its durability, the stresses and strains shoes endure, the safety of the person wearing the shoe, and the shoe’s aesthetics. Engineers often collaborate with each other to determine whether a shoe is fully functional and safe to wear. Mechanical engineers use the principles of physics to analyze and design products for humans to use, such as shoes. The responsibilities of Material Engineers account for a lot in the shoe making process as well because they determine which materials are safe and which materials are going to hold up.

**Socially Relevant Issue/Challenge/Problem**

Climate change, pollution, and rapid use of natural resources are global issues that are of increasing concern in the modern world. In fact, Americans produce about 1,700 pounds of garbage on average in a year, and that number will continue to increase unless we change the ways in which we produce the products we use every day, like shoes, and what they are made from. With that in mind, one goal of this project is to get students to think about the environmental impact of engineering and how they can solve problems in a creative and eco-friendly way.

**Guidelines**

- The footwear must be made of safe materials.
  - No hazardous materials (corrosive, reactive, or toxic)
  - No sharp materials
  - Participants must use a minimum of 3 different types of materials
- The materials must be recyclable, reusable, and/or biodegradable.
- Materials (and cost) must be tracked accurately and reported to judges.
- Participants are prohibited from using manufactured shoes in design.

**Judging Requirements**

Footwear will receive points depending upon tasks completed. These tasks include walking, running in place, skipping, dancing, jumping, and walking up and down stairs. Each task awards a certain number of points.

**Bonus: waterproofing**

Score will also be determined by materials used in the shoe through a bill-of-materials, and participants must submit a sketch of their design. Additionally, participants will be judged on cost efficiency.

**Points to be Awarded for**

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Number of Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>20 pts</td>
</tr>
<tr>
<td>Running in Place</td>
<td>20 pts</td>
</tr>
<tr>
<td>Skipping</td>
<td>20 pts</td>
</tr>
</tbody>
</table>
- Dancing 20 pts
- Jumping 20 pts
- Walking up/downstairs 20 pts
- Bonus: Waterproofing 20 pts

- Sketch of design
  - Includes dimensions 20 pts
  - Top, right, and front view 20 pts
- Complete Bill of Materials
  - Includes all materials used 20 pts
  - Includes cost 20 pts
- Bill of Materials – Cost
  - $0.00 - $5.00 30 pts
  - $5.01 - $10.00 25 pts
  - $10.01 - $15.00 20 pts
  - $15.01 - $20.00 15 pts
  - $20.01 - $25.00 10 pts
  - $25.01 or more 5 pts
- Video Submission
  - Shows footwear 20 pts
  - Discusses design choices 20 pts
  - Shows footwear demonstration 20 pts
  - The same footwear is shown in entirety throughout the video 20 pts

In case of a tie, further judging will be based on the quality of the sketch of the design, the bill of materials, and the video submission.

- Sketch of design: neat, legible handwriting
- Bill of materials: organized, legible
- Video submission: participants use professional language

Video Submission Requirements

To be considered for judging, the video submission must show the following:

- Must show the footwear and discuss the reason for design choices.
- Must show the footwear demonstration,
  - During demonstration, the footwear must be shown in entirety after every cut to ensure the same footwear is being used.

Materials Provided

No materials will be provided by the University of Oklahoma or the Gallogly College of Engineering.