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**Background and Objective:**

The Purdue phenomobile is a key piece of the Smarter Agriculture project. The Smarter Agriculture project hopes to help farmers gain the knowledge to manage nutrients and water better than before and achieve yields that were previously thought to be unattainable. The bulk of the data used in that process will be taken using the phenomobile. The goal for our project was to design a 45' boom for the Phenomobile Research Team to use as a mobile sensor platform in order to collect phenotyping data from a variety of crops. The design of the 15' prototype boom was the inspiration for the current boom.

**Impact and Sustainability:**

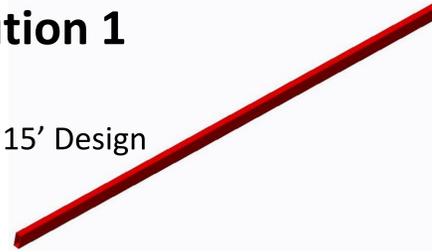
The data taken using the phenomobile will help researchers to develop new strains of seeds. These strains will help the crop to yield more, even in years with extreme weather events. With this extra yield more food and biofuels can be produced. Since biofuels do not pollute the air as much as normal fuel, the environment will benefit.

**Constraints:**

- Articulation of Machine
- Camera Mount Design
- Camera Mount Location
- Rigidity of Boom
- Folding Complications with Cameras
- Weight/Materials

**Alternative Solution 1**

- 1 2x4x1/4"
- Extension of Original 15' Design



**Pros**

- Simplistic Design
- Uses Current Mount Design

**Cons**

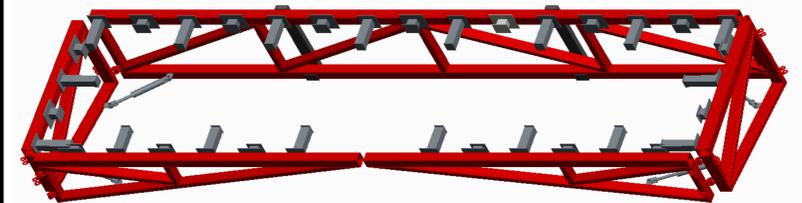
- Large Deflection on Ends
- Storage and Transportation Difficulties



**Economics:**

Alternative Solution 2	Final Solution
Cost of Materials \$1700	Cost of Materials \$3000
Cost of Labor \$900	Cost of Labor \$1500
Total Cost \$2600	Total Cost \$4500

**Final Solution**



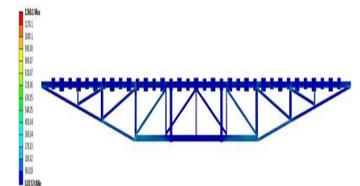
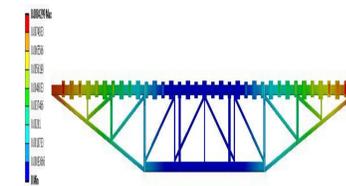
- Square Fold Design
- Inverted and Reinforced

**Pros**

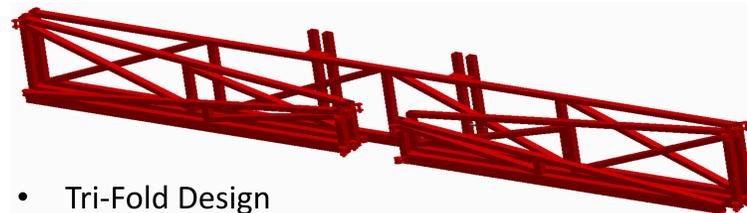
- Deflection of 0.008"
- Max Stress of 1260 psi
- Accommodated Camera Mounts

**Cons**

- Non-Traditional Fold Pattern
- Weight of 940 lbs.



**Alternative Solution 2**



- Tri-Fold Design
- Tapered and Reinforced

**Pros**

- Deflection of 0.09" and Max Stress of 7897 psi
- Effective Fold Pattern

**Cons**

- Wire Pinching Likely
- Complex Hinges for Hydraulic Folding

**Recommendations:**

- Run the wire to the cameras along the top of the boom through a flexible sleeve in order to avoid pinch points in the folding process.
- Additional weight might be needed to counter the weight of the boom.

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