Portable Floor-to-Standing Lifting System

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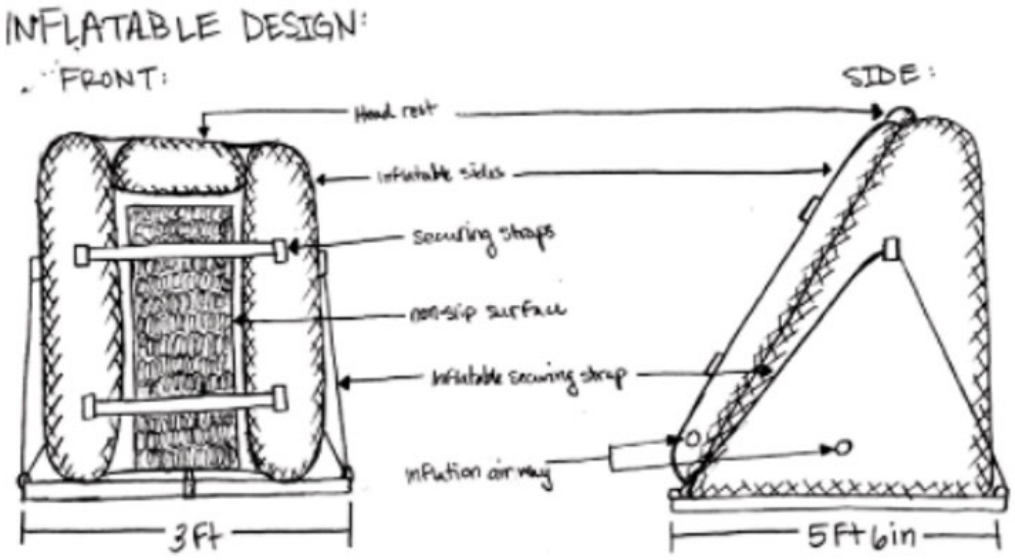
Community Entity: Families Together, Inc.

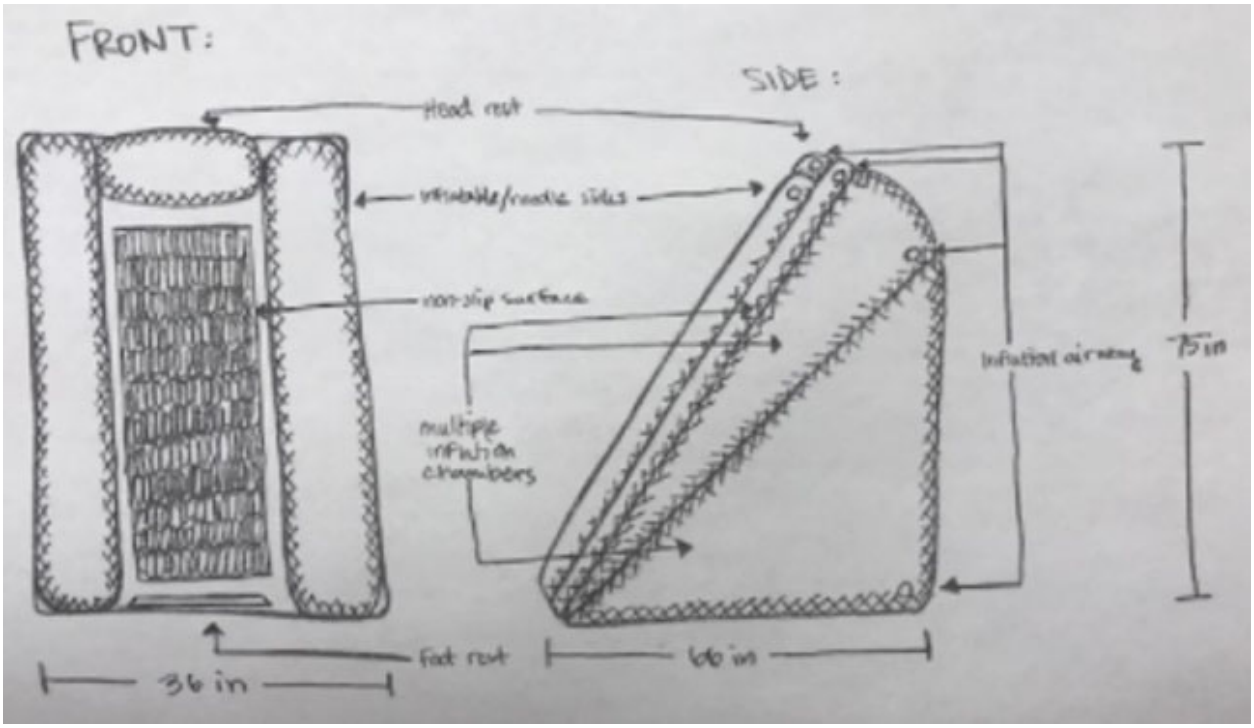
Problem Statement:
Manual techniques for lift an adult from floor to standing require strength and agility that make it difficult or pose a high risk of injury to older and smaller adults performing the task. The alternative is to use a crane-type lift system, which are large, difficult to maneuver in one location and are not possible to transport between locations, in a car, minivan, or standard van. Cranes are also difficult for one person to move from a building and load into a truck. A better way for lifting that is safe and portable is needed.

Project Goal:
Improve the safety and ease of lifting an adult with cerebral palsy or other physical limitations from the floor to a standing position for transfer to a chair or bed with a system that is portable.

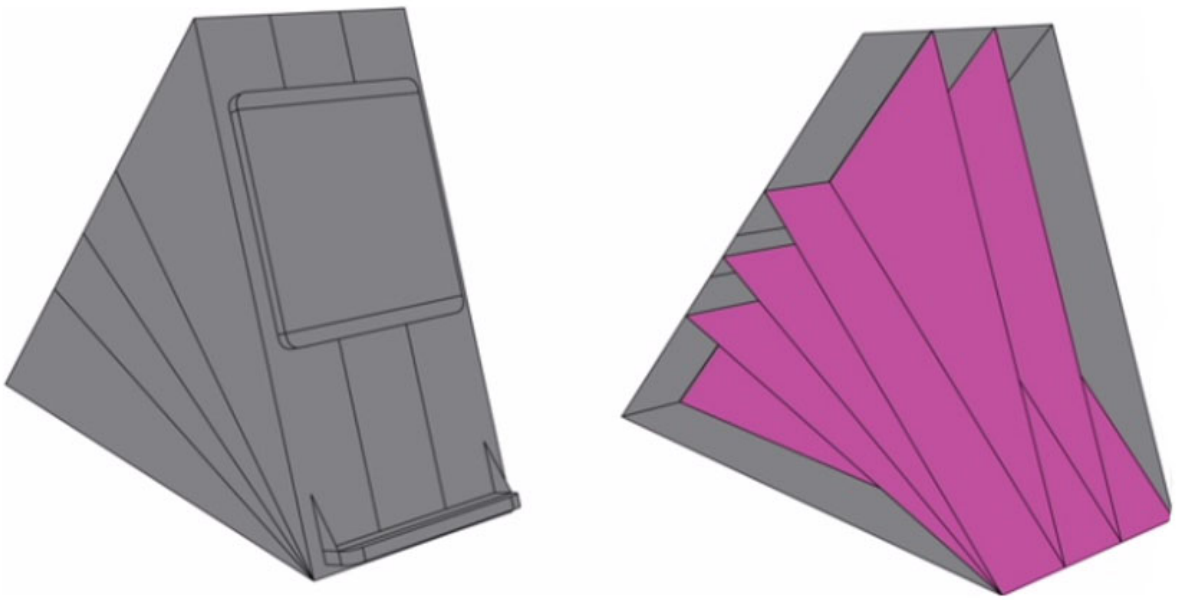
Approach:
The design team chose to use an inflatable, which could be laid out on the floor, and the subject to be lifted could be maneuvered onto the inflatable. They would be secured with straps and the features of the inflatable.



The team chose a design with progressive inflation. First the backboard surface directly supporting the subject would be inflated to create a "rigid" surface that would then be lifted by multiple wedges in the inflatable.



In testing they found that the inflatable backboard would easily buckle/fold during inflation of the wedges, so the team opted for a semi-rigid backboard made of lightweight foam. This improved the performance. And the team finalized the design and sent it out for fabrication.



Computer-Aided Design of the inflatable (outside shown left, and internal baffles shown right).

However, another problem encountered was the stability of the inflatable during inflation. Partially inflated wedges created gross instability, allowing the backboard to slide from one side to the other. Though this could be stabilized with little effort by an attendant, the system was deemed currently too unsafe for actual use with people with disabilities. If and attendant was distracted for only a moment, the subject could move to the side and the system would fall over. Also, the inflation time was longer than desired, and though working with a professional inflatable company, controlling the inflation process was still difficult.

Further testing and modifications by follow-up teams will be needed to make the design usable in a home or institutional setting.