UW BMF Design

Assistive Transfer Device

Team

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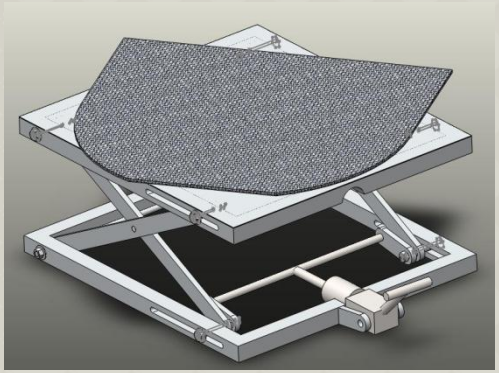
OUTLINE

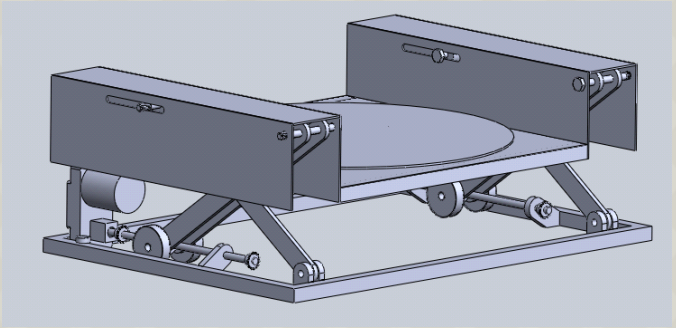
I. Problem Statement
   i. Need for Device
II. Design Specifications
   i. Background
III. Review of Previous Design
   i. Where we left off
   ii. Areas for improvement
IV. Design Analyses
V. Future Work
   i. Ergonomics
   ii. Parameter research

REFRESHER

Spring 2010



Fall 2010



PROBLEM STATEMENT

- Safely transfer patients from wheel chair to exam table
- Patients should feel secure while lifted
- Reduce Physical exertion of both patient and medical personnel

CURRENT LIFTING METHODS

- Manual Labor
  - Method
    - Medical assistant wraps arms around patient
    - Holds patient while slowly rotating toward table
    - Hoists patient onto exam table
  - Risks
    - Large effort from assistant
    - Uncomfortable for patient and assistant
    - Dependent on assistant strength
- Hoyer Lift
  - Mostly for Wheelchair-bound patients
  - Have to get sleeve underneath patient

http://www.corpmed.com/images/patient-transfer.jpg

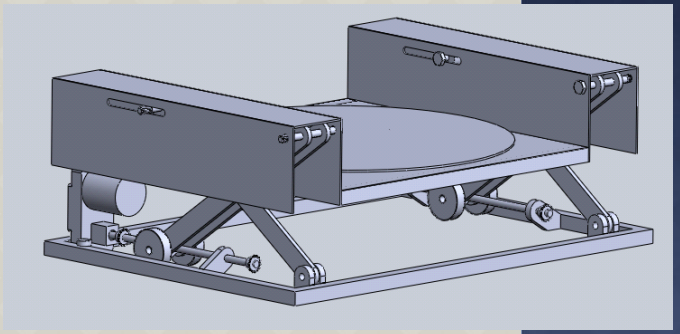
http://dehanmedequip.com/images/electric%20hoyer%20lift.jpg

SPECIFICATIONS

- Able to lift 300 lbs.
  - (Safety factor of 2)
- Lift 10-15 in.
- Rotate Patient
- Portable
  - (Device < 50 lbs. or on wheels)
- Easy Storage
  - Fits into small spaces
- Stable during operation

FALL '10 DESIGN

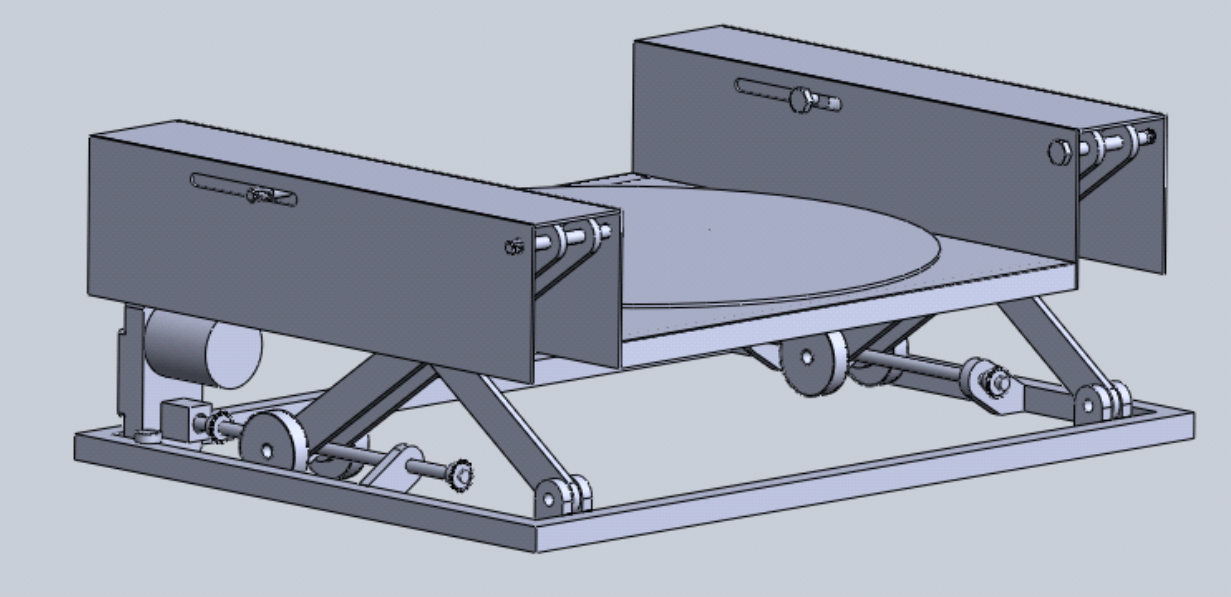
- Successes
  - Can lift up to 300lbs
  - Initial step height is $2\frac{1}{8}$ in.
  - Stable during ascent and descent
  - Can operate automatically
  - Everything fits within frame



- Areas for Improvement
  - Support mechanism for patients
    - walker, railing, etc.
  - Increase ease of storage
  - Improve ergonomics

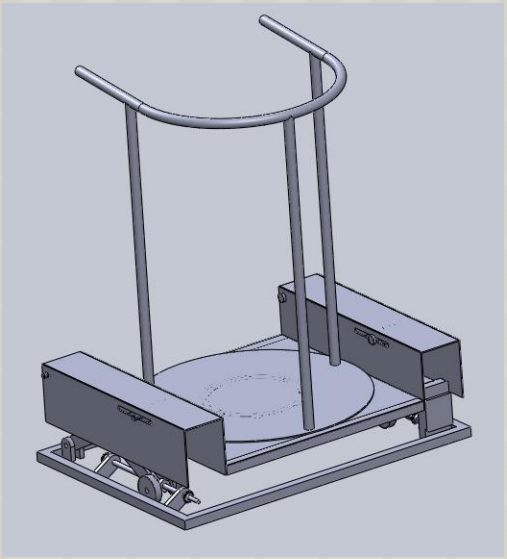
IMPROVEMENTS

- Structural
  - Thrust bearings for driveshaft
  - Supports for top frame



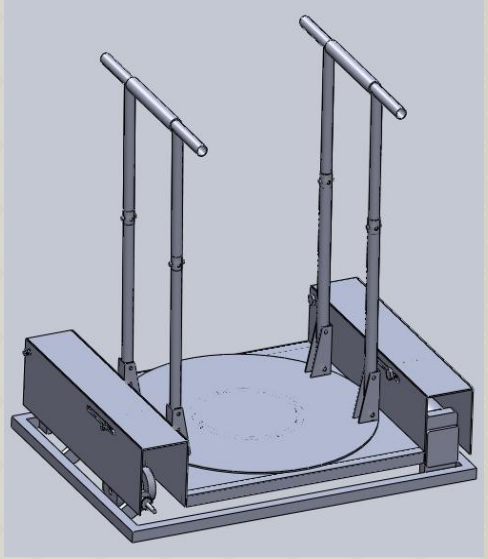
PATIENT SUPPORT DESIGNS

U-Shape design



Walker

Double Bar design

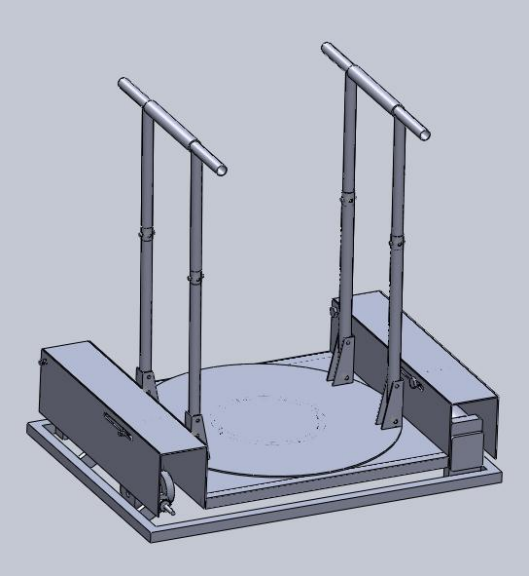


- Design Requirements
  - Stable, promotes patient comfort
  - Easy to store
  - Simple assembly

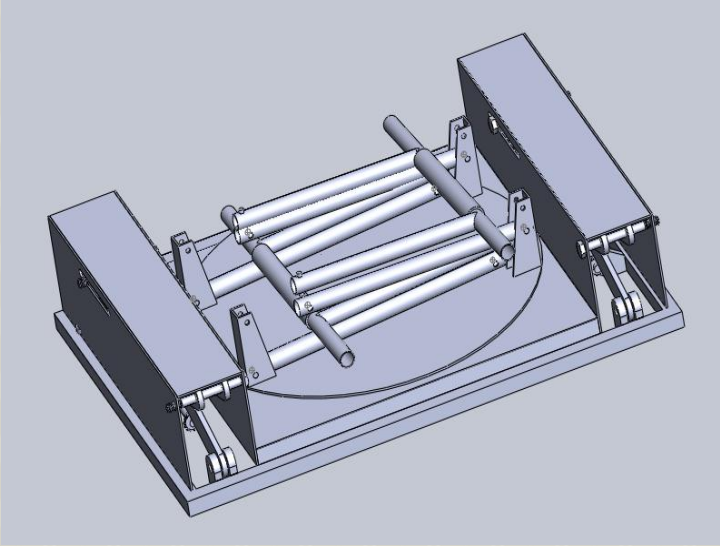
FRAME DESIGNS

	Stability	Storage	Patient Comfort	Cost	Adaptability to Current Devices	Ease of Operation	Feasibility	Total
Walker	5	2	5	4	1	4	3	24
U-shape	4	4	3	3	4	2	2	22
Double Bar	4	4	4	4	5	3	3	27

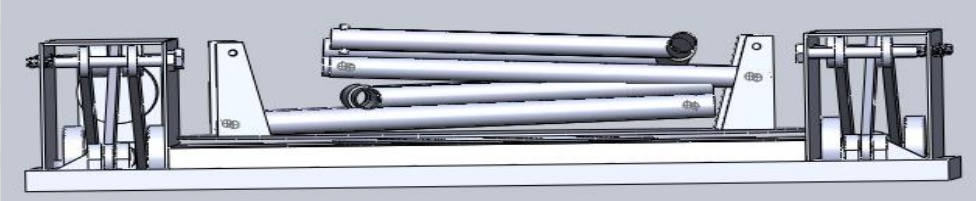
PROPOSED DESIGN



Operational Position



Collapsed support rails (top view)



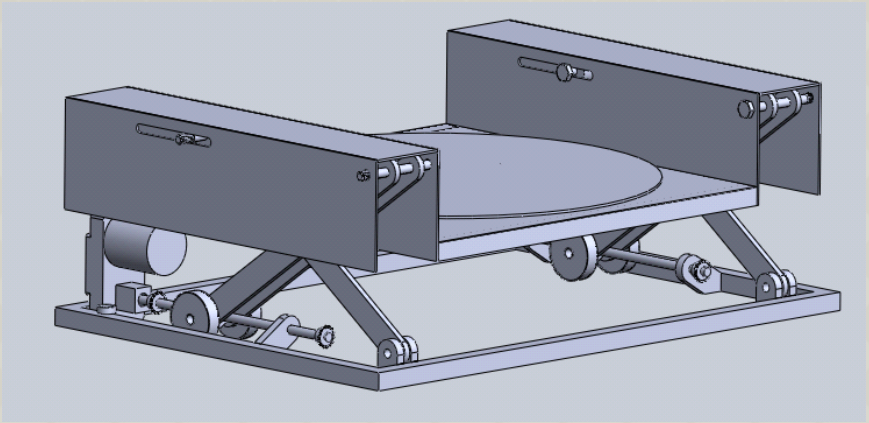
Collapsed support rails (side view)

PARAMETER RESEARCH

- Target population: Individuals older than 65 yrs
- Parameters for device
  - Maximum step height
  - Stance Width
- Survey for study subjects
  - Test different step heights
  - Measure stance widths
  - Rate on comfort/difficulty
- Health Science (Minimal Risk) IRB Approval

FUTURE WORK

- Parameter research
  - Build test boxes
- Fabrication
- Validation of final design



DOES ANYONE HAVE ANY QUESTIONS?

REFERENCES

[1] Bergland A, Sylliaas H, Jarnlo GB, Wyller TB. Health, balance and walking as correlates of climbing stairs. *J of Aging and Physical Activity*, 2008;16:42-52.

[2] Larsen AH, Sorensen H, Puggaard L, Aagaard P. "Biomechanical determinants of maximal stair climbing capacity in healthy elderly women." *Scandinavian J of Med & Science in Sports*, 2009;19:678-686.

[3] Mcllroy WE and Maki BE. "Preferred placement of the feet during quiet stance: development of a standardized foot placement for balance testing." *Clinical Biomechanics*, 1997;12:66-70.

[4] Occupational Safety and Health Administration. Standard 1910.24(e). <http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9716>.

[5] Smutnick JA, Bohannon RW. "Hip and knee flexion of lead and trail limbs during ascent of a step of different heights by normal adults." *Phys Ther*, 2009;95:289-293.