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### **Title**

Assistive Device for Floor-to-Wheelchair Transfer

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## Assistive Device for Floor-to-Wheelchair Transfer

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<sup>1</sup>Biomedical Engineering <sup>2</sup>Materials Science and Engineering



### **Background**



1 in 100 individuals worldwide use wheelchairs, and for them floor-to-wheelchair transfers are one of the most difficult and life-threatening tasks.

Average wheelchair seat height: 18-20 inches

Common transfer injuries: Cuff tears. shoulder and wrist pain, and could potentially cause a permenant or life threatening injury

#### **Current Solutions**

	Assist Handle	Stepladder Products	Lift Sling Products
Safe	Ó	Ó	Ó
Independent Use	0	0	
Portable	0	0.00	4.4.4
Affordable	0		***
Versatile	0	Tan.	***

TABLE 1: Existing devices (stepladder products [1], lift sling products [2]) and Assist Handle.

#### **Project Goals**

- Develop portable assistive device to independently assist wheelchair users with various mobility needs
- Stress testing and clinical trials of new manufactured prototype

# **Assist Handles**





- Maximum hip height by more than 10in
- Safer and less strenuous transfers
- Used as hard-to-reach door handles and lowered crutches for crawling support
- FIGURE 2: Illustration of the disassembled device. **Disssembled State** - Disassembled in matter of
- seconds Compact, pocket-sized device
- Directly attached to the
- wheelchair frame using universal snap-fit mechanism

#### **Device Validation**

<b>Test Category</b>	Customer Requirements	Engineering Requirements	V&V	
	Supporting weight	Up to 400lb weight support	Fatigue testing	
Functionality	Assist with Floor transfer	At least 10 in increase in maximum achieved hip height	Free body diagrams	
Sunnius s	Device can last for years	10,000 assemblies (~ 4 years)	Assembly test	
	Survive any temperature	Extreme temperatures (0 - 100 °F)	Temperature test	
	Limited wear after prolonged usage	Survive applied weight over a designated period of time	Usage test	
Comfort Comfordaily	Comfortable to use on the	portability		
		Assemble under 15 seconds	Validation testing	
	-	Cushioning rubber handle		
	Can be shipped without any issues	Surviving real transportation conditions and potential hazards	Drop test	
			Vibration test	
			Compression test	
		TO CAN THE CONTROL OF CASCASTANCE	Impact test	

TABLE 2: A table of our proposed validation testing

#### FDA Standards:

Class 1 medical device & 510k

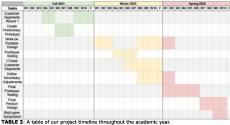
classification: Aid, Transfer product code: IKX

#### ISO Standards:

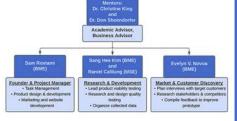
ISO 14971 Medical devices - Application of risk management to medical devices ASTM F04.15 Material Test Methods ISO 13485 Medical devices - Quality management

ISO 9001 Quality management systems — Requirements ISO 9999 Assistive products for persons with disability Classification and terminology

#### **Timeline**



#### **Team Organizational Chart**



#### References:

1 "How to use a hover lift " Preferred Health Choice - Mobility & Patient Aid Center [Online] Available: https://www.phc-online.com/How\_to\_use\_Hoyer-Lift\_a/146.htm. [Accessed:

2t. "Wheelchair Transfers," Wheelchair Transfers - Hesperian Health Guides. [Online]. Available: https://en.hesperian.org/hhg/Disabled\_Village\_Children:Wheelchair\_Transfers. [Accessed: 22-Nov-2021].

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