# DEPARTMENT OF MECHANICAL ENGINEERING



## Motivation, Goal, Impact

Project Objective: Design an affordable and adaptable mechanical device to assist elderly individuals with limited mobility in **safely** and independently transferring **between** wheelchairs and car seats, reducing the physical strain on elderly users and caregivers.





- High Risk of Injury: Wheelchair transfers pose serious injury risks to both elderly individuals and caretakers (Nie et al., 2023).
- **Financial Barriers:** Over 20% of older adults make less than \$13.6K per year (Florence et al., 2019).
- **Product Limitations:** Existing transfer devices are expensive and inefficient.



## **Design Calculations & Decisions**

**Transfer Board Stress & Deflection Analysis** 



#### Deflection



### **Transfer Board Material Design Decisions**

- Materials evaluated on manufacturability, sustainability, and performance.
- Stress & deflection analysis under 750-lb load.
- Chosen Material: Birch plywood.







# ENME - D3 - Kiss Me I'm a Senior **Elderly Wheelchair-to-Car Transfer Device**

Patrick Bagliani, Jane Gorman, Meghan Kurz, Sadie Marra, Felipe Pinzon-Vanegas, Sabrina Zaleski

## Requirements

**General Functionality** 

**Easy and Intuitive Use** 

Vehicle Compatibility



- Lifting:
  - Conducted several lifting/ lowering tests.
  - Average lift time was about 0.1 in/sec.

#### • Sliding:

- underneath sliding seat.
- Sliding was very difficult and balls did not roll easily.





## A. JAMES CLARK SCHOOL OF ENGINEERING



## **Prototype & Test Results**

• Tested sliding mechanism with bearing balls

#### • Deflection:

- Slid test patient along transfer board.
- Transfer board deflected more than desired for safe transfer.

#### • Mounting:

- Tested multiple weights on mounting brace.
- Brace held firmly and did not deflect or yield.

