DEPARTMENT OF MECHANICAL ENGINEERING

Motivation, Goal, Impact

- 1. 1 in 3 adults aged 65 or older fall at least once per year
- 2. Falls lead to 40% of long term care admissions
- 3. 59% of all emergency department admissions from failing in ages 61+ were on stairs.
- 4. Current market solutions such as stair lifts are expensive

Task: Design an affordable, adaptable, low cost, and preferably mechanical device that can assist users in climbing up and down stairs independently.

Requirements

- Product must cost under \$150.
- 2. Product must be portable.
- 3. Product must actively assist the user in climbing stairs.
- 4. Product must catch user after they fall
- 5. Product must weight less than 20 pounds.
- 6. Product must be easy to use.
- 7. Product is preferably mechanical.
- 8. Product must be regulatory compliant



Sustainability

The Caniacs **Assistive Stair Climbing Device** William Albowicz, Charles Bullock, Kavyasri Gouda, Alexis Graybill, Joshua Mesa, Jeffrey Xu,

Harness that the user wears attached by straps and buckles Figure 1. Overview of main subsystems

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Final Design

Three main subsystems:

- 1. Cane The cane helps to cut down the height that the user has to navigate.
- 2. Harness The harness prevents catastrophic falls by catching the user.
- 3. Railing The railing allows for movement in only one direction and locks in the other. Thus providing a stable base that can catch the user.

Prototype & Test Results

Real Life Testing

Testing Results

- The 3D printed ratchets with four teeth engaged were able to withstand at least 75lbs of longitudinal load (maximum reading of force gauge) without breaking
- Half steps are stable and can hold at least 170 lbs

Future Tasks

- More rigorous testing
- Exploration of other materials
- Refinement of the railing system
- Interview and test prototype with

key stakeholders

