Lifestyle Tools - Speedy Secure

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Background & Market Gap

- Custom solution for individuals with Dystonia and Chorea movement disorders
  - Represents an extreme of the demographic of our target population
- **Disease Background:** Dystonia and chorea can impair daily life and reduce independence
  - Over 250,000 cases in the US [1]
  - Patient with hemi-chorea and dystonia needs assistance tying their hair up along with other daily tasks of living
- **Market Gap:** Current devices on market require the use of a residual limb as an assist to the hair tying mechanism, thus limiting the target population
- **Target Population:** Individuals with mobility impairments limiting them to one functional arm. This includes:
  - Amputees
  - Stroke
  - Partial paralysis
  - Temporary injuries

Problem Statement

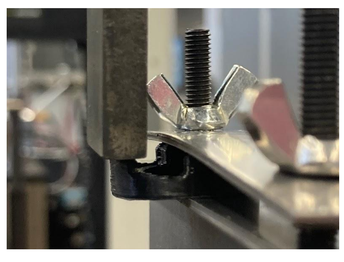
A compact, portable, easy-to-use device which can enable an individual with one functional arm to secure their hair for everyday use.

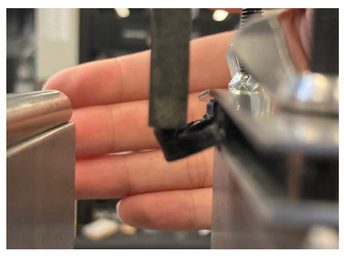
Methods

- CAD
- TPU 3D Printing
- PLA 3D Printing
- Injection Molding

Mechanical & Material Testing

- Compression testing on our design in PLA and TPU
  - Placing load onto outer lip of ring
- Results
  - PLA: more load, non-recoverable deformation
  - TPU: less load, recoverable deformation (almost to 100%)





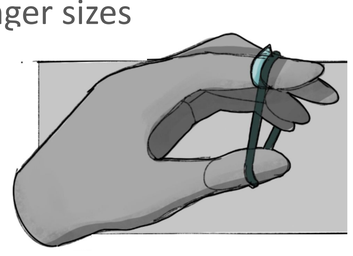
- Future testing may include
  - Longevity/fatigue testing - cyclic loading

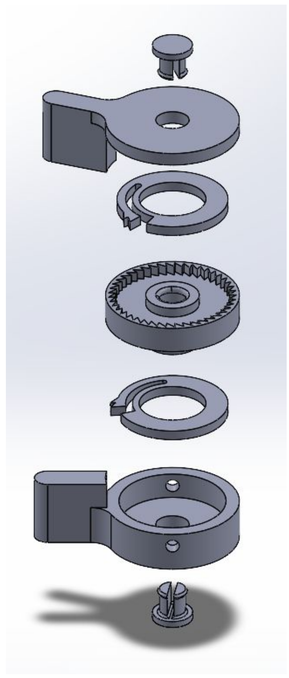
Conclusions & Future

- Successfully assembled kit
- Almost at SUS target score of 75 for ring design
- Future work: more testing for ratchet and beanie designs

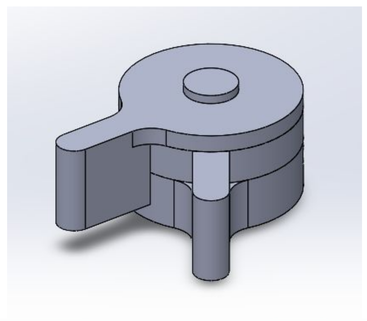
Our Product - An Assistive Hair Kit

Solution 1: Single Ring Design
- Material: TPU
- Stiff protruding lip and sunken in slot allow hair tie to stay around hand without slipping down to wrist
- Adjustable for all finger sizes

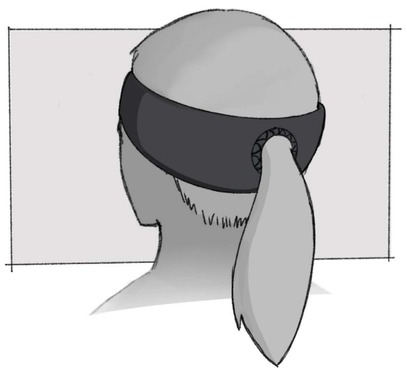


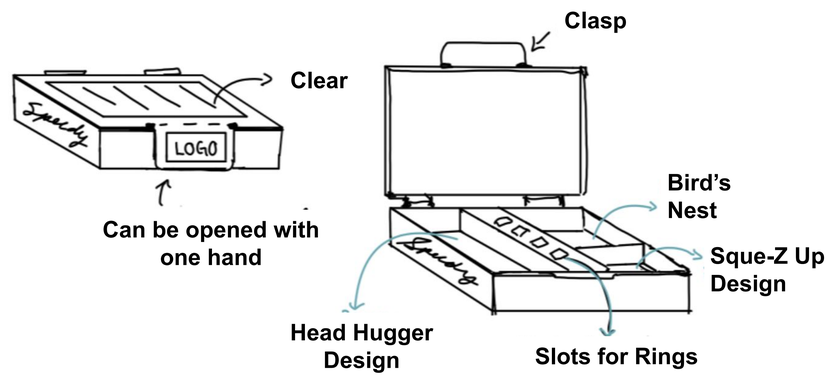


Solution 2: “Sque-EZ Up” Squeeze ratchet
- Material: PLA (prototype)
- Double sided ratchet to tighten elastic band around hair



Solution 3: “Head Hugger” Beanie Design
- Material: Stretchable fabric
- Purpose: Aid in gathering hair





User Testing

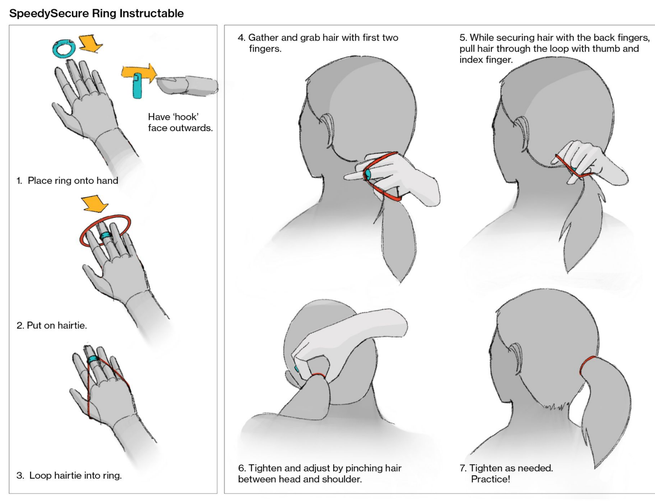
Ring Design Testing:

An Infographic and video was used to inform users of how to use ring design
User test population included hair of varying lengths and textures

We asked patients to provide feedback throughout the span of a week:
- Each user was asked to time their attempts
- Videos of final attempts were collected
- Asked to fill out SUS Feedback

Initial feedback: difficult to use, but possibility for improvements over time.

System Usability Scale (SUS) Feedback:
- 11 college students participated in testing
- Average SUS Score: ~74, target of 75



Acknowledgements & References

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[1] NIH. “Chorea.” National Institute of Neurological Disorders and Stroke, http://www.ninds.nih.gov/health-information/disorders/chorea. Accessed 1 December 2023.