Wheelchairs are great! But…

Dafne Zuleima Morgado Ramirez and Catherine Holloway

Interaction Centre, Computer Science, University College London, 66-72 Gower Street, London, WC1E 6BT, United Kingdom
d.morgado-ramirez@ucl.ac.uk, c.holloway@ucl.ac.uk

THE PROBLEM
- 70 million people need a wheelchair worldwide, only 5% to 15% have access to one [1]
- Over 1.2 million wheelchair users in the United Kingdom [2]
- Only 10% of the total effort during handrim wheelchair propulsion goes directly into moving the wheelchair [3]
- Continuous and excessive handrim propulsion leads to:
  1. Shoulder pain, 42% to 66% incidence [4,5]
  2. Rotator cuff muscles injury [6]
  3. Bilateral carpal tunnel syndrome [7]
- We do not know if the support provided by current handrim propelling assistance devices available is what manual wheelchair users actually need and expect.

WHAT HAVE WE FOUND?

Barriers to manual wheelchair propulsion are: inaccessible built environment, lack of wheelchair propelling skills, other people, weather, the length of a journey in distance, propelling assistance devices that change the socially accessibility of the manual wheelchair and negative emotional experiences

WHAT HAVE WE DONE?

- Interviewed 12 manual wheelchair users with different ranges of experience in using power assist devices and different disabilities for an average of 1.5 hours regarding:
  1. Barriers to wheelchair propulsion
  2. Manual wheelchair users needs
  3. Knowledge and experience on wheelchair propelling assistance
  4. Expectations on propelling assistance
- Reviewed the power assist devices available in the UK market.

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REFERENCES


NEW JOINTED-UP SERVICES

- WHO: help raise awareness of alternative wheelchair propulsion mechanisms in comparison with the inefficient handrim wheelchair propulsion
- Wheelchair delivery services: offer mechanical or power wheelchair propelling assistance BEFORE offering electric/power wheelchairs when possible

PROPOSED SOLUTIONS

NEW DEVICES REQUIRED

- Call to researchers and designers to create an affordable and high quality manual wheelchair propelling assistance device that preserves the social accessibility of current handrim propelled manual wheelchairs
- First a fully mechanical design and later a powered option
- Parallel research for an open source design that can be manufactured anywhere with basic tools and materials, including 3D printing, is desirable
- Encourage technology users to modify the design to satisfy their individual needs. Avoid technology abandonment by enabling a participatory making and modification process through DIY forums locally and worldwide online [8]

FUTURE WORK

Future work should consider the role of caregivers/support workers/personal assistants which push and pull wheelchairs and that could benefit from using either mechanical or power assist devices to make their caring work easier. A core design challenge of assistive technology in the future will be in reducing device weight, which we believe can be achieved using modular power options.

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