2.009 Green A
Sketch Model Review
October 5, 2006

Problem

- Conversations are difficult from behind.
- Ability to push and be beside the wheelchairbound individual increases communication.
- Especially important for shared experience.



Customer

- First Customer Museums, aquariums, etc. –
 15,000 museums in U.S.¹
 - MFA disability access coordinator, Ruth Kahn
- Secondary Customer Individuals in care homes/need constant care – 831,000 in U.S.²
- Tertiary Customer permanent wheelchairbound user buying new chair – 1.5 million in U.S.³

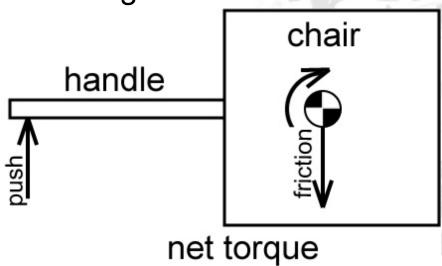
Benchmarking

Currently nothing like this on the market.

Wheelchair Type	Manual	Electric	Side Push (or retrofit)
Cost	\$100 - \$3000	\$1000 +	\$100 - \$3000
Power	User/push behind	Battery and motors	User/push side <u>or</u> behind
Weight	~30 lbs	70-250 lbs	~35 lbs
Ease of repair	easy	difficult	easy
Conversation ease	hard	easy	easy

Features/Technical Feasibility

- Folding handle
 - Compact storage
- Locking wheel mechanism
 - Binary clutch allows for turning



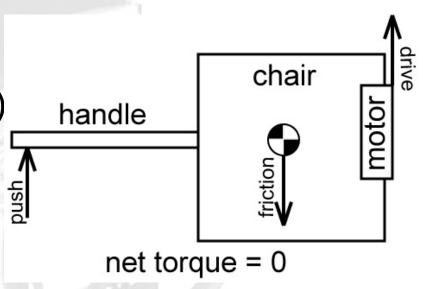


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<u>Design Alternatives</u>

MOTOR ASSIST

- Actively controlled motor counters torque produced by pushing from left side.
- Draws 5W (steady walking)
- Peak 33W (acceleration)
- Compare to 300W+ capability in powered wheelchairs.
- Roughly 10x battery life



Rolling Friction: http://auto.howstuffworks.com/tire4.htm

Motor efficiency: Maxon EC16 spec sheet http://www.maxon.com

Powered wheelchair: Invacare spec sheets http://www.invacare.com

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Wheelchair use at museums:

- Museum of Fine Arts: 15
- Museum of Science: 10
- JFK Museum: 6
- New England Aquarium: 5
- Children's Museum: 3
- Isabella Stewart Gardner Museum: 2

Wheelchair Customers

PRIMARY CUSTOMER:

- 15,000 museums in US¹
- ~37,500 1st-customer wheelchairs

SECONDARY CUSTOMER:



TERTIARY CUSTOMER:

 90% of wheelchair users use manual wheelchairs (1.5 million users)³



¹⁻ http://www.aam-us.org/aboutmuseums/abc.cfm#how_many

²⁻ http://www.cdc.gov/nchs/data/nhhcsd/curhomecare00.pdf

³⁻ http://dsc.ucsf.edu/publication.php?pub_id=2§ion_id=4