

Geared Wheelchair



Yellow – A

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Problem Overview

- **Injury to manual wheelchair users**
 - 51% have shoulder injuries (often rotator cuff tendonitis)
 - Calluses and blisters to hands
- **Greater force required for some surfaces**
 - Soft surfaces (Grass, Carpet)
 - Hills and ramps

Consumer Requests

Stakeholder Forum on Wheeled Mobility:

- Mechanical advantage for variable terrain
- Unobtrusive appearance
- Geared mechanism contained within the wheel for easy incorporation
- Lightweight
- “Feeling” of normal wheelchair

Mockup Design Features

- Mechanical advantage – low gear (4:3), normal (1:1), high gear (3:4)
- Hand-friendly coaster brake
- Independent levers for shifting
- Audible click to indicate shifting
- Separate rims for normal and geared uses



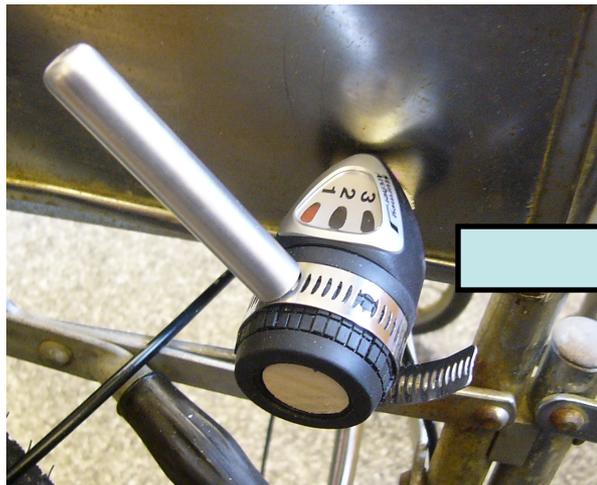
Benchmarks and Improvements

- “Magicwheels”
 - Low and normal gear
 - Slightly obtrusive appearance
 - Must shift while stationary
- Our design
 - Includes high gear for greater efficiency for athletic users
 - Less obtrusive appearance
 - Can shift while moving or stationary
 - Coaster brake feature



Future Design Challenges

- Directionality of the hubs
 - Fixed gear vs. coasting and brake
 - Integrate separate rims into one if necessary
 - Backward drivability
 - Hub drive direction
- Incorporate shifter into wheel
 - Reduce obtrusive appearance
 - Eliminate wire to wheel
 - User interface



Future Outlook

Consumer feedback to make key decisions:

- Coaster brake vs fixed gear decision
- Brake stiffness
- Independent shifters or single shifter
- Shifter placement and interface
- Single rim design
- Remove clicking sound during freewheeling