TEAM #4: LIGHTWEIGHT, COMPACTABLE, POWER WHEELCHAIR

By Kristie Astoria and Nathan Storie
Overview

- Background
- Project Objective
- Previous Work Done
- Project Design
- Safety Constraints
- Materials/Budget
- Acknowledgments
BACKGROUND

- Annalee Hughes
  - Cerebral Palsy
    - Caused by abnormal motor cortex development.
    - Effects on the body by movement, balance posture
    - Baclofen pump placed in abdomen to reduce spasticity causes poor trunk strength

- Effect on Client
  - Permanently confined to a wheelchair.
  - Slightly more motor control of right side of body.
  - Tendency to lean forward due to baclofen pump.
  - Supportive straps to maintain posture and twisting of legs and feet.
PROJECT OBJECTIVE

- Provide a design that is lightweight and easily transported.
- Ensure health and safety needs.
- Allow independent movement in a social environment and other homes.
- Accommodate for growth of the client.
- Durable, and maintainable.
**PREVIOUS WORK DONE**

- **Atm’ Invacare power wheelchair**
  - Joystick Controlled
  - Disassemble into three parts – battery, seat, and frame
  - Traction motor - rubs against tire in order to cause rotation of wheel
  - Total Cost: $1,749

- **NSF Senior Design Project designed by students at the University of Massachusetts at Lowell.**
  - Joystick Controlled
  - Disassemble into four parts
  - Adjustable height
  - Wheelbase – 23” by 21”
  - Two 12 voltage batteries, 24 volt source, PWM controller
  - Total Cost: $1,500
Used Atm’ Travel Power Wheelchair Electrical System:
- Included- battery, battery charger, speed controller, and two traction motors.
- Had to switch the connection of the motors so that the right motor would spin when turning.
PROJECT DESIGN
(Chair Frame)

- Chair frame reduced in width – 18 to 15 inches
Cross bar was moved forward and foot bar shortened to make room for mounting plate.
PROJECT DESIGN
(Motor Mount Plate)

- Transmissions, motors, speed controller, and battery brackets attach to the mounting plate.
A gear ratio of 7.2 to both transmissions.

One transmission is 3.5 inches longer in order to arrange the motors in a tiered manner and reduce the width.
TESTING

- 5 mph
- Inclines
- Rough terrain
- Forks were lengthen after testing
SAFETY CONSTRAINTS

- Metal plate under transmissions protect electrical system.
- Two tilt assemblies located on back of the base frame.
- Two adjustable foot straps to prevent twisting of legs and feet.
- Two adjustable seat belt straps:
  - Around waist
  - Across front of body
    - To prevent leaning forward and twisting in chair.
**MATERIALS/BUDGET**

Initial Budget: $947.00
Remaining Budget: $140.48

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ACKNOWLEDGEMENTS

- Serge, Rich, and Pete – UCONN Machine Shop
- John Fikiet - UCONN Electrical Shop
- James Paulino – UCONN BME
- Dr. John Enderle – UCONN BME
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QUESTIONS?