



## FACT SHEET:

### Dynamic Seating System

Phone: 404-894-4960 (Voice/TTY)

Fax: 404-894-9320

<http://www.mobilityrerc.gatech.edu/>

#### Précis

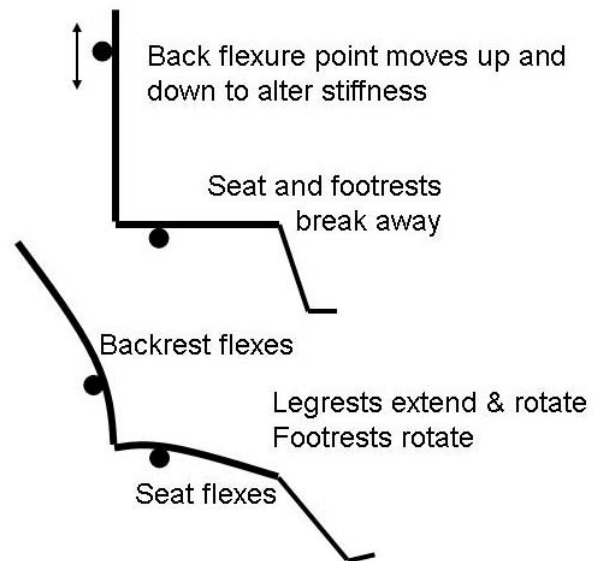
Dynamic Seating System-an active wheelchair seating system that dissipates energy resulting from user extensor thrusts. The system reacts to force sensors that distinguish between voluntary and involuntary extensor patterns of the user. The system provides support during episodes of controlled, voluntary motions, while dissipating energy during involuntary thrusts.

#### Background

Adequate seating and positioning is a challenge for wheelchair users with reflexes. Strong, uncontrolled extension of the upper and lower extremities and trunk, leads to forceful pushing against the backrest, seat and footrests. The current approach to this problem results in a loss of functionality. The dynamic seating system prototypes are designed to dissipate the energy resulting from extensor thrusts in order to give the user a safer, more secure and more comfortable seating system.

#### Features

- Active flexible backrest matches spinal contour of the user during thrust; Motorized mechanism allows rapid change to backrest stiffness
- Active and dynamic seat, leg rests and footrest permit motion and dissipate forces of the lower extremities
- Back, seat and leg rest systems can be controlled or locked out independently
- Research has shown that the total forces on occupant were reduced 25%
- Active system senses higher force gradients of involuntary thrusts; adjustable sensitivity
- Motorized mechanism restores user to upright posture after thrust
- Is compatible with different manual and power bases
- Provides a carrier for components (e.g. backs, seat cushions, seat belts, and postural supports) from various manufacturers



#### Tooling

- Improved design process using robust dynamic models to design through multiple iterations
- Active component technology can be quickly applied to the development of other components



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#### Market Issues--Potential users of the Dynamic Seating System

- Children and adults with CP who experience extensor thrusts

#### Customer Perspective

Twenty-three stakeholders participated in the one of three focus groups and follow-up mail survey (n=23) conducted between April and November 2004. Six families, one adult user, 11 therapists and 5 vendors participated in the study.

Three topic areas were identified that required additional clarification to inform design-thrusting, system adjustability, and dynamic movement of the system. This additional information was gained through a mailed out survey.

Participants felt that differences exist between purposeful and involuntary thrusts. This input led to the concept that the seating system must react differently to purposeful versus involuntary thrusts. When thrusts are used in a purposeful manner, the user depends on a stable base upon which to push against to accomplish a desired function. Therefore, the seating system must remain stable during purposeful thrusts. Conversely, involuntary thrusts will have to be dampened by movement in the seating system and then return to upright after the thrusting movement.

Participants wanted a seating system assembly (frame) that is compatible with manual and power bases and components (e.g. backs, seat cushions, securement belts and postural supports) from different manufactures. Participants described the difficulty they have making seating system adjustments, often several times a day, to accommodate the changing positioning needs of the user.

Participants felt that active systems were the best option. Active systems include sensors and actuators that can react to involuntary thrusts as well as actively return the user to upright. In addition, they requested that resistance and movement be adjustable and capable to be disabled. Finally, participants suggested that the individual movements of the backrest, seat, armrest and footrests work independently of each other.

#### Contact Us

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