

Navigating Differently: Alternative Drive Controls

Jacelyn Goh
Linds Rehabilitation Equipment
Clinical Educator / OT / ATP



Learning Objectives

- Participants will be able to list methods to improve driving skills through standard set up prior to considering alternative driving systems
- Participants will be able to differentiate different driving systems for powered wheelchairs and list the benefits for different client groups
- Participants will be to list 2 considerations for additional functions of alternative driving systems

Electronics of a Standard PWC

Standard Drive System

- R-Net and Q-Logic
- Proportional control
- With standard joystick / modified joystick
- Mounted on armrest/ other suitable locations
- Expandable vs Non-Expandable
- Function controls on the controller / Easy access

Physical requirements:

- Sufficient UL movement and fine motor control
- Ability to sustain force
- Joystick placement



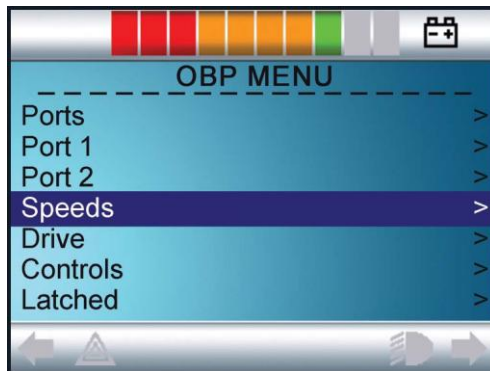
Q-LOGIC 3
Advanced Drive Control System



Electronics of a Standard PWC

Adjustability within this standard system:

- Programming (Speed, Acceleration, Active Throw, Dead Band, Tremor dampening, Active Orientation)
- Joystick Handles
- Mounting systems
- Access buttons



Alternate Drive Controls – Why?

- Why use an alternate drive system?
 - Accommodation of physical needs
 - Support posture and access
- What are they?
 - Different sources of control
 - Placement of systems
 - Would require additional control interface



<https://www.numotion.com/products-services/innovative-lifestyle-products/ability-drive#overview>



Additional Considerations in Ax:

- **Physical Abilities**

- Available Movements
- Consistency
- Vision
- Postural Stability and Displacement
- Prognosis and impact

- **Wheelchair requirements**

- Power Functions
- Drive wheel location
- Communication devices

- **Access**

- Environment use
- Drive style

- **Cognition / Perception**

- Ability to learn / Adapt
- Good safety awareness
- Problem-solving
- Spatial perception/awareness

- **Carer Requirement**

- Ability to manage complex systems
- Transfers / daily activities in wheelchair



Hierarchy of Driving Methods for Efficient Mobility

Lange's (2025)
hierarchy of
driving methods

1

Proportional Methods

- Standard joystick
- Joystick modifications
- Alternate proportional options
- Head array / gyro devices

2

Non-Proportional Methods

- 3–5 switch array
- Head array / tray-mounted proximity / fiberoptic array
- 2 switch array
- Single switch scanning
- Eye gaze

Alternate Control Drive System - Based on Consistent Movement Patterns

Good Fine motor, Limited Gross motor

- Mini and Micro- Switches
 - Significantly lesser amount of force for displacement (~10-50g)
 - Multiple mounting options



Alternate Control Drive System - Based on Consistent Movement Patterns

No UL, Good Head Control

- Chin control (micro switches)
- Gyro systems (Vigo and Munevo Glasses)
- Head Controls (proportional vs Head array)



Alternate Control Drive System - Based on Consistent Movement Patterns

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- **Gyro systems (Vigo and Munevo Glasses)**
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<https://www.sunrisemedical.com/power-wheelchairs/switch-it-electronics/head-controls/vigo>



Alternate Control Drive System - Based on Consistent Movement Patterns

No UL, Good / Fair Head Control

- Chin control (micro switches)
- Gyro systems (Vigo and Munevo Glasses)
- **Head Controls - Switched Head array (Permobil total control, Switch-it Duo Pro, ASL Fusion, Stealth i-Drive)**



 **SUNRISE MEDICAL. Dual Pro™**



 **SWITCH-IT**
SMART TECHNOLOGIES

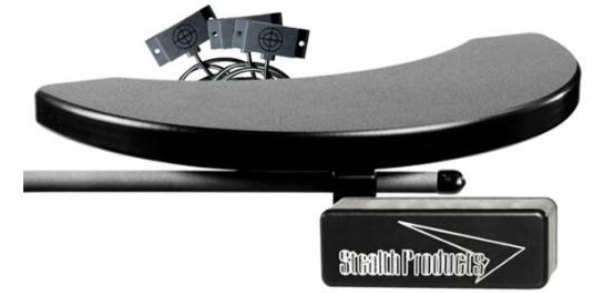


 **Stealth Products**
i-Drive® Head Arrays

Alternate Control Drive System - Based on Consistent Movement Patterns

Good / Fair Gross Motor Control, Limited Fine Motor

- Switch (4) / Proximity Switch / Foot or Arm Control
- Single Switch scanning (single body site)
- CoMoveIt



JSC for foot drive (FCMH)



JSC for arm drive (ACMH)

Alternate Control Drive System - Based on Consistent Movement Patterns

Good / Fair Gross Motor Control, Limited Fine Motor

- Switch (4) / Proximity Switch
- **Single Switch scanning (single body site)**
- CoMove It



<https://www.youtube.com/watch?v=UAudjSUYYDo>

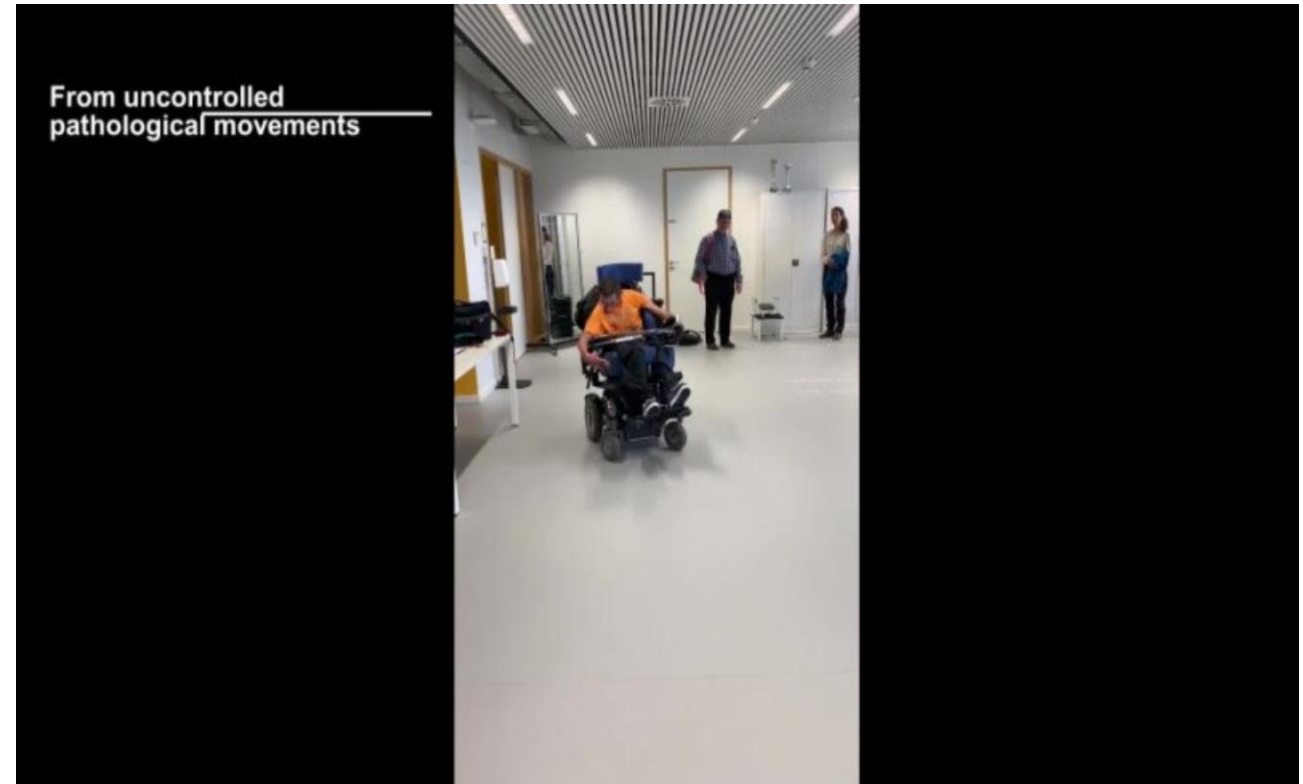
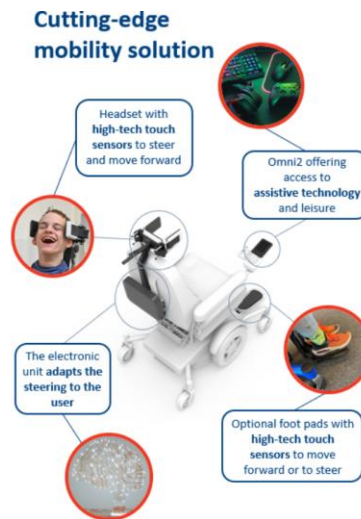


<https://hub.permobil.com/blog/alternative-drive-controls-single-switch-scanning-eye-gaze>

Alternate Control Drive System - Based on Consistent Movement Patterns

Fair Gross Motor Control, Limited Fine Motor, Fair head control

- Switch (4) / Proximity Switch
- Single Switch scanning (single body site)
- **CoMoveIt**



The Wheelchair People

power mobility
The power to move you

LINDS
REHABILITATION
EQUIPMENT

Alternate Control Drive System - Based on Consistent Movement Patterns

Fair Head Control

- Combined use of systems

Considerations:

- Head supports required
- Endurance
- Increased adjustments to profiles to reduce postural displacement



Alternate Control Drive System - Based on Consistent Movement Patterns

Minimum head control, good eye gaze control
- Eye Gaze



Mounting Systems

Setting up the most ergonomic position of drive method to ensure endurance and ease of use

Considerations for carer staff:

- Ease to remove/replace
- Adjustments required
- Durability

Mounting Systems



Tray mounted Systems



Arm rest
mounts



Center Drive System / Mounts



Chin Control / Head Array mounts



Recommendation

“The factors identified in research related to non-use of provided assistive technology (as listed) should be considered by the therapist during the wheelchair prescription process, as these may influence the outcomes.”

https://www.aci.health.nsw.gov.au/__data/assets/pdf_file/0003/167286/Guidelines-on-Wheelchair-Prescription.pdf Page 25





Case Study - Mike

Regaining Quality of Life



Mike

Diagnosis: Duchenne muscular dystrophy

Age: 35

Context: Has lost hand/wrist function and has limited ability to control PWC, dependent on others for all outdoor mobility

History of Non-Use:

- PWC 4 years ago
- Have been in his old/current wheelchair for 14 years – however, increasing maintenance issues
- Also, very limited independent mobility



Mike

Body Functions:

- Good cognition and very tech savvy, can be slightly resistant to changes
- Has very limited active movement, able to sustain finger movements Right > Left
- Dependent on others for placement of ULs
- Limited head movements

Activities:

- Requires assistance for all activities of daily life



Mike

Personal:

- Getting more depressed and stressed over increase level of care / aging of mom
- "Lost of ability to access home / outdoors is putting a downer on life"
- "Would like to be able to still get myself places and not rely on family"
- Very motivated to maintain independence and social interactions (other than ones online)



Mike

GOALS

- To be able to maintain independence with mobility at home, if home, if possible outdoors
- To be able to participate in social activities with friends and family, without having to worry about access

Intervention:

- Trial of alternate drive system to increase independence



Mike – Trials (Challenges)



- Difficult set up - was not open to new seating review
- First trial - Meet and greet, review current options for FWD chairs
- Getting measurements for 2nd trial

Subsequent Trials:

- Trialled different drive wheel configuration
- Measurement for delivery set up



Mike – Post Delivery

"This new chair has really changed my independence and I independence and I feel so much more alive. I can go hang go hang with friends without having to worry about not not being able to control my chair and not be dependent on dependent on others. Its great to be independent outdoors outdoors again"





**Questions?
Please come and try out the
systems!**

Jace Goh
Occupational Therapist/ Product Consultant
jacelyn@lindsrehab.com.au

The Wheelchair People