Mobile Device Integration for Manual and Powered Wheelchair Users

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Learning Outcomes

- Describe three considerations for assessing integration needs of wheelchair users
- Describe three options for mounting of mobile devices to manual or powered wheelchairs
- List two options for device integration with on-the-market powered wheelchair electronics packages

Capabilities of Mobile Technology

- Everyday computing
- Communication – AAC and SGD
- Environmental controls
- Health monitoring

Mobile Device Access Options

- Touch
  - Direct
  - Assistive Touch
  - Stylus Use
- Mice and keyboards
- Voice
  - Siri, Google, others
- Switches
  - iOS vs Android

Direct Access?

- Access to the device in the way it was intended to be used
- In Mobile Devices:
  - Apple: Touch only
  - Android: Touch primary
    - Mouse options secondary

Options

- Touch
  - Simple Assistive Devices (i.e. Stylus, gloves)
  - Third Party Keyboards/Keyboard Settings
  - Touch Accommodations (iOS)
  - Assistive Touch (iOS)
- Peripherals
  - Mouse
  - Keyboard

Proportional Mouse Emulation

- Android or Windows devices
- Potential to use proportional joystick or head array for 360° mouse emulation
- Offers more control than switch access
- Requires refined fine motor movements

Digital Mouse Emulation

- Use of switches to “drive” mouse cursor
- No 360° control
- Used for head array, switch, or sip n’ puff drivers

Voice Access

- Potential to interact with your device by speaking (requires clear voice)
- Operating system voice options
  - iOS: Siri
  - Android: Google
  - Windows: Cortana
- App specific voice options
  - Dragon

Switch Access?

- Control of entire device with one or more 'switches'
- Switches may be
  - Buttons
  - Levers
  - Proximity
  - Movement
  - Other sensors

Interfaces…

- Switches cannot plug directly into devices
- How switches 'talk' to devices
- Intermediate device

Interfaces

- Wireless (iOS/Android: Ablenet Blue2 Switch, RJ Cooper)
  - Continue to charge device while using switch
  - Requires charging
- Wired (iOS: Pererro, Zybox, Tapic
  - No charging required
  - No challenges with pairing

iOS Switch Control

- iOS 10 has updated switch control
  - Bluetooth vs wired switch
  - Head
  - Full screen
- Programmable through the main menu
- Scanning (row-column) or point scanning
- With or without Voiceover
- Adjustments for speed, hold length, repeat, release time

Android Switch Access

- Android has integrated switch access in Lollipop 5.0.2
  - From 'Accessibility' in settings
  - Options very limited at present
  - Challenges
    - Difficult to see
    - Single switch limited

Windows Surface Tablet Access

- USB access
  - Head Mouse access
  - Swifty
- Software
  - Dragger
  - Cross Scanner

Making it work with life…

- Not everyone who needs switch access uses a wheelchair… but many/most do
- Not everyone who needs switch access uses a powered wheelchair… some do

Integrating Direct Access

- Touch
  - Location, location, location!
- Mouse
  - Mounting a mouse
  - Potential for joystick integration*
- Keyboard
  - On-screen keyboard use
  - Mounting a standard keyboard
  - Alternative text inputs

Mouse Emulation

- Bluetooth connection of joystick to device
- Mouse clicks in multiple ways…
  - Nudges
  - Assigned buttons
  - Built-in or external switches
  - Dwell clicker

Integrating Voice Access

- Consider speaker and microphone needs
- Consider access to turn on voice
  - Voice activated
  - Switch activated
  - Other buttons?
- Location, location, location!

Integrating Switch Access

- Consider type of switches and required movements
  - Are wheelchair controls an option?
  - External switches?
  - Any other required functions?
- Line of sight and visual field
- Access to 'voice'
- Positioning is critical

What about Mounting??

- Lightweight
- Clear screens with light adjustment
- Multiple mounting options
  - Commercial/off the shelf
  - Custom

How do I figure out where?

- Mounting location must take into account…
  - Type of access: If direct access, needs to be in the right place
  - Vision: How well can the person see the screen to target or use their switches?
  - How the person transfers and navigates around their chair
  - Access to other tables, locations
  - Overall footprint of the chair
  - Storage options when driving or using transportation
  - Line of sight for driving if mounted permanently

Direct Access

- Mount should place the device …
  - In the most useful position
  - Where the user does not fatigue easily
  - May be modifiable by the user or fixed
  - User should be able to access all areas of the screen
  - Trial, trial, trial… one inch can make a HUGE difference

Voice Access

- Mount should place the device…
  - Where the user can see the screen to respond to prompts or read what is there
  - Close enough for the voice access to be used in a crowded situation***

***May use switches as backup

Switch Access

- Mount should place the device…
  - Where the user can see the screen to respond to prompts or read what is there
  - Where the user can still reliably access their switches (especially anything near the head)

Permanent vs. Removable

- Transferring needs
  - Consider fold away, swing away, or removable
- Transportation needs
  - May need to be removed for transportation (not crash tested)
- Line of sight
  - User may need to drive with/without device mounted

Line of Sight

- Removable mounts do not promote independence in the community…
- If mounted permanently
  - Can the user see around the device where it is mounted
  - Do you have strategies to address blind spots
  - Does the user have insight to check blind spots
  - Use of mirrors, front facing cameras

Table-Top Mounting

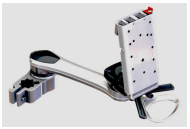
- Suction cup systems
- Stands
- Bean Bags
- Clamps

- Consider how your client interacts with the device…

Commercial/Non-Modifiable Mounting Options

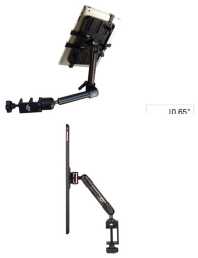
Mount N Mover – Blue Sky Designs

Cost: $635-1075



Joy Factory

Cost: $119-180



Modifiable Mounting Options

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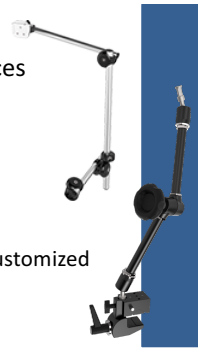
Modifiable Mounting Options

REHAdapt: Cost… custom

- Heavy and lightweight devices
- Permanent Attachments
- Floor stands/Table Top
- Assessment Kits
- Virtual Mounting Solution
  - Send pictures and info, get customized mount



Wheelchair Integration

- Bluetooth Emulators (Android)
- Bluetooth Switch Input
- Any hard wired switch

Wheelchair Integration

- Permobil Bluetooth iDevice Module

Wheelchair Integration

- Pride/Quantum Q-Logic3
- Integrated switch and mouse access

Wheelchair Integration

- Switch It Dual Pro Head Array (Sunrise)

Case Study #1

- Teen with Athetoid CP
  - Lots of extraneous movement
  - Some control of hands when positioned well
- As 'normal' as possible
- Multiple switch sites
- Communication device
- Control music, camera, communication, and Facebook

Case Study #2

- Adult with C4 quadriplegia
- Sip and puff driver
- Two switch access sites on right and left sides of head
- Has voice output
- Cognitively intact
- Access to email, calendar, browser, and integration with computer

Case Study #3

- Teen with muscular dystrophy
  - Limited strength
  - Fatigues easily
- Cognitively well
- Micro-Joystick drive
- Interesting in computer programming

Resources

- AbleNet iOS Switch Guide
- Jump Start OT iOS Switch Guide
- Handsfree (Christopher Hills - iBook)
- RJ Cooper Website
- Youtube Videos

Questions?

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