Touchscreen Accessibility
Supporting Individual Motor Abilities

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By the end of 2013, Microsoft and Apple predict that tablet-based touchscreen computers will outsell PCs.
What are mainstream touchscreen devices being used for on a daily basis?

What adaptations are users making to improve accessibility?
Most studies on accessibility and motor impairments:

5-20 participants

Our goal:
Approach: Find and analyze user-generated content (YouTube videos) of people with physical disabilities interacting with mainstream touch devices.
Qualitative analysis of existing material
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Created a dataset of 187 videos

**YouTube Search**

- 60 disability-related terms (e.g., cerebral palsy)
- 9 technology-related terms (e.g., smartphone)

= a lot of searches, 187 videos, 101 uploaders
Qualitative analysis of existing material
Created a dataset of 187 videos
Coded videos along 21 dimensions

Examples:
Age of user
Video emotion (negative or not)
Direct vs. indirect interaction
Direct touch detail (e.g., index finger + thumb)
Use of external objects (e.g., head pointer)
User Characteristics

**Age:** Almost half (47% were small children)

**Gender:** 43% female, 57% male
Devices

- iPad: 78%
- iPhone: 17%
- Other: 5%
Findings
Theme #1

Interaction Styles
Interaction Styles

92%
Direct Touch
  e.g., finger, knuckle, hand, foot, nose

8%
Indirect Input
  e.g., head stick, mouth stick
Somewhat standard interaction styles.
Index Finger (29%)
“[He] has been doing a much better job of touching the screen with the pad of his finger, instead of his nail.” (V8).
Wider variety of interaction styles....
Nose (3%)
Feet (1%)

Slings to Support Limbs: 13% of videos
Common Interaction Issues

Hitting with fingernail
Excessively long dwell times
Accidental touches
Problematic dragging and sliding motions
Inability to complete multitouch gestures
Theme #2
Homemade Adaptations
Screen Protectors
Pointing Devices
Pointing Devices
Physical Barriers
Theme #3
Sentiment Expressed
Positive and Negative Sentiment

Mostly positive or neutral sentiments, e.g.:

Adult female with a spinal cord injury who uses capacitive stylus attached to her mouth stick (V22)

“My main concern was if I would be able to use it given the fact that it’s designed to be used with your hands... It gives me the freedom and independence to... do a lot of things on my own, which is great.”

Six videos with obvious negative sentiment, e.g.:

Young adult male with cerebral palsy (V250)
Unable to control hands enough to even touch the device
How can we design more accessible touchscreen interaction?
Design Implications

Allow control over sensitivity of the device

Provide alternatives to multitouch

Ignore long touches

Support DIY physical guides

Apple's AssistiveTouch
Reflecting on the Method
Demonstrated the effectiveness of using publicly available, user-generated content to inform input and interaction design
Thank you
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