

## *Interfaces for People with Disabilities*

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## *Major Impairments*

*- a continuum of capabilities*

- **Vision** - low vision, blindness
- **Hearing** - hard of hearing, deafness
- **Speech** - dysarthric speech, swallowing
- **Movement** - spinal cord injury, amputation, arthritis
- **Cognitive** - stroke, brain injury
- **Multiple** - deaf/blindness

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## *Major Functions and Activities Affected*

- **Vision** - seeing, reading, navigation
- **Hearing** - communication
- **Speech** - communication
- **Movement** - mobility, grasping, feeding, navigation
- **Cognitive** - understanding, learning, remembering, scheduling

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### ***Computer Activities Affected by Disabilities***

- *seeing the screen*
- *moving the mouse*
- *keyboarding*
- *handling media*
- *using a printer*
- *hearing system sounds*
- *understanding*

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### ***Rationale for Adapted / Assistive Devices***

- *independence*
- *privacy*
- *quality of life*
- *empowerment*
- *cost savings*
- *inclusion / mainstreaming*

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### ***Device Design Issues***

- *size, portability, battery power*
- *aesthetics*
- *social acceptance*
- *mental load*
- *physical fatigue*
- *communication speed*
- *ability to interact with environment*
- *ability to integrate with other devices (computers)*
- *market size*
- *economics*

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## *VA RR&D Projects*

- *Ultrasonic Head Control Wheelchair and Interface*
- *Lingraphica*
- *HandBike*
- *Lower Body Positive Pressure*
- *Robotics*
- *Fingerspelling Hand*

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### *Ultrasonic Head Control Wheelchair and Interface*



- *Disability - spinal cord injury*
- *Function - mobility*

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### *Lingraphica*

- *Disability - brain injury*
- *Function - communication*



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## HandBike



- **Disability** - paralysis, amputation
- **Function** - mobility, recreation

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## Lower Body Positive Pressure

- **Disability** - recovery from neurologic disease and orthopedic procedures
- **Function** - facilitates walking therapy



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## Robotics



- **Disability** - spinal cord injury
- **Function** - vocational training, movement, physical therapy

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## Fingerspelling Hand

- **Disability** - deafblindness
- **Function** - communication



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## **Commercial Products**

- Braille Displays
- Screen Readers
- Computer Access software / hardware
- Speech synthesis
- Voice recognition
- Recreational devices
- Communication devices

The following products and links are presented here for reference and informational use. The Rehab R&D Center cannot accept responsibility for the product or commercial information that they may contain. The Rehab R&D Center does not endorse any particular policy, program, product, service, position, issue, conference, presentation, research, website, therapy, or commercial organization.

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## Memory Aid

- **Disability** - head injury, Alzheimer's, ADD
- **Function** - planning, scheduling, cueing



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### Darci PCMCIA Card



- **Disability** - movement, non-vocal
- **Function** - computer access, communication

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### One Hand Keyboard

- **Disability** - amputation, movement
- **Function** - computer access, communication



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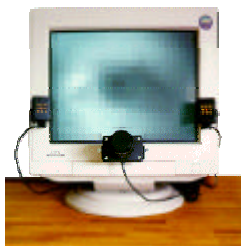
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### Eye Gaze System



- **Disability** - paralysis, amputation, movement
- **Function** - computer access, communication

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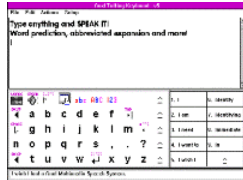
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## On Screen Keyboard

- **Disability** - amputation, spinal cord injury, movement
- **Function** - computer access, communication



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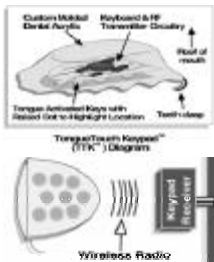
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## Tongue Touch Keyboard



- **Disability** - spinal cord injury
- **Function** - computer access, environmental control, wheelchair control

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## Wivik On Screen Keyboard

- **Disability** - spinal cord injury, movement
- **Function** - computer access



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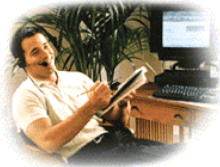
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## Voice Recognition



*writer*

- **Disability** - spinal cord injury, movement, hands busy
- **Function** - computer access

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## Personal Reader

- **Disability** - low vision
- **Function** - access to printed media



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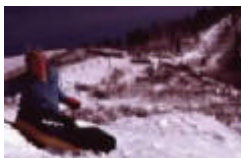
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## Ski Sled



- **Disability** - spinal cord injury
- **Function** - recreation

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## Braille Notetaking

- *Disability* - blindness
- *Function* - notetaking



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## Communicator



- *Disability* - non-vocal
- *Function* - communication

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## Communicator

- *Disability* - non-vocal, movement
- *Function* - communication



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## Augmentative Communication



- **Disability** - non-vocal, movement
- **Function** - communication

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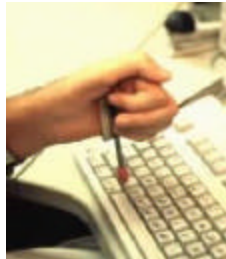
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## HandTyper

- **Disability** - grasping, spinal cord injury
- **Function** - computer access



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## Head Tracking



- **Disability** - amputation, movement, spinal cord injury
- **Function** - computer access

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## Mouse Substitute

- **Disability** - spinal cord injury, movement
- **Function** - computer access



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## Ke:Nx



- **Disability** - movement
- **Function** - computer access to Mac

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## Braille Display

- **Disability** - blindness
- **Function** - braille output



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## OCR Scanner



- **Disability** - low vision
- **Function** - access to printed material

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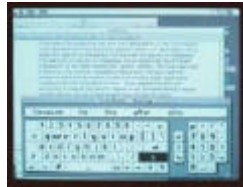
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## On Screen Keyboard

- **Disability** - spinal cord injury, movement
- **Function** - computer access



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## Telebraille



- **Disability** - blindness
- **Function** - telephone communication

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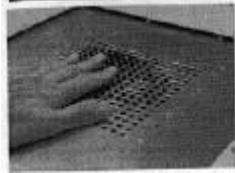
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## Tactile Braille Display

- **Disability** - blindness
- **Function** - access to graphical information



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## Personal Robot

- **Disability** - mobility
- **Function** - food service manipulation



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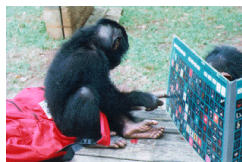
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## Non-Human Communication

- **Disability** - non-vocal
- **Function** - communication



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## Portable Braille Display

- **Disability** - blindness
- **Function** - reading electronic books



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## Talking ATM

- **Disability** - blindness
- **Function** - personal banking



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## Brain Control

- **Disability** - lack of motor control
- **Function** - control computer or robot by thoughts



"Bionic Rat"

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## Portable AAC

- **Disability** - non-vocal
- **Function** - augmented portable communication using speech synthesis



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## AI Speech Recognition



- **Disability** - keyboarding
- **Function** - computer and Internet access through an agent

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## Java and Jini

- **Disability** - lack of cross-platform access
- **Function** - provides development environment with built-in access



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## VR Oscilloscope



- **Disability** - hands and sight occupied
- **Function** - hands-free control

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## Braille Laptop

- **Disability** - blindness
- **Function** - portable computer



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## Signing Avatars



- **Disability** - deafness
- **Function** - onscreen signing agent for communication or learning

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## Feelings

- **Disability** -
- **Function** - communicate tactile sense



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## Add Speech Recognition



- **Disability** - manipulation, hands occupied
- **Function** - add voice recognition interface to system

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## Web Resources

- [Jim Lubin's website](#)
- [RESNA SIG-11 webpage](#)
- [Rehabilitation R&D Center](#)

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