

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** - disarthric speech, swallowing
- **Movement** - spinal cord injury, amputation, arthritis
- **Cognitive** - stroke, brain injury
- **Multiple** - deaf/blindness

Major Functions and Activities Affected

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

Computer Activities Affected by Disabilities

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

Rationale for Adapted / Assisitive Devices

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

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

VA RR&D Projects

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

Ultrasonic Head Control Wheelchair and Interface



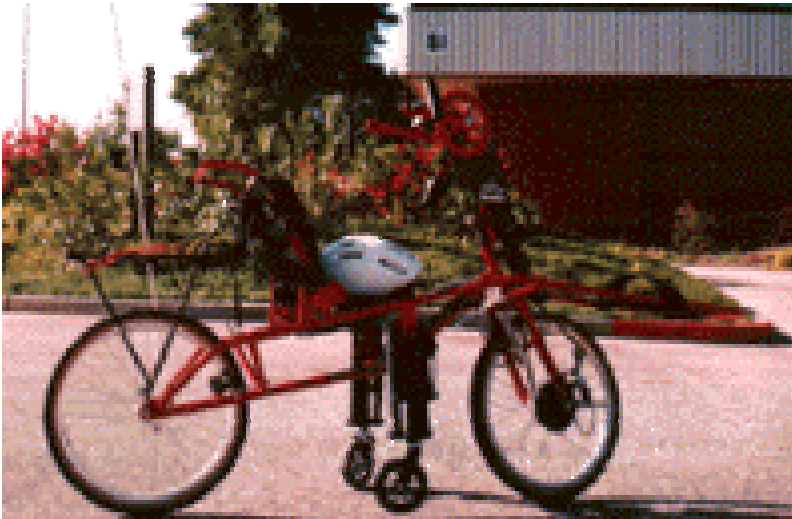
- **Disability** - spinal cord injury
- **Function** - mobility

Lingraphica

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



HandBike



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

Lower Body Positive Pressure

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



Robotics



- **Disability** - spinal cord injury
- **Function** - [vocational training](#), [movement](#), [physical therapy](#)

Fingerspelling Hand

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



Stepping Over Training



- **Disability** - stroke, COPD
- **Function** - training to better negotiate obstacles

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.

Memory Aid

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



Darci PCMCIA Card



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

One Hand Keyboard

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



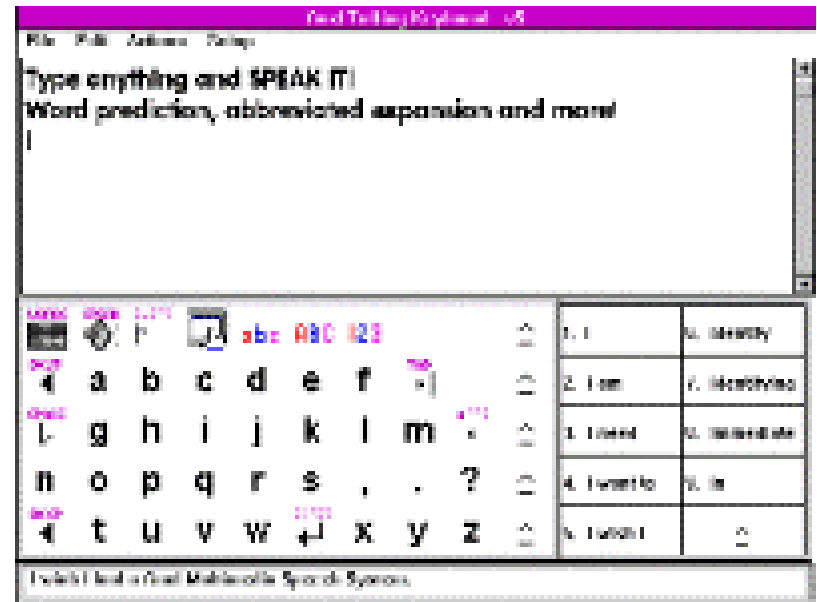
Eye Gaze System



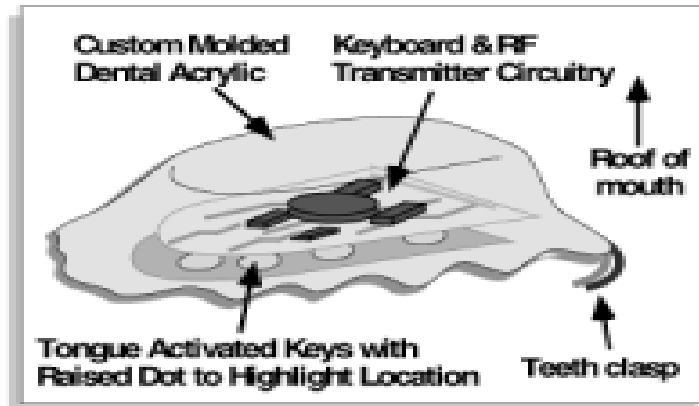
- **Disability** - paralysis, amputation, movement
- **Function** - computer access, communication

On Screen Keyboard

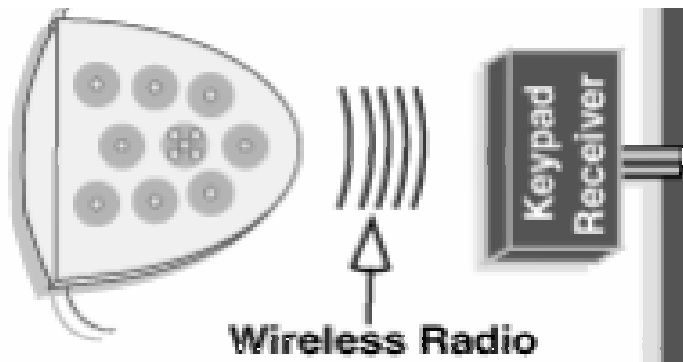
- **Disability** - amputation, spinal cord injury, movement
- **Function** - computer access, communication



Tongue Touch Keyboard



TongueTouch Keypad™
(TTK™) Diagram



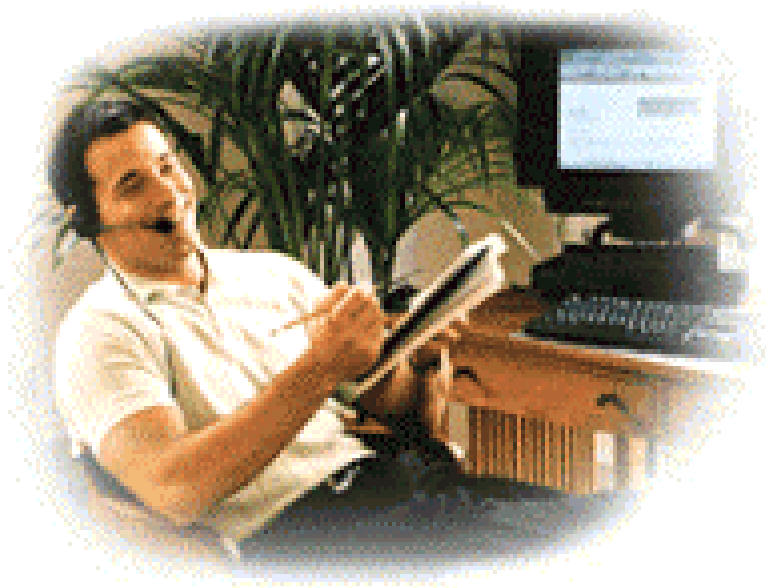
- **Disability** - spinal cord injury
- **Function** - computer access, environmental control, wheelchair control

Wivik On Screen Keyboard

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



Voice Recognition

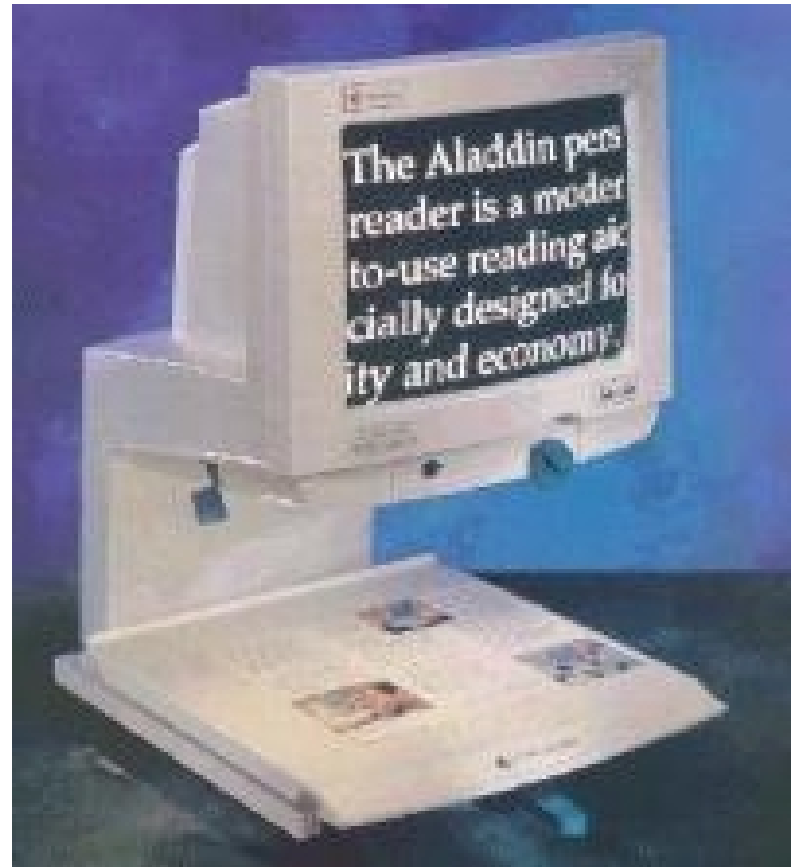


writer

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

Personal Reader

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



Ski Sled



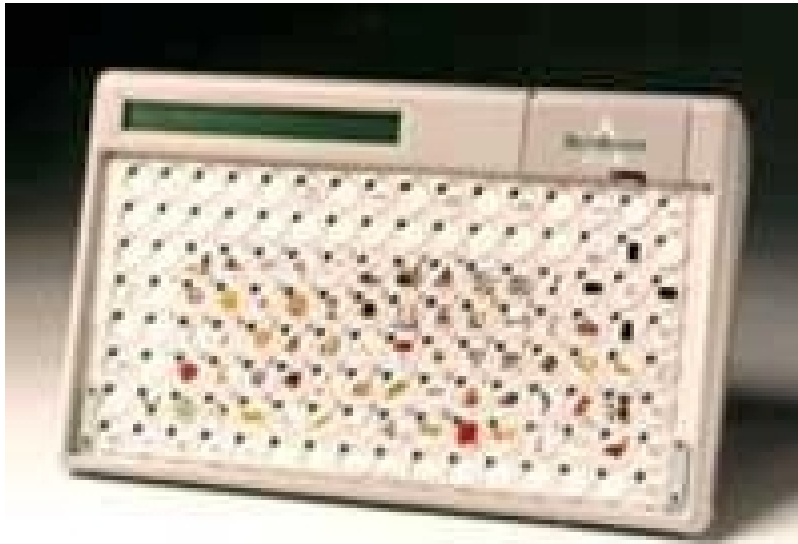
- **Disability** - spinal cord injury
- **Function** - recreation

Braille Notetaking

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



Communicator



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

Communicator

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



Augmentative Communication



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

HandTyper

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



Head Tracking



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

Mouse Substitute

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



Ke:Nx



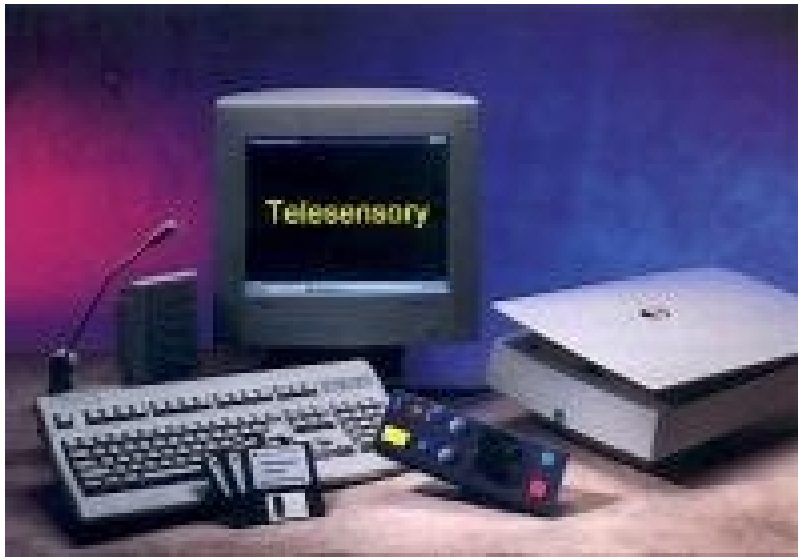
- **Disability** - movement
- **Function** - computer access to Mac

Braille Display

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



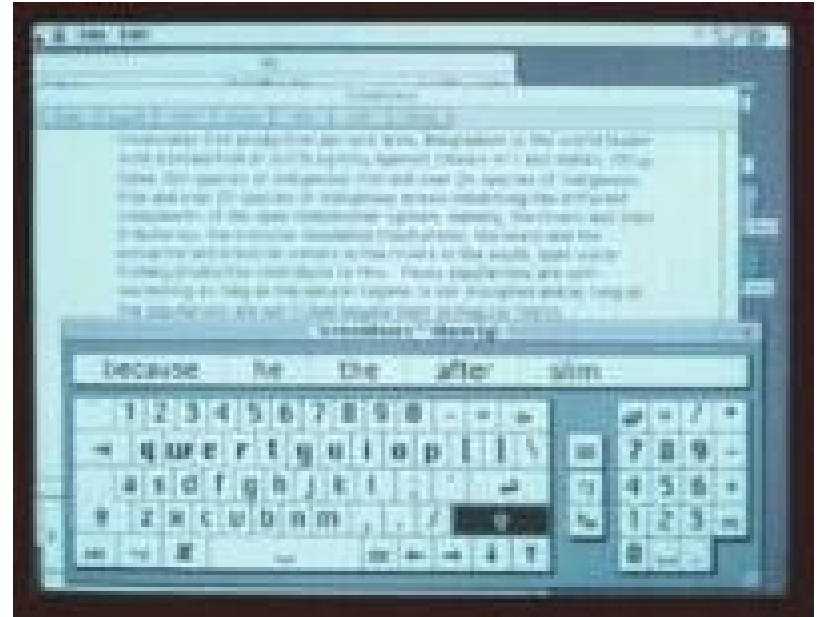
OCR Scanner



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

On Screen Keyboard

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



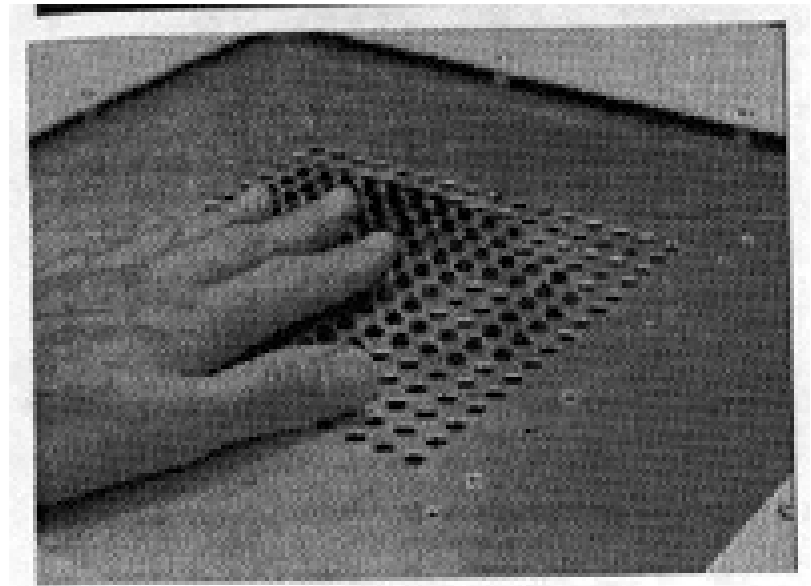
Telebraille



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

Tactile Braille Display

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



Personal Robot

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



Cye

Non-Human Communication

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



Portable Braille Display

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



Talking ATM

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



Brain Control

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



“Bionic Rat”

Portable AAC

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



AI Speech Recognition



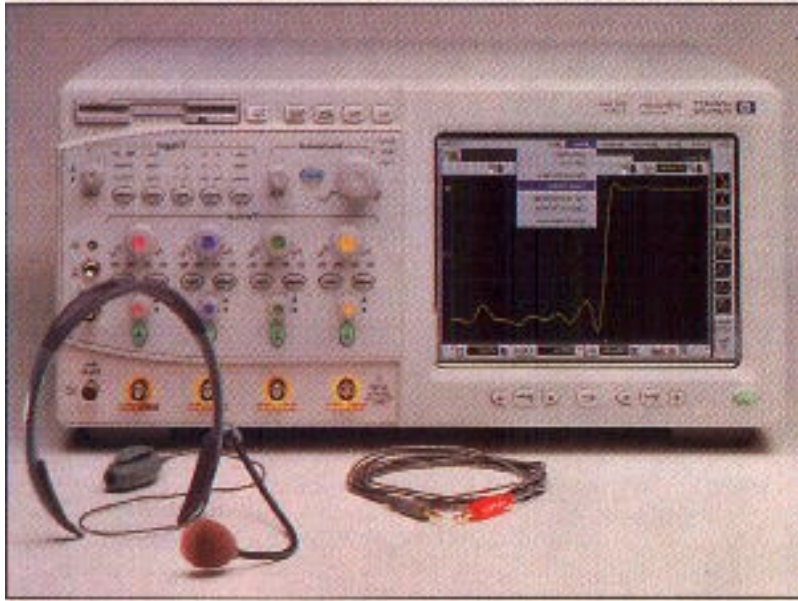
- **Disability** - keyboarding
- **Function** - computer and Internet access through an agent

Java and Jini

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



VR Oscilloscope



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

Braille Laptop

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



Signing Avatars



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

Feelings

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



Add Speech Recognition



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

Web Resources

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