

MODULE SEVEN: EMERGING TECHNOLOGIES

Eye Gaze

Eyegaze Computer System (www.eyegaze.com) - an eye controlled (eye gaze) computer input system designed for use by individuals with severe physical disabilities. The system is controlled by the use of one eye; nothing is attached to the user's body. Using a camera and an infrared light source, the computer interprets where the eye is focused on a computer screen. The system is operated entirely with the eyes. By looking at control keys displayed on a screen, a person can synthesize speech, control his environment (lights, call bells, etc.), type, run computer software, operate a computer mouse, and access the Internet and e-mail. For this type of system the user must remain very still in order to maintain the delicate calibration that allows it to work. These systems work well for users with spinal cord injuries who cannot use a speech input system. Users with ocular motor problems or involuntary head or eye movements may not be suited for eye gaze systems.

The Impulse Sensor (www.ablenetinc.com)

The Impulse sensor is an EMG (Electromyography) sensing electrode that senses EMG activity, which is made up of tiny electrical potentials that are produced by muscles and the nervous system when muscle contractions occurs. Using its patented ProActive technology, the Impulse sensor amplifies, digitizes and transmits the EMG signal at the electrode site. Specialized software runs on a Microsoft Windows compatible computer that wirelessly receives the signal. When volitional muscle control is detected, a virtual switch "hit" is passed to special software allowing users to control their computer.

Mind Control

A number of research institutions are investigating techniques of controlling computers using brain waves. While this is still in the very early stages of experimentation and development, there are some indications that this may be a future access method for individuals with no other means of physical access. The following products are currently available

- Cyberlink (www.brainfingers.com) - a mouse emulator designed to provide hands-free computer operation for individuals with upper extremity disabilities. The device uses a headband/sensor harness to detect electrical signals on the forehead resulting from subtle facial muscle, eye, and brain activity. These signals are amplified and digitized and sent to the computer for cursor control. Eye motions and facial gestures are also decoded into mouse button clicks, keystrokes, and cursor resolution control.
- Mind Controlled Switch (MCTOS) (Technos America) - eye-controlled or brain-controlled switch designed for use by individuals with severe physical disabilities. This switch utilizes consciously generated signals detected by a receiver worn on the user's forehead. These signals are converted to an output of electrical control signals, enabling the user to control a single switch using eye movement, facial muscle activity, or thought. No physical movement is required. The user must be able to learn to quiet the mind and increase conscious mental activity at will.
- A neuromotor prosthesis (NMP), is inserted into an area of the brain known as the motor cortex, which is responsible for voluntary movement. The NMP comprises an internal sensor that detects brain cell activity, and external processors that convert the activity into signals that can be recognized by a computer.

APPENDIX

Locations of Operating System Accessibility Options

- To find accessibility options in Windows Vista and Windows 7: **Start > Control Panel > Ease of Access > Ease of Access Center**

Keyboard Control	Location Mac OSX	Location Windows XP
Accessibility Wizard	N/A	Start > Accessories > Accessibility > Accessibility Wizard
Sticky Keys	Apple > System > Universal Access > keyboard. Click the button "On" to access "Sticky Keys"	Start > Settings > Control Panel > Accessibility Options > Keyboard tab
Slow Keys (Mac) Filter Keys (Win)	Apple > System > Universal Access > Keyboard tab	Start > Settings > Control Panel > Accessibility Options > Keyboard tab
Click key sounds (Mac) Filter keys notification (Win)	N/A	Start > Settings > Control Panel > Accessibility Options > Keyboard tab > Filter Keys > Settings
Delay until repeat (Mac) Repeat delay (Win)	Apple > System > Universal Access > Mouse and Trackpad tab	Start > Settings > Control Panel > Keyboard > Speed tab
Keyboard viewer (Mac) Onscreen keyboard (win)	Apple > System > Universal > Input Menu > Keyboard viewer	Start > Programs > Accessories > Accessibility > Onscreen Keyboard
Keyboard shortcuts (Mac) (Win)	Apple > System > Keyboard & Mouse/ Keyboard Shortcuts	Start > Help and Support > Accessibility > Windows keyboard shortcuts overview
Mouse/Cursor Control	Location Mac OS 10	Location Windows XP
Cursor size	Apple > System Preferences > Universal Access > Mouse and Trackpad tab	Start > Settings > Control Panel > Accessibility Options > Cursor Options
Display Pointer Trails	N/A	Start > Settings > Control Panel >

		Mouse> Pointer Options tab
Pointer Speed	Apple> System Preferences> Universal Access> Mouse and Trackpad tab	Start> Settings> Control Panel> Mouse> Pointer Options tab
Double Click Speed	Apple> System Preferences> Mouse and Trackpad tab>	Start> Settings> Control Panel> Mouse> Buttons tab
Automatically move pointer to dialogue box	N/A	Start> Settings> Control Panel> Mouse> Pointer Options tab
Track Pad (Mac) Touch Pad (Win)	Apple> System Preferences> Mouse and Trackpad tab>	Start> Settings> Control Panel> Mouse> Touch Pad On/Off tab
Mouse Keys	Apple> System Preferences> Universal Access> Mouse and Trackpad tab	Start> Settings> Control Panel> Accessibility Options> Mouse tab
Acceleration	N/A	Start> Settings> Control Panel> Accessibility Options> Mouse tab> Settings
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Visual Control	Location Mac OS 10	Location Windows XP
Screen resolution	Apple> System Preferences> Universal Access> Seeing” tab	Right-click on desktop> Properties> Settings> Screen Resolution
Icon size	View>Show View Options OR Command-J	Start> Settings> Control Panel> Display> Appearance> Advanced> Pull down to Icon. Pull down Size: to select
Cursor size	Apple> System Preferences> Universal Access> Mouse & Trackpad	Start> Settings> Control Panel> Mouse> Pointers tab> Scheme pull-down menu (or Customize by double-clicking on individual cursors)
Zoom (Mac) Magnifier (Win)	Apple> System Preferences> Universal Access> Seeing” tab	Start>Programs> Accessories> Accessibility> Magnifier
High Contrast	Apple> System Preferences> Universal Access>Seeing Tab	Start> Settings> Control Panel> Accessibility Options> Display> High

		Contrast
Auditory Control	Location Mac OS 10	Location Windows XP
Narrator (Win)	N/A	Start> Programs> Accessories> Accessibility> Narrator
Text to Speech	Apple> System Preferences> Speech>Text to Speech	Start> Settings> Control Panel> Speech> Text To Speech tab
VoiceOver	Apple> System Preferences> Universal Access>Seeing Tab	N/A
Flash (Mac) Sound Sentry (Win)	Apple> System Preferences> Universal Access>Hearing Tab	Start> Settings> Control Panel> Accessibility Options> Sound> Sound Sentry
Show Sounds	N/A	Start> Settings> Control Panel> Accessibility Options> Sound> Show sounds
Text Captions	N/A	
Speech Recognition	N/A	Start> Settings> Control Panel> Speech> Speech Recognition tab

REFERENCES AND WEBSITES

Please note: All references and website addresses were active at the time of printing – if a link becomes inactive, you will likely find the reference or resource on the internet by performing a keyword search using Google or another search engine.

References

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- Bowser, G. and Reed, P. (2001). Hey! Can I try that? A student handbook for choosing and using assistive technology. Wisconsin Assistive Technology Initiative: Oshkosh, WI.
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- Reed, P and Lahm, E. A., (2005). A Resource Guide for Teachers and Administrators about Assistive Technology. Wisconsin Assistive Technology Initiative: Oshkosh, WI.
- Tash. (2004) Step-by-step guide to assistive technology: Switch edition. Tash, Richmond, VA.
- Wisconsin Assistive Technology Initiative (2004). The WATI Assessment Package. Wisconsin Assistive Technology Initiative: Oshkosh, WI.

[Wanderman](#), R. and [Clark](#), D., (2002). Macintosh OS X Accessibility Resources

Windows XP Step by Step Tutorials, www.microsoft.com/enable/training/windowsxp/

Periodicals

Assistive Technology, RESNA Press, Arlington, VA www.resna.org

Journal of Special Education Technology, CEC/Technology and Media, Las Vegas, NV
<http://www.tamcec.org/jset/>

Rehab Report, Intertec Publishing, Malibu, CA 310-317-4522

Special Education Technology Practice, Knowledge by Design, Inc. Whitefish Bay, WI
www.knowledgebydesign.com

Technology and Disability, IOS Press. Amsterdam www.iospress.nl

Websites

Assistive Technology Programs

Abledata	www.abledata.com
Alliance for Technology Access	www.ataccess.org
American Occupational Therapy Association	www.aota.org
Apple Computer's Disability Resources	http://www.apple.com/accessibility/
Assistive Technology Industry Association	www.atia.org
CALL Centre	http://callcentre.education.ed.ac.uk
Closing The Gap	www.closingthegap.com
Michigan's Assistive Technology Resource	www.cenmi.org/matr/
Microsoft Accessibility	www.microsoft.com/enable
RESNA	www.resna.org
TASH	www.tash.org
University of Kentucky Assistive Technology	http://serc.gws.uky.edu/www/ukatii/boxershorts/BoxerShorts.htm
University of Wisconsin-Madison Trace Center	www.trace.wisc.edu
Wisconsin Assistive Technology Initiative	www.wati.org

Resources in BC

BC Child Development & Rehabilitation Assoc.	http://www.childdevelopment.ca/
Community Health Units or Hospitals	www.healthservices.gov.bc.ca/socsec
Queen Alexandra Centre for Children's Health	www.viha.ca
SET-BC	www.setbc.org
Sunny Hill Health Centre for Children	http://www.bcchildrens.ca/AboutUs/default.htm

Assistive Technology Vendors & Manufacturers

Ablenet	www.ablenetinc.com
Adaptivation	www.adaptivation.com
Alphasmart	www.alphasmart.com
Apple Accessibility	www.apple.com/accessibility
Assistive Technology	www.assistivetech.com
BigKeys Company	www.bigkeys.com
Brain Actuated Technologies	www.brainfingers.com
Crick Software	www.cricksoft.com
Daedalus Technologies	www.daessy.com
Datadesk Technologies	www.datadesktech.com
DJ Technical Sales	http://www.usatechguide.org/index.php
Don Johnston	www.donjohnston.com
Enabling Devices	www.enablingdevices.com
Fingerworks	www.fingerworks.com
Humanware	www.humanware.com
Infogrip	www.infogrip.com
IntelliTools	www.intellitools.com
Kurzweil Education Systems	www.kurzweiledu.com
LC Technologies	www.eyegaze.com/
Madentec	www.madentec.com/
Matias Corporation	http://www.matias.ca/halfkeyboard/

Mayer Johnson Company	www.mayer-johnson.com
Natural Point	www.smartnav.com
Origin Instruments Corp	www.orin.com/access
Palm Gear	www.palmgear.com
PenFriend Limited	www.penfriend.biz
Penny + Giles	www.pennyandgiles.com
QuillSoft	http://Wordq.com/
RJ Cooper & Associates	www.rjcooper.com
ScanSoft, Inc.	www.scansoft.com
Smart Cell Technology	www.smartcell.com
Tablet PC Talk	www.tabletpctalk.com
Tash International	http://www.synapseadaptive.com/switches/default.htm
TextHelp Systems	www.texthelp.com
Textware Solutions	www.fitaly.com
Westing Software	http://www.ablemouse.com/ourcompany.php
WiViK	www.wivik.com
Words+	www.words-plus.com
Zygo Industries Inc	www.zygo-usa.com