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Assistive Technology for People with Mobility Impairments

Presenter: Mobility and Cognition Team

Clinical Assistive Technology

October 8, 2025

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Agenda

1. What is Mobility Impairment?
2. Types of Mobility Impairment
3. Gadgets and Devices
4. Voice Input for Electronic Devices
5. Eye Gaze System, Head Movement and Facial Expression Detection

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Learning Objective and Sources

- To explore different kinds of Assistive Technology to help people with mobility impairments.
- Thanks to sources including Cleveland Clinic, WebMD, Medical News Today, University of Washington, University of Colorado, California State University, etc.

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What is Mobility Impairment?

- Physical conditions that limit a person's functional ability to move their body.
- It can affect gross motor skills and / or fine motor skills.

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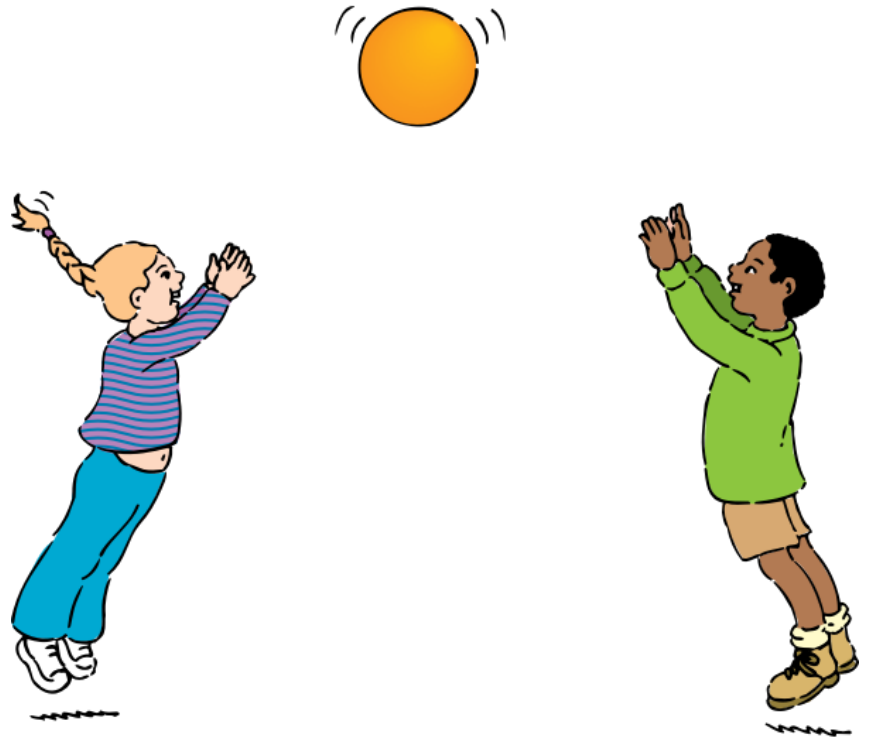
What are Gross Motor Skills?

They are movements that use the large muscles in the body, such as the legs, arms, and trunk, to perform whole-body activities like walking, running, jumping, and throwing a ball.



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What do Gross Motor Skills involve?

- Skeletal muscles (the strength and power behind the movements).
- Bones (the structures that your muscles attach to).
- Nerves (the “messengers” of your brain that tell your muscles when and how to move).

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What other functions are Gross Motor Skills related to?

- Balance
- Coordination
- Body awareness and spatial awareness
- Reaction time

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Examples of Activities that require Gross Motor Skills

Examples of hand-eye and foot-eye coordination skills that are also gross motor skills include:

- Throwing and catching a ball
- Kicking a ball
- Swimming
- Riding a bike or skateboard
- Rollerblading or ice skating

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What are Fine Motor Skills?

They are the small, precise movements we make with our hands, fingers, feet and toes. They involve the complex coordination of your muscles, joints and nerves.

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What do Fine Motor Skills require?

Fine motor control is a complex process that requires:

- Awareness and planning
- Coordination
- Muscle strength
- Normal sensation in your hands and fingers (or feet and toes)
- Precision (dexterity)

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Examples of Activities that need Fine Motor Skills

- Turning doorknobs, keys, and locks
- Putting a plug into a socket
- Buttoning and unbuttoning clothes
- Opening and closing zippers
- Fastening snaps and buckles
- Tying shoelaces
- Brushing teeth and flossing
- Bathing or showering

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Types of Mobility Impairments

- Mobility impairments can be caused by orthopedic (bone, muscle, ligament and joint issues) or neuromuscular (nerve and muscle) disorders.

- These include but are not limited to amputation, paralysis, cerebral palsy, stroke, multiple sclerosis, muscular dystrophy, arthritis, and spinal cord injury.

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Mobility Impairments to a Degree

- Can be permanent or temporary
- A broken bone or surgical procedure can temporarily impact one's ability to walk independently and travel between buildings in a timely manner.
- Likewise, some people may be ambulatory with a walker for short distances within home or a classroom but may need a wheelchair or scooter for longer distances.

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What we usually see…

A student's or a worker's ability to manipulate objects, turn pages, write or draw with a pen or pencil or a finger, type at a keyboard, use a mouse in a repeated motion, press a button in the elevator, scan an ID card at the entrance, open or close a door, reach up to a coat hanger, and/or retrieve materials of different texture, etc.

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Impact of Mobility Impairments on Daily Lives

Medical conditions such as Arthritis or repetitive stress injuries can impact fine motor abilities and decrease endurance for longer assignments. One's physical abilities may also vary from day to day.

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Gadgets and Devices

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Gadgets and Devices for Computer Access

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One-Handed Keyboards

Maltron One-Handed Keyboards – invented in the 70s

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More Portable Ones…

TiPY and Redragon K585 Pro

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Half-Keyboards

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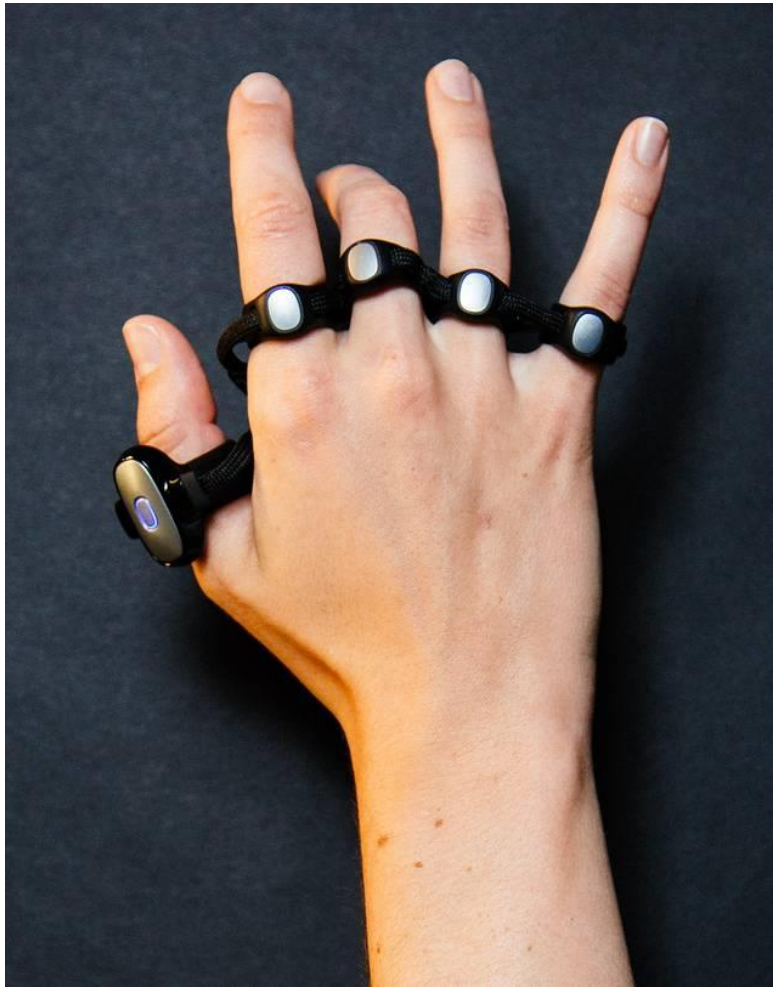
Tired of the Mechanical Keys?

Tap Strap 2 - Wearable Keyboard, Mouse & Air Gesture Controller

- Ambidextrous - Works the Same for Right and Left Hand
- Pair to Any Bluetooth 4.0+ Device - VR/AR/XR, Smartphone, Tablet, PC, SmartTVs, etc.
- Fully Customizable - Personalize your Tap using the TapMapper Tool



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Typing Aid

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Trackball Mouse

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ProtoArc Wireless Trackball Mouse

ProtoArc Wireless Trackball Mouse, EM01 NL Ergonomic Bluetooth Rollerball Thumb Rechargeable Computer Laptop Mouse, Adjustable Angle & 3 Device Connection for PC, Mac, Windows-Silver Ball

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DeLUX Wireless Vertical Mouse, Small, Silent, Rechargeable Mouse for Carpal Tunnel

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Wrist Rests

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Contour RollerMouse Pro3

- **Ergonomic design for repetitive strain injury, carpal tunnel & shoulder pain**
- **No reach, no grip, no strain**
- **Adjustable speed**
- **Wired USB for Mac & PC**

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Pretorian nAbler Joystick

Specifically designed to address the needs of computer users with limited hand control, motor skill difficulties, poor hand-eye co-ordination, lack of manual dexterity and involuntary muscle spasms.

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Gadgets and Devices for Writing, Drawing and Screen Access

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Pencil Grips

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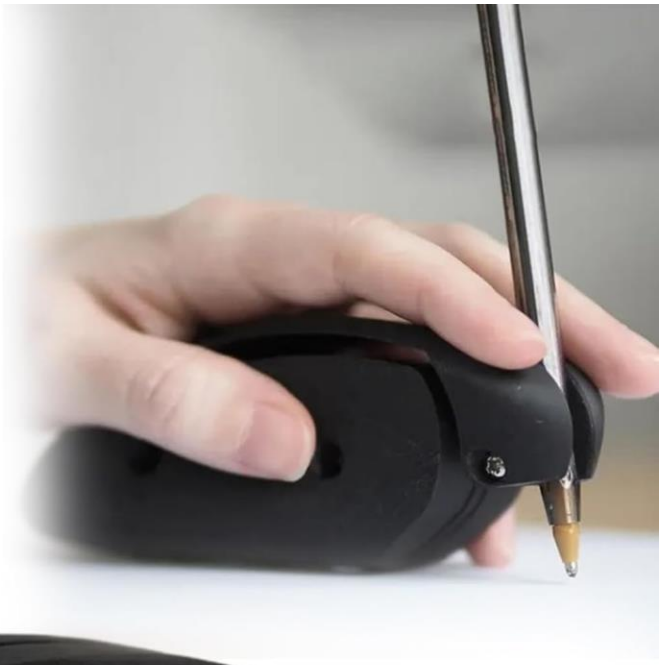
Writing / Drawing Aids



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Guided Hands for Drawing & Painting

Guided Hands is an assistive device that helps anyone with limited hand mobility to write, paint, draw and access technology through touch-screen devices.

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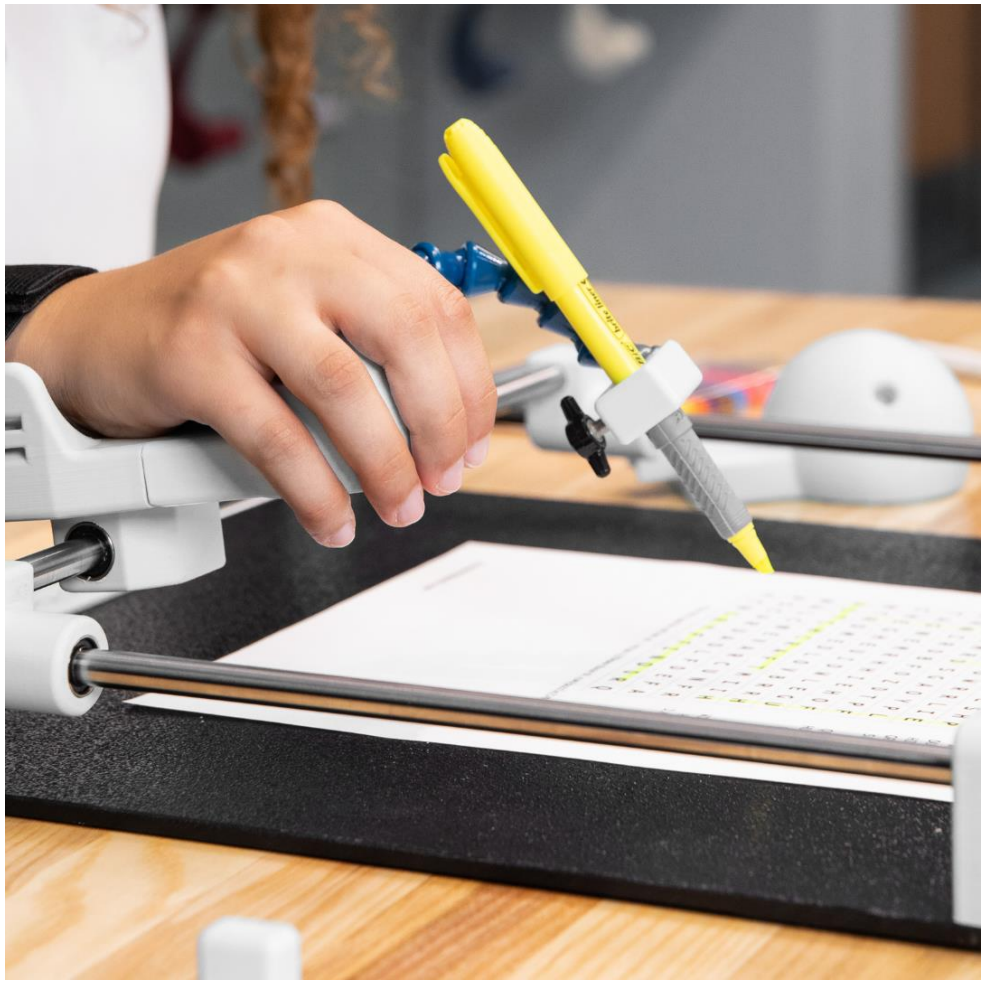
Guided Hands for Writing or Accessing Touch Screen



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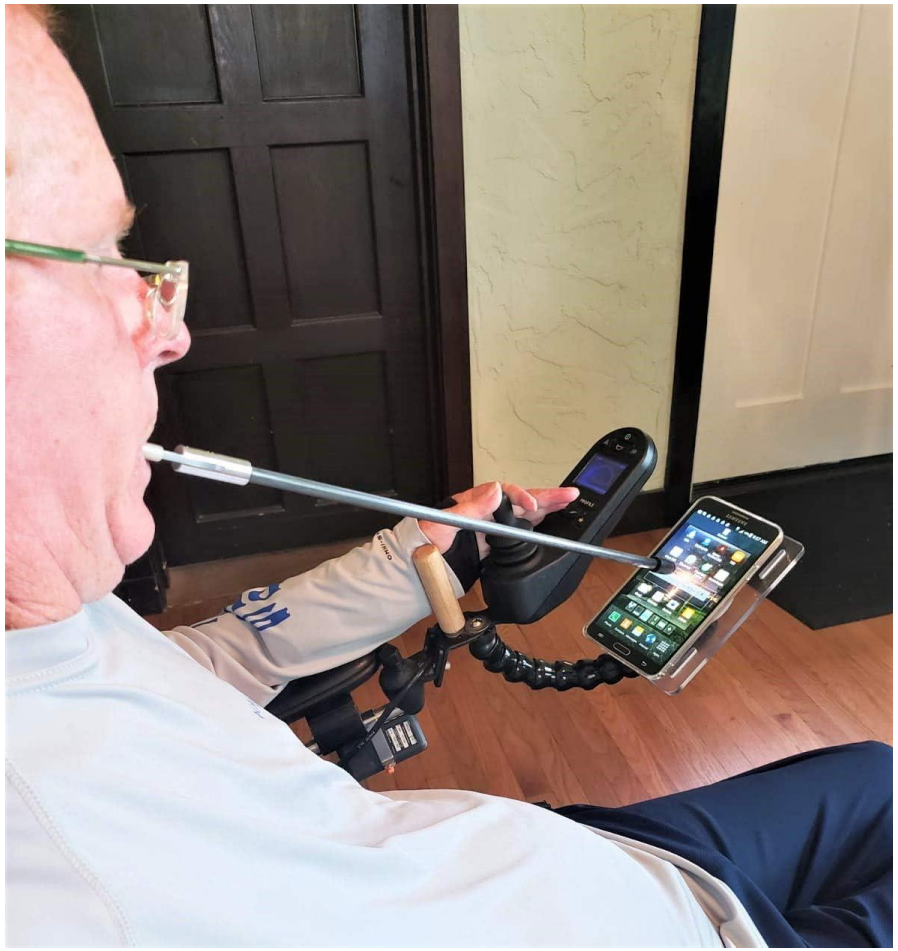
Jastick Mouthstick - V Bite Straight



Works for accessing touchscreen, typing, turning pages, pushing light switches and buttons, etc.

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Adaptive Switches

Adaptive switches are dynamic tools that enable individuals with physical, cognitive and movement-limiting disabilities to use technology and electronic devices.

They offer easier, simplified movement solutions. For example, pressing a button helps users perform daily tasks. People can use adaptive switches for toys, games, computers, voice-output communication tools and home appliances.

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Hand, Finger, Body Switches

Switches activated by hand, fingers, or any body parts - for example, mini-cup switches, big buddy switches, foot switches, pillow switches, etc.

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Light, Music and Vibration Switches

Focus on creating an auditory experience with music or sounds, while others use bright or blinking lights for visual engagement or to make the target easier for those with visual impairment to find.

Tail Light Switch, Say It Play It (Yellow) - a gentle touch to activate this sense-ational switch that plays a 20-second-long message, as it lights up and vibrates.

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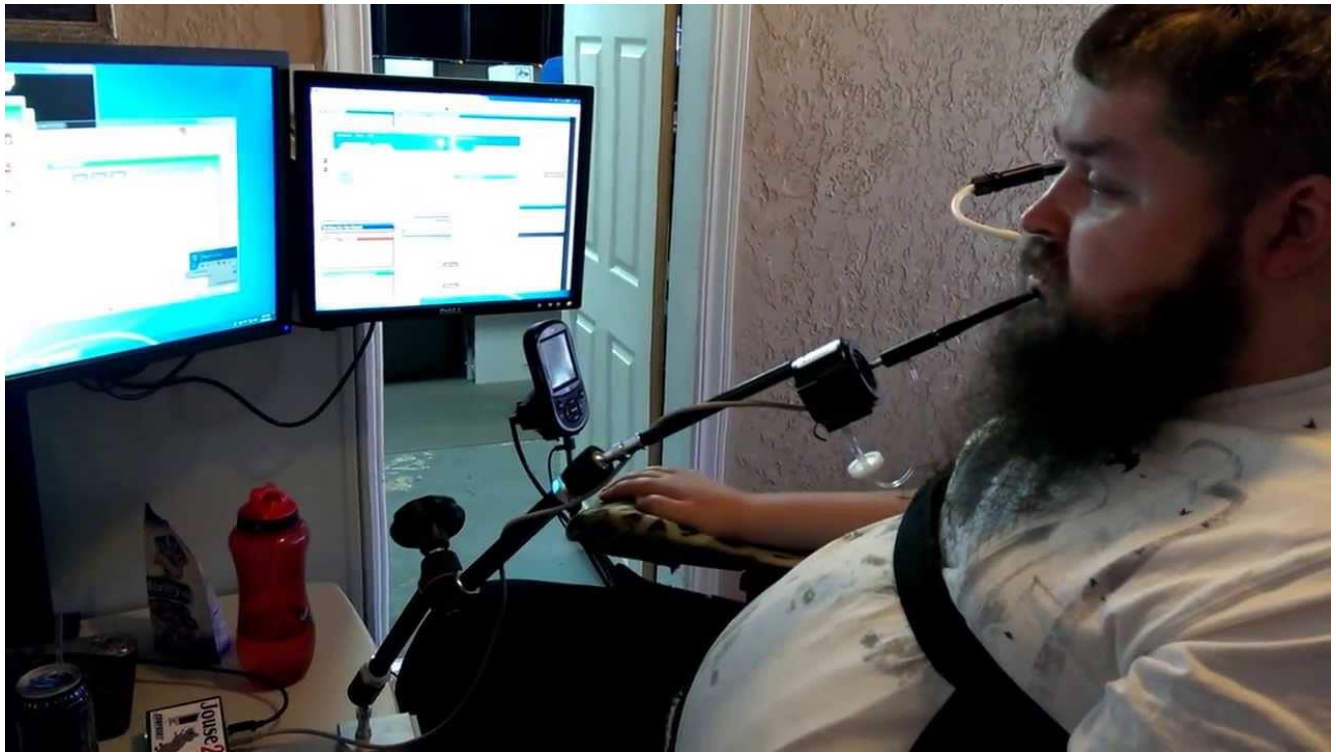
Sip and Puff Switches

Mouth Switches – for example, sip and puff switches allow users to use these actions to trigger different commands. The mouthpiece connects to a system that translates these actions into digital commands, similar to keyboard strokes or mouse clicks.



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Wheelchair or Bedside Switches

Wheelchair or Bedside Switches can be easily mounted on wheelchairs, tables, and bedsides. All these ability switches activate with the slightest touch.

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Independent Living Aids

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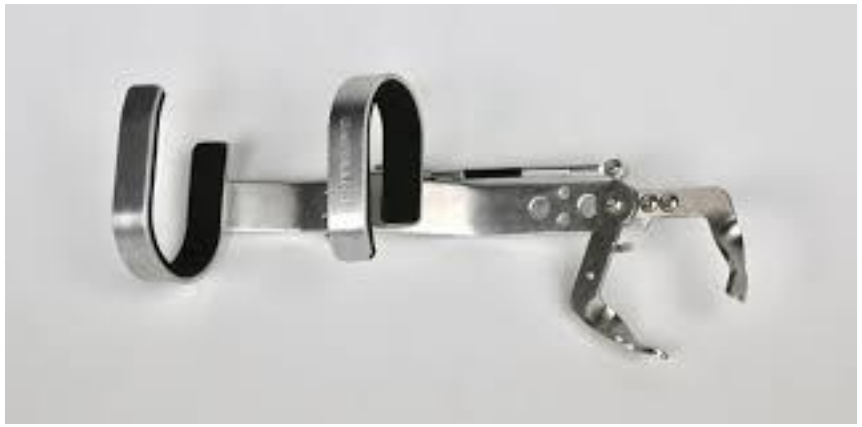
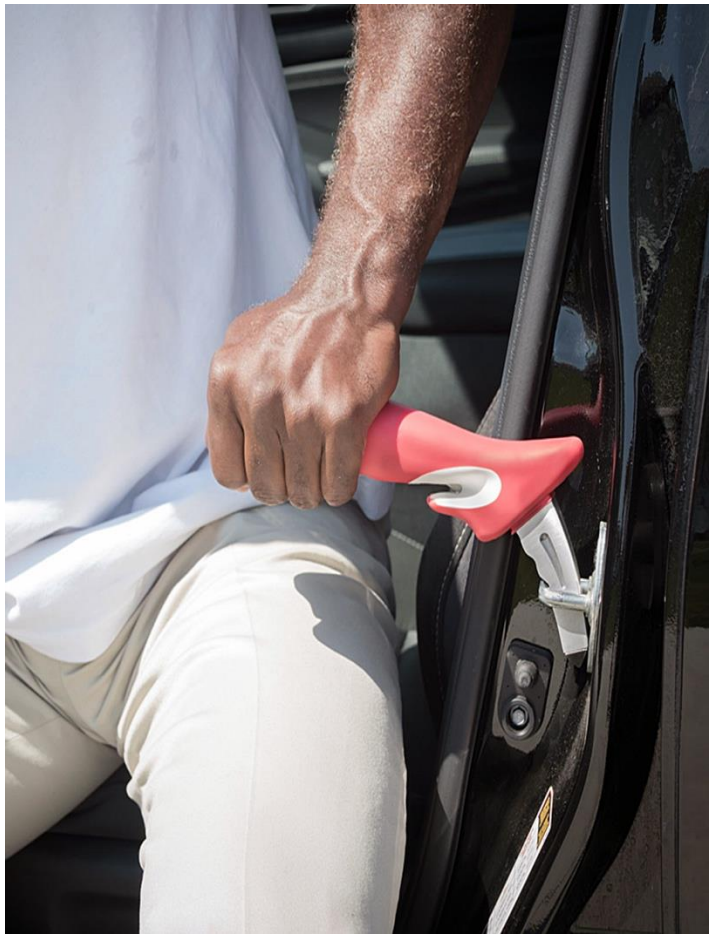
Independent Living Aids for Grabbing Objects





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Independent Living Aids for Opening Doors

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Independent Living Aids for Grooming

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Independent Living Aids for Grooming

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Independent Living Aids for Meals Preparation

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Independent Living Aids for Mobility

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…and Many More!

Consider working with an Occupational Therapist or a Physical Therapist to evaluate your seating and mobility needs.

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Thank you for your Time!

Any Questions??

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Voice Input for Electronic Devices

Presenter: Anna Leung

Email: aleung@eastersealscrossroads.org

Clinical Team - Assistive Technology

October 8, 2025

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Agenda

1. What is Voice Input?
2. Who benefits from Voice Input Software?
3. How to enhance the experience of using Voice Input?
4. Questions and Feedback

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Learning Objectives

1. Define Voice Input and discuss the categories of Voice Input
2. Explore the types of scenarios that certain Voice Input Software is appropriate.
3. Learn about the built-in and third-party software applications and devices in the market.
4. Consider the hardware, software, environment and approach that complete and enhance the entire experience of using Voice Input.

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What is Voice Input?

- According to Dictionary.com, Voice Input is “the control and operation of computer systems by spoken commands.”
- Some refer it to speech recognition or speech-to-text technology.
- It has two main types: 1) Dictation and 2) Voice Control.

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What??

- Dictation produces text in an edit field.
- Voice Control allows one to use verbal commands to execute a function or control the operation of a device.
- No matter which category, someone is speaking, someone is listening, and someone is processing.

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Why??

Benefits:

- Communication -> Expression of needs, wants and feelings, relationship building, etc.
- Automation -> Setting up reminders and appointments, prioritizing tasks, organizing, taking care of others, etc.

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Who would benefit from it??

- A lot of people…
- Who are too busy
- Who are multitasking
- Whose hands are doing something else
- Who do not have functional hands or fingers or upper or lower extremities
- Who have insufficient fine motor skills or poor dexterity in handling objects

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Who else would benefit from it??

- Who have tremors
- Who cannot type, write or spell
- Who are bed-bound
- Who needs help in organizing their daily lives
- Who have difficulties in prioritizing or in focusing
- Who do not have good working memory

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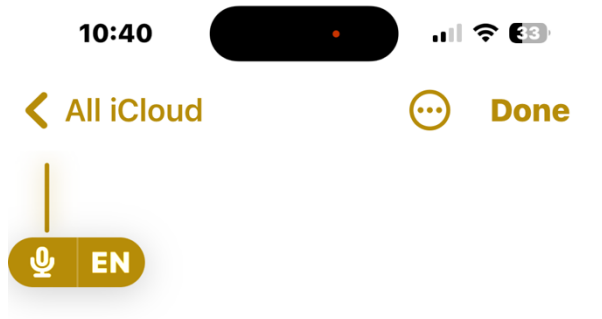
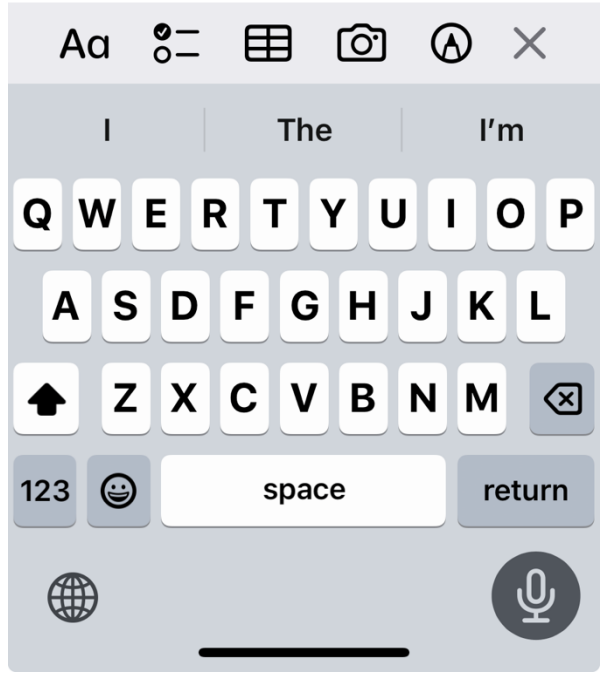
What devices have built-in dictation?



- Apple smart devices
- Android smart devices
- Windows Computers
- Mac Computers
- Chromebooks
- Smart TVs
- Newer automobiles and other machines that have speech recognition system



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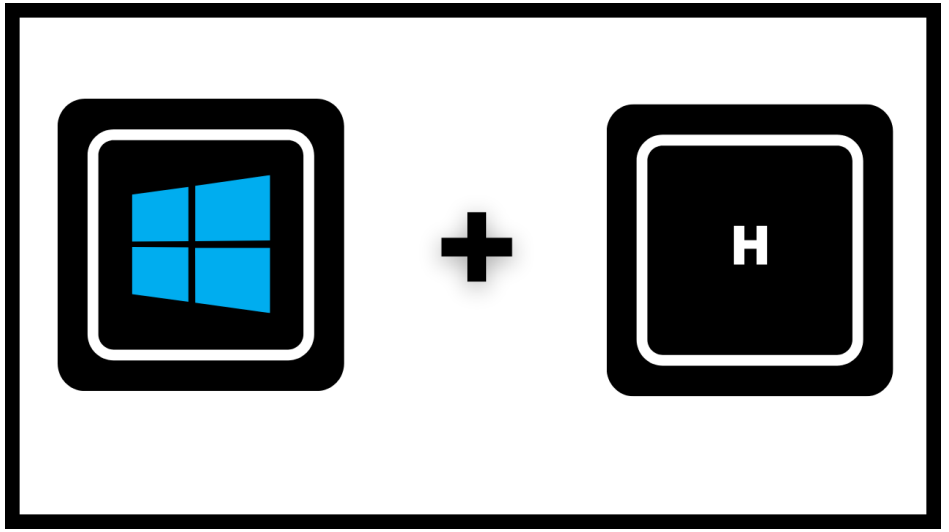
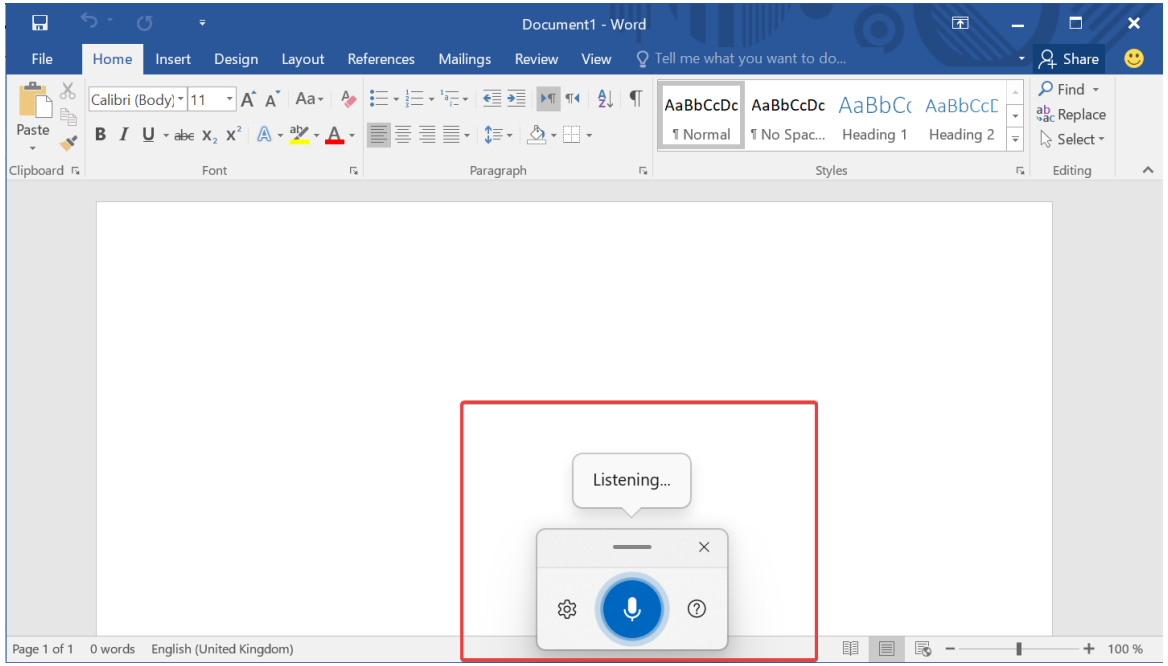
Windows Dictation





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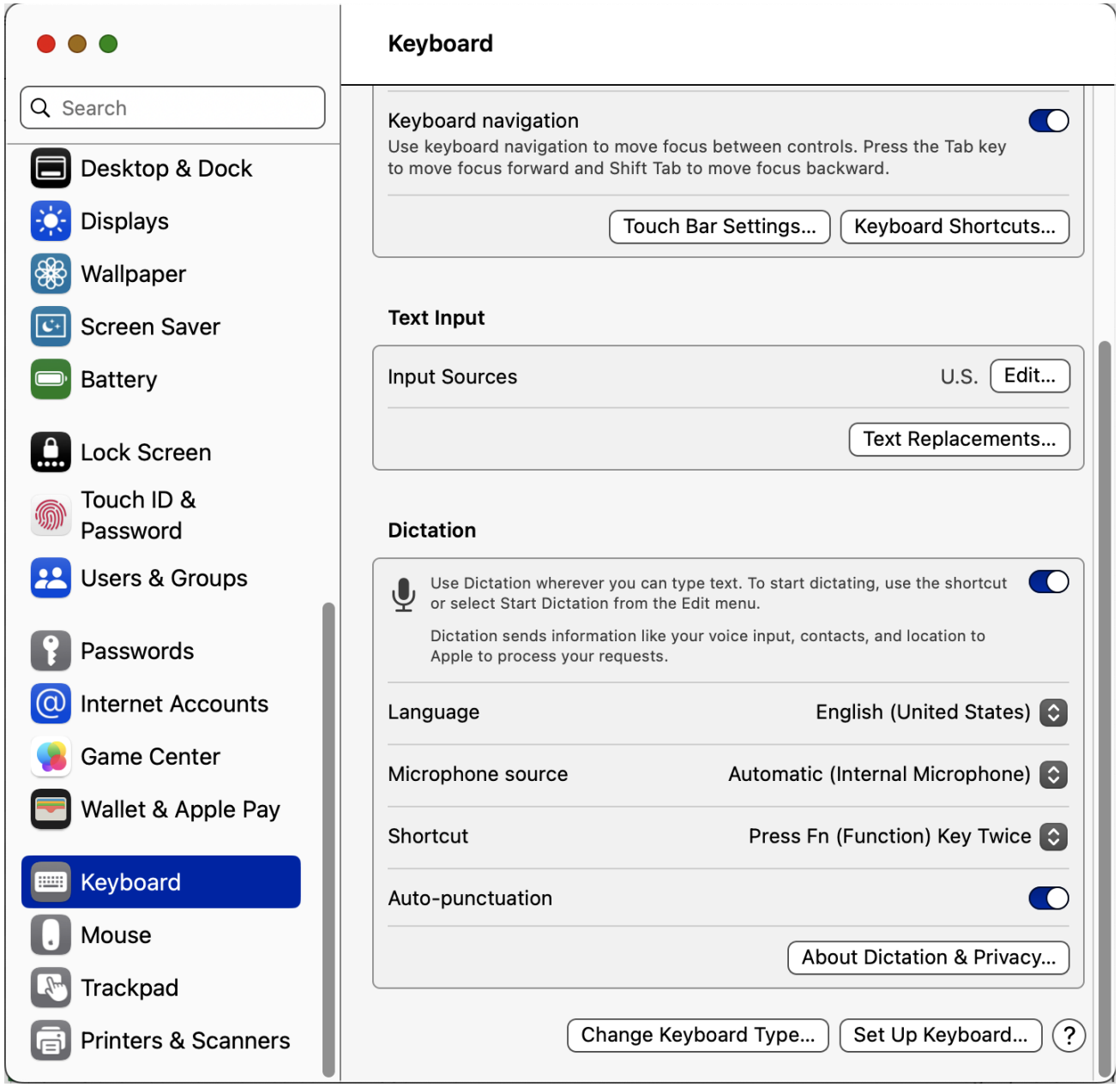
Mac Dictation



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Why is dictation not for everyone?

- Some prefer to type or write to express their thoughts or to study what they learn.
- The environment is too noisy.
- Some have speech disorder or tend to mumble.
- Some cannot find the microphone icon.
- Some have difficulties in activating the microphone icon.
- Some have difficulties in performing the gestures or keystrokes to activate dictation.
- Some ask, “Where is the edit field?”
- Dictation generally does not include word editing or correction by voice.

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Voice Control

- Voice Control allows one to use verbal commands to execute a function or control the operation of a device.
- Voice Control generally includes the dictation feature.
- Virtual Assistant powered by artificial intelligence is one type of voice control.

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Voice Control Commands Categories

Voice Control on a computer or a smart phone or tablet usually covers comprehensive verbal commands categories such as the following:

- Basic Navigation
- Overlays
- Mouse Mode
- Basic Gestures
- Advanced Gestures
- Dictation
- Text Navigation
- Text Selection
- Text Editing
- Text Deletion
- Device Accessibility

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What devices have built-in voice control?

- Apple smart devices
- Android smart devices
- Windows Computers
- Mac Computers
- Some adaptive equipment such as OrCam, smart glasses, hearing aids, headsets, etc.

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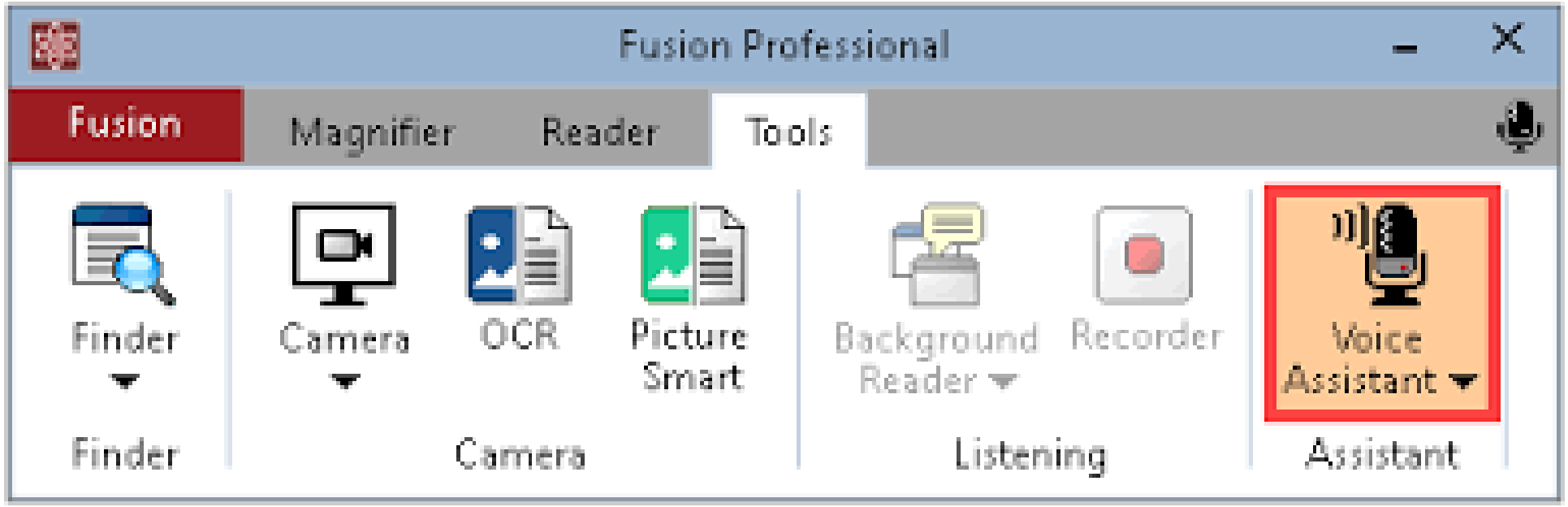
What software have voice control?

For example, the toolbar for the Fusion Software, a magnification and screen reading software from Vispero, contains a Voice Assistant button.



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Fusion Software from Vispero

- Voice Assistant provides a way to interact with Fusion and ZoomText in Windows 10/11 using speech input.
- Supported languages include English, Dutch, German, Spanish, and French.
- Ask Voice Assistant to help you with various Fusion or ZoomText features. For instance, to increase magnification, you could say "zoom in" or "increase zoom level" or "increase magnification."

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Examples of devices that have built-in virtual assistants

- Apple smart devices
- Android smart devices / Chromebooks
- Windows Computers
- Mac Computers
- Smart speakers
- Smart alarm clocks
- Smart homes

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RayBen Sunglasses – Meta Wayfarer

CONTROLS

Unlock a range of hands-free possibilities with **voice command** – call and message, capture content, and manage media settings with your phone in your pocket. Or activate the features in a **single touch** with the hyper-responsive touchpad and capture button.

Features:

- Meta AI – “Hey Meta”
- Camera – take photos and videos
- Audio – open-ear speakers
- Controls – voice commands for calls and messages
- Companion app
- Retail around $300-$500

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Smart Speakers

Major brands: Amazon, Google, Apple, Sonos

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Rosie 2.0 Alarm Clock with Voice Reminder for Medications

Rosie responds to simple voice commands like “what day is it”, “today’s reminders’, “reminder off” and more. Retail around $150.

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Rosie Alarm Clock Features

- Records up to 25 reminders/messages in the familiar voice of a loved one shown to deliver maximum task compliance.
- Record reminders/messages daily, weekly, Mon-Fri, by date or annually with associated reminder times.
- NO WIFI, NO FEES: Eliminates frustrations associated with wi-fi and costly recurring monthly fees.

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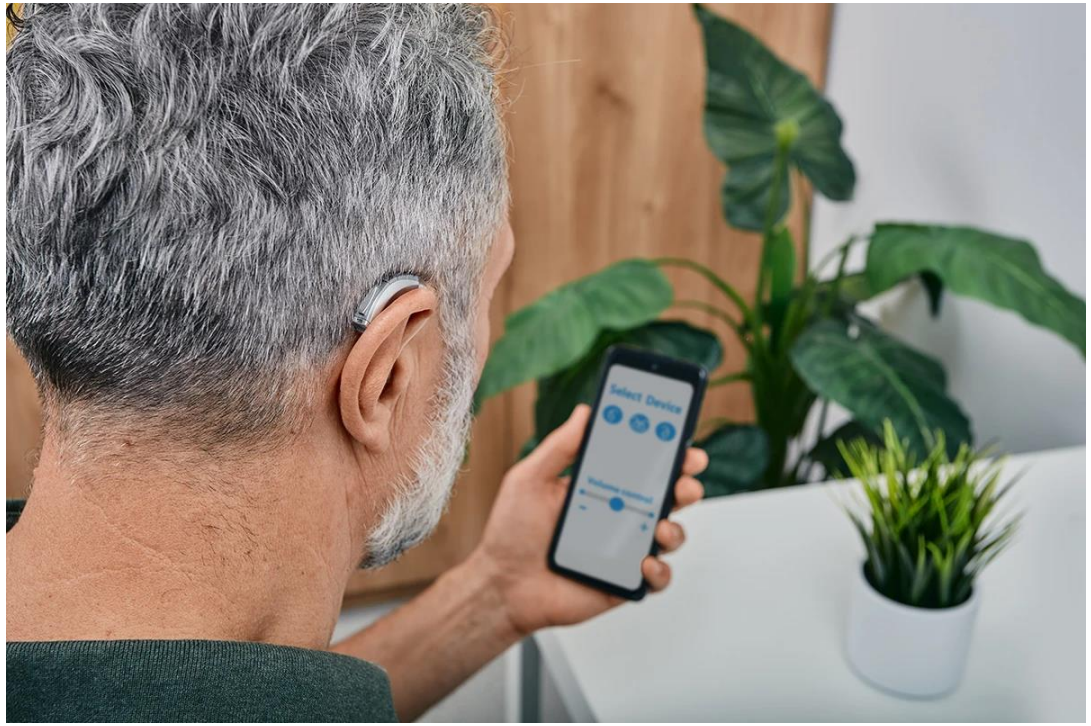
Hearing Aid Virtual Assistants

Hearing aid AI technology provides life-changing benefits like noise suppression, voice recognition, and rechargeability. Some hearing aids have built-in microphones, allowing you to control the setting of the hearing aids with your voice. For example, you can say “Mute my hearing aids” or “Volume up”, etc.



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Hearing Aid Voice Recognition Technology

Some hearing aids with artificial intelligence technology continuously analyze your environment and automatically optimize your settings to suit your surroundings. They have built-in voice recognition to amplify sounds that you want to hear and diminish sounds that you don’t.

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Hardware, software, environment and training that complete and enhance the entire experience

- Quiet environment
- One-on-one or group meetings
- Microphone
- User interface
- Responsiveness
- Training and practice

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Thank you for your Time!

Any Questions??

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AT for Eye Gaze Systems, Head Movement and Facial Expression detection

Presenter:

Marini Johnson & B.D. Berggoetz

Assistive Technology Trainers

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Agenda

1. Discover innovative **Hands-Free Mouse Control** options using Eye Gaze, Head Movement, and Facial Expression.
2. Compare **Access Methods** based on hardware needs and how they work, by focusing on individuals with diverse mobility and accessibility needs.
3. **Who** Benefits from These Technologies?
4. **Overview** of pricing, supported platforms, interface design, ease of use, learning requirements, and available training resources.

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Access Methods

- **Smyle Mouse** (Facial Gesture & Head Movement)
- **PC Eye** (Eye Gaze Tracker)
- **Cephable** (Head Movement Detection & Facial Gesture Detection)
- **Apple &Windows built-ins** (Eye Tracking, Head Movement Detection, Facial Gesture Detection)

smyle™ mouse

Cephable

cephable.com

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Who Benefits from these Technologies?

- **Quadriplegia or spinal cord injuries**: No hand or arm movement; rely on head or eye-based input.
- **ALS (Amyotrophic Lateral Sclerosis)**: Progressive loss of motor control; eye gaze often remains functional.
- **Cerebral Palsy**: May have limited fine motor control; head movement or facial gestures may be more reliable.
- **Multiple Sclerosis (MS)**: Fatigue and tremors can make traditional input difficult.
- **Muscular Dystrophy**: Weakness in limbs; alternative input methods reduce strain.
- **Moebius Syndrome**: Facial paralysis; head movement or eye gaze may be preferred.
- **Stroke survivors**: May have hemiparesis or facial muscle impairment.
- **Locked-In Syndrome**: Eye gaze is often the only reliable form of communication and control.

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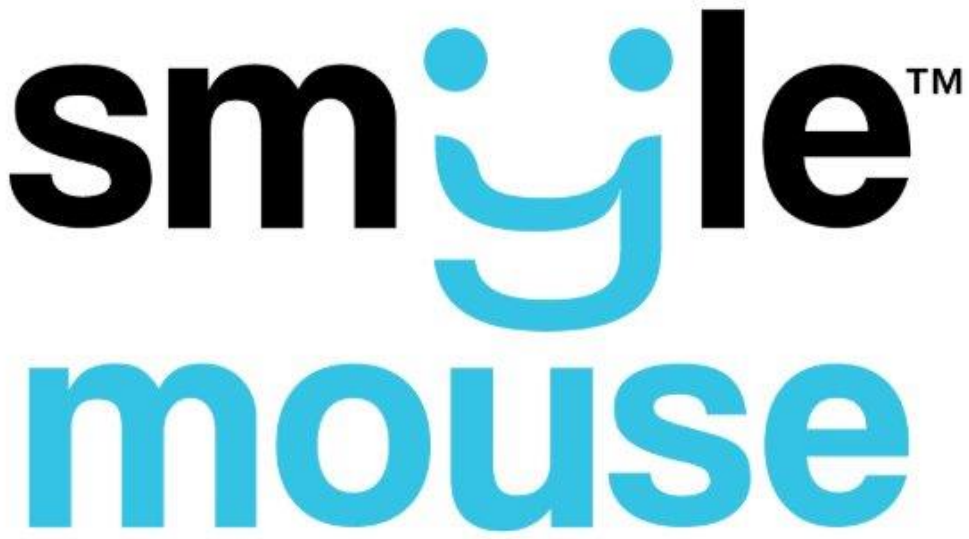
Smyle Mouse



- Uses webcam – no extra hardware needed
- Smile, blink, squint, or raise eyebrows to click
- Point, drag, scroll with head movement
- Great for users with ALS, MS, spinal injuries

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Tobii Dynavox PCEye

- Controls Windows using eye movement
- Works with tablets, laptops, desktops
- Includes TD control, TD snap, Communicator 5
- Supports web browsing, games, video calls
- Ideal for users with physical disabilities

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Cephable

- Combines voice, head movement, facial gestures
- Customizable controls for any app or game
- Works with webcams and microphones
- Designed for gaming, productivity, and creative tools
- Great for adaptive setups and neurodiverse users

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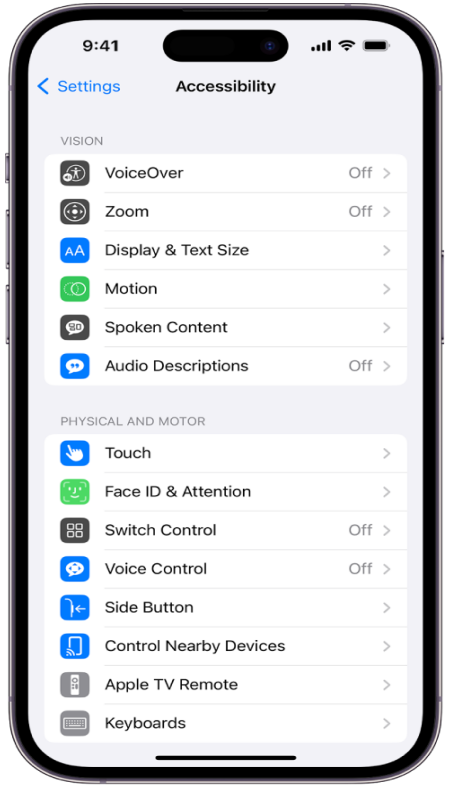
Apple Built-ins

Pre-installed Hands-Free Accessibility Features

- Voice Control : Full voice-based navigation
- Switch Control: External switch or screen scanning
- FaceTime Eye Contact Correction
- AssistiveTouch: On-screen gestures for limited mobility
- Live Captions, Magnifier, Siri Shortcuts



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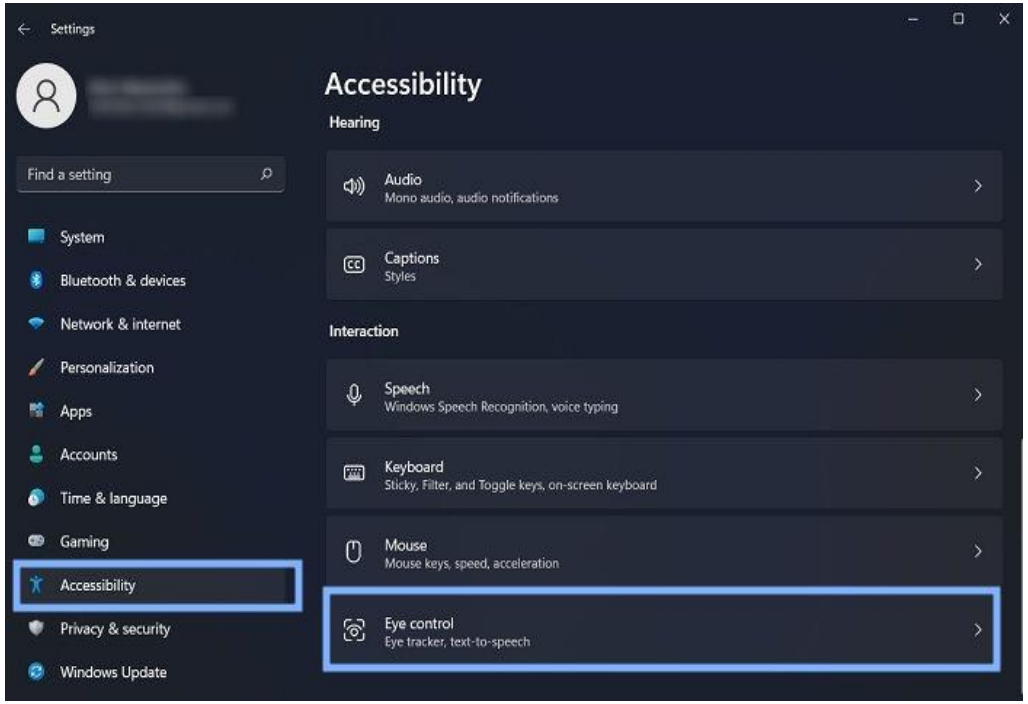
Windows Built-ins

Pre-installed Hands-Free Accessibility Features

- Eye Control: Works with compatible eye trackers
- Speech Recognition: Voice commands for navigation
- On-Screen Keyboard, Magnifier, Narrator
- Facial Recognition Login (Windows Hello)
- Color Filters, Sticky Keys, High Contrast Mode



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Smyle Mouse
Overview

- Cost: $649 one-time purchase
- Platform Availability: Windows 7 and above (desktop/laptop/tablet)
- Interface: Simple and customizable; uses webcam for head and facial gesture tracking
- User-Friendly: Yes; praised for ease of use and intuitive controls
- Learning Curve: Easy; 10-second calibration and learn-in-minutes setup
- Training Options: Online resources and support via Smartbox Hub; no formal training required

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Tobii Dynavox PCEye
Overview

- Cost: Varies by configuration; typically over $1,000 (quote required)
- Platform Availability: Windows 10/11 (64-bit); not compatible with ARM-based Surface ProInterface
- TD Control software; intuitive eye gaze navigation
- User-Friendly: Yes; designed for seamless eye-based control of Windows environment
- Learning Curve Moderate; requires calibration and familiarity with eye tracking
- Training Options: Extensive: on-site, online, e-learning via Tobii Academy; expert-led sessions available

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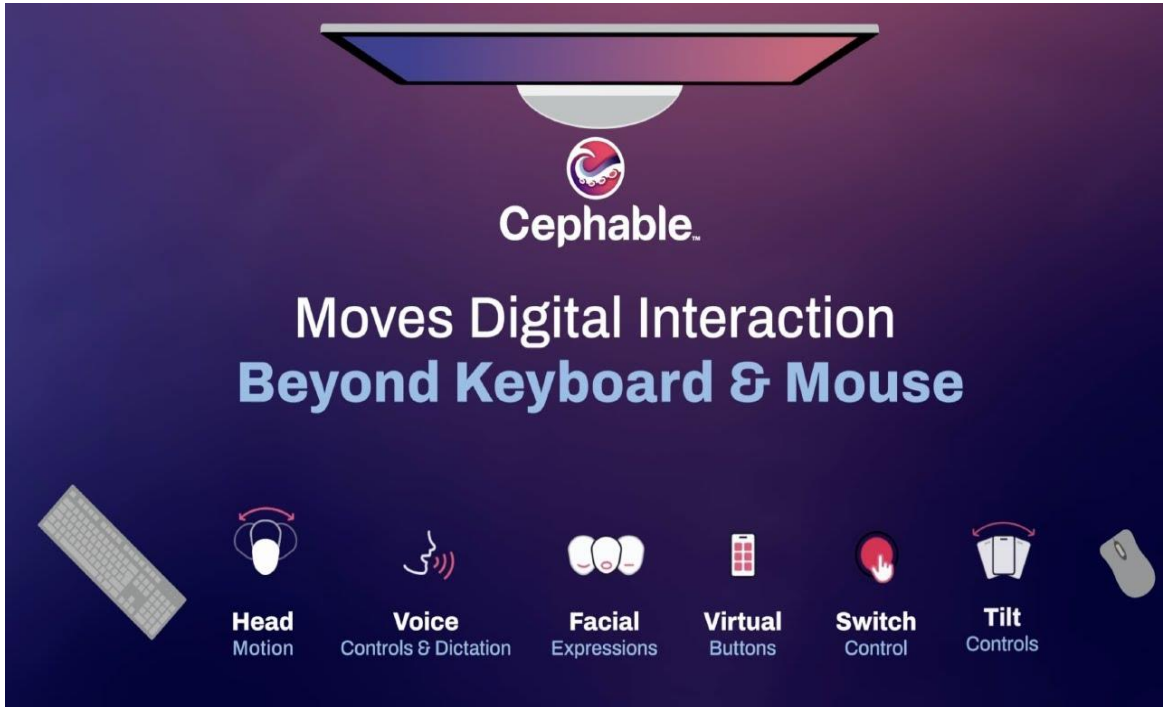
Cephable
Overview

- Cost: Free (Basic), $10/month (Plus), $29/month (Professional), Custom pricing (Enterprise)
- Platform Availability: Windows and macOS; mobile app for iOS and Android
- Interface: Modern and customizable; supports voice, camera, and quick action controls
- User-Friendly: Yes; designed for intuitive control and personalization
- Learning Curve Easy to moderate; depends on customization depth
- Training Options: Guides, insights, and tools available online; no formal training required



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Apple Built-In Accessibility

Overview

- Cost: **Free**; built into all Apple devices
- Platform Availability: macOS, iOS, iPadOS, watchOS, tvOS
- Interface: Highly polished and integrated; includes VoiceOver, Magnifier, AssistiveTouch, Eye Tracking, etc.
- User-Friendly: Extremely; designed for universal access from the start
- Learning Curve Easy to moderate; depends on feature complexity
- Training Options: Apple Support videos, accessibility guides, and expert help available

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Windows Built-In Accessibility Overview

- Cost: **Free**; built into Windows OS
- Platform Availability: Windows 10 and 11
- Interface: Includes Narrator, Magnifier, Speech Recognition, Eye Control, etc.
- User-Friendly: Yes; designed to be accessible to all users
- Learning Curve: Easy to moderate; varies by feature
- Training Options: Microsoft support articles, tutorials, and community forums

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Thank you for your Time!
Any Questions??

Please check out our website,

www.eastersealstech.com

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