MULTI-FUNCTION ELECTRONIC AIDS TO DAILY LIVING
Michelle L. Lange, OTR, ABDA, ATP/SMS

Electronic Aids to Daily Living (EADLs) control devices in the environment using an alternative method, to provide independent control for persons with physical, sensory and/or cognitive impairments. This chart compares many of these systems and is categorized by access method. This is not an exhaustive list and is based on my personal opinions. This document contains products available in the United States.

DIRECT ACCESS SYSTEMS

Direct Access is finger (or pointer) to button for direct selection of a device function. This requires adequate fine motor control. Vision and reading are generally required.
Some manufacturers sell dedicated Direct Access EADLs specifically designed for people with disabilities. These are not listed here as these are overpriced in comparison to the commercially available Home Automation products on the market.

Audio/Visual Only

Audio/Visual remote control models and prices change frequently. Check with the manufacturer. Some of these are Universal Remote controls which combine functions of several remote controls so the consumer only needs to use one. This also results in more and smaller buttons on a remote. Some of these remote controls offer larger buttons to ease motor and vision requirements. Some Service Providers (i.e. Comcast) have their own remote control which can also be programmed as a Universal Remote Control to control the TV and other attached devices, such as a DVD player. Other Universal Remote Controls may not control these cable boxes/satellites as the original Service Provider remote control may send a combination of infrared and radio frequency signals. Finally, some clients have do not require a large number of buttons and find this confusing. Some remotes offer only the most commonly used buttons to simplify these tasks.

Universal Remote Control *Example:* GE 24912 3 Device Universal Remote Control, Smarthome.com, $9.99 *Pros:* combines features of separate remotes so the consumer only requires one, only needs to carry one. *Cons:* many small buttons require good fine motor control, vision, sometimes reading, and cognition. This will not work in place of many Service Providers remote controls.	
Large Button Remote Control *Example:* Big Button Remote Control, maxiaids.com, $24.95 *Pros:* larger buttons are easier to access and see. Some are backlit. *Cons:* still may be difficult for those with fine motor limitations, still many buttons to see and sometimes read. This will not work in place of many Service Providers remote controls.	
Simple Remote Control *Example:* Fobis Technologies WE-10 Weemote dV Remote, Smarthome.com, $29.99 *Pros:* only includes critical buttons which may ease cognitive and visual requirements, may prevent client from accidentally activating certain functions. *Cons:* limited function control. This will not work in place of many Service Providers remote controls.	
Smart Phones and Tablets Options allow a Smart Phone or Tablet to function as an audiovisual remote control. These devices transmit WiFi and Blue Tooth (BT) only. Most A/V equipment receives Infrared (IR) signals. *TV only:* - Many TV manufacturers offer an App to allow these devices to act as a TV remote control. These often require a hardware accessory to convert BT signals to IR signals. Example: Westinghouse iWavit. - Some hardware converts BT to IR externally, so that nothing has to plug into the device itself. An example is the Beacon from Griffen Technology. A universal remote App can then be used with any TV, such as Dijit Media. *TV and other A/V equipment only:* - The Beacon and similar technologies, along with a universal remote App, can control other A/V equipment, as well. - Universal Remote App examples: i-Got Control, Re, RedEye and FLPR. *Service Providers only:* Many Service Providers (i.e. Comcast) offer an App to allow an Smart Phones or Tablets to act as their remote control, typically using the wireless network in the home. Another App is required to control the TV and other A/V devices.	 iWavit  Beacon

DIRECT ACCESS SYSTEMS, cont.

Modular Only

These remotes send a signal to modules that can, in turn, control lights, simple appliances, thermostats and more. Only wireless options are listed here, as these are portable for people with disabilities. X10 technologies are still available, but becoming obsolete, so are no longer listed here.

Insteon Mini Remote – 8 scene Smarthome.com, $44.99 *Pros:* controls multiple modules, good range, good price *Cons:* requires 2 Access Point phase couplers, $39.99	
Vizia RF Z-Wave Programmer Smarthome.com, $150.99 *Pros:* controls multiple modules, good range *Cons:* higher price	
Smart Phones and Tablets These devices transmit WiFi and BT and generally control modules through WiFi. - Insteon App (free) works on iPhone, iPad and Android, requires Insteon Hub $130. This system controls light modules, appliance modules, thermostats, cameras and more. Smarthome.com. - MobiLinc, MobiLinc Lite and MobiLinc Pro and HD App for iOS systems and Android. Lite version is free, others are low cost. Controls multiple modules. Requires controller. - Other Apps include Cortexa, eKeypad and Indigo Touch. The latest for iDevices and Android can be found at www.smarthome.com.	

Combination Systems

Although some dedicated EADL systems provide A/V and Modular control via Direct Access, these systems are outdated and costly. Combination systems are primarily Tablet based at this point.

IRLinc Receiver The IRLinc converts IR signals to Insteon signals. An extra function button on any universal remote control can be programmed to control an Insteon Device. Smarthome.com, $99.99.	
IRLinc Transmitter The IRLinc Transmitter converts Insteon to IR signals. This can be used with the Insteon mini remote above to provide control of A/V devices, as well as modules. Smarthome.com, $89.99 (requires Insteon remote)	
Smart Phones and Tablets - iRule uses direct network control for A/V equipment and modules using the Leviton Z-Wave controller. - Control 4 MyHome (requires Control4 system)	

**Any information regarding options for Smart Phones and Tablets tends to change rapidly, so please check on current options.*

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SWITCH ACCESS SYSTEMS

Switch Access allows any type of switch placed in any location to access an EADL, typically through scanning. One to two switches can be used. Vision and reading are generally required, though some of these systems utilize graphics or auditory scanning.

Many of these systems have become quite outdated. Many tablet computers can now be accessed with a switch and specialized switch interface (or BT switch for iOS7 and above) though navigating Apps such as those listed above under Direct Access can be quite tedious using switch access at this time. The visual and cognitive load is also high.

Some of these systems only send IR signals. X10 modules could be controlled by IR in the past using an X10/IR convertor that is no longer available. These same systems can send IR signals to an IR/Insteon convertor (IRLinc) and control Insteon modules. Some original Cable/Satellite Service Provider remote controls may send a combination of infrared and radio frequency signals. The EADL will not be able to learn the RF signals.

Prices are not listed as these vary with the specific options chosen.

Angel ECU 772-834-1989, www.angelecu.com *Pros:* learns IR signals, macros, can customize display, controls multiple devices including AV, X10, other lighting systems, built-in phone, bed, nurse call, serial and relay control. Optional portability (remote control) with voice prompts (auditory scanning). New residential version, EX ECU. *Cons:* expensive, may require dealer support for order and set-up.	
GEWA Control Prog Zygo Industries, 800-234-6006, www.zygo-usa.com *Pros:* Direct or Switch access. Learning IR remote. Can control Insteon modules by learning these codes (i.e. IRLinc). Macros. Portable. *Cons:* must change overlays to access more than 18 functions, no auditory scanning. Outdated.	
HouseMate ECU for Android Configurator (*Tablet based) Broadened Horizons, 612-851-1040, www.broadenedhorizons.com *Pros:* full device and function control, full tablet control, 1-2 switch access. Uses Housemate wireless Bluetooth ability switch interface and learning IR. Can add optional ClickToPhone for phone control. Can customize templates. *Cons:* expensive. *HouseMate is from ClicktoGo in the UK.*	
MM40 ECU (*Tablet based) Convergence Concepts, 303-907-3050, www.convergenceconcepts.com *Pros:* Windows Tablet based. Single switch scanning or dual switch. Also head tracking, direct, voice and USB input devices. Sends IR and Insteon, Macros, option to control IR speakerphone or BT cell phone. Mounting arm. *Cons:* expensive, text only, no auditory scanning.	
PocketMate SAJE Technology, 847-756-7603, www.saje-tech.com *Pros:* one to two switch access, optional phone, auditory feedback, macros, up to 16 devices (including AV, lights, phone, bed) and 16 functions for each device. *Cons:* no graphics, no auditory scanning, small display.	
Primo! Possum/AbleNet, Inc., 800-322-0956, www.ablenetinc.com *Pros:* Direct or Switch (1-2) access, learning IR, sends IR signals, dynamic display, macros, portable, compatible with Sero! IR phone, 179 functions, can customize display, templates included, graphics and text. *Cons:* monochrome display, expensive, no auditory scanning.	

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Relax II AbleNet, Inc., 800-322-0956, www.ablenetinc.com *Pros:* one to two switch access, up to 4 devices and 40 functions, learning IR, 10 X10 devices through radio signals, inexpensive *Cons:* no graphics, no macros, no auditory scanning, outdated.	
Servus 10-Z (*Tablet based) Zygo-USA, 888-321-6006, www.zygo-usa.com *Pros:* controls anything that receives IR and uses Z-wave for modular control. Learning IR, uses Windows 8 Tablet PC, The Grid 2 software and backbox with switch interface and USB port. Customizable templates. *Cons:* expensive, additional cost for RF transmitter and Wi-Fi to IR converter.	
Simplicity Switch Quartet Technology, 978-957-4328, www.qtiusa.com *Pros:* pre-programmed IR codes and learning IR, controls multiple devices and functions including AV, lights, nurse call (option), built-in telephone, appliances, bed control, client can listen to options (no vision or reading required). *Cons:* 2 switch control only, not portable, no display, expensive.	
Switchamajig (*Tablet based) Enabling Devices, 800-832-8697, www.enablingdevices.com *Pros:* controls anything that receives IR, uses Wi-Fi to IR converter, learning, can use with IRLinc for modular control, can customize templates by size, color, text, symbols, pictures and auditory response. Requires BT switch. App free, IR Converter has low cost. *Cons:* for IPad only, no auditory scanning.	

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VOICE ACCESS SYSTEMS

Voice Access EADLs are controlled by discreet voice commands. Many of these systems do not have a display at all or it is very small and provides little information. The client must therefore have a good memory to remember where specific functions are in a hierarchy and what sequence of commands are required to get to the desired choice.

Switch back-up access is critical in case voicing is not recognized.

Some of these systems only send IR signals. X10 modules could be controlled by IR in the past using an X10/IR convertor that is no longer available. These same systems can send IR signals to an IR/Insteon convertor (IRLinc) and control Insteon modules. Some original Cable/Satellite Service Provider remote controls may send a combination of infrared and radio frequency signals. The EADL will not be able to learn the RF signals.

Prices are not listed as these vary with the specific options chosen.

Independent Living Systems Speak4Use, 850-381-4321, www.speak4use.com *Pros:* Voice access, IR signals, supports large amount of devices. No vision or literacy required (no display), wireless microphone for portable use, alert chime, power door opener control, uses Microsoft Voice. Also provides computer control. *Cons:* No display, expensive.	
MM40 ECU (*Tablet based) Convergence Concepts, 303-907-3050, www.convergenceconcepts.com *Pros*: Windows Tablet based. Built in mic or external. Also head tracking, direct, switch and USB input devices. Sends IR and Insteon, Macros, option to control IR speakerphone or BT cell phone. Mounting arm. *Cons*: expensive, text only, no auditory scanning.	
Pilot One **Pilot Pro** AbleNet, Inc., 800-322-0956, www.ablenetinc.com *Pros:* Voice or Switch (1-2) access, IR and X10 control, X10 (Pro version RF signals, One version IR signals, must use Insteon), portable, macros, learns IR. Optional phone, bed and external microphone. Auditory scanning on Pro version. Pro version has more features, but is more expensive. *Cons:* Small display, no graphics. Voice recognition with built-in microphone not strong. Pro version expensive.	
PocketMate plus Voice SAJE Technology, 847-756-7603, www.saje-tech.com *Pros:* one to two switch access, voice access, optional phone, auditory feedback, macros, up to 16 devices (including AV, lights, phone, bed) and 16 functions for each device. No voice training required. *Cons:* no graphics, no auditory scanning, small display.	
Roomate Plus SAJE Technology, 847-756-7603, www.saje-tech.com *Pros:* Voice or Switch (1) access, IR and X10 (powerline) control, phone, portable with wireless headset, macros, learns IR. Vision and literacy not required (no display). Auditory feedback. *Cons:* No display, expensive.	
Servus 10-Z (*Tablet based) Zygo-USA, 888-321-6006, www.zygo-usa.com *Pros:* controls anything that receives IR and uses Z-wave for modular control. Learning IR, uses Windows 8 Tablet PC, The Grid 2 software and backbox with switch interface and USB port. Customizable templates. *Cons:* expensive, additional cost for RF transmitter and Wi-Fi to IR converter.	

Simplicity II AIO Quartet Technology, 978-957-4328, www.qtiusa.com *Pros:* Voice access, Switch (1-2) access on AIO, IR and X10 signals, pre-stored and learning IR, portable with wireless headset, vision and literacy not required (no display), nurse call option, speech feedback, Plus model includes computer access. *Cons:* No display, expensive, no macros.	
VoiceIR Infrared Voice Controller Broadened Horizons, 612-851-1040, www.broadenedhorizons.com *Pros:* Direct (for caregiver) or voice (1-4 users) access, IR signals, modules through converter, learns IR, portable, IR bed control, IR phone control, very inexpensive. *Cons:* No display, limited battery life, reliability issues and support.	

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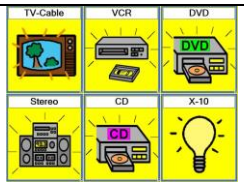
COMPUTER ACCESS SYSTEMS

Other Assistive Technology can send signals to control devices in the environment, including Computers, Speech Generating Devices and Power Wheelchairs. Tablet options are listed under Direct Access.

Many Home Automation software/hardware packages are available that are primarily designed to set-up scheduled events in the home using X10 technology. Some of these also send IR signals. To control individual devices and functions, the consumer must be at the computer. These are not specifically designed for people with disabilities. Common examples include X10 Active Home, Hal 2000, Control 4 and Home Director. A good resource for these products is SmartHome.com.

Some of these systems only send IR signals. X10 modules could be controlled by IR in the past using an X10/IR convertor that is no longer available. These same systems can send IR signals to an IR/Insteon convertor (IRLinc) and control Insteon modules. Some original Cable/Satellite Service Provider remote controls may send a combination of infrared and radio frequency signals. The EADL will not be able to learn the RF signals.

Prices are not listed as these vary with the specific options chosen.

CINTEX 4 NanoPac, Inc., 800-580-6086, www.nanopac.com *Pros:* uses computer access method (typically voice), IR and X10 control, phone, learns IR. *Cons:* no macros, not portable, outdated.	
Independence One Independence One, 630-717-9514, www.independenceone.net *Pros:* uses computer access method, can be accessed through a tablet or cell phone, browser based, uses X10, Zigbee, BlueTooth and WiFi. Browser communicates to wireless access point. *Cons:* not adapted for visual or cognitive limitations.	
MEDIAssistant System Convergence Concepts, 303-907-3050, www.convergenceconcepts.com *Pros:* Uses computer access method, IR and Insteon control, built-in speakerphone, includes PC, separate touch screen remote control, Tablet based version (MM40, can be run on Smart Phone or Tablet as well). Portable with microphone or MM40 version. *Cons:* Main system not portable. Expensive. Must use their computer.	
MotivAid 908-781-6595, www.motivaid.com *Pros:* uses computer access method, IR and Insteon signals, phone, learns IR. *Cons:* no macros, not portable.	
MultiMedia Max Multimedia Designs, 888-353-3996, www.multimediadesigns.com *Pros:* uses computer access method (typically voice), includes Dragon Naturally Speaking, IR and X10 or Z-Wave signals, phone, learns IR, macros, graphics, includes laptop computer, training and installation. Remote chime. Can program reminders. Portable with headset. *Cons:* Have to use their computer, expensive.	
PTP-PC for EADL RJ Cooper & Assoc., 800-752-6673, www.rjcooper.com *Pros:* uses computer access method, switch scanning capabilities built-in, IR and X10 control, phone, learns IR, software runs on some speech generating devices, inexpensive. Includes software and USB/IR cable. *Cons:* no macros, not portable. X10 control uses discontinued convertor.	
REACH Break Boundaries, 513-645-4203, www.breakboundaries.com *Pros:* touch screen, voice, switch scanning, IR and X10 (radio receiver) signals, phone. Learns IR, macros, portable dedicated computer, can customize screen. *Cons:* expensive.	

SPEECH GENERATING DEVICES

Other Assistive Technology can send signals to control devices in the environment, including Computers, Speech Generating Devices (SGDs) and Power Wheelchairs. Tablet options are listed under Direct Access.

Some of these SGDs only send IR signals. X10 modules could be controlled by IR in the past using an X10/IR convertor that is no longer available. These same systems can send IR signals to an IR/Insteon convertor (IRLinc) and control Insteon modules. Some original Cable/Satellite Service Provider remote controls may send a combination of infrared and radio frequency signals. The EADL will not be able to learn the RF signals.

What are the advantages of using an SGD to control devices in the environment?

- A variety of access methods. The SGD access method is used; most commonly switch access for EADL features.
- Learning IR.
- If a client already uses an SGD for communication and theses features are included, no or little additional cost is required to provide control. For modular control, modules must be purchased. If a client does not need the device for communication, the SGD may still be the most appropriate EADL option.
- SGDs capable of these functions allow the hierarchy of commands to be customized to an individual's needs.
- Graphics can be used for clients with low vision or who are illiterate.
- Auditory scanning can be used for clients with low or no vision.
- Auditory scanning can be used for clients with poor memory or sequencing to provide a cue to available options.
- Some SGDs have cell phone capabilities.
  Examples of SGDs that include these features: DynaVox's Maestro, V series, Xpress, M3 and Prentke Romich's Essence and ECO. Newer Tablet based SGDs do not send IR signals.

What are the disadvantages?

- These features can only be accessed when the client can access their SGD. The SGD needs to be mounted in all areas the client may need control, including bed.
- It can be challenging to find professionals who know how to set up these features.

POWER WHEELCHAIRS

Other Assistive Technology can send signals to control devices in the environment, including Computers, Speech Generating Devices (SGDs) and Power Wheelchairs (PWCs). Tablet options are listed under Direct Access.

Many complex rehab level power wheelchairs use electronics that are capable of learning and sending IR signals. These electronics include Invacare MK6i (used on Invacare PWCs), PG Drives R-net (used on Permobil, Quickie and Otto Bock PWCs) and Quantum Q-Logic (used on Pride Mobility Quantum Rehab PWCs). Some of these PWCs only send IR signals. X10 modules could be controlled by IR in the past using an X10/IR convertor that is no longer available. These same systems can send IR signals to an IR/Insteon convertor (IRLinc) and control Insteon modules. Some original Cable/Satellite Service Provider remote controls may send a combination of infrared and radio frequency signals. The EADL will not be able to learn the RF signals.

What are the advantages of using a PWC to control devices in the environment?

- A variety of access methods. The PWC access method is used to navigate choices and select.
- Learning IR. Some electronics also contain pre-stored IR codes.
- If a client already uses a PWC for mobility and these features are included, no or little additional cost is required to provide control. For modular control, modules must be purchased. MK6i and R-net are separate features that may not be covered by third party payers. The price to add these features is often less than buying a stand-alone system.

What are the disadvantages?

- These features can only be accessed when the client is in the power wheelchair, not if the client needs to use a manual chair (i.e. accessibility, break-down of the PWC) or is in bed.
- It can be challenging to find professionals who know how to set up these features.
- The display is small and requires good vision and usually literacy. The display can usually not be customized.
- A combination of switch activations or joystick movements are required to navigate and select features.
- TV Channel control is Channel Up and Channel Down which is not always practical for clients who have large channel options.
- Less device and function options than other options.

Glossary:

IR: infrared control of audio/visual equipment, IR phone or other IR controlled device
X-10: on/off control for lights, appliances, fan, buzzer, door opener, drapery control, more. Uses existing house wiring (powerline) and, if remote, radio (RF) to a converter.
Insteon: like X10, uses powerline and RF, more reliable, can control more devices. Can be given X10 address.
UPB: like X10, uses single band technology, powerline.
ZigBee and Z-Wave: like X10, single band RF wireless network.
Bed control can be accomplished with IR signals using the Ablenet IR Bed Control, $1000.
Door Openers can usually be controlled with an X10 module. If the EADL is not portable, you cannot open the door from outside. IR Door openers are available, as well though are subject to light interference, especially the outside receiver.
Any EADL transmitting IR may be programmable to send to an IR telephone. Check with the manufacturer.

Please also refer to the Basic EADLs and Phone/PERs/Pager charts.