Characteristics Of Electronic Aids To Daily Living
Learning Outcomes

• Recognize the definition of Electronic Aids to Daily Living
• Identify functional applications of specific Electronic Aids to Daily Living
• Distinguish between transmission methods for specific Electronic Aids to Daily Living
What are Electronic Aids to Daily Living?

- EADLs provide independent control of electrical devices within the environment
- EADL Definition: “Any electronic technology used for the specific purpose of providing independent operation of appliances”

Barker, Lange 2003
What’s in a name

• EADLs
• Formerly Environment Control Units (ECUs) or Environmental Control System (ECSs)
• EADLs defines the task rather than what is being controlled
• ECU technically refers to HVAC
EADL Applications

What do EADLs control?

- Audio / visual equipment
- Powered hospital bed controls
- Door openers & Security Cameras
- Telephone
- Lights and Appliances
- Heating and air conditioning
User Interface

How can the client access the EADL?

- Direct Selection to Control Unit
- Switch (Single Switch or Scanning)
- Voice
- Via a computer
- Via a communication device
- Via Smartphone Interface
Who can benefit from EADLs?

• Nearly all ages
  • children need control for play

• Any client who cannot independently control devices in the environment due to physical, cognitive and/or sensory issues
Environments

Where can EADLs be used?

• Home
  • i.e. stereo, bed, HVAC, security cameras
• Work
  • i.e. lights, door
• School
  • i.e. slide projector, automatic fish feeder
• Community
  • i.e. elevators, door openers
Needs Assessment

Consumer

• Goals - short and long term
  • Choosing a system which is expandable
• Control needs - applications
• Physical abilities
  • motor, endurance
• Psycho-social issues
• Cognitive skills
  • memory, sequencing, reading
• Sensory skills
  • vision to see display
Needs Assessment

• Environmental considerations
  • Where will the EADL be used?
    • i.e. home
  • Does the EADL need to be portable?
    • i.e. use from wheelchair and bed
  • Will the client use the EADL in more than one room?
    • i.e. possibly use a transmission method that goes through walls
Classification

• General function EADL
  • Limited output
  • Multiple output

• Specific function EADL
Limited Output EADLs

- Intermittent switch control of battery operated or electrical devices
- Typically single switch access
- Modes of control
  - momentary or direct
  - latched
  - Timed
- Can be used to develop scanning skills
Limited Output EADLs

Switch Latch and Timer

PowerLink 4
Multiple Output EADLs

- Control more than one device
- Multiple Control Interface/Access options
Multiple Output EADLs: User Interface or Access Method

• Keyboard/direct
• Single switch/switch array
• Speech recognition
• Via a computer
• Via a communication device
• Via a power wheelchair
• Via smartphone interface
User Interface/Access Method

- Keyboard
- Direct

- Note: newer technologies Interface with older X-10 modules.

X-10 mini controller
User Interface/
Access Method:
Keyboard/Direct

Universal Remote
Control
User Interface or Access Method

• Single switch/switch array

• Tash – Relax Unit
User Interface or Access Method

Speech recognition

Pilot
User Interface or Access Method

Using a computer or smartphone interface

Multimedia Max or current Home Automation Systems
User Interface or Access Method

Through a communication device

Dynavox
Home Automation Resources

Autonome
1-800-933-8400
https://asi-autonome.com

Smarthome
1-800-762-7846
www.smarthome.com

Home Controls Incorporated
1-800-266-8765
www.homecontrols.com
Home Automation Resources

• Amazon Alexa Smart Home
• Google Home
• Apple Home
• Internet of Things (IoT)
Interfacing EADLs to a Power Wheelchair

• Allows client to access the EADL using the driving access method
• Always switch output
• Requires interfacing component and a cable
  • i.e., Invacare AUX1/2 or AUX 3/4
• Some newer power wheelchair electronics send IR signals
Interfacing EADLs to Power Wheelchairs

Invacare COMM 1,2
Specific Function EADLs

• Door openers

• Adaptive phones

• Page Turners
Adaptive Phones

- Infrared
- Switch controlled
- Voice controlled
Door Openers

• Battery back-up is essential in an emergency

• May receive IR or X10 signals
Page Turners

• Tend to be expensive and not work well
• Consider other options
  • Audiobooks/MP3
  • computer

GEWA PAGE TURNER
Modes of Transmission

• Direct connection
• Remote
Direct Connection

• 2-wire cables and multi-wire cables
• House wiring
  • Circuits
  • Breakers and fuses
• Not portable
Remote

- Requires a transmitter and receivers (or transceivers)
- Trainable/programmable remote control
- Usually portable

Technology

- Radio frequency (RF)
- Infrared (IR)
- Wi-Fi
- Bluetooth
Module Control

• X10
  • Uses existing house wiring (powerline)
  • Remote uses radio frequency (RF) or IR
  • Can be interfaced with new wireless technologies

• Insteon
  • Powerline and RF
  • More reliable than X10, can control more devices

• Z-wave (Zigbee system)
  • Single band RF wireless network
Module Control

• These technologies can control:
  • Lights
  • Simple appliances (i.e. fan)
  • Specialized Thermostats
  • Window A/C units
  • Electric Hospital beds (with adaptor)
  • Power door openers
Module Control

• X10:
  • X10 is technology that sends signals over the house wiring to turn on and off simple appliances, such as lights and fans
Module Control

• Insteon Technology
  • Mesh Network
    • Combines house wiring and RF
  • RemoteLinc
  • 6 scenes (macros)
  • 417 devices
  • Requires Access Point
Module Control

- Z-Wave Technology
- Mesh Network
  - House wiring
  - RF
- Vizia RF Z-Wave Programmer
- 256 devices
- Scenes (macros)
Infrared (IR)

- Line of sight
- Inexpensive
- Readily available
- Can be subject to light interference
Radiofrequency (RF)

• Goes through walls and ceilings
• Subject to interference
• Good range
The X10 problem...

• X10 stopped making their IR/X10 receiver
• This was the only way to control X10 modules from EADLs and SGDs that only send IR signals
• What to do?
  • Insteon!
  • Zigbee
Insteon Module Control

- www.smarthome.com
- IRLinc Receiver #2411R
  - Receives IR signals and sends to modules
  - Includes remote
- Access Point #2443
  - Order 2, phase couplers that allow devices to talk across circuits
Insteon Module Control

• ApplianceLinc #2456S3
  • Appliance module
• LampLinc #2456D3
  • Lamp module
• Thermostat #2491T1
  • Thermostat control
• Insteon Wall Switch #2477D
  • For ceiling lights

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Safety

• User understanding of operation and modes
• Operational limits to prevent injury to user (powered bed controls)
• Equipment power ratings
• Power outlet multiplication
• If client has access to door opener, are they safe outside alone?
• If client has access to phone, will they use this responsibly? (i.e. not call 911 if not required)
Emerging Technologies

EADL Technologies are constantly changing – web searches and YouTube will often find current applications which are available – “youtube, disability, home controls.”
IR Remote Controls

• Tablets and Smartphones
  • Apps are available that can control specific TVs and Cable boxes.
  • An external hardware device is required to send the IR signal (Samsung Android built-in)
    • Plugs into Tablet
    • Hub
  • Much of the Cable Box control is through a wireless network
  • Requires reading, good vision, precise control
IR Remote Controls
Module Control

- Tablets and Smartphones
- More Apps are coming out to control these modular systems
- Work on wireless network
Module Control Apps

- INSTEON Hub
- Netvox Zigbee System
- MobiLinc
- Cortexa
- These require the App, a controller and modules
Servus 10-Z

- Windows 8 Tablet PC
- Uses The Grid 2 software
- Can be controlled by touch, switches, voice or USB input device
- Both IR and RF
- $2680
- Zygo
HouseMate
HouseMate ECU for Android

• Available from Broadened Horizons
• 1-2 switch access
• IR learning
• Customize templates
• Hardware is BT switch interface and learning IR Controller
• $1500
• http://housemate.ie

M. Lange 4.2014
ClickToPhone

HouseMate ClickToPhone for Android

• SmartPhones
• Built-in scanning
• Available from Broadened Horizons
• $999
Review Questions (feel free to discuss with your neighbors)

1. Assistive technologies that control devices within the environment are defined as:
   a. Environmental Control Units (ECUs)
   b. Environmental Control Systems (ECSs)
   c. Environmental Aids to Daily Living (EADLs)
   d. Electronic Aids to Daily Living (EADLs)

2. Using Limited Output EADLs to control a switch toy provides intermittent switch control which can be used to develop what skills?
   a. Mobility concepts
   b. Cause and effect concepts
   c. Scanning concepts
   d. Motor skills

3. Which technology uses house wiring for transmission?
   a. X10
   b. Bluetooth
   c. Radio frequency
   d. IR
Review Questions (Here are the answers. How did you do?)

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Questions?