Making Choices:
Control System Size and Scope

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Introduction

- Control Technology
- Ease of Use
- Cost Concerns
- Types of Room Controllers
- Control System Design
Questions to Ask

- Who is going to control the AV equipment?
- Who is going to maintain the AV equipment?
- What needs to be controlled?
- How can we simplify control?
- What are the goals and approaches of control system design?
Huddle Rooms
Boardrooms
Lecture Halls
Control Technology
Control Technology

Wireless
• Infrared - IR
• Radio Frequency - RF
• TCP/IP - WiFi

Wired
• Relay
• Contact Closure
• Digital Input
• Digital Output
• Analog Input
• RS-232
• RS-422
• RS-485
• TCP/IP
Control Technology: Relay - Operation

- Relay is used to complete a circuit controlling a screen

Diagram:
- 110 VAC
- 24 VDC
- Motorized Screen
- Low Voltage Controller (screen control interface)
- Relay
Control Technology: RS-232

- Serial standard used for hardwired communication
- Unbalanced transmission standard
  - Because it is unbalanced, it is susceptible to interference

<table>
<thead>
<tr>
<th>Signal</th>
<th>Wiring</th>
<th>Signal</th>
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<tbody>
<tr>
<td>Tx</td>
<td></td>
<td>Rx</td>
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<tr>
<td>Rx</td>
<td></td>
<td>Tx</td>
</tr>
<tr>
<td>GND</td>
<td></td>
<td>GND</td>
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Tx and Rx signals are referenced to ground
TCP/IP

Communication Over the Network
Control Technology

- TCP/IP – Transmission Control Protocol/Internet Protocol
- TCP/IP are protocols that support communication over a network
  - Industry Standard: Telnet (port 23) and HTTP (port 80)
Control Technology: Control Ports

- Examples of what the control ports might be used for
Ease of Use
Ease of Use: Primary Goals

- The most successful control systems achieve two primary goals:
  - Intuitive user interface
  - Easy-to-use configuration environment
Ease of Use: Goal and Approach - User Satisfaction

- System user goals
  - Deliver the best user experience
  - Users’ experience becomes perceived value
- Control system design approach
  - Design systems that satisfy user goals
  - Create consistent systems that are easy to operate and maintain
Ease of Use: How to Achieve System Design Goals

- Design intuitive user interfaces
- Utilize custom configuration to deliver consistent, easy to operate systems from simple to complex

Results vary when proven design principles are not applied
Competing Demands in Control System Design

A Balancing Act
Competing Demands in System Designs

- Budget
- Design
- Aesthetic
- Reliability
Competing Demands: Budget

• Clients who have a low budget need the best solution for their dollar
• Designer Challenge: Design a system that meets the need and stays within budget
• System Solution:
  • Make client aware of system limitations
  • Prioritize where the dollars should be spent
  • Develop system based around priorities
Competing Demands: Design

• A feature-rich system solution that incorporates maximum functionality – budget considerations are minimal

• Designer Challenge: Keeping from going overboard by putting too much into the system

• System Solution:
  • Address all clients goals
  • Include flexibility
  • Build in extensibility
Competing Demands: Aesthetics

- The best-looking solution, considering both environmental integration and GUI design
- Designer Challenge: Not get caught up in aesthetics without providing system functionality
- System Solution:
  - Design aesthetic is top priority
  - Incorporate functionality & flexibility
  - Consider special aesthetic need:
    - High-tech look and feel
    - Visible components and UI blend into surrounding environment
Competing Demands: Reliability

• Critical operations systems require maximum “up time”
• Designer Challenge: Create a system with maximum reliability, while providing the ability to get systems back online with minimal effort
• System Solution:
  • Place system reliability as top priority
  • Design simple configurations
  • Place high-priority on an intuitive user interface
Types of Room Controllers
Types of Room Controllers
Button Panel Controllers vs. Touchpanels

• When to use button panels vs. touchpanels comes down to two basic questions:
  • What is the best location for the control interface?
  • What does the client want to accomplish from that location?

• Budget must be factored in
Types of Room Controllers
Choosing a Control Interface: Button Panels

- Ideal for applications that have limited functionality
- More cost-effective solution
- Example: Room entry locations and podiums that require basic AV functionality plus lighting and shade control
Types of Room Controllers
Choosing a Control Interface: Touchpanels

• Ideal for applications that require more functionality
• Perfect for larger systems requiring interactive feedback
• Effective use of graphics provides a more aesthetically pleasing interface and can be used for corporate branding
Types of Room Controllers
Additional Points of Control

- Desktop and laptop PCs are now being used as control devices
- Tablets and smartphones are playing a larger role as additional or primary points of control
- Third-party touchscreens
### Types of Room Controllers

<table>
<thead>
<tr>
<th>Interface Type</th>
<th>Description</th>
<th>User Interface</th>
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</table>
| Primary        | • The main control interface  
• Each primary interface can be unique  
• Configured independently for the application | ![Primary User Interface](image1) |
| Mirror         | • Same product family, uses the identical graphical layout  
• Follows the operation of the primary user interface  
• May be used for redundancy | ![Mirror User Interface](image2) |
| Secondary      | • Physically different than the primary user interface  
• Uses the same graphical layout of the primary  
• Follows the operation of the primary user interface | ![Secondary User Interface](image3) |
Control System Design

From Simple to Complex
Control System Design: Single Room and Collaboration Systems

- Single room control
  - Can vary from simple to complex
  - Depends on size and scope of room – conference room, huddle room, classroom, lecture hall
- Collaboration systems – BYOD
  - Flexible source requirements
  - Available as a turn-key system or designed from scratch
Huddle Room

Contact Closure Remote with Three LED Switches

AC Power Controller

12V

Contact Closure

Tally

Wireless Collaboration Gateway

Media Presentation Switcher

Contact Closure/Tally

Display

VGA “Show Me” Cable

HDMI “Show Me” Cables

PC

VGA

Audio

HDMI

Wireless

Laptop

Tablet

Smartphone
Single Room Application 1
Single Room Application 2

- Input Sources:
  - Local Monitor
  - Laptop
  - Blu-ray Player
  - Media Player

- Video Display:
  - Flat Panel Display
  - Projector

- Audio/Video Connections:
  - HDMI
  - CATx
  - RS-232
  - Twisted Pair
  - Wireless

- Control Systems:
  - Matrix Switcher
  - Touchpanel
  - iPad – Secondary Control

- Audio Equipment:
  - In-Room Speakers
  - Microphones

- Networking:
  - Ethernet
  - TCP/IP

- Other Components:
  - Relay
  - Ethernet
  - TCP/IP Network

Integration:

- Twisted Pair Receiver
- Twisted Pair
- In-Room Speakers
- Microphones
- iPad – Secondary Control
Lecture Auditorium

Outputs

- Display
- Projector
- Screen Control

Inputs

- Laptop
- MacBook
- 3G-SDI Camera with PTZ Control

Scaling Presentation Matrix

- Control App
- Touchpanel
- Power Injector
- Ethernet
- CATx Cable up to 330' (100 m)

TCP/IP Network
Collaboration Application - ALC

Secondary controller – iPad – provides mobility and access to different systems
Control System Design:
Multi-Room and Enterprise Systems

- Systems created for these environments have many design requirements
  - Complex control planning and design
  - Multiple control processors
  - Advanced configuration
- Other considerations include:
  - Control programming
  - Network security protocol support
  - Building control management
Divisible Room Application
Multi-Room Application

- Group multiple controllers to simplify device location and expand port capabilities for larger AV systems
- Each panel provides independent room control
- Separate GUI per panel
- Master panel provides access to all four rooms via Controller Grouping
Control System Design - Enterprise Design Strategies

- Design using a scalable, repeatable standard
  - Customizable AV, but not custom
  - Minimize number of variables within the enterprise
  - Understand connectivity and infrastructure plan to allow for interoperability and future-proofing
Open Discussion
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