

## CONFERENCE ROOM AUTOMATION AND CONTROL SYSTEM

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**Abstract:** Room Automation is becoming more of a necessity for many companies instead of a luxury item that only suits Multinationals in the past. As technologies become more advanced and demanding, so do their controls and functions. In a typical conference, the use of a Centralized Control System eliminates the need of numerous remote controls for the various equipment and enabling endless possibilities such as “One-Touch” settings for presentation or conferencing to enhance the User Experience.

**Keywords:** Conference Room Automation System, Conference Meeting Room Control Technology, Conference Room Control System Design Concept

### 1. INTRODUCTION

How people work together is changing. Businesses are moving from a top-down directing approach to a collaborative workforce that engages all employees and aligns them with the organization’s goals. This change is impacting how companies design the workspaces and technology that employees use to get work done.

The meeting room is evolving with these changes. In the past, managers would have an office and would meet with their direct reports there. Now, these managers are in an open work environment, but still need space for meeting one-on-one with their teams. As a result, companies started deploying enclaves to support the 1-3 person meetings. Where you used to have more formal meetings in the traditional 8-15 person conference room, companies now need smaller, more collaborative meeting rooms. Thus the Huddle Room emerged and is now the “workhorse” meeting room for most offices. With more and more out-of-office workers, you need to support every room with capabilities to engage a remote workforce. All of these dynamics have changed the mix and technology used in meeting rooms.

No matter how much we sometimes wish we could replace conference rooms, they are often the best place to get a fair amount of work done. Even in a digital era, face-to-face meetings are still extremely valuable, and that means it’s worth it to invest in modern conference room technology and conference room design that can make your time spent together with your team more effortless and seamless than ever before. The design or re-design of your conference room and use of technology is important to the success of your employees as well as meetings with business guests and clients.

The idea that Personal Video Conferencing would reduce the need for physical meeting spaces has not borne out. The meeting rooms being deployed today include:

- Executive Meeting Rooms – Formal meetings to support executives and high profile meetings
- Standard Meeting Rooms – Supporting 8-15 people (the old traditional meeting room)
- Huddle Rooms – Used for more informal collaborative meetings with 3-5 people
- Enclaves – Great for one-on-ones or for private phone conversations
- Collaborative open areas – Open areas to create impromptu meetings

To create seamless collaboration every meeting room needs to support:

- Audio
- Content sharing
- Video conferencing

### 2. MODERN MEETING ROOM KEY COMPONENTS

From our home office to the conference room, the way we work is changing at a rapid pace. More and more companies are allowing employees to work remotely part time to cut down on commuting and create more work-life balance.

They’re also putting the customer-first, focusing on relationships and bringing together partners to offer a comprehensive solution. The right meeting room technology enables the seamless connection between all these parties. Not only does it enable relationship building on a deeper level than audio alone, it also acts as a cost-saving tool by reducing travel expenses.

To get the most out of your collaborative efforts and maximize your efficiency, there are a few key pieces of conference room audio visual technology critical to success. We can describe some main components you need to bring your workplace into the modern day.

• **Crisp, comfortable lighting**

Lighting has an enormous impact on presentation quality, whether the meeting is confined to the table or if the meeting involves teleconferencing. Harsh lighting can frustrate and wear people out, making it difficult for them to participate meaningfully. The best way to approach conference room lighting is to consider what comfortable lighting feels like outside the context of work. It tends to be gentle, warm and indirect, ensuring there is no annoying glare. Setting up the proper lights will be essential to moving forward with system installation.

• **Automated Shades or Motorized Window Treatment**

You can easily save energy, save energy, and protect interiors. Automated heat shading and drapery transforms. Have a game changing presentation? It is possible to transform daytime into an enthusiastic audience. There are hundreds of window treatment options and options available to complement any decor.

• **Quality Displays**

A lot plays off of the room's central display, so it should receive special focus. Modern LED displays are capable of outputting at least full HD, though it is becoming increasingly common to see 4K displays as well. LED displays can be continuously operated for years before they suffer any degradation in picture, so they are a standard choice. The ideal display size will determine how large the room is, and how far away people will be sitting from it. Some conference rooms are fitted with multiple displays in a video wall formation, allowing for meetings with multiple parties, or for better data organization.

• **Microphones & Speakers**

Audio is affected by a ton of factors, including the size of the room, what it's made of, what furniture is in the space, whether doors are opened or not, and so on. A/V integrators can model acoustics in 3D space, giving them insight into how microphones and speakers should be arranged. In most cases, integrating the microphones into the central table promotes optimal audio clarity, as they can be spaced to ensure that ambient sounds are not picked up. Some companies choose to install their microphones in the ceiling, which allows for audio to be picked up around the room. It's more difficult to control, though. Speakers should be arranged and zoned throughout the space so that it produces a comfortable, even level of sound from front to back.

• **Audio or Video Conferencing Equipment**

The next choice in conference room technology is whether you need audio conferencing, video conferencing, or both.

Video conferencing allows companies to connect their branches together, allows companies to discuss joint initiatives with partners, and allows companies to interface directly with their clients, promoting a mutually productive relationship. Video conferencing requires video and audio outputs and inputs to work in concert to create a smooth experience on both sides. Video conferencing has taken center stage in the meeting room.

As video calls become more mainstream, organizations are on calls with clients, partners, and off-site employees. These external participants may be calling in from a different video conferencing platform. A company working with Zoom may need to invite a partner that uses Polycom, and a customer that is on LifeSize. Fortunately, most video conferencing technologies can handle these situations offering easy dial in instructions for those working with different systems.

Scaling web conferencing is a big trend. More and more companies are standardizing on technologies like Zoom and Skype for Business/Teams in their conference rooms. Crestron, StarLeaf and Polycom are a few of the manufacturers that offer hardware to scale these platforms in the conference room.

Audio is the second piece of the meeting room communication. While some companies are comfortable going all-in with video calls, others still want the option for audio conferencing. It is common for companies to have both audio and video conferencing technology in a single room, just consider in the design process to include the functionality in your design.

• **Digital presenters or document cameras**

Although many companies rely completely on digital media to present material, there is still a need for technology that can better display physical media. Document cameras are an easy fix for this, and they can even display things stereoscopically for everyone in the room, preserving all three dimensions for improved presentation quality.

• **Interactive Whiteboard**

Companies and educators have long used interactive displays and boards to deliver concepts in a fresh, engaging way. If you host brainstorming sessions in your office or work with people that are visual learners (around 65% of people), an interactive whiteboard can be a valuable tool to add to your system of conference room equipment.

Interactive displays allow you to write directly on the board in various colors, annotating over web pages or documents.

In addition, video conferencing platforms enable users to whiteboard while on the call and share to other participants in real-time or after the conference has completed. This can be helpful if your employees present over video conferencing and can create a more engaging experience for the others on the call.

- **Camera**

If your room is staged for video calls it will need to be equipped with a camera. This can range from a small camera in a huddle room to something more sophisticated in larger spaces. Your video conferencing platform may dictate the camera needed.

- **Connectivity**

You have three choices when it comes to connectivity: wired, wireless, or a combination of wired and wireless. Both wired and wireless connectivity have their pros and cons, and ultimately it will come down to a matter of personal preference.

Many people prefer wireless connectivity simply because it eliminates the clutter of cords, but table inserts however can discretely hide wired connectivity that would provide a typically higher-quality and more stable presentation experience.

Connected table boxes can also include electrical outlets for charging or a wired connection for plug and play. If you want to be able to screen share without plugging in, a wireless connectivity solution may be the right choice for you.

- **Intuitive Control Systems**

Intuitive control systems – A modern conference room is one that allows for precise control of all of these elements, typically from a single portal. That portal usually takes the form of a touch panel that allows for easy component calibration and setting. Controls can be personalized to each user, and can even be set to respond to voice, allowing presenters to move about the room without being tied to a control panel.

- **Room Scheduling**

Just outside of the conference room door is an opportunity to increase efficiency and gain valuable analytics. Room schedulers are a robust hardware system built for the workplace. Crestron's room schedulers, for example, feature both a touch-panel display which sits outside the room as well as a LED that lights up red or green depending on the room's availability. The room scheduler automatically goes red when the room is booked and stays green when available. This allows passerby's to quickly see which spaces are open for an impromptu meeting. The touch-panel displays show the day's schedule, meeting title, and invited participants.

Employees can easily schedule a meeting room from their Outlook or Google Calendar by inviting the room just like they would invite a colleague. Open architecture allows you to run applications like team, Robin, and appspace. In addition, room analytics share key usage data like hours each room is reserved, meeting frequency at certain times of the day, and average length of the meetings.

Those are the underlying aims and features of a fully outfitted conference room. A modern conference room should meet also below essential requirements:

- **Comfort** - first of all, a conference room should be a place where people can feel comfortable in communication. Otherwise, what is the point? People become comfortable or uncomfortable due to dozens of factors, both obvious and not so obvious.

- **Controllability**. A modern conference room usually contains several technologies that interact with each other to create a unified experience. Therefore, it is imperative that all these technologies can be controlled separately. Thus, the appearance and presentation can be changed until they become correct.

- **Efficiency** - it is not difficult to create a space for people to communicate with each other. A table and a few chairs are perfect. But if a company wants more from its meeting space, then speakers will need more dynamic material, communication will have to involve other parties, and will need to focus on preserving the content. As a rule, this can not be achieved without any complicated hardware.

### 3. MEETING ROOM AUTOMATION AND CONTROL SYSTEM

Conference Room automation systems use many devices and technologies and most of them really enhance our lifestyle. Typically each technology brings its own mobile device application enabling visualization and control of specific devices, e.g. security, locks, lights, HVAC, audio/video systems, etc. Finally the user would have several different applications to setup, learn and use and they all have a different look and feel. In addition many technologies does not offer other control panel than mobile device. In case of device loss or discharge the control is impossible.

Most of worldwide automation technologies lack very important feature - integration of other technologies. That means there is no common way they could interchange data thus create a smart and true automated environment.

The average conference room contains a variety of technology tools that allow you to host productive meetings. Room automation systems allow all of these technologies to work in unison and be controlled through one device. A typical conference room automation system utilizes a touchscreen remote to open and close window shades when appropriate, dim lights, adjust the thermostat, start and end a live feed and give individual employees the ability to quickly share information from their device on the interactive display or standard displays. This unifying system provides a productive environment that can improve efficiency and communication.

With the advent of applications that allow tablets, laptops, smartphones and more to connect via internet or satellite, taking advantage of video, audio, messaging, and other collaborative software means that meetings can extend beyond geographical locations and time zones. This technology has evolved to complement the way modern employees communicate and work. The workplace of today has been transformed into the office of tomorrow. As a result, technology such as interactive displays, advanced telephony, video communication, and more needs to work together seamlessly. That is where a central control is most useful.

An integrated automation and control system is the heart and brain of a collection of communication hardware and software that allows the operator to control each piece in tandem or individually. It is a real multi-tasking tool that functions to streamline the various commands that control the individual technology. Think of it as a sophisticated and innovative device that facilitates collaboration between the different hardware mechanisms, thereby facilitating collaborative efforts among employees and management. They can be used to run a single conference room or the entire office.

Integrated automation and control system can be comprised of an assortment of hardware that includes conference telephones, video cameras, interactive whiteboards, digital signage, computers, smartphones, tablets, wireless connectivity, and more. Many firms are beginning to see the value in incorporating a single control module. These systems are a smart and necessary investment for a business that relies on conferences and presentations as a matter of routine.

An automated conference room system includes features such as:

- Projector/Monitor Control
- HVAC Control
- Lighting Control
- Shade Control
- Audio Conferencing
- Audio Recording
- Wireless Collaboration
- Video Conferencing
- Video Recording
- Collect & Monitor Data

#### **4. BENEFITS OF MEETING ROOM AUTOMATION AND CONTROL SYSTEM**

The number of benefits offered by a room automation system is limited only by the degree to which you decide to implement such a system. If you select a simple automation system with audio-visual controls only, your benefits are limited to streamlined AV technology and control. If you opt for a robust room automation system, your benefits will be numerous. Generally speaking, however, there are a few benefits you can expect to enjoy when you make the decision to implement a room automation system in your conference room.

First and foremost, room automation provides a simple user interface that all employees will be able to control. These systems use touchscreen control panels, wireless, wall mounted or desk mounted, to control various features of the conference room and AV tech. Its simple user interface makes navigating the menus a breeze. There is no need for lengthy training to equip employees with the ability to control your newly implemented room automation system(s).

Next, the centralized control of room automation systems improves the workflow during meetings. Centralized control over all room devices prevents delays previously caused by people needing to adjust shades, lights and presentation equipment from several locations. These adjustments and more can be controlled from the touchscreen panel, enabling an efficient and focused meeting to take place.

Additionally, the automation of several different conferencing functions makes it easy to initiate meetings, and adjust to changes from one meeting room to the next. For example, many room automation systems come with a predetermined videoconference mode or presentation mode. With the swipe of a finger, you can initiate any predetermined modes configured on your system.

Last but not least, a room automation system shows your clients, employees and industry partners that your business is committed to quality communication and efficiency. Your investment in this technology will improve relationships built in meetings and enhance the productivity of the countless meetings that consume a significant amount of employee time.

## 5. CONCLUSION

Conference Room Control System is very important because the system brings together the various technologies in use and runs them in a seamless manner. The idea is to keep the integrated automation and control system as simple to use as possible. Control can be automated or run manually, and it should not be significantly hard to learn how to use. The user should not have to deal with a steep learning curve. The control interface should be intuitive, even for non-technical operators. Depending on the environment, the idea is to bring a user up to speed without a lot of training.

For all of the advanced technology available, the key is to connect humans. Only then does true collaboration become possible.

## REFERENCES

- Bhatia, V., & Bhatia, G. (2013). "Room Temperature based Fan Speed Control System using Pulse Width Modulation Technique", International Journal of Computer Applications, ISSN: 0975 – 8887, Vol. 81,
- Chitte, P.P., Shinde, R.R., & Thosar, S.V. (2015). "Smart Automated Conference Room System", International Journal of Emerging Technology and Advanced Engineering, ISSN 2250-2459, Vol. 5, Issue 3
- Center for Active Design. Building Design Checklist. Accessed 4.25.2016  
<https://centerforactivedesign.org/ourapproach>
- Chandler, D. L. (2012). For businesses, going green brings in greenbacks. MITnews. Massachusetts Institute of Technology, 30 Jan. 2012. Web. 11 Dec. 2013
- Mattson, D. (2015). " Benefits of Teamwork in the Workplace " Accessed 10.10.15, February 19, 2015.
- Murphy, M. (2015). " Stuck in a meeting? Daydream about the conference room of the future" Accessed 12.6.16
- Ying-Wen B., & Yi-Te K. (2008) "Automatic Room Light Intensity Detection and Control Using a Microprocessor and Light Sensors", IEEE Transactions on Consumer Electronics, Vol. 54, No. 3, August 2008.
- Yu, Z., & Nakamura, Y. (2010). "Smart meeting systems: A survey of state-of-the-art and open issues," ACM Computing Surveys (CSUR), vol. 42, p. 9
- "Workplace Technology Design Guide", Crestron Electronics, Inc., 2018