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Designers Lighting Forum

Beyond Blueprints:
Integrating Smart Controls for Holistic Wellbeing

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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What is this presentation about ?

Step into the future of building controls with Bluetooth Mesh. Join us in this AIA presentation as we uncover the complexities of traditional systems and the revolutionary impact of smart, wireless solutions. Explore how Bluetooth Mesh technology simplifies integration, reduces costs, and enhances design flexibility, paving the way for intelligent, responsive spaces. Discover how to harness the power of embedded intelligence to create environments that are not just efficient but adaptive and intuitive, redefining the possibilities of modern architecture.

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What Will You Learn?

Beyond Blueprints

MODULE 1. Uncover the hidden complexities of traditional building control systems and understand the challenges they pose to architects, installers, and end-users. Dive into real-world examples to grasp the limitations and high costs associated with outdated technology.

MODULE 2. Explore the transformative power of Bluetooth Mesh IoT, a revolutionary solution that simplifies integration and enhances flexibility. Learn how this technology enables intelligent, decentralized networks that adapt to the evolving needs of modern architecture.

MODULE 3. Delve into the nuances of embedded intelligence within devices and its implications for the future of building controls. See how real-time data and edge computing can create responsive environments that are both efficient and intuitive.

MODULE 4. Gain practical insights into adopting Bluetooth Mesh technology across various applications, from restaurants to commercial buildings. Discover how this innovative approach can solve longstanding challenges and redefine the future of building design.

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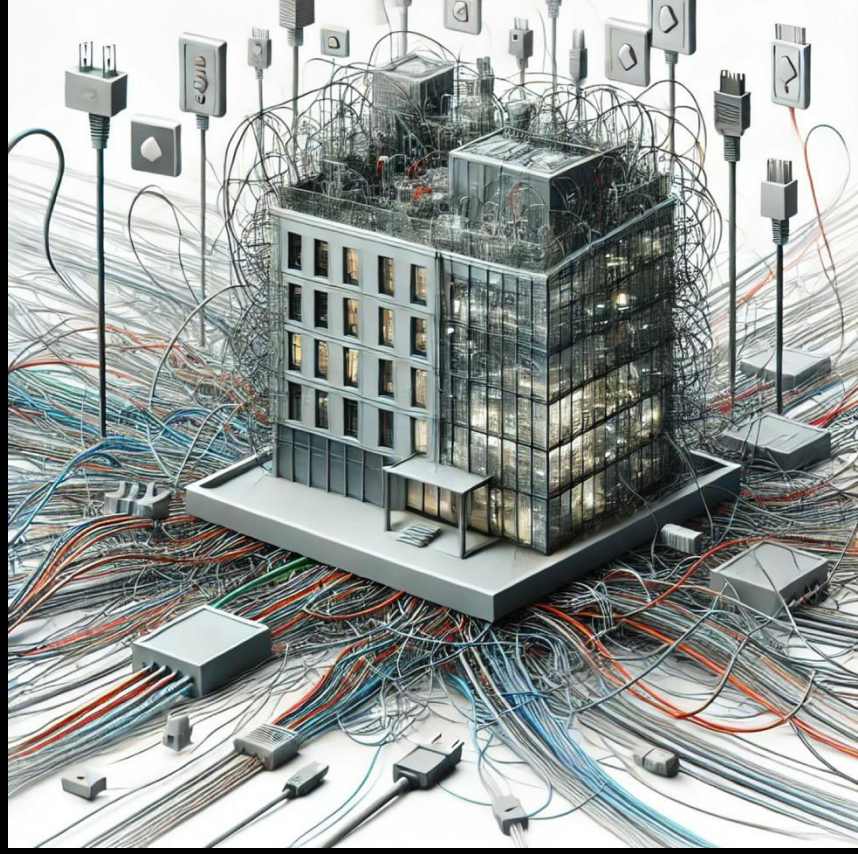
The Problem :
Complexity in Traditional Control Systems



1. **System Downtime**
2. **Limited Integration**
3. **Environmental Impact**
4. **Maintenance Cost**

1. System Downtime

High downtime risk during maintenance due to interdependent hardwired systems, disrupting critical environments like hospitals and offices. Single point of failure increases exponentially downtime costs.
Needed redundant system at higher cost.

HOW MUCH?

Total Annual Downtime Cost	Key Factors	Network Type	Average Downtime per Year	Cost per minute of Downtime
$2,688,000	Single points of failure, complex infrastructure, high maintenance requirements	**Wired Networks**	**8 hours**	$5,600
$1,680,000	Susceptible to interference, dependent on central access points	**Wi-Fi Networks**	**5 hours**	$5,600
$336,000	Decentralized, resilient to individual node failures, lower maintenance needs	**Bluetooth Mesh**	**1 hour**	$5,600

Ponemon Institute: 2016 Cost of Data Center Outages

2. Limited Integration

Siloed applications make aggregation complex.

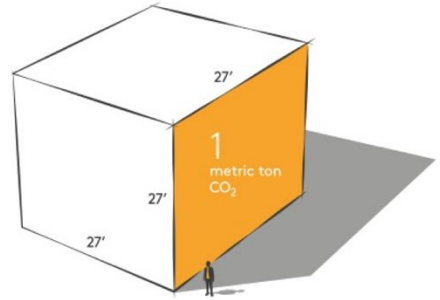
Lack of hardware integration leads to obsolescence and reduced functionality.

Limited integration hinders latest technologies adoption lowering the building's market value and competitiveness.

HOW MUCH?

Buildings with limited integration capabilities can see a ***decrease in value by as much as 10-15%*** *because they are less attractive to buyers or tenants who prioritize modern, adaptable infrastructure.*

3. Environmental impact



3.7 billion tons CO_2

Annual embodied carbon emissions associated with new construction

Equivalent to the weight of **11,000** Empire State Buildings

Kieran Timberlake. (2023). *Reducing the Embodied Carbon of Walls in Industrial Buildings*. Research commissioned by Kingspan. Data analyzed using Tally® Life Cycle Assessment software.

Traditional systems need extensive wiring, increasing the carbon footprint due to material and resource use.

Traditional systems lead to higher energy use, increased utility costs, and a larger carbon footprint; potentially affecting certifications like LEED and WELL.

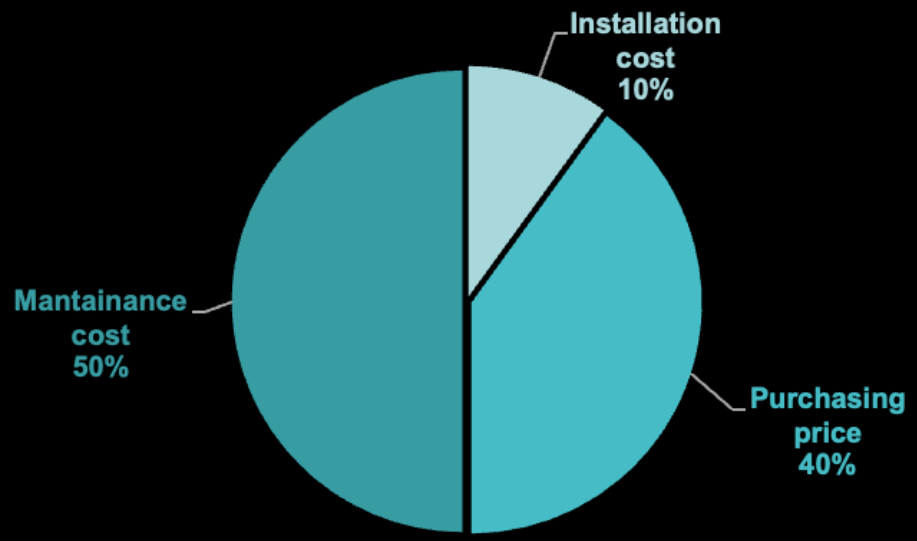
HOW MUCH?

*According to the U.S. Green Building Council, non-efficient buildings can cost **30% more in energy** and reduce **property value by 5-10%.***

4. Maintenance Cost

Difficulty in integrating newer technologies with existing legacy systems, leading to potential obsolescence and limited functionality.

TCO (Total Cost of Ownership) of equipment



IFMA Reports - The International Facility Management Association

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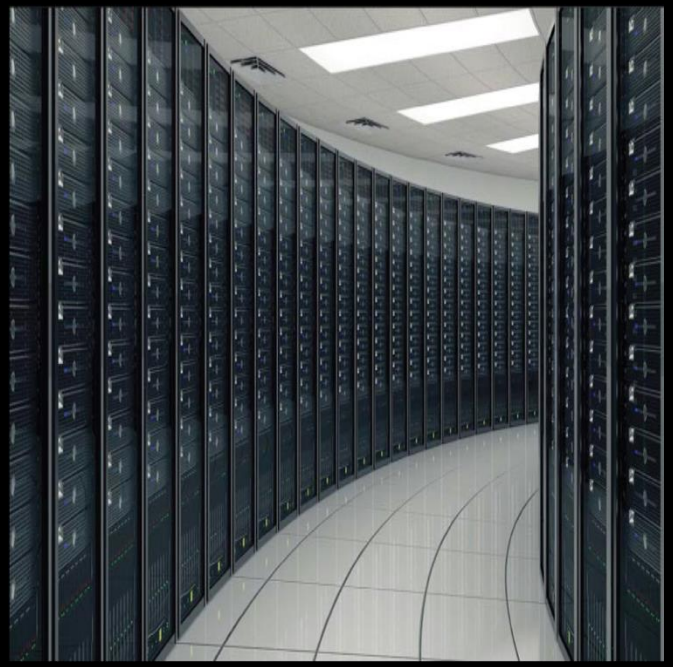
Denver airport failure 1990

- Required seamless integration of multiple technologies.
- Frequent malfunctions: misrouted or damaged bags, conveyor synchronization errors.
- Opening delayed 16 months, adding $560 million in costs.
- Mostly abandoned for manual handling, resulting in major financial losses and a cautionary tale of technological overreach.

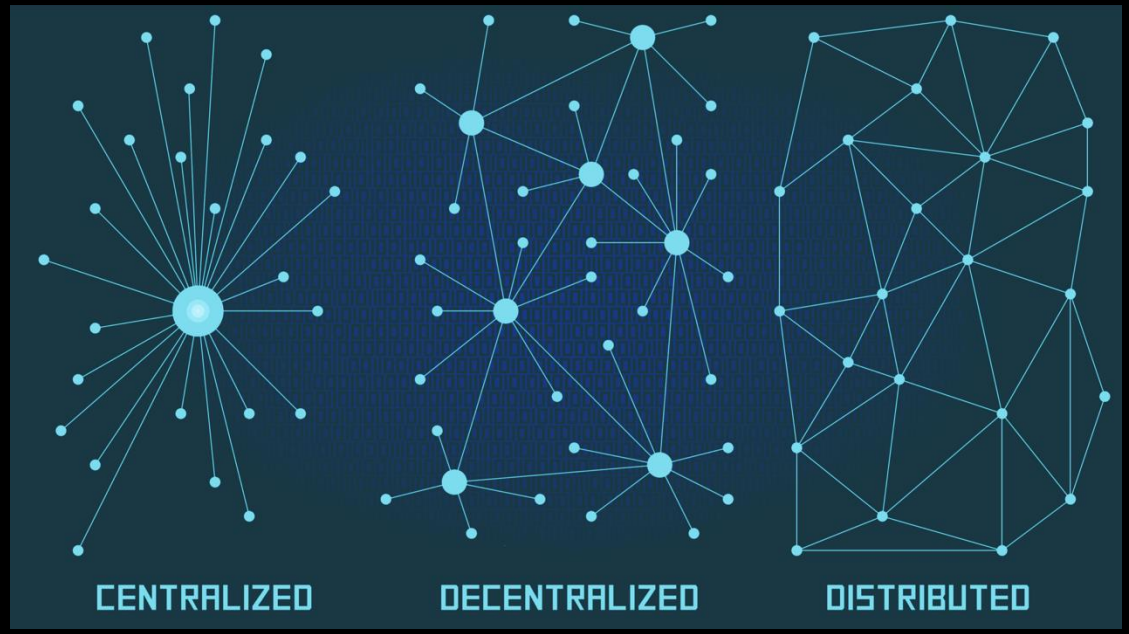
Edge Computing vs Cloud Computing

Bluetooth Mesh uses edge computing: each node processes data locally and shares essential info, keeping the network operational even if one node fails.



All data is sent to a centralized cloud system, turning each node into a potential failure point.

What is Bluetooth© Mesh?



Distributed Network: Each device (node) in a Bluetooth Mesh network can communicate with any other node, ensuring no single point of failure.

Scalability: Supports thousands of devices in a single network, making it ideal for large buildings or industrial environments.

Reliability: Messages are relayed through multiple nodes, increasing the robustness and coverage of the network.

Energy Efficiency: By enabling smarter, more efficient control of devices, Bluetooth Mesh reduces energy consumption, which helps lower utility costs and minimize environmental impact.

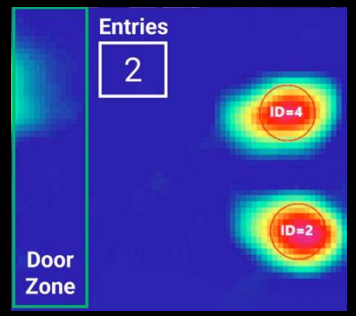
Most Common Applications

HVAC

Smart Lighting

Paging/Sound Masking

Air Quality Management



People Counting

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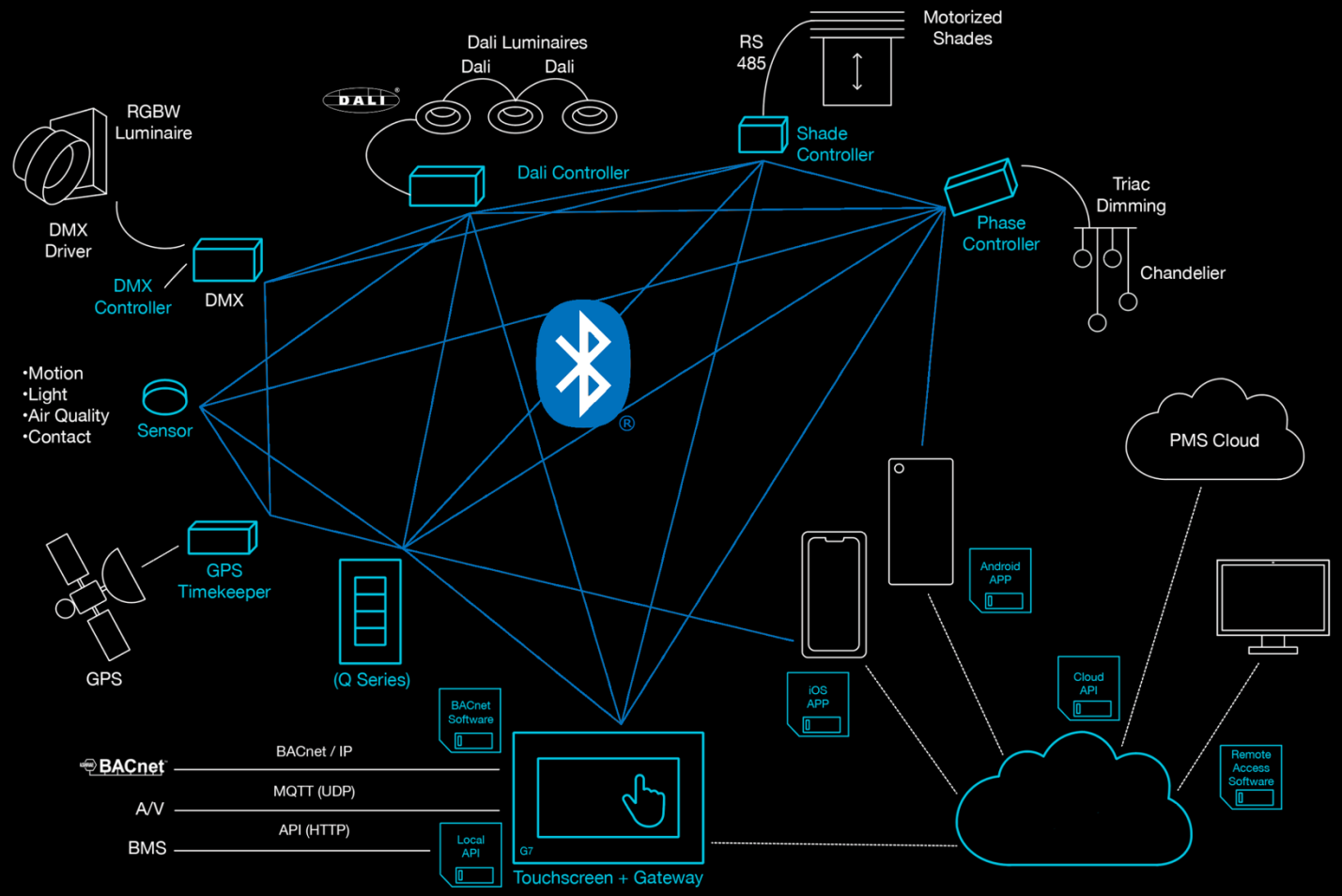
Ease of Integration



Seamless integration with various building devices, even at different stages of the project—including post-design—is now possible.

Module 2

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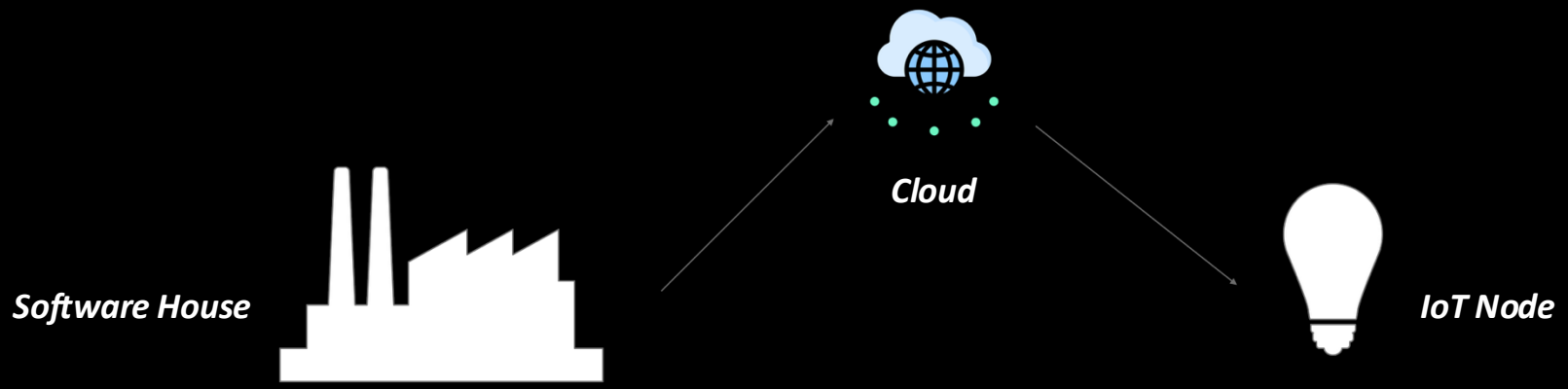
The Greenest Option

Longevity: New devices, technologies, and updates can be seamlessly integrated through the system's built-in intelligence, eliminating the need for hardware replacements.



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The Greenest Option

Real-Time Optimization: Bluetooth Mesh collects sensor data to optimize building operations. It can adjust HVAC to focus on occupied areas, automatically turn off lighting in unoccupied rooms, dim lights based on daylight levels, and regulate shades to reduce HVAC load by managing sunlight exposure.

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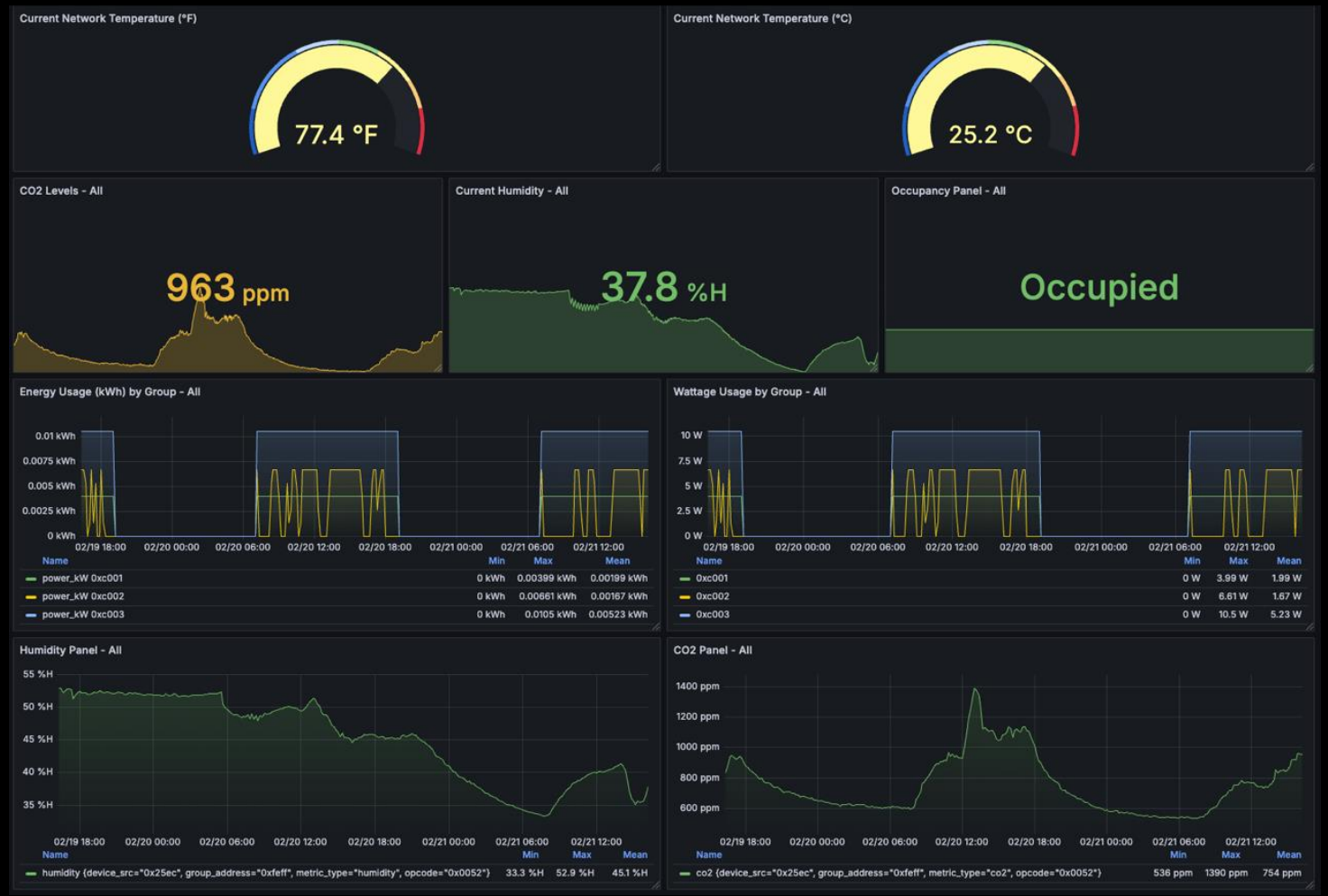
The Greenest Option

Energy Consumption Report: Bluetooth Mesh provides detailed feedback on the energy consumption of each device, allowing for in-depth analysis and insights into optimizing usage based on cost.



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SMART SENSORS

Function: Collect real-time data on occupancy, temperature, humidity, CO2 levels and light levels.

Application:
AQ sensor can control HVAC systems to ensure fresh air circulation, maintaining a healthy indoor environment.

Adjust lighting output to align with natural circadian cycles, enhancing health and productivity in workplaces and healthcare settings.

Automatically adjust shade controllers and lighting to maintain optimal light levels and reduce energy usage.

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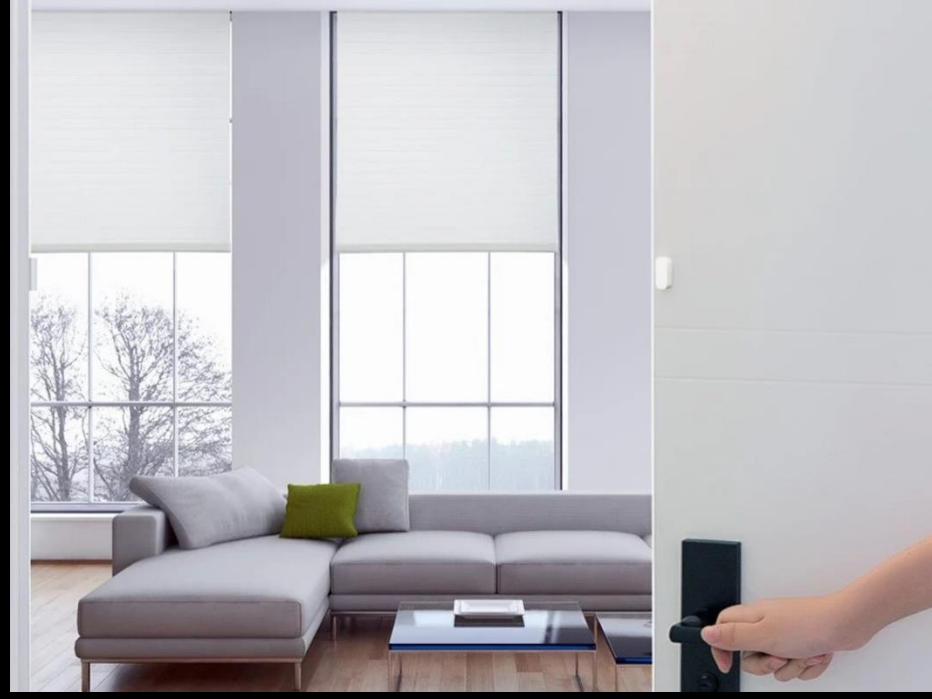
Shades Control



Function: Control shades in the building.

Application:
Automatically adjust shades to optimize daylight usage, reducing the need for artificial lighting and enhancing energy efficiency. Shades can be lowered to prevent glare or raised to allow more natural light, depending on the sensor's readings.

Use shade controllers to manage heat through windows: lower shades in hot weather to reduce solar heat and ease the HVAC load; raise them in cold weather to let sunlight naturally warm the space.

Auto-adjust shades based on occupancy: open when occupied for natural light; close when unoccupied for privacy and energy savings.

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Sound Masking

Function: Control and protect conversation without having constant extra noise.

Application:

Auto-adjust sound masking to match noise levels, ensuring privacy and reducing distractions.

Lower sound masking during quiet hours to save energy; increase during peak times for optimal acoustics.

Corporate

Retail

Hospitality Application

Restaurant

Transportation

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This concludes The American Institute of Architects Continuing Education Systems Course

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Do You Have Any Questions?

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