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## **The Role of Building Automation System for Interior Design of Building**

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### **ABSTRACT**

This research focus on the Building automation systems (BAS) and intelligent lighting control strategies emerge as an imperative best practice for contemporary as well as future interior projects in the building industry. Building Automation Systems are a valuable tool for architects, interior designers, investors, and clients. By incorporating these systems into interior design, they may enhance the behaviour of those occupying such spaces. The findings highlight how networked LED lighting integrated with occupancy sensors, daylight harvesting, and centralized control can enhance visual comfort, workspace productivity, while delivering up to 60% energy savings compared to conventional lighting setups. Moreover, the research underscores the potential for smart lighting to provide a return on investment within three years for certain applications. By aligning design philosophies with automated building systems, interior architects and designers can create superior user experiences while meeting increasingly stringent sustainability goals and reducing operational expenditures.

*Keywords: Building Automation, Smart Lighting, Intelligent Controls, Energy Efficiency, Sustainable Interiors, High-Performance Buildings*

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### **Introduction:**

Interior design plays a crucial role in creating user friendly building environments. Use of Building Automation Systems is that interior design can focus on maximizing the energy efficiency. Building Automation Systems are integral to modern interior spaces, offering a multifaceted approach to energy efficiency, occupant comfort, security, and overall building management. The integration of technology into interior spaces can transformed the way we interact with and manage our built environments. The significance of Building Automation Systems (BAS) in improving the efficiency, comfort, and utility of interior spaces is crucial. Given the capabilities of current technology to detect human presence and micro-movements inside rooms, interior lighting is a prime target for automation. With automated lighting, you may choose scenarios and recall them with the push of a switch, allowing you to immediately customise the lighting to suit your tastes and the space's diverse purposes. Automated heating and lighting systems are also thought to have the ability to reduce energy consumption in houses by cutting down on unnecessary lights.

Building automation systems can enhance the performance, efficiency, and services of buildings, which in turn improves the behaviour of the individuals present in them. This research study aims to inform the public, including architects, interior designers, investors, and clients, about the importance of these systems in interior design. As this study will provide the intelligent automated lighting empowers interior environments with enhanced aesthetics, comfort, functionality, and efficiencies. This directly supports productivity, wellness, and sustainable operations. The automation of lighting is thus becoming increasingly mainstream in modern buildings. This research study aims to inform architects, interior designers, investors, clients, and the general public about the significance of Building Automation Systems in interior design. It will highlight how intelligent automated lighting and HVAC systems can enhance the aesthetics, comfort, functionality, and energy efficiency of interior environments, directly supporting productivity, occupant well-being, and sustainable operations.

The integration of BAS into interior design is becoming increasingly mainstream in modern buildings, driven by the demand for energy-efficient, comfortable, and technologically advanced spaces. This research paper will provide valuable insights into the benefits and practical applications of BAS in interior design, contributing to the development of more sustainable and user-friendly built environments.

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### **Aim**

The purpose of this research will focus on space which follows the concept of building automation system and how smart lighting automation important for interior design for any space.

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## Objectives

1. The significance of using in the design of interior settings for newly constructed places is emphasized.
2. Explore several approaches to building an energy efficient interior environment, with the goal of reducing or eliminating wasteful energy use and associated costs.
3. As this research will define that how interior space can improve the quality by use of smart lighting system.

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## Methodology

This research employs a qualitative approach to investigate how the design of interior on space which follows the concept of building automation system and how smart lighting automation important for interior design for any space. The methodology consists of the following components:

1. Literature review
2. Case Study Analysis
3. Comparative Analysis
4. Findings and Insights

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## SCOPE & LIMITATION

### Scope:

1. This dissertation's main objective is to explore various aspects of Building automation system energy-efficient systems, and safety of interior space of buildings.
2. To study the application of smart lighting technology for building services and the application of BAS which can significantly reduce energy consumption by optimizing lighting.

### Limitations:

1. Due to broad scope of building automation system, the research may not cover every aspect of automation system used in building, so it will focus on key areas.
2. The following dissertation will focus lighting automation systems which can be used in interior and can be incorporated while interior design process of building.
3. The following dissertation will focus on the economical aspect of lighting automation system and its application in various large scale projects.

### How Automation is Changing the Face of Interior Design

These days, automation may alter your home's design in a variety of ways; the method you choose to use may determine the specifics. For instance, having an intelligent home has several advantages if you want it to be "smart." In order for your appliances to cooperate for your comfort, it would need connecting smart devices such as lighting and locks with them.

These new technologies are about more than simply managing things from your phone or laptop; they may also learn your routines and behaviours and adapt your surroundings appropriately.

More automation than ever before will be found in the residential complexes of the future. However, your position as an architect is unaffected by this. All this really implies is that you'll have to hone your abilities to accommodate the latest designs and construction materials.

Architects will have to adapt their practices to the next technological age if they want to keep up with the increasing automation in structures and cities. We are in dire need of technically proficient architects who can plan spaces to accommodate the growing number of automated building systems.

### Pros of Automated Interior Design

The ability to be more imaginative is a key benefit of automated interior design systems, as they generate more space for new ideas. It also saves space, time and money.

In the world of design, automated interior design is a relatively recent development. Due of this, a lot of designers have been able to try out different approaches and layouts without fearing that they could mess up the whole project.

Automated design procedures provide various advantages, such as more efficiency and more room for creativity. The interior design business is starting to feel the effects of design automation. Automation systems help designers save time and money by letting them employ complex algorithms that provide better outcomes faster than they could without the system.

### Cons of Automated Interior Design

Automating interior design has many potential benefits, but it also has numerous potential disadvantages. Automation in the interior design industry has been around for some time and is seeing explosive increase in popularity. The financial and temporal benefits of automated interior design are among its greatest advantages. Nonetheless, before diving in headlong, one should take into account the many drawbacks associated with this kind of automation.

Automating the design process is not without its difficulties. Navigating through all of the features might be challenging due to the often complex interfaces. Your ability to influence the end result is diminished due to the lack of customisation choices.

There are a few drawbacks to automation, but designers still get to create as they want. The designer's ability to express their individuality will be diminished due to the increased reliance on computers, which is one of the drawbacks.

### Understanding The Different Types Of Lighting Control Systems

Finding the perfect lighting control solution for your requirements requires familiarity with the many available alternatives and an understanding of their differences. Assisting you in realising the goal of your lighting configuration, this article delves into several control possibilities.

- **Basic lighting controls**

The manual on/off switch is the most basic control for lights in most households. So that power is not squandered, people have to manually switch them on when they enter a room and off when they depart.

- **Pre-set lighting control**

A slider beside the toggle lets you adjust the pre-set lighting settings' brightness levels. You can turn the lights on and off using the switch, which is identical to the basic controls discussed before; to adjust the brightness, you may use the slider, which has pre-set values.

### Integrated lighting controls

If you thought controls for aided lighting were ingenious, integrated lighting controls are much more so. Typically, a house or company will use a wired or wireless connection to centralise these systems.

- **Motion sensor controls**

Motion sensors are used for both security and utility illumination, and they are sometimes mistaken for occupancy sensors. The lights in your home will come on when they sense motion, and they will turn off after a short period of time.

- **Assisted lighting controls**

Your lighting system may be combined with voice-controlled assistive technologies like Google Home and Amazon Alexa. By just speaking a command, you may turn on the lights, making it easier to navigate your home at night

### The Economical Factors of Building Automation and smart lighting system used in interior construction projects.

The term "building automation" describes the process of making a building's many systems, including HVAC, lighting, and security, operate in tandem and with intelligence. Building automation provides a multitude of financial advantages while decreasing our environmental effect by merging technology with sustainability. Here are a few important benefits and things to remember:

#### Cost Savings through Energy Efficiency

One of the most important aspects of building automation is energy reduction. Building owners may drastically lower power bills by using automated technologies that decrease energy waste. Some key considerations are as follows:

Energy-efficient light bulbs, like LEDs, may reduce lighting expenses by as much as 80% when compared to incandescent and halogen lamps.

Automated heating, ventilation, and air conditioning (HVAC) systems are able to optimise energy use by dynamically altering temperature and airflow based on occupancy levels and the weather conditions.

Timer and intelligent sensor systems limit power usage and utility expenditures by turning on appliances, lights, and machinery only when needed.

There are a lot of monetary benefits to investing in building automation systems' energy efficiency. Let us examine the principal advantages that may be obtained by companies and building proprietors:

- **Significant cost savings:** Reduced energy usage means big savings for energy-efficient buildings. Energy efficiency measures may reduce energy consumption by 30 to 50 percent, which means cheaper electricity bills and better financial performance, according to studies in the industry.
- **Increased property value:** Due to their superior environmental performance and long-term savings in operating costs, energy-efficient buildings command a premium in the real estate market. Evidence from studies shows that commercial buildings with great energy efficiency tend to have higher occupancy rates and rents, making them a good investment.

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## Case Study

### Armani Hotel at the Burj Khalifa

The Armani Hotel, located in the world's tallest building, the Burj Khalifa, is the pinnacle of five-star luxury. A private entrance invites visitors to a lobby that exudes sophistication with its polished materials and luxurious colours. These elements, hand-picked by Giorgio Armani, are shown throughout the hotel. The lighting is not an attempt at ostentatious interior design, but rather a deliberate demonstration of understated minimalism. An atmosphere that is equal parts contemporary and old is achieved by discreetly concealing all lighting and related gear.

### Burj Al Arab

The old world's four elements—water, fire, wind, and earth—inspired the interior design. There are fountains and aquariums all across the hotel that feature water, while the entry fountain represents fire and air with its steam. The 24,000 square metres of marble represent the earth. In addition to the 2,000 square metres of gold foil, the hotel is adorned with valuable stones.

Despite the numerous structural hurdles, the stunning aesthetic structure is now coming together, thanks to the many brilliant minds who worked on it. A sense of a boat drifting through the waves was the architect's intended effect. The structure towers majestically on the golden dunes of Dubai.

### Advantech Linkou Campus Phase 1

A public technology exhibition and an office complex for day-to-day activities are housed in the Office Building in phase I. The building's components include a brick hollow cavities wall, exposed concrete, steel truss, low-E insulated glass and a vertical shade panel. They animate the façade by connecting the inside with the outside and bringing the inner functions to life. In addition, a smart greenhouse that has solar panels that detect the sun's movement may enhance the illumination in the room by regulating the temperature and humidity. intentions: the creation of a central axis, the positioning of a central courtyard, and the emphasis on a clear front from the back.

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## Conclusion:

This research establishes present a compelling case regarding the central role building automation systems (BAS) and smart lighting solutions can play in enabling sustainability and cost efficiencies in modern large-scale interior construction projects like hotels, shopping centres and offices. Smart lighting built on networked and addressable LED fixtures along with sensors and central management facilitate granular improvements in visual comfort and workspace productivity while achieving up to 60% lighting power savings versus conventional setups. This can give an ROI of less than 3 years in certain cases.

In light of the overwhelming techno-economic and environmental advantages outlined through cited research works, adopting building automation and intelligent lighting control strategies emerges as an imperative best practice for contemporary as well as future interior projects in the building industry. As integration of sensors, such as occupancy and daylight sensors, along with a central management system, enables adaptive lighting solutions. Lights can be automatically adjusted based on occupancy, time of day, or available natural light, leading to significant energy savings.

## References

Building\_automation\_and\_control\_systems.pdf

Design\_and\_Implementation\_of\_Smart\_Office\_Automati%20(1).pdf

The%20impact%20of%20innovative%20smart%20design.pdf Design\_and\_Application\_of\_a\_Smart\_Lighting\_System\_.pdf

[https://www.researchgate.net/publication/308552728\\_Lighting\\_System\\_In\\_Interior\\_Design\\_f\\_or\\_Modern\\_administration\\_buildings](https://www.researchgate.net/publication/308552728_Lighting_System_In_Interior_Design_f_or_Modern_administration_buildings)

[https://www.researchgate.net/publication/235350724\\_The\\_Impact\\_of\\_Lighting\\_on\\_Impressi\\_ons\\_of\\_Interior\\_Space](https://www.researchgate.net/publication/235350724_The_Impact_of_Lighting_on_Impressi_ons_of_Interior_Space)

<https://blog.alliedmarketresearch.com/intuitive-lights-to-define-the-future-of-intelligent-lighting-control-systems-654>

<https://www.corbusian.com/interior-design-and-the-age-of-automation/>

<https://energy5.com/the-economics-of-building-automation-investing-in-energy-efficiency#anchor-1>

<https://www.hampshirelight.net/blog/understanding-the-different-types-of-lighting-control-systems-for-your-property>

<https://www.burjkhalifa.ae/en/the-tower/>

<https://www.emaartechnologies.com/project/burj-khalifa/>

<https://www.focuslighting.com/new-gallery-25/i6zbu2b31kyjul0rhik27kb9c5ey1j>

<https://www.arc-magazine.com/the-boutique-at-inside-burj-al-arab-uae/>

<https://www.armanihotels.com/en/hotels/armani-hotel-dubai/armani-hotel-dubai->

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<https://architizer.com/projects/advantech-linkou-campus-phase-i-ii/>

[http://www.spid.com.tw/eng/product\\_d.php?id=50](http://www.spid.com.tw/eng/product_d.php?id=50)