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BUILDING TECHNOLOGY BIZBITS

JULY ISSUE 2024

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FROM THE EDITOR

My esteemed peers,

By royal decree, you are graciously summoned to grace our distinguished flagship technical symposium, INBAC, where the nexus of innovation and erudition beckons. This illustrious gathering of industry luminaries pledges an unparalleled exploration of avant-garde technologies and the indulgence in intellectually stimulating discourse. Lest you miss this noble opportunity, secure your presence forthwith and partake in shaping the trajectory of esteemed advancements in BUILDING AUTOMATION.

Welcome to the latest issue of INBAC - Building Automation Magazine, where we explore the dynamic world of smart building technology. As the industry continues to evolve, our mission remains steadfast to provide the fraternity with the latest insights, trends, and innovations shaping the future of building automation.

In this issue, we delve into the advancements in diversified field of building automation, showcasing how these technologies are revolutionizing the efficiency, sustainability, and comfort of our built environments. From cutting-edge automation systems to state-of-the-art solutions, we bring you comprehensive coverage of the tools and strategies driving the industry forward.

Our articles highlight technical know-how from around the globe, offering practical case studies and expert opinions that illustrate the tangible benefits of adopting smart building solutions. We also focus on the importance of connected buildings, emphasizing the need for robust protocols to protect critical infrastructure.

As always, we are committed to fostering a community of professionals passionate about the future of building automation. We also invite readers and experts to share your experiences, insights, and innovations with us, contributing to a collective vision of smarter, more sustainable buildings.

Thank you for joining us on this journey. Together, we are building the future.

Sincerely,

Dr. Amit Chaudhari (CFPS, LEED AP, PMP)
Editor-in-Chief
Building Technology BizBits Magazine

ROLE OF BUILDING AUTOMATION IN PROPERTY LOSS PREVENTION

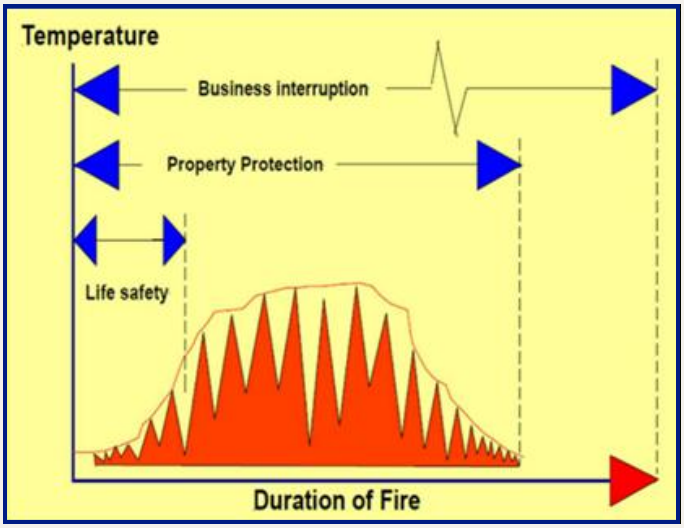
The world is changing rapidly, and technology is evolving just as quickly. New challenges, such as global warming and climate change, force us to scrutinize our surroundings, habitats, industries, and assets with greater seriousness. Amid these high-magnitude challenges, the silver lining is the opportunity to address these changes through advancing technology. This evolution requires us to adopt new technologies.

We have witnessed dramatic changes in today's built environment; buildings constructed three to four decades ago differ significantly from those being constructed today, which are smarter and more advanced. Various frameworks now govern today's built environment, including sustainability, occupant well-being, safety and security, and adapting to the effects of global warming and changing natural conditions. The main focus of these frameworks is well-defined and often practiced by occupants. Although adherence levels may be low, we must consider our built environments from the perspectives of investors and stakeholders.

While investors are keen on sustainability or ESG aspects, they are equally concerned about business resilience and property loss prevention. Most safety and security efforts typically focus on human life safety, which is crucial and mandated by local laws requiring 100% compliance. However, we should aim to go beyond human life safety and also limit the impact of any catastrophic event on properties and assets.

Take, for instance, a fire incident. There are various reasons a fire might start in a built environment. Through proper human element programs and practices, we can proactively limit the reasons fires start on the premises. Despite these measures, fires still occur. In recent months, we've witnessed devastating fires in India that resulted in the loss of precious human lives and entire assets.

If a fire starts and there is a sufficient protection and prevention program in place, the fire can be contained in a specific area, mitigating the aftermath, saving human lives, and safeguarding assets. Unfortunately, recent events have often shown a different picture, where everything was lost. Organizations with mature property loss prevention programs can effectively tackle such events, achieving the status of highly protected risks. You might not have heard of terminologies like property loss prevention or highly protected risk. These terms are common among clients, occupants, or investors who bring some of the best practices with them when they invest in any asset. Property loss prevention is integral to business administration as it not only supports business resilience but also bolsters stakeholder confidence and protects brand names. This is taken very seriously by most Fortune 1000 companies, who continue to prosper based on highly effective risk management practices.



With this background, it becomes easier to understand the role of new technologies, particularly building automation, in property loss prevention. Risk management encompasses various dimensions, from identifying risks to quantifying their impact and probability, and then defining strategies to mitigate these risks. When considering building automation, even industrial automation, it significantly aids all phases of risk management. Looking back at the history of automation, particularly since the onset of Industry 4.0, we have seen tremendous progress. Just as the internet has transformed our lives over the past couple of decades, automation has revolutionized our perspective and definitions of its use in various industries.

Another crucial area is emergency response. Building automation plays a vital role during emergencies by providing valuable evacuation information to occupants, and safeguarding their lives. While not discussing specific cases here, I aim to highlight the importance of integrating building automation into property loss prevention strategies. Often, safety considerations are limited to fire safety, but property loss prevention encompasses many dimensions, including combustible construction, electrical hazards, natural peril exposures, utility/service reliability, emergency response planning, and failure of fire protection means. These potential loss drivers can be predicted and controlled through proactive risk management approaches. There are numerous opportunities to utilize different building automation techniques collaboratively across various stages of risk management. For example, security cameras coupled with temperature sensors throughout a building can help identify abnormal situations or pre-alert for incidents like fires (in addition to legacy fire detection practices).

COMMAND CENTRE IMAGE

This enables immediate action to alert stakeholders and occupants. Additionally, building automation technologies can maintain the health and condition of protective measures and equipment, evaluate the status of prevention programs, and reflect updates related to property loss prevention strategy through dashboards accessible to decision-makers and responsible teams. This can be further improved by integrating on-site building automation frameworks with external databased highly efficient tools to improve loss-threatening incident predictions and align protection and prevention strategies. In recent amendments to the Maharashtra Fire Act 2023, much importance is given to aspects like Automated Continuous Monitoring Systems for Fire Fighting in Buildings. Moreover, IRDA is mandating insurance companies to follow Risk-Based Supervisory Frameworks. These policy changes are going to highlight the use of automation techniques in property loss prevention.

In conclusion, building automation offers significant potential to enhance all dimensions of property loss prevention, from strategy and training to predictive maintenance and performance evaluation.

BY ABASAHEB KALE
BUSINESS DEVELOPMENT EXPERT, MANAGING DIRECTOR, PDKASM CONSULTING

THE RISE OF IOT IN RESIDENTIAL BUILDING MANAGEMENT

Introduction

In an era where technology permeates every aspect of our lives, our homes are no exception. The advent of the Internet of Things (IoT) has revolutionized residential building management systems, offering homeowners unprecedented levels of control, comfort, and convenience. In this article, we explore the transformative impact of IoT on home living and the future possibilities it holds.

One of the primary benefits of IoT for building managers is real-time monitoring and insights into building operations. IoT sensors installed throughout the building collect data on various parameters such as temperature, humidity, energy usage, and occupancy levels. This data is then transmitted to a centralized platform, providing building managers with valuable insights into building performance and enabling them to identify areas for optimization and improvement.

Efficiency and Sustainability

IoT plays a pivotal role in enhancing building efficiency and sustainability throughout the project lifecycle. Smart building management systems equipped with sensors and automation technologies optimize energy usage, lighting, HVAC systems, and water management. Additionally, IoT-enabled predictive maintenance tools identify potential equipment failures before they occur, minimizing downtime and extending the lifespan of building assets. Through these innovations, builders can deliver environmentally conscious and energy-efficient residential projects that resonate with modern homeowners. One of the primary benefits of IoT in residential building management is the promotion of energy efficiency and sustainability.

Smart thermostats optimize heating and cooling based on occupancy patterns and weather conditions, reducing energy waste and lowering utility bills. Likewise, IoT-enabled lighting systems adjust brightness levels and usage patterns to minimize electricity consumption. Through these innovations, homeowners can embrace environmentally conscious living without sacrificing comfort or convenience.

Predictive Maintenance

Maintenance is a crucial aspect of building management, and IoT facilitates predictive maintenance strategies that help building managers address issues before they escalate into costly problems. Smart sensors installed on building equipment and systems continuously monitor performance metrics and detect anomalies or signs of potential failure. By analyzing this data, building managers can schedule maintenance tasks proactively, minimizing downtime and extending the lifespan of building assets.

The Smart Home Revolution

Gone are the days of conventional home management. With IoT, our homes are evolving into smart ecosystems, where interconnected devices seamlessly communicate and collaborate to enhance our living experience. From smart thermostats and lighting systems to voice-controlled assistants and security cameras, IoT-enabled devices empower homeowners with remote control and automation capabilities, transforming the way we interact with our living spaces.

Personalized Comfort and Convenience

IoT technologies offer personalized comfort and convenience tailored to individual preferences. Smart home hubs and mobile apps serve as centralized platforms for controlling and monitoring various devices, allowing homeowners to create customized settings for lighting, temperature, entertainment, and security. Whether it's adjusting the thermostat from the comfort of the couch or remotely monitoring home security cameras while away, IoT puts control at your fingertips, enhancing your quality of life.

Enhanced Safety and Security

IoT enhances security and safety in residential buildings by providing building managers with advanced surveillance and access control capabilities. Smart security cameras and motion sensors monitor common areas and entry points, detecting unauthorized access and alerting building managers to potential security threats in real-time. Moreover, IoT-enabled access control systems allow for secure keyless entry and customizable access permissions, enhancing building security while providing residents with peace of mind. Safety and security are paramount concerns also for homeowners, and IoT delivers innovative solutions to address these needs. Smart security systems equipped with cameras, motion sensors, and door/window sensors provide real-time monitoring and alerts, empowering homeowners to safeguard their property remotely.

Furthermore, IoT-enabled smart locks offer secure keyless entry options and customizable access controls, enhancing home security while simplifying everyday tasks.

Challenges and Opportunities

While IoT promises to revolutionize residential building management, it also presents challenges that must be addressed. Privacy and data security concerns surrounding IoT devices raise valid apprehensions among homeowners, necessitating robust cybersecurity measures and data protection protocols. Interoperability issues between different IoT platforms and devices also pose challenges, highlighting the need for standardized protocols and seamless integration solutions.

The Future of Home Living

As IoT continues to evolve, the future of home living holds exciting possibilities. Innovations such as AI-powered home assistants, predictive maintenance systems, and smart appliances promise to further enhance the comfort, efficiency, and sustainability of residential buildings. Moreover, advancements in IoT technology pave the way for interconnected smart communities and energy-efficient neighbourhoods, fostering a more interconnected and sustainable future.

Benefits and how we can achieve this!

- Sensors: Install various sensors throughout the complex to monitor environmental conditions such as temperature, humidity, and air quality. Additionally, motion sensors can be used for security purposes.
- Smart Thermostats: Use IoT-enabled thermostats that can be controlled remotely to regulate heating and cooling in individual units or common areas. These can optimize energy usage based on occupancy and external weather conditions.
- Smart Lighting: Install smart lighting systems that adjust brightness based on natural light levels and occupancy. Residents can also control lighting remotely through a mobile app or voice commands.
- Energy Monitoring: Implement energy monitoring devices to track electricity, water, and gas consumption in real-time. This data can help identify inefficiencies and encourage conservation among residents**.**
- Security Cameras: Deploy IoT-connected security cameras for surveillance purposes. These cameras can be accessed remotely, allowing residents to monitor their homes and common areas from anywhere**.**
- Access Control Systems: Install smart locks and access control systems for entrances, parking garages, and other communal areas. Residents can use keycards, PIN codes, or mobile apps to gain access, enhancing security and convenience**.**
- Remote Monitoring and Control: Develop a centralized platform or mobile app that allows residents and property managers to monitor and control various IoT devices from a single interface. This could include setting temperature preferences, adjusting lighting schedules, and viewing security camera feeds.

- Predictive Maintenance: Utilize IoT sensors to collect data on the condition of equipment such as HVAC systems, elevators, and water pumps. By analyzing this data, maintenance needs can be predicted, reducing downtime and prolonging the lifespan of assets**.**
- Integration with Smart Grids: Integrate the BMS with local utility providers and smart grid infrastructure to optimize energy usage and take advantage of demand-response programs**.**
- Data Analytics and Insights: Use advanced analytics tools to analyze the vast amounts of data generated by IoT devices. Insights gained from this analysis can be used to identify trends, optimize operations, and improve the overall efficiency of the residential complex**.**

Some remedies

LED Lighting: LED (Light Emitting Diode) lighting consumes significantly less energy compared to traditional incandescent bulbs and even CFLs (Compact Fluorescent Lamps). LED bulbs are highly energy-efficient, have a longer lifespan, and are available in various Color temperatures and designs to suit different needs.

Occupancy Sensors: Install occupancy sensors in common areas such as hallways, stairwells, and parking garages. These sensors detect motion and automatically turn lights on and off as needed, ensuring that lights are only on when necessary.

Daylight Harvesting Systems: Incorporate daylight harvesting systems, which use sensors to adjust artificial lighting levels based on the amount of natural light available. This helps optimize lighting levels and reduces the need for artificial lighting during daylight hours.

Low-Flow Fixtures: Install low-flow fixtures in bathrooms and kitchens to reduce water usage. Low-flow toilets, faucets, and showerheads can significantly decrease water consumption without sacrificing performance.

Energy-Efficient Appliances: Equip units with energy-efficient appliances, including refrigerators, dishwashers, washing machines, and dryers. Look for appliances with ENERGY STAR certification, which indicates superior energy efficiency.

Smart Thermostats: Install smart thermostats in individual units to optimize heating and cooling energy usage. Smart thermostats can learn residents' preferences, adjust temperatures based on occupancy, and be controlled remotely via smartphone apps, helping to reduce energy waste.

Energy-Efficient Windows and Insulation: Ensure that windows are energy-efficient and properly sealed to minimize heat loss in the winter and heat gain in the summer. Additionally, invest in adequate insulation throughout the building to improve energy efficiency and occupant comfort.

High-Efficiency HVAC Systems: Install high-efficiency heating, ventilation, and air conditioning (HVAC) systems that meet energy efficiency standards. Properly sized and maintained HVAC systems can significantly reduce energy consumption while providing optimal indoor comfort.

Energy Monitoring Systems: Implement energy monitoring systems to track and analyze energy usage in real-time. These systems provide valuable insights into energy consumption patterns, helping building management identify opportunities for further energy savings.

BY AMOL PORE, HEAD MEP DESIGN (MECHANICAL) - L&T REALTY

INFRASTRUCTURE TECH RESULTING IN SUSTAINABLE SMART SPACES

Sustainable smart spaces are not a choice any more.
The concept has transitioned itself from being an option – once upon a time to being an essential element in our day to day lives. This transition is driven by several factors namely – Environment factors, Economic impact, Urbanization trends & Technological advancements. Increasing global warming & visible changes in weather events have necessitated incorporation of Sustainable practices in the way we plan conceive & plan spaces. Sustainable smart spaces have played a major role in conservation of both renewable & non-renewable resources.
Implementing energy-efficient technologies and sustainable practices can lead to significant long-term cost savings in Capital & operational expenditures. Subsidies being rolled out by Governments has been evoking a decent response off late from the end users. Spaces which have embraced such techniques have seen a surge in their market values as well.

Role of Infrastructure Technology
Infrastructure technology plays a crucial role in developing sustainable smart spaces, aiming to create environments that are efficient, eco-friendly, and conducive to high quality of life. These key infrastructure technologies play a major role while planning our cities, neighbourhoods & framing relative policies mandating its incorporation. The role of Governments & Municipal Corporations,
Town planners Architects at planning stage & Corporate houses, Industrial manufacturers & Developers should ensure incorporation of these technologies in their spaces.
This technology includes planning strategies, materials, Management systems comprising of Electro- mechanical technology designed on principles of automation.

Here's an overview of collective infrastructure technologies involved in designing & developing sustainable smart spaces:

Urban Planning and Design

- Green Spaces: Incorporate parks, green roofs, and vertical gardens to enhance air quality and urban biodiversity at macro & micro level.
- Mixed-Use Developments: Design communities that integrate residential, commercial, and recreational spaces to reduce the need for long commutes indirectly reducing use of natural fuels & stress on traffic infrastructure.

Effective Architectural planning strategies

- Smart planning: Architectural planning as a response to Climatic conditions & geographical limitations plays a vital role in reducing dependency & strain on the non-renewable resources of energy.
- Building orientation: Building orientation as a response to micro climatic conditions ensures energy efficiency by reducing heat gain & optimizing infusion of natural light into the building.

Green Building Materials

- Sustainable Construction Materials: Use of recycled, low-carbon, and energy-efficient materials available in certain vicinity of building construction.
- Insulation and Windows: Use of Advanced insulation materials to reduce heat gain and improve energy efficiency, thereby reducing use of air-cooling devices.

Renewable Energy Sources

- Solar Panels: Convert sunlight into electricity, reducing dependence on fossil fuels which are depleting fast.
- Wind Turbines: Generate power from wind, suitable for areas with high wind speeds especially coastal belts & higher terrains
- Energy Storage Systems: Batteries and other technologies to store energy for use when renewable sources are not generating power.

Transportation Infrastructure

- Electric Vehicle (EV) Charging Stations: Support the adoption of electric vehicles, reducing emissions from transportation.

- Smart Traffic Management Systems: Use real-time data to optimize traffic flow, reduce congestion, and lower emissions.

Internet of Things (IoT)

- Smart Sensors and Devices: Collect and analyze data on energy use, environmental conditions, and human activity to optimize resource usage and improve comfort.
- Connected Systems: Integrate various building systems (HVAC, lighting, Security devices) for centralized control and improved efficiency.

Energy Management Systems (EMS)

- Smart Grids: Balance supply and demand, integrating renewable energy sources and enhancing grid reliability.

SMART SUSTAINABLE CITY NEIGHBOURHOOD

- Building Management Systems (BMS): Automate and control building operations to reduce energy consumption and improve efficiency.

Water Management Systems

- Smart Water Meters: Monitor water usage in real-time, detect leaks, and promote conservation.
- Greywater Recycling Systems: Treat and reuse water from sinks, showers, and baths for non-potable purposes like irrigation, fulfilling water need for landscape purposes.

Waste Management

- Automated Waste Collection: Use smart bins that signal when they need to be emptied, optimizing collection routes and reducing fuel use.
- Recycling and Composting Systems: Facilitate waste separation and processing to reduce landfill use and promote recycling.

Information and Communication Technology (ICT)

- High-Speed Internet and 5G: Support IoT devices and smart infrastructure with fast, reliable connectivity.
- Cloud Computing and Data Analytics: Process and analyze vast amounts of data from smart devices to inform decision-making and optimize operations.

Cybersecurity

- Protection of Smart Infrastructure: Implement robust cybersecurity measures to safeguard data and systems from cyber threats.

Benefits

Benefits of implementation of Infrastructure technology has benefits on Environment, Economy improvising health of residents & enriching social fabric.

Benefits of Use of above technologies have tangible & intangible benefits on Sustainable Smart Spaces such as reduced Environmental Impact due to lower carbon emissions, reduced waste, and conservation of resources further improving quality of Life with Enhanced comfort, safety, and convenience for residents. Energy-efficient buildings and smart grid technologies can lead to significant savings on utility bills and maintenance costs ensuring Economic Efficiency. Properties with sustainable features often see higher market values and attract more investors. The development and maintenance of sustainable technologies and infrastructures create new job opportunities in various sectors. By further reducing dependence on finite resources and improving efficiency, sustainable smart spaces contribute to long-term economic stability.

Enhanced urban planning, green spaces, and better air quality contribute to a healthier and more enjoyable living environment ensuring improved Quality of Life. Reduced pollution and better indoor environments lead to lower incidences of respiratory and other health issues. Smart technologies facilitate greater community participation and engagement in local decision-making processes. Smart technologies alleviate pressure on existing infrastructure, extending its lifespan and improving performance, managing the challenges of urbanization by promoting efficient use of space and resources.

A few challenges and considerations like Initial up-front investment in infrastructure and technology are a challenge along with interoperability while ensuring different systems and devices work seamlessly together. In this era where cyber crimes are on the rise protecting user data and ensuring system security is another crucial aspect to be considered.

However, by overcoming these adversities & leveraging these infrastructure technologies, sustainable smart spaces aim to create environments that are not only technologically advanced but also environmentally responsible and socially inclusive.

BY GAURAV JOSHI
ARCHITECT | IGBC AP | AN EXPERT ON RESORTS & TOWNSHIPS; PARTNER, STUDIO3 ARCHITECTS

INFRASTRUCTURE TECHNOLOGY ENABLING SUSTAINABLE SMART BUILT ENVIRONMENT

Green building also known as sustainable building or eco-friendly building refers to both a structure and the application of processes that are environmentally responsible and efficient during the course of a building's entire life-cycle from planning to design, construction, operation & maintenance, renovation, and demolition. This requires a close cooperation of all the stakeholders like the architects, the engineers, the client and contractor, at all project stages. Green construction also refers to saving resources to the maximum extent, including energy saving, water saving, material saving, reducing wastage etc. During the whole life cycle of the building, protecting the environment and reducing pollution, providing people with healthy, comfortable and efficient use of space, and being in harmony with nature. Buildings that live in harmony; green building technology focuses on low consumption, high efficiency, economy, environmental protection, integration and optimization.

The built environment is not unexperienced to digital transformation. Though technology is revolutionising all other processes across the IT, manufacturing and similar other industries, it is also transforming the same way the buildings designed, build and operated. Sustainable buildings has become growing common in the construction sector in modern years, the wave of digital transformation has huge effects for both the built environment and for sustainability.

Smart buildings using BMS

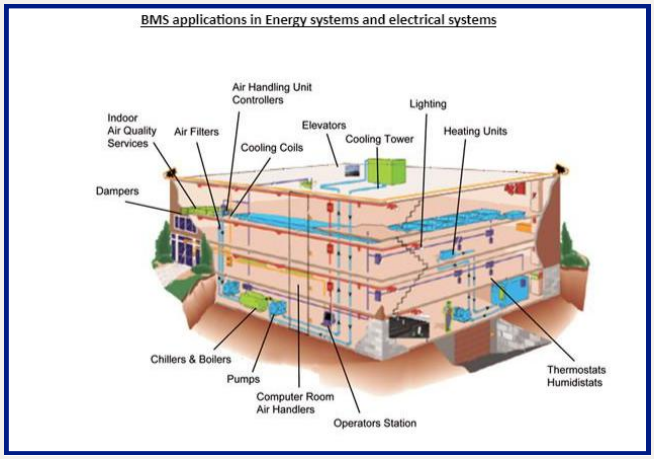
Smart buildings are the structures that utilize tools / technology to optimize the resource usage, efficiency and comfort for inhabitants. These buildings are equipped with a variety of modern and innovative technologies like artificial intelligence (AI) and to the Internet of Things (IoT)

S**mart buildings operations using BMS**

These buildings designed to monitor performance on various parameters such as comfort, efficiency and productivity, to get these they are equipped with sensors that can gather data and connect to the software for further optimization.

Smart building advantages using BMS

- Energy Efficiency
  - HVAC system Optimization: BMS can control heating, ventilation, and air conditioning (HVAC) systems to maintain optimal performance. It adjusts temperature settings, airflow, and humidity levels based on real-time data and occupancy patterns, thus minimizing energy consumption.
  - Lighting Control: Automated lighting systems, managed by BMS, can adjust lighting levels based on occupancy, daylight availability, and time of day. This reduces unnecessary electricity use and lowers energy bills.
  - Operations Scheduling: BMS can schedule the operation of electrical and mechanical equipment to avoid peak demand times, thereby reducing energy costs and minimizing strain on the grid.



BMS APPLICATIONS IN ENERGY SYSTEMS AND ELECTRICAL SYSTEMS

- Water Conservation
- Water Leak Detection and Repair: BMS can monitor plumbing systems for leaks and inadequacies, ensuring quick detection and repair, which saves water, damages to property and reduces wastage.
    - Efficient Water Heating: BMS controls water heating systems to ensure they operate only when needed and at optimal temperatures, reducing energy consumption and water usage.
    - Smart Water metering: used to monitor water usage to optimizing it, ensuring that you gain substantial benefits in terms of cost savings, accurate water data, water conservation, and a more.

SMART WATER MANAGEMENT SYSTEM IN BIM

- Indoor Environmental Quality
    - Air Quality Monitoring: BMS monitors indoor air quality parameters like CO2 levels, humidity, and pollutants. It adjusts ventilation rates to ensure a healthy indoor environment, enhancing occupant comfort and productivity.
    - Thermal Comfort: By maintaining consistent and comfortable temperature levels through precise control of HVAC systems, BMS ensures thermal comfort for building occupants, which can also contribute to energy savings by avoiding over-conditioning.
- Additionally, BMS can be integrated with energy management systems to monitor & manage energy usages and provide details reports enabling facility managers to make informed decisions on energy saving measures.
- BMS can also help in buildings get green building certifications by providing the required performance data and ensuring compliance with sustainability criteria's.

Steps for implementation of Smart technologies or BMS

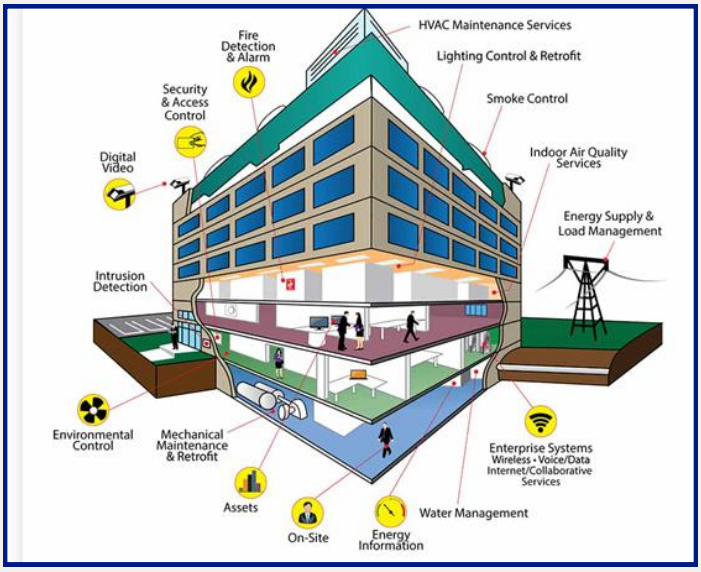
Design and Planning-
The incorporation of smart technologies begins with comprehensive design and planning, ensuring seamless operation and compatibility of all systems.
Installation and Integration-
Proper installation and integration of sensors, meters, and control systems are crucial for optimal performance. Initiative with experienced professionals ensures successful implementation.
Commissioning and Testing-
Thorough testing and commissioning ensure that all systems function as intended. Calibration of sensors and meters is essential for accurate data collection and system performance.
Maintenance and Optimization-
Regular maintenance and updates keep systems functioning optimally. Continuous data analysis helps identify further improvements and maintain efficiency.
Configurability and upgrades-
Smart systems should be designed with scalability in mind, allowing for future upgrades and technological advancements without major troubles.

The key takeaways-
Building Management Systems are not just a trend but also an essential tool in modern building management, offering a blend of energy efficiency, operational excellence, and enhanced resident well-being. Intrinsically, they are a crucial investment for any building looking for viable and sustainable in the growing landscape of Sustainable building management.

BY MANDAR KULKARNI
GENERAL MANAGER, WATER & FIRE MANAGEMENT, PANCHSHIL

BUILDING AUTOMATION: TRANSFORMING MODERN INFRASTRUCTURE FOR EFFICIENCY AND SUSTAINABILITY

Building automation, the integration of advanced technology to manage and control building systems, has revolutionized the infrastructure landscape. By leveraging automated systems for heating, ventilation, air conditioning (HVAC), lighting, security, and other critical functions, building automation enhances operational efficiency, comfort, and sustainability.

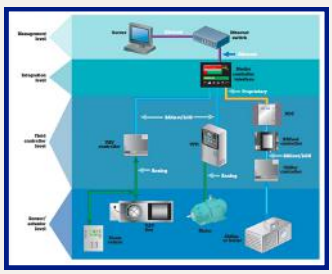


BUILDING AUTOMATION SYSTEM (COURTESY: CONTROL.COM)

Key Components of Building Automation Systems

Building automation systems (BAS) are sophisticated integrations of hardware and software designed to control various building functions. These systems consist of:

- Sensors and Actuators: Sensors collect real-time data on environmental conditions like temperature, humidity, and occupancy, while actuators execute commands to adjust HVAC, lighting, and other equipment settings.
- Controllers: Serving as the central processing unit of BAS, controllers analyze sensor data, make decisions based on preset algorithms, and send commands to actuators. They can range from programmable logic controllers (PLCs) to advanced computer-based systems.
- Communication Networks: Reliable communication protocols such as BACnet, Modbus, and LonWorks ensure seamless data transmission between sensors, controllers, and actuators, even across devices from different manufacturers.
- User Interface: From simple keypads to sophisticated graphical interfaces accessible via computers or mobile devices, the user interface allows facility managers to monitor and control building systems effectively.
- Software: BAS software includes algorithms for data analysis, control logic, and user interfaces.



KEY COMPONENTS OF BAS (COURTESY: FLUKE)

- Increasingly, artificial intelligence (AI) and machine learning (ML) are being integrated to optimize performance and predict maintenance needs.

Benefits of Building Automation

Building Automation Systems (BAS) offer significant benefits that improve the efficiency, comfort, and sustainability of buildings:

- Energy Savings: BAS optimizes energy-intensive systems like HVAC and lighting by adjusting operations based on occupancy, time of day, and external weather conditions. This can lead to substantial energy savings, often up to 30%, according to industry reports.
- Cost Reductions: Lower energy consumption translates directly into reduced utility bills. Additionally, BAS can lower maintenance costs by providing predictive maintenance alerts, thereby extending the lifespan of equipment.
- Improved Comfort and Productivity: Maintaining optimal environmental conditions enhances occupant comfort, which in turn boosts productivity, particularly in commercial and office environments. Automated control of ventilation systems also ensures good indoor air quality, further contributing to occupant well-being.
- Enhanced Security and Safety: BAS integrates with security systems such as surveillance cameras, access controls, and fire alarms, offering a comprehensive approach to building safety. This integration allows for immediate response and coordination during emergencies, thereby improving overall safety.
- Operational Efficiency: Centralized control and monitoring simplify building management, reducing the need for manual intervention. BAS also collects and analyzes data from various systems, providing insights that enable further optimization of building performance and efficiency.

To summarize, implementing a Building Automation System offers significant tangible benefits that improve energy efficiency, reduce costs, enhance comfort and security, and streamline building operations, making it a valuable investment for any modern building.

Future Trends in Building Automation

The field of building automation is rapidly evolving, driven by technological advancements and increasing demands for smarter, more sustainable buildings:

- Internet of Things (IoT) Integration: The proliferation of IoT devices enhances BAS capabilities by providing granular data and enabling more sophisticated control strategies. This integration facilitates seamless connectivity between building systems and external services.
- Artificial Intelligence and Machine Learning: Artificial Intelligence (AI) and Machine Learning (ML) are increasingly incorporated into BAS to optimize performance and predict maintenance needs. These technologies analyze vast amounts of data to identify patterns, anticipate equipment failures, and suggest energy-saving measures.

- Cybersecurity: As BAS becomes more interconnected and reliant on digital technologies, cybersecurity becomes crucial. Ensuring the security of data and systems against cyber threats is essential to maintaining the integrity and reliability of automated buildings.
- Smart Grids and Renewable Energy Integration: BAS plays a pivotal role in integrating renewable energy sources and participating in smart grid initiatives. They can manage energy loads dynamically, respond to grid conditions, and optimize the use of on-site renewable generation, contributing to overall energy efficiency.
- Human-Centric Design: Future BAS will increasingly focus on enhancing occupant comfort and productivity through adaptive systems that learn from occupant behavior and preferences. This approach aims to create personalized and responsive environments that cater to individual needs.
- **S**ustainable Building Practices: Advances in building materials, coupled with automation, will drive the construction of more sustainable buildings. BAS can manage energy flows efficiently in structures designed with innovative materials aimed at enhancing energy efficiency and sustainability.

Conclusion

Building automation transforms building operations, enhancing efficiency, comfort, and sustainability. Embracing advancements in IoT, AI, and renewable energy will further revolutionize modern architecture and urban planning, making building automation an indispensable element of future infrastructure. By integrating these technologies thoughtfully, we can create smarter, greener, and more adaptive buildings that meet the evolving needs of society.

PRAFULL SANGLE
ASSOCIATE, P & T ARCHITECTS AND ENGINEERS LTD

ADVANCES IN FIRE DETECTION PORTFOLIOS

Like never before, current unfolding events are necessitating sustainability to take the central core space in building designs! Every responsible Corporate entity has set ambitious ESG commitments including net zero target schedules.

A lot automation efforts are also being contributed by every portfolio to churn out relevant parameters. This helps in gaining better visibility of the deployments and thus the control through, thorough monitoring!

Fire Detection industry, being a life safety necessity, is also governed by various codes & standards in India as well as Globally. We have various experts contributing their inputs ensuring innovations which tend to help, through the project lifecycle. The idea is to minimize resources consumption, with effective pulse of the system. This ultimately results in “consistent, reliable & healthy” system, ready to save lives during fire or non-fire emergencies!

Certain recent key trends with Indian and Global codes & Standards, are being briefed below;

- Internet infrastructure is being used now to ensure quick alerts acknowledgement by key first responders. This also helps in better reporting and maintenance i.e. detailed device reports at Fire Alarm Control Unit are now helping for pinpointed maintenance measures. This is being advanced by leading manufacturers by utilizing existing portfolio ability. Such technology is now sending “critical alerts” which need quick action, right in hands of key responders. These features are also helping us to gather data points for effective maintenance and overall monitoring purpose. Code Committees have in fact, gone a step ahead, and have introduced “Cyber Security” as a part of life safety measures. Since the deployments will be utilizing IT infrastructure, the hazards of cyber attack also need to be closely looked at, i.e. NFPA 72, 2022 edition has introduced Chapter 11 “Cyber Security” and new Annexure J has been added. This is expected to gain more details in upcoming editions. Also, Code also cautions us to have Fire Life Safety components to be distinctively marked, for few reasons, knowing maintenance ownership and to avoid any wrong handling affecting the critical lifesaving system. Based on user and application feedback, now global codes have introduced concept of BSIU (Building System Information Unit). Now end user can deploy Fire systems monitoring graphics on less lenient listed hardware with pre-condition of having central panel in the same room, with similar controls on both, BSIU and FACU.
- Carbon Monoxide (CO) Sensor – This change was introduced in NFPA 72 to acknowledge CO hazards from life safety perspective. CO has been a silent killer in sleeping zones. Code committee took cognizance and also has introduced “Temporal 4” as a distinctive alarm to alert occupants. This device become “resilient” alarm sensing in tricky areas like mist generation. They also obey “OSHA Guidance” while installed in parking lots. The Code guidance suggesting locating it locations including, Centrally located in every habitable/every HVAC zone, on ceiling of permanently installed fuel burning appliances, and 6.4 m from any door to a sleeping room.

- UL Listing on 7th Edition for Smoke Detection was newly introduced to better represent the profiles and behavior of modern building fires e.g. petrochemical based materials, like foam and nylon increased usage. Vast usage of these material is resulting in fire deaths due to faster flaming, rapid oxygen depletion and toxic gases concentration.
- **Secondary Power Supplies** – Codes are taking cognizance of incidences happening due to faults in in rechargeable batteries. There are suggestions on listing or component recognition by a nationally recognized laboratory.
- **Mass Notification** : This is an indeed crucial design factor, as it helps protect and alert in premise occupants. Depending on evacuation strategy, the design of notification appliances becomes very crucial. Code has been insisting on rather “Intelligible” and “not louder” sound for better comprehension about critical evacuation messages being delivered. Emergency communication is becoming increasingly crucial considering ever reducing evacuation times. Hence latest guidelines are now suggesting listing specific to Mass notification applicable to Fire Alarm Control Unit if it is being used for the mass notification application. Listing requirements being very stringent, these new changes are welcome to enhance safer evacuation during fire or non- fire emergencies!
- There are certain key changes also have happened over last decades including;
    - Low Frequency Sounders – This is a suggested by code for all audible appliances initiated by the building fire alarm that are provided in sleeping areas to wake sleeping occupants. These low frequency alarm appliances are effective for children, elderly and occupants having mild to severe hearing loss.
    - Avoiding document storage inside the Fire Alarm Unit, as control units are not approved for storage of combustible material. One can have storage chip based on panel processor or external cabinet with prominent label “document storage”.
    - Fire Alarm testing – Testing process shall be well informed to the occupants, pre and post conclusion of testing. This ensures to avoid relevant response from the occupants
    - As per medical guidance (ADA), it advised to avoid the likelihood of seizure due to the strobe light triggering (Photosensitive Epilepsy). This is covered under Notification appliances chapter in NFPA 72 as well;
        - The flash rate be kept to under 2 Hertz with breaks every so often between flashes.
        - Flashing lights should be placed at a distance from each other and set to flash together at the same time (Synchronized) to avoid an increase in the number of individual flashes.

BY AJIT GARVE
BUSINESS DEVELOPMENT MANAGER, GLOBAL FIRE DETECTION PRODUCTS AT JOHNSON CONTROLS

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A GUIDE TO ELECTRICAL SERVICES AND FIRE ALARM SYSTEM MAINTENANCE

Electricity and fire safety systems are the cornerstones of a secure and functional environment, be it a residential home, commercial building, or industrial facility. Regular electrical service and fire alarm system maintenance are crucial for preventing accidents, ensuring smooth operations, and complying with local regulations. This comprehensive guide delves into the importance of both, offering insights into the services offered, maintenance best practices, and a real-world case study for better understanding.

Understanding Electrical Services:
Electrical services encompass a wide range of tasks performed by qualified electricians to ensure the safety, efficiency, and functionality of a building's electrical system. Some common services include:

- Inspections and Testing: A qualified electrician will thoroughly inspect the entire electrical system, identifying potential hazards like faulty wiring, overloaded circuits, and outdated components. They may also conduct tests to measure voltage, current, and grounding integrity
- Repairs and Upgrades: Electrical repairs address existing issues like flickering lights, tripping breakers, or malfunctioning outlets. Upgrades involve modernizing the electrical system to meet current safety standards and accommodate increased electrical demands of modern appliances.
- Panel Upgrades: Electrical panels are the heart of a building's electrical system. Outdated panels may not handle the power requirements of modern equipment. Upgrading the panel ensures safety and prevents overloading
- Ground Fault Circuit Interrupter (GFCI) and Arc Fault Circuit Interrupter (AFCI) Installation: These specialized outlets provide additional protection against electrical shocks and arc faults, significantly reducing fire risks.
- Lighting Design and Installation: Electricians can design and install new lighting systems or upgrade existing ones to enhance aesthetics, improve energy efficiency, and meet specific functional needs.

The Benefits of Regular Electrical Services:
Regular electrical service offers a multitude of benefits:

- Enhanced Safety: Addressing potential electrical hazards significantly reduces the risk of fires and electrical shocks.
- Improved Efficiency: Regular maintenance ensures a well-functioning system, leading to lower energy consumption and reduced electricity bills.
- Extended Lifespan of Equipment: Proper maintenance extends the life of electrical components, delaying expensive replacements.
- Compliance with Regulations: Many areas have electrical codes that mandate periodic inspections and maintenance. Regular service ensures compliance with these regulations.
- Peace of Mind: Knowing that your electrical system is safe and functioning optimally provides peace of mind for residents or building occupants.

Fire Alarm System Maintenance:

A properly maintained fire alarm system is vital for ensuring the safety of occupants in case of a fire. Fire alarm system maintenance typically involves:

- Scheduled Inspections: Qualified technicians perform routine inspections to ensure all components are functioning correctly, including smoke detectors, heat detectors, pull stations, and the central control panel.
- Testing and Cleaning: Fire alarms undergo regular testing to verify proper operation. Technicians also clean detectors to ensure they function optimally.
- Battery Replacement: Fire alarms rely on batteries for backup power. Technicians ensure timely replacement of batteries to maintain functionality in case of a power outage.
- Documentation and Reporting: Detailed records of inspections, testing, and maintenance are maintained for future reference and to document compliance with fire codes.

Why Regular Fire Alarm System Maintenance Matters:
Regular fire alarm system maintenance is essential for the following reasons:

- Early Warning in Case of Fire: A well-maintained fire alarm system detects smoke or heat at the earliest stages, giving occupants precious time to evacuate safely.
- Reduced False Alarms: Regular maintenance minimizes the occurrence of false alarms, which can disrupt occupants and waste emergency response resources.
- Compliance with Regulations: Most jurisdictions have fire codes mandating regular fire alarm system inspections and maintenance.
- Lower Insurance Costs: Some insurance companies offer discounts for buildings with documented fire alarm system maintenance programs

Case Study: The Benefits of Proactive Maintenance in a High-Rise Hotel

Introduction:
The Grandview Hotel, a 25-story luxury hotel in a bustling downtown area, accommodates hundreds of guests daily. Ensuring their safety and comfort is paramount. This case study explores how the Grandview prioritized proactive maintenance of its electrical and fire alarm systems, preventing potential disasters and enhancing guest experience.
The Challenge:
Prior to implementing a proactive maintenance plan, the Grandview faced several challenges:

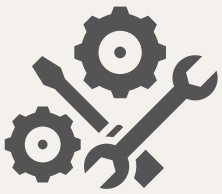
- Reactive Maintenance: Electrical and fire alarm issues were addressed only when they arose, leading to disruptions and potential safety risks.
- Unforeseen Expenses: Unexpected repairs caused unplanned downtime and financial strain.
- False Alarms: Occasional false alarms disrupted guests and staff, causing frustration and potentially eroding trust in the hotel's safety measures.
- Compliance Concerns: Meeting fire code requirements for system inspections and testing posed a challenge without a structured approach.

The Solution:
The Grandview partnered with a reputable electrical and fire safety company to implement a comprehensive maintenance program:

- Electrical Services: Quarterly inspections were implemented, focusing on:
  - Visual inspection of wiring, outlets, and panels for damage.
  - Thermal imaging to detect potential overheating issues.
  - Circuit testing for proper voltage and amperage levels.
  - GFCI testing for functionality.
  - Cleaning and tightening electrical connections.
- Fire Alarm System Maintenance:
  - Monthly visual inspections of detectors, panels, and notification devices.
  - Semi-annual testing by a certified technician, including:
    - Triggering alarms to ensure proper functionality.
    - Testing communication between system components.
    - Cleaning smoke detectors.
  - Annual comprehensive inspection, focusing on:
    - Detailed review of system documentation.
    - Testing of all system components.
    - Verification of code compliance.

The Results:
The proactive maintenance program delivered significant benefits:

- Improved Safety: Early detection and rectification of electrical issues minimized the risk of fire and electrical hazards.
- Reduced Costs: By addressing minor problems before they escalated, the hotel avoided costly repairs and downtime.
- Enhanced Guest Experience: Fewer disruptions from electrical issues and false alarms contributed to a more positive and secure guest experience.
- Compliance Assurance: Regular inspections and testing ensured the fire alarm system met all code requirements, providing peace of mind and avoiding potential citations.



Conclusion:
The Grandview Hotel's commitment to proactive electrical and fire alarm system maintenance serves as a prime example of preventive measures fostering safety, cost-effectiveness, and a superior guest experience. The case study emphasizes the importance of prioritizing maintenance not just for emergencies, but as a cornerstone of a safe and well-functioning building.

BY VIVEK PAI
DIRECTOR, VL ASTRA ENGINEERS (INDIA) PRIVATE LIMITED

APPROACHING THE AUTOMATION UTOPIA IN INFRA-CONSTRUCTION

We have witnessed incredible strides in the development and advancement in the infra-construction sector, especially more so in the past decade. Records being made and surpassed as larger, faster, taller, smarter, environmentally ambient construction infrastructure is being birthed. It is the automation alongside the global need- not demand, for newer, updated infrastructure at economical costs, that is emerging to be a contributing and deciding factor shaping the direction of this industry.

There are three primary areas for automation in infra-construction. The first is automation of what falls under traditional physical tasks on-site, like machines paving roads. The second kind focuses on modular construction and production in factories, like 3-D printing of components such as facades. And the third centers on digitization and the subsequent automation of design, planning, monitoring and management systems, as well as the vast efficiencies resultant of this application. In general, examples of new automated construction technologies are BIM, drones, modular construction, AI, Digital Twins, blockchain technology, virtual and augmented reality, 4D simulations, 3D printing and such more, completing their evolutionary incubation period.

Need is the mother of invention.

If this is so, why do so many unwanted things get invented? That is a query to contemplate. Well, if one technique applies to a particular requirement effectively, it may not necessarily prove its worth to another application! It is a no brainer to now acknowledge, automation brings in increased precision and drastically reduces time on repetitive tasks. When excavators began demonstrating the massive capacities to excavate, relocate rubble, on challenging terrains or depths, that was perceived as a huge advancement as against manual effort of labor with their pans and sapping energies in the harsh infra-construction environments. And this was just the beginning…

Today, data from automated inspections helps project managers to convert it into information, and that in turn helps decision makers take timely and corrective action based on the knowledge it offers. This, in turn makes bandwidth available to Promoters to focus on more strategic initiatives and provide faster project completion, saving over investment in surplus resources. Currently, infra-construction automation is a process offering indispensable functionalities of advanced technologies like high resolution cameras linked with data analysis software, sensors (temperature, humidity, etc.), GPS (for monitoring fuel theft or geo-tagging), wireless communication, AI and even robotics (confined space working, tunneling), to automate or assist the operation and control of the infra-construction equipment and activity, either remotely or autonomously. Automation is truly become a game-changer, enhancing not just efficiency and safety, but also reducing waste and increasing sustainability in the infra-construction process.

SURVEY WITH DGPS AT RPIPL SITE

For the humans, by the humans

Then there is also the imperative and key human factor to consider too. All this effort is for betterment of human life after all! Although the infra-construction industry is generally slightly behind, looking for ways of eliminating hazardous tasks to enhance efficiency, ensure and improve the safety of site workers. Customized machine-learning-algorithms can sort through the massive amounts of data generated on a daily basis, tracking pre-determined criteria to find patterns that could indicate the potential safety issues, that human observers might take for granted or miss. Injuries at site often occur due to changes in a work process, brought on by fatigue of long working hours or distraction. Since the same process is used each time without fatiguing, automated machinery eliminates risks associated with human error. Presently, only about 3% of young adults from Gen Z are interested in working in infra-construction sector because it is perceived to be physically demanding job. One of the biggest arguments against automation is that it is going to steal jobs from construction workers, but in fact automation, cannot a replacement for human workforce because it is the human element is that designs and drives it.

Where and what to watch for?

The areas automation is seeping in extends right from the preliminary planning stages, all the way to procurement, inspection, erection, monitoring, operating and even maintaining the final infra-construction project.

- Autonomous and self-navigating machines are seen employed to transport materials or to haul heavy items, enhancing quantum of work delivered and with little risk to the workforce. These machines fitted with robotic technology and sensors, that take real-time readings of location, temperature, pressure and other conditions, are enabling cranes and forklifts, diggers, and other similar equipment to operate without a driver in the cabin. By pre-defining the function, providing GPS coordinates, and programming the movement of the machine itself, operators can remotely operate machinery with safety, confidence, precision and efficiency
- The Drones are programmed to automatically scan the working area after which signals can be sent back to a centralized control system. Use of drones for conduction of pre-project inspections has become a SOP already, the NHAI as well as state authorities are insisting Drone surveys and reporting in their online formats to periodically monitor the progress of projects
- Automation has also found its way to asphalt mixing in Hot Mix plants for road paving. Control systems and robotics are being used to mix concrete, or the required proportion of ingredients according to approved design-mix formulae to ensure the optimal quality of work. Automation prepares precast and ready-mixed concrete products that take a much shorter time to install. It also directs to pour and level concrete in the right portions, avoiding obstacles near the work zone, reduces material consumption and eliminates the human error
- Demolition robots are being used to bring down walls and to safely dismantle concrete slabs, resulting in lower operational costs and a safer working environment for on-site workforce
- Virtual reality systems simulates a realistic environment using programmed 3D scans that are highly accurate and not prone to human error. Equipping the execution team to plan for an entire project even before a single step is taken, and a technician can virtually crawl through pipes in the building to determine if they have enough room for repair and maintenance

SENSOR PAVER USED IN GUINNESS WORLD RECORD

How far to the Utopia?

In the long run, automation will replace jobs that are mundane, risk oriented, highly repetitive and require little skill. The future of infra-construction is certainly not one where robots and drones replace people. Instead, the future of automated construction is a workplace where technology works alongside humans to ensure job sites are safer, the work more efficient, and the project results more profitable.

PAVER AUTOMATION SETTINGS

In the Indian scenario it is highly unlikely that the entire operation goes fully automatic, however it presents a perfect opportunity to begin reshaping the future of infra-construction sector, before automation becomes a mandatory tool to keep-up with an already ultra-competitive industry. That way we can collaboratively engineer, specify, integrate, install and control systems for a broad range of applications. from concept to completion. That is the roadmap to the Utopia we seek.

BY TRUPTI NAYAK
CHIEF OPERATING OFFICER(TI &I), RAJPATH INFRACON PVT. LTD.

SMART INFRASTRUCTURE AND BUILDING AUTOMATION IN DIGITAL INDIA 2024

India's cities are undergoing a remarkable transformation, driven by the rapid adoption of smart building technologies and integrated infrastructure solutions. As the country marches towards its ambitious goal of becoming a $5 trillion economy by 2026-27, the role of smart infrastructure and building automation has become pivotal in enhancing efficiency, sustainability, and liability across urban centres.

Trends in Building Automation

The building automation market in India is poised for substantial growth, with the market size expected to surge from $181.89 billion in 2023 to $300.33 billion by 2028. This growth is fuelled by the proliferation of the Internet of Things (IoT) and the increasing emphasis on security, energy efficiency, and occupant comfort.

One of the key trends driving building automation is the integration of traditionally siloed systems. Building automation systems are now steering towards integration with conventional systems, such as security and HVAC, unlocking benefits like advanced administration, cost savings, improved communication, and reduced incident response time. This integration is a cornerstone of the building automation market's growth in the coming years.

Sustainability and energy efficiency are also at the forefront of building automation advancements. With the advent of IoT, the surge in connected devices is contributing to higher energy efficiency and reduced carbon footprints. India's initiatives like the Energy Conservation Building Code (ECBC)are further driving the adoption of green and smart building technologies.

Smart Infrastructure Transformation

Beyond building automation, the broader landscape of smart infrastructure in India is also undergoing a remarkable transformation. Across sectors like roads, railways, and water management, the deployment of digital construction technologies is revolutionizing project planning, implementation, and long-term asset management. In the road construction industry, the adoption of new and emerging technologies is paving the way for more resilient and efficient infrastructure. The Ministry of Road Transport and Highways has developed guidelines for enhancing hill road infrastructure, incorporating best practices for alignment, geometric design, and drainage.

Additionally, the use of full depth reclamation (FDR) technology and "Rejupave" which is a bio-oil-based asphalt modifier that reduces the heating requirement of bituminous mixes and preserves their temperature during transit in high-altitude road construction which is improving the durability and performance of roads. The railway sector is also at the forefront of digital transformation, with Indian Railways leveraging automation and instrumentation to modernize its operations and enhance efficiency across the rail network. Geospatial technologies, such as GIS, drones, and LiDAR, are transforming water network management, enabling accurate data gathering, remote infrastructure monitoring, and improved decision-making processes.

IOT FOR SMART BUILDINGS

Driving Collaboration and Innovation

The integration of smart infrastructure and building automation in Digital India 2024 has the potential to drive collaboration and innovation across various sectors. By leveraging these technologies, India can create a more connected, efficient, and sustainable nation. While challenges exist, the benefits of smart infrastructure and building automation far outweigh the costs. As India continues to accelerate its digital transformation, the integration of smart technologies into infrastructure and buildings will play a vital role in shaping the nation's future.

The Road Ahead

As India continues its journey towards becoming a $5 trillion economy, the role of smart infrastructure and building automation will only become more crucial. The integration of data, advanced analytics, and artificial intelligence will further enhance the efficiency and responsiveness of these systems, enabling city authorities to prioritize citizen-centric actions and transform chaos into control.

The willingness to embrace new technologies and foster collaboration will be essential for the construction industry to thrive in the years to come. By harnessing the power of data, cloud-based tools, and real-time location intelligence, stakeholders can streamline project planning, improve safety, and optimize long-term asset management.

In conclusion, the digital transformation of India's infrastructure and buildings is not just a vision, but a reality that is unfolding before our eyes. As the country marches towards its ambitious goals, the integration of smart technologies, sustainability, and user-centric design will be the driving force behind the creation of a more liveable, efficient, and resilient urban landscape.

BY RAKESH GONDOLIYA REGIONAL SALES MANAGER WEST, NAFFCO INDIA

BUILDING AUTOMATION: MORE THAN JUST CONVENIENCE

As a technology enthusiast, I always prefer solutions that are both innovative and sustainable. One such solution is automation. It is often considered as lighting control or AC temperature control, but its much more than just convenience. Building automation has rapidly evolved from a luxury to a necessity, offering far more wide range of technologies and systems designed to monitor, control, and optimize building functions such as heating, ventilation, air conditioning (HVAC), lighting, security, and more. Building automation systems (BAS) contribute to sustainability, operational efficiency, and a better quality of life.

Let's see how:

Enhancing Energy Efficiency

One of the most significant benefits of building automation is its potential to drastically reduce energy consumption. Automated systems can intelligently manage energy use, adapting to real-time conditions and occupancy patterns.

- Optimized HVAC Systems: Building automation systems can adjust heating and cooling based on occupancy, time of day, and weather conditions. Smart thermostats and sensors ensure that energy is used efficiently, maintaining comfort while reducing wastage.
- Intelligent Lighting: Automated lighting systems can adjust based on natural light availability and occupancy. Lights can dim or turn off when rooms are unoccupied, significantly cutting down energy use.
- Energy Monitoring: BAS provides detailed insights into energy consumption patterns, enabling building managers to identify inefficiencies and implement corrective measures. This data-driven approach helps in achieving sustainability goals and reducing utility costs.

Improving Occupant Comfort and Health

Building automation enhances the comfort and well-being of occupants by maintaining optimal indoor environments. This leads to increased productivity and satisfaction among residents and employees.

- Climate Control: Automated climate control systems ensure consistent and comfortable temperatures throughout the building. Advanced systems can create individual climate zones, catering to the specific preferences of different areas or even individual occupants.
- Air Quality Management: BAS can monitor and control indoor air quality by regulating ventilation and filtering systems. Ensuring a supply of fresh air and maintaining optimal humidity levels reduces the risk of health issues such as allergies and respiratory problems.
- Adaptive Lighting: Circadian lighting systems adjust the color temperature and intensity of artificial light to mimic natural daylight patterns. This supports occupants' biological rhythms, improving mood, alertness, and overall well-being

Enhancing Security and Safety

Building automation significantly improves security and safety, protecting both occupants and assets.

MANY ADVANTAGES OF BUILDING AUTOMATION

- Integrated Security Systems: BAS can integrate various security components such as access control, surveillance cameras, and alarm systems. Automated systems can monitor for unauthorized access, detect unusual activities, and respond to security breaches in real-time.
- Fire and Life Safety: Automated fire detection and suppression systems enhance safety by providing early warnings and automatically activating sprinklers or other suppression methods. These systems can also facilitate safe and efficient evacuation procedures.
- Emergency Response: In the event of an emergency, building automation systems can coordinate responses, such as unlocking exits, guiding occupants to safety, and notifying emergency services. This integrated approach ensures a swift and effective response to crises.

Operational Efficiency and Cost Savings

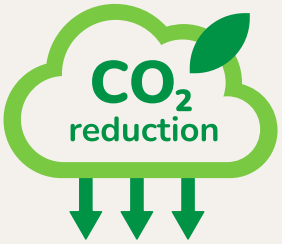
Building automation streamlines operations and reduces maintenance costs, providing a quick return on investment.

- Predictive Maintenance: BAS can monitor the condition of building systems and predict when maintenance is needed, preventing unexpected breakdowns and extending the lifespan of equipment. This proactive approach reduces downtime and maintenance costs.
- Resource Management: Automated systems optimize the use of resources such as water and electricity. Smart irrigation systems, for example, can adjust watering schedules based on weather forecasts and soil moisture levels, conserving water.
- Labor Savings: Automation reduces the need for manual intervention in managing building systems. This allows staff to focus on higher-value tasks, improving overall operational efficiency.

Supporting Sustainability Goals

Sustainability is a critical concern for modern buildings, and automation plays a vital role in achieving green building certifications and environmental targets.

- Green Building Certifications: Building automation systems contribute to achieving certifications such as LEED (Leadership in Energy and Environmental Design) by optimizing energy and water use, improving indoor environmental quality, and reducing waste.
- Reduced Carbon Footprint: By optimizing energy use and integrating renewable energy sources, building automation systems help reduce the carbon footprint of buildings. This aligns with global efforts to combat climate change and promotes environmental stewardship.
- Sustainable Resource Use: Automated systems ensure the efficient use of resources, minimizing waste and promoting sustainable practices. This includes everything from energy and water conservation to waste management and recycling initiatives.



The future of building automation is promising, with emerging technologies set to significantly enhance its capabilities and impact. Artificial Intelligence (AI) and Machine Learning (ML), IoT integration, and advanced user interfaces enable more intelligent and adaptive automation systems, identifying and addressing issues before they become problems.

In conclusion, I would say that the building automation is transforming the way we manage and interact with buildings. As technology continues to advance, the potential for building automation to contribute to sustainable, efficient, and comfortable living and working environments will only grow. Embracing these technologies is essential for creating smarter, greener, and more resilient buildings.

BY RAJILA JAIN, ASSISTANT VICE PRESIDENT AT CANNONDESIGN

BUILDING AUTOMATION & CONTROL SYSTEM

Building automation and control systems (BACS) for residential / commercial, high-rise buildings are designed to enhance the efficiency, comfort, safety, and overall management of the building. These systems integrate various building technologies/disciplines and functions into a centralized control system, offering comprehensive monitoring and control capabilities.

Overview:
BACS is installed in any building in the BMS room which is generally on Ground Floor of that development. In this room control cables are laid / terminated at the field devices to take Input / Output. These cables are further connected to the DDC panel which is at every floor / zone. These various DDC panels are connected to the Network Control units and subsequently to Network switches. These network switches are connected to computer through various platforms like BACNET / MODBUS. In this computer, software is designed to understand flow of schematic of that discipline and to control as well as monitor the input received through the field devices.

Following are few Field Devices among many which plays major role in transmitting the information from equipment till the BACS.

- ·Flow Switches
- ·Water Pressure Transducers
- ·Differential Pressure Switches
- ·Temperature Sensors
- CO Sensors

Key Components of Building Automation and Control Systems

HVAC (Heating, Ventilation, and Air Conditioning) Systems:
·Smart Thermostats: Automated control of heating and cooling based on occupancy, time of day, and weather conditions.

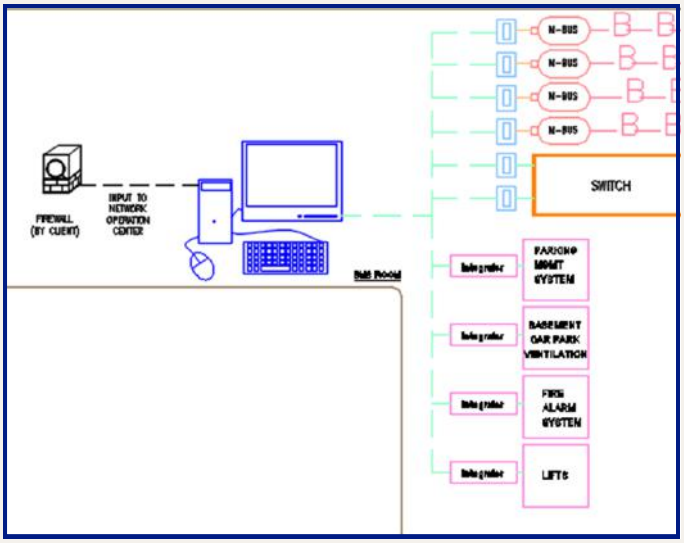
- ·Smart Thermostats: Automated control of heating and cooling based on occupancy, time of day, and weather conditions.
- ·Air Quality Sensors: Monitoring and adjusting ventilation to ensure optimal indoor air quality.
- Energy Management Systems: Optimizing energy use by regulating HVAC operations to reduce waste and costs.

Lighting Control Systems:

- Automated Lighting: Sensors and timers to adjust lighting based on occupancy and natural light availability.
- Dimming Controls: Energy-saving features that adjust the intensity of lights in common areas and individual units.

Security and Access Control:

- Surveillance Cameras: Integrated CCTV systems for real-time monitoring and recording.
- Access Control Systems: Keycard or biometric systems for secure entry to the building and restricted areas.
- Intercom Systems: Communication systems for residents to interact with visitors and building management.



Fire Safety and Emergency Systems:

- Smoke and Fire Detectors: Automated detection and alarm systems connected to central monitoring.
- Emergency Lighting and Signage: Automatically activated in case of power failure or emergency.
- Sprinkler Systems: Automated fire suppression systems integrated with the building's fire alarm system.

Elevator Control Systems:

- Smart Elevators: Systems that optimize elevator use based on traffic patterns and demand.
- Energy-Efficient Operations: Regenerative drives and energy-saving modes during off-peak hours.

Energy Management and Sustainability:

- Smart Meters: Monitoring and managing energy consumption for individual units and common areas.
- Renewable Energy Integration: Systems to manage the use of solar panels or other renewable energy sources.
- Water Management: Automated systems for monitoring and controlling water usage, including leak detection.

Benefits of Building Automation and Control Systems

Enhanced Energy Efficiency:

- Reduces energy consumption through optimized control of HVAC, lighting, and other systems.
- Lowers utility costs for residents and building management.

Improved Comfort and Convenience:

- Provides a comfortable living environment with automated climate control and lighting.
- Simplifies access and security management for residents and visitors.

Increased Safety and Security:

- Enhances building security with integrated surveillance and access control systems.
- Ensures quick response to emergencies with automated fire and safety systems.

Operational Efficiency:

- Streamlines building management operations with centralized control and monitoring.
- Reduces maintenance costs through predictive maintenance and real-time diagnostics.

Sustainability:

- Supports sustainable building practices by reducing energy and water consumption.
- Facilitates the integration of renewable energy sources.

Considerations for Implementing BACS in Residential High-Rise Buildings

System Integration:

- Ensure compatibility between different systems and devices for seamless integration.
- Choose open protocols and standards to allow for future upgrades and additions.

Scalability:

- Design the system to accommodate future expansion and technological advancements.
- Plan for scalability to meet the needs of a growing residential community

Data Security and Privacy:

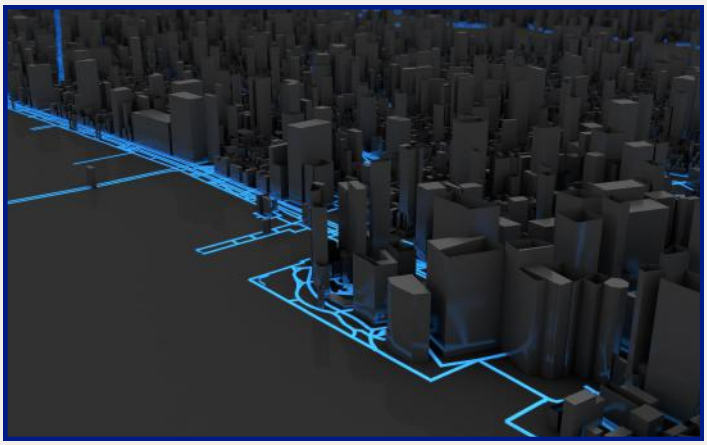
- Implement robust cybersecurity measures to protect sensitive data and control systems.
- Ensure residents' privacy is maintained with secure data handling practices.

User Training and Support:

- Provide comprehensive training for building management and residents on system use.
- Offer ongoing technical support and maintenance services to ensure smooth operation.

Cost Considerations:

- Evaluate the initial investment versus long-term savings and benefits.
- Consider financing options, incentives, and rebates for energy-efficient technologies.



Conclusion

Building automation and control systems are essential for modern residential high-rise buildings, offering significant benefits in terms of energy efficiency, comfort, security, and operational efficiency. By carefully planning and implementing these systems, building managers and developers can create smarter, safer, and more sustainable living environments for residents.

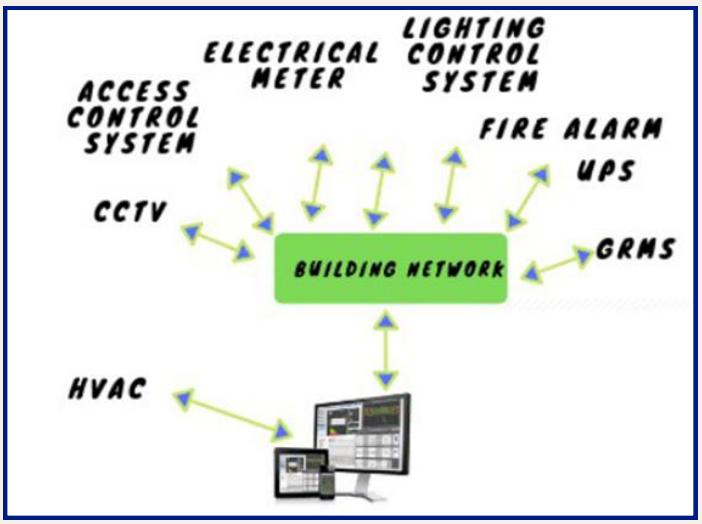
BY ANIRUDDHA DAHIWELE, MEP PROFESSIONAL WITH MORE THAN 18 YEARS OF EXPERIENCE, PRESTIGE GROUP

GENERAL AREA OF INTEREST IN THE FIELD OF BUILDING AUTOMATION

In today's world, everyone talks about sustainable design, green buildings, net zero building, etc. Let's understand Key principles of sustainable design;

- Reduce, Reuse and Recycle
- Rationalize energy use and improvise efficiency
- Protect/Conserve/Reuse water
- Use of Eco friendly material
- Consider the entire lifecycle of the product or service

In Building automation system/ Building management system (BMS), systems such as Heating, ventilation, air conditioning (HVAC), Lighting, Security, Access Control, Pumps, Fire Life safety system, LV panels, Diesel generator shall be monitored and controlled. It typically involves integrating these systems into a centralized control system that allows for efficient management, monitoring, and optimization of building operations.



Security and Access Control: Automation can manage access control systems, surveillance cameras, and alarms to enhance building security.

Remote Monitoring and Control*: Many building automation systems allow operators to monitor and control building systems remotely, improving responsiveness and efficiency.

Energy management using BMS

Energy management using automation refers to the use of technology and systems to monitor, control, and optimize energy consumption in buildings, homes, or industrial settings. Here's how automation plays a crucial role:

- Smart Sensors and IoT: Automation relies on smart sensors and IoT (Internet of Things) devices to gather real-time data on energy usage. These sensors can monitor parameters like temperature, lighting levels, occupancy, and machinery operation.
- Data Collection and Analysis: Collected data is analyzed to identify patterns, trends, and inefficiencies in energy usage. This analysis helps in understanding when and where energy is being consumed excessively or inefficiently.
- Automated Controls: Based on the data analysis, automated systems can adjust energy usage in real-time. For example, HVAC systems can adjust temperature settings based on occupancy levels detected by sensors, or lighting can be dimmed or turned off in unoccupied areas.

- Demand Response: Automation enables participation in demand response programs where energy consumption can be adjusted during peak demand periods. This helps in reducing overall energy costs and strain on the grid.
- Optimization and Efficiency: Continuous monitoring and adjustment lead to optimized energy use, reducing waste and improving overall efficiency. This not only saves costs but also reduces carbon footprint and environmental impact.
- Predictive Maintenance: Automation can also enable predictive maintenance of equipment based on energy usage patterns and performance data. This helps in reducing downtime and extending equipment lifespan.
- Integration with Renewable Energy: Automation systems can integrate with renewable energy sources such as solar panels or wind turbines. They can prioritize using renewable energy when available or store excess energy for later use.
- User Engagement and Awareness: Automation systems often provide feedback and insights to users about their energy consumption habits. This encourages behavioral changes that can further reduce energy usage.

Overall, energy management through automation is about using technology to make energy consumption more efficient, cost-effective, and sustainable. It combines hardware, software, and analytics to create smarter, more responsive energy systems.

Failure of automation system and its impact

HVAC (Heating, Ventilation, and Air Conditioning) systems play a critical role in maintaining indoor comfort and air quality in buildings. When HVAC automation fails, the effects can be significant and impact various aspects of building operations and occupants' well-being:

- Temperature and humidity Control Issues: HVAC automation failures can lead to inaccurate temperature control. This may result in rooms becoming too hot or too cold, causing discomfort for occupants. In extreme cases, it can affect sensitive equipment or materials that require specific temperature ranges. Sometime, mould formation starts due to higher humidity.
- Energy Efficiency Reduction: Automated HVAC systems are designed to optimize energy usage based on occupancy and external conditions. When automation fails, systems may operate inefficiently, leading to higher energy consumption and increased utility costs.
- Indoor Air Quality Concerns: HVAC automation often includes ventilation control to ensure adequate fresh air exchange. Failure in automation can compromise indoor air quality by reducing ventilation rates or failing to remove contaminants effectively.
- Occupant Comfort and Productivity: Uncomfortable indoor conditions due to HVAC failures can impact occupant comfort and productivity. Temperature extremes or poor air quality can lead to decreased concentration levels, increased stress, and reduced overall well-being
- Equipment Wear and Tear: Inefficient operation resulting from automation failures can lead to increased wear and tear on HVAC equipment. This can shorten equipment lifespan and necessitate more frequent maintenance or repairs.
- Compliance Issues: Buildings may be required to comply with indoor environmental quality standards and regulations. HVAC automation failures that affect indoor air quality or thermal comfort could result in non-compliance, leading to potential fines or legal implications.
- Operational Disruptions: Depending on the severity of the automation failure, there could be disruptions in building operations. This may include delays in addressing occupant complaints, interruptions in facility management tasks, or even temporary closure of certain areas of the building.

To mitigate these effects, proactive measures such as regular maintenance, monitoring of automation systems, and having backup controls or manual overrides in place are essential.

Example for Failure of BMS /Poor performance of BMS

In order to have healthy environment, air quality within office premises is utmost important. Air quality includes optimum air temperature, humidity, filtration and fresh air.

Below picture shows mould formation on the wall in one of the commercial building.

Various sensors and modulating actuators were installed for re-circulating AHU's and for treated fresh air handling units. Sensors will monitor the parameter and actuator will operate based on requirement to ensure set temperature and humidity. In nutshell, design of BMS was correct.

After thorough investigation of system design and site survey, following were the reasons for mould formation.

- Humidity in the said area was in the range of 70% to 80%:
- Air Infiltration due to negative pressure.
- Poor performance of BMS
- Failure of BMS.

Observations during site survey;

- Condensation and moisture in rooms and staircase.
- Supply chilled water temperature was 8 Deg C whereas design temp is 5.5 Deg C
- Treated fresh air unit (TFA), due to undersized U trap, air is being sucked through the drain resulting in water stagnation inside the TFA. This water was being carried away by the air which further increases humidity inside the rooms.
- Inside Treated fresh air unit (TFA), Heat recovery wheel belt was found broken, resulting in no heat recovery. This increases the chilled water consumption. Purpose of (HRW) is defeated.
- Pre-filters were choked resulting in less airflow.

Conclusion:

Even after having excellent BMS system for monitor and control the HVAC operations, lot of inefficiencies within the system due to non-performance or failure of automation system.

BY BHUSHAN MULAY, HEAD-MEP DESIGN, BIRLA ESTATES

BUILDING AND INDUSTRIAL AUTOMATION - THE FUTURE OF SUSTAINABLE AND INTELLIGENT ENVIRONMENTS

Automation is an amazing term in today's scenario and is becoming an integral part of our daily lives, benefiting not only youth but also adults and the elderly. With continuous technological advancements, automation has been converted to luxury from necessity.

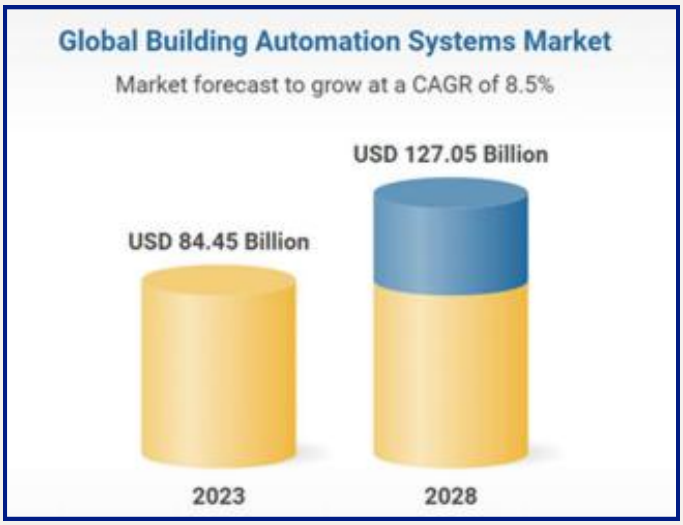
Automation in Our Homes In our homes, automation simplifies everyday tasks. Devices like washing machines, kitchen appliances, and food processors make household chores easier and quicker. Home theaters, lighting, temperature control, and security systems now operate with minimal human effort, enhancing convenience and efficiency. This trend is equally significant in building and industrial automation, ensuring they don't lag. Automation is prevalent in manufacturing, robotics, automotive, and IT systems, gaining substantial importance with the advent of AI.

Market Growth and Industry Trends: The global building automation system (BAS) market is poised for substantial growth. As per the market survey, the global BAS is expected to reach USD 127.05 billion by 2028 from 84.45 billion in 2023, growing at a CAGR of 8.50% during 2023 – 2028 period.

In the manufacturing sector, Industry 4.0 is the new era. Manufacturers are integrating new technologies, including the Internet of Things (IoT), cloud computing and analytics, AI and machine learning into their production facilities and throughout their operations. Smart factories are equipped with advanced sensors, embedded software and robotics that collect and analyze data and allow for better decision□making. These technologies are changing the way we live, work, and interact with the world.

Building Automation Systems: Components and Functions: Moving forward to Building Automation, these are sophisticated computer network systems, which involve the use of integrated systems to monitor, control, and manage various functions within a building, including:

- HVAC Control: Smart thermostats and Variable Air Volume (VAV) systems adjust heating, ventilation, and air conditioning based on occupancy and external conditions.
- Smart Lighting: Automated control of lighting systems using sensors and schedules to ensure energy efficiency.
- Security and Access Control: Enhanced security with surveillance cameras and access control systems.
- Energy Management and Monitoring: Real-time tracking of energy use to identify inefficiencies and optimize consumption.
- Fire and Life Safety Systems: Automated smoke and fire detectors, alarms, and emergency communication systems.
- Water Management: Smart irrigation and greywater recycling systems to optimize water use.
- IoT Integration: Connecting various building systems for seamless operation and monitoring.
- Digital Twins: Virtual replicas of physical systems using real-time data and simulation models to predict and optimize performance.



Adoption by Real Estate Players

Prominent real estate developers like DLF, Godrej Properties, Bharti Realty, Brookfield Properties, Emaar India Ltd., Prestige Group, Brigade Enterprises, Piramal group, etc. are implementing building automation techniques. They are applying these technologies to their new constructions and upgrading existing buildings over time.

Benefits of Building Automation

- Enhanced Monitoring: Real-time equipment and systems monitoring provide improved insights and control over power usage.
- Enhanced Comfort: Consistent and comfortable temperature, humidity, and lighting improve occupant well-being.
- Increased Efficiency and Performance: Automating routine tasks saves time and resources, boosting overall productivity.
- Data-driven decisions: Continuous data collection & analysis support firm decisions.
- Cost Reduction: Efficient resource utilization and preventive maintenance lower operational costs, yielding a good Return on Investment (ROI).
- Better Simulation with Virtual Environmental Testing.
- Real-Time Monitoring: Ongoing monitoring ensures systems operate optimally.
- Improved Life Cycle Management: Enhanced management of the building and product life cycle.
- Error Reduction: Automation minimizes human error, enhancing system reliability.

Overall, automation reduces the 5M's of any industry - Man, Material, Machines, Methods, and Money expenditure yielding a good ROI, while enhancing productivity and efficiency.

Conclusion:

Implementing building automation systems enables significant energy consumption reduction, better integration of renewable energy sources, and optimized operations towards achieving India's net-zero energy goals. These systems enhance energy efficiency, support sustainability efforts, contribute to a lower carbon footprint, and foster a healthier environment.

Developers leveraging these technologies create more sustainable and intelligent environments, positioning themselves at the forefront of the industry's future

BY ASTHA BHATIA
GENERAL MANAGER - MEP (CONTRACTS & PROCUREMENT) – BROOKFIELD PROPERTIES

DESIGN AUTOMATION - BUILDING & INFRASTRUCTURE CONSULTING ENGINEERING

Introduction

Automation in design speed up the process of identifying defects and can do more work in a fixed period than normal design process. This efficiently reduces the time and resources spent on designing & testing, which ultimately saves money, especially in large-scale & long-term projects.

Automation is revolutionizing various sectors, and the field of building and infrastructure consulting engineering is no exception. The integration of automation into design processes has significantly enhanced efficiency, accuracy, and innovation.

I have tried to explore the profound impact of automation in this field, examining its benefits, applications, and future prospects.

The Role of Automation in Design

Automation in design involves the use of advanced software and technologies to perform tasks that traditionally required manual effort like computer-aided design (CAD), building information modeling (BIM).But by creating the other digital tools / add ins with the help of scripting, we can integrate with the other software to automate the planning, designing, and quality assurance to managing of building and infrastructure projects.

Key Benefits

- Increased Efficiency: Automation significantly reduces the time required to complete design tasks. Automated tools can quickly generate design options, perform complex calculations, and simulate project-based conditions, allowing engineers to focus on creative and strategic aspects of the project.
- Enhanced Accuracy: : Human errors in design can lead to costly reworks and delays. Automation minimizes these errors by ensuring precise calculations and adherence to standards and regulations. This leads to higher-quality designs and smoother project execution.
- Cost Savings: By streamlining processes and reducing the need for manual intervention, automation can lower resource costs and reduce time and printing wastage. These savings can be redirected to other critical areas of the project.
- Improved Collaboration: Automation tools like (BIM collab, BIM 360 etc.) often come with collaborative features that allow multiple stakeholders to work on the same project in real-time. This fosters better communication, reduces misunderstandings, and ensures that everyone is on the same page.

Applications of Automation in Design

- Building Information Modeling (BIM): BIM is a cornerstone of modern construction and infrastructure projects. It involves creating a digital representation of the physical and functional characteristics of a facility. BIM software automates the creation of detailed 3D models, enabling better visualization, coordination, and planning throughout the project lifecycle.
- Simulation and Analysis: Automated simulation tools can model various scenarios, such as structural loads, energy

- scenarios, such as structural loads, energy consumption, and environmental impact. These simulations help engineers predict the performance of their designs under different conditions, leading to more resilient and sustainable structures.
- **Parametric Design:** Parametric design involves defining design parameters and relationships that can be automatically adjusted to explore different design outcomes. This approach is particularly useful for complex geometries and adaptive systems, allowing for rapid prototyping and iteration.

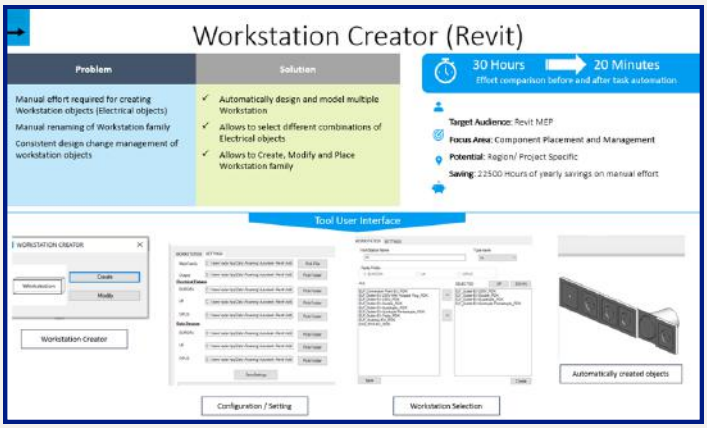
Case Studies

- **Building/ High-Rise Projects**: Automation has been pivotal in the design and construction of high-rise buildings. For example, using BIM, engineers can create detailed models that integrate architectural, structural, and MEP (mechanical, electrical, and plumbing) systems. This integration helps identify and resolve clashes early in the design process, reducing costly changes during construction.

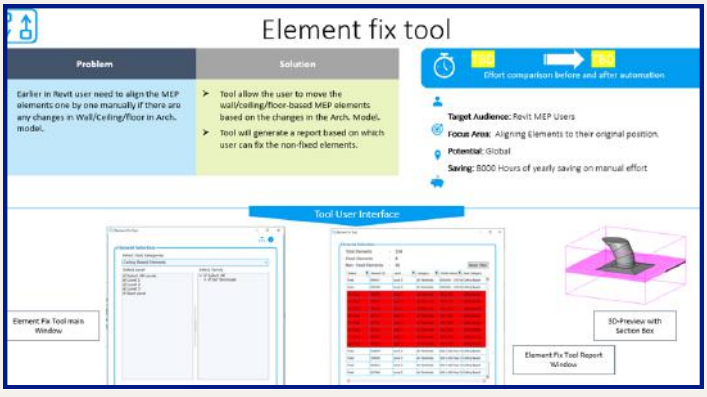
- **Infrastructure Development**: In large infrastructure projects like city development, bridges and highways, automated design tools facilitate the efficient handling of large datasets and complex geometries. Advanced simulation tools ensure that these structures can withstand environmental and load stresses, enhancing safety and longevity.

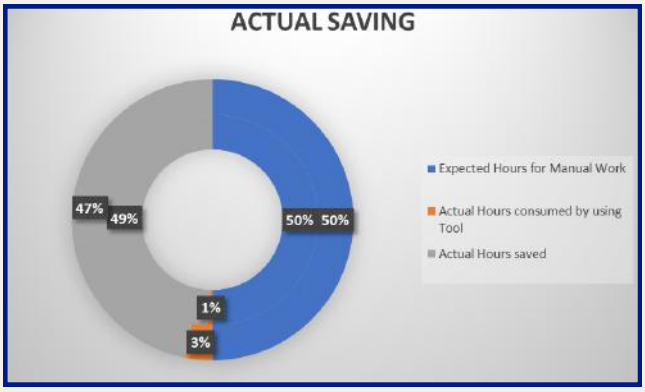
Developed Automation Tools Results & Savings

- **Workstation Creator:** By creating this tool, 22500 annual hours was saved.



- Element Fixing Tool: By creating this tool, 8000 annual hours has been saved.





EFT CONSUME 3% OF MANUAL HOURS, WHEREAS WS CREATOR CONSUME ONLY 1%

Challenges and Considerations

While the benefits of automation are clear, there are challenges to consider:

Initial Investment: The cost of advanced automation tools can be high by estimating the project requirement and developing the tool. However, the long-term savings and efficiency gains often justify the investment.

Training and Adaptation: Engineers and designers need to be trained to use new tools effectively. This requires time and resources, but it is essential for maximizing the benefits of automation.

Data Management: Automation relies heavily on accurate data. Ensuring data integrity and managing large volumes of information can be challenging but is critical for successful project outcomes.

Future Prospects

The future of automation in design for building and infrastructure consulting engineering looks promising. Advancements in artificial intelligence (AI) are expected to further enhance the capabilities of design tools, offering even greater optimization and predictive insights.

Conclusion

Automation is transforming the field of building and infrastructure consulting engineering, offering significant improvements in efficiency, accuracy, and innovation.

As technology continues to evolve, the integration of automated design tools will become increasingly indispensable, driving the industry towards a more sustainable and efficient future.

Embracing these advancements will enable engineers to tackle complex challenges and deliver superior outcomes for their clients and communities.

BY MANZOOR ALAM KHAN
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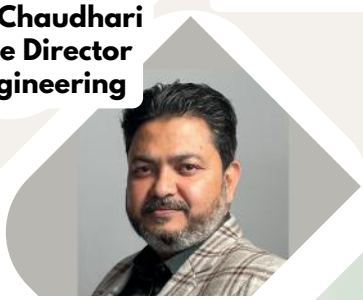

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