Automation Systems in Smart and Green Buildings

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Abstract: Traditionally, a building was viewed as a passive element of the workplace. Today, that has changed. The present paper describe the an intelligent building is one which provides a productive and cost effective environment through optimization of its four basic elements structure, services, and management and interrelationship between them. To meet contemporary and future needs, a building must establish an environment that is hospitable to those who work within it as well as to the changing technologies.

I. INTRODUCTION

Building exists to enable collaboration, allowing occupants to be productive, efficient and creative. Intelligent buildings provide for improved occupant circulation, interaction and collaboration. Intelligent building is the one that provides a productive and cost-effective environment through optimization of its four basic elements- structure, systems, services and management – and the interrelationships between them. In every country in the world, the built environment normally constitutes more than half of the total national capital investment and construction represents as much as 10% of GDP.

Buildings are long-term assets so need to be economical, durable, flexible, adaptable and sustainable. There are many stakeholders involved in the process of building a new intelligent building or updating an old one. There is also a need to recognize the pace of change not only in technology but also in society. The intelligent Building must demonstrate whole life value. This means an integrated team approach to design, construction and facilities management is essential.

India's infrastructure sector is going through an unprecedented boom phase with an estimated Rs4000 billion worth of investment per year. This investment includes an increased appetite and interest in green and intelligent buildings. Many local developers are interested in green design, but lack in experience.

Meaning of Intelligent and Green (smart) Buildings

The term "intelligent" is generally applied to refer to a new generation of high-tech buildings with the following state-of-art features:

- Flexibility to adapt to changing use of the space and technology.
- Minimizing energy and operations cost while maximimizing the effectiveness of operations personnel.
- Energy saving controls in HAVC and Lighting Control.
- Infrastructural services like- server form, office system, mass mailing system, video-on–demand, presentation, space-management, telecommunications, building management system.
- Security services e.g. alarm signal, CCTV, access control system, fire alarm, intrusion alarm.
- Business and Financial planning and survey services for example technical, fixed assets database, warehouse record, invoicing systems.
- Energy management systems and energy saving devices.
- Means of Solar Harnessing

The attributes of intelligence in building

Intelligence is the faculty of *thinking, reasoning, acquiring, and applying knowledge.* At present, the Intelligent Building Institute (USA) considers a building "intelligent" if provides productive and economically effect to optimization of the following four elements:

- Structure
- Service Systems
- Managements Systems
- Interrelated Systems

Goals of Green (IB) building

High Technology

It is divided the operation into four categories:

1) **Energy efficiency:** Intelligence with respect to energy in an intelligent building consists of the reduction of energy use to the bare minimum.Computrised systems are used extensively. Such systems go by many names: Building Automation System (BAS), Energy Management System (EMS), Central Control and Monitoring System (CCMS) and Facilities Management System (FMS). Some strategies used to reduce energy consumption in intelligent building are (typically in case of HVAC Applications) :
    - Programmed start or stop
    - Optimal start/ stop
    - Duty cycling
    - Electric demand limiting
    - Chiller optimization
2) **Life safety Systems:** Intelligence with respect to life safety in an intelligent building consists of the use of high technology to maximize the performance of fire alarm and security systems while at the same time minimizing costs. Life safety factors involved in IB are :
    - Reduced manpower dependence
    - Closed-Circuit Television
    - Card Access Control
    - Smoke Detection
    - Emergency control of elevators, HVAC systems, Fire alarms and Doors
    - UPS,Voltage stabilizer system, Spike arrestors and Emergency Power supply
3) **Telecommunications Systems:** Intelligence with respect to telecommunication in an intelligent building consists of the offering to tenants of many sophisticated telecom features at a considerably reduced cost because many users share the equipment. Some of the telecom features involved in intelligent buildings are :
    - EAPBX telephone system with VOIC
    - VLAN, WAN
    - Electronic mail
    - Local and Tele Video-conferencing
    - Presentations and Projection Facilities
    - Wireless Communication including Wi-Fi and blue tooth
4) **Workplace Automation:** Intelligence with respect to workplace automation in an intelligent building consists of use of high tech office automation system to render the operation of a company more efficient. This can be done at a reduced cost to tenants by virtue of the equipment being shared. Some of the factors involved in workplace automation in intelligent buildings are :
    - Centralized Data Processing
    - Word Processing
    - Computer Aided Design
    - Information Services
    - Mobile and E- commerce

Some typical Services Are:

1. **Message Center:** When a telephone line is busy or does not answer after specified rings, the message center answer the call automatically. The terminal and the center display the name of the person whose phone is ringing so that the operator can answer the call courteously and accurately.
2. **Word Processing: W**ord processing includes the electronic creation, revision, storage, retrieval and transmission of correspondence documents. With pickup and delivery service 24-hour document turnaround during business hours and premium one-hour turnaround, word processing service offers convenience and economy.
3. **Computer- Assisted Design:** With CAD, the owner has accurate and easy-to- read drawings that can be used to reduce the cost of carrying out any sort of modification whether it can be architectural, structural, mechanical or electrical.
4. **Electronic Mail: T**hrough electronic mail, instantaneous communications can be established worldwide on a system designed to reduce cycle time and produce saving to the tenants/ users.
5. **Teleconferencing:** Teleconferencing is an alternative to expensive travel budgets and can be made available to the owner's requirement any time.

II. CONCEPT OF INTELLIGENT BUILDINGS IN VIEW EXTENT OF AUTOMATION

In its most general sense, it should mean a building that in some way can sense its environment. In practice, this should mean that a building can adjust some aspect of the interior or exterior environment in response to a change in some other aspect of that envoirment.Let us visualize through one example:

After a half- hour commute by local train, Mr X arrives at office to begin his workday. As he approaches the building's front door, a smart security system identifies his and unlocks doors. After he passes through the entrance on the ground floor, an intelligent identification system senses his entry and energizes his personal work place on the 20thfloor.The system turns on his office lights, starts his computer, pulls his electronic mail box, and the adjust the local temperature based on his personal settings. Intelligent buildings with same capabilities, as well as many more innovative features; but ''Intelligent Building' means different thing to different people like to an architect; an intelligent Building may be one that is energy efficient and flexible.

III. CONCLUSION

From above brief study on Intelligent Building so we can say it as Smart Green eco friendly building, which is more, demanded today when the following primary features are to be fulfilled by us:

- Full communication and computer network infrastructure
- Building security system
- Energy saving equipments and controls
- Flexible work areas
- Environmental control systems

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