SunView LED + APANET Green Technology Systems

Smart Buildings

Globally, human history begins with common categories: food, sleep, companionship, work relations, worship, and protection. The protection category relates to an environment into which occupants could gather, exchange ideas and sustenance, keep comfortable, perform essential daily tasks, and sleep in safety. These are fundamental to the concept of a building and have not altered much since the dawn of civilization. Where humans gather to live, to work, to enjoy, or to worship, a building represents humans working with and/or against a natural environment that either supports their needs or must be managed to supply those needs.

Modern building architecture can astound us with its complexity and dazzle us with the technologies necessary to provide comfortable occupancy. However, the truly amazing ability of buildings is still to be demonstrated in the ongoing development of Smart Building concepts. Common features like lighting, heating, air conditioning, security, and ventilation, are all being threaded together into compatible information sharing intelligent system networks. These networks are built on applications that can be layered onto one another over time, and eventually lead to interaction with the Smart Grid.

How do you define 'Smart Buildings?' Because each building is different and each owner requires a definition that explains their particular need, defining a smart building can only be accomplished by citing what application capacities can be used in a building. The foundations of these capacities are intelligent automation, analytics and integration. Automation is programmed into the building function for more efficient

building operation and management. Analytics that include sensors and controls that can be remotely managed are used to improve energy efficiency, lower operating and maintenance costs, and provide asset reliability. Integration of the building with current connection to smart energy systems within and beyond the building completes a general definition.

Smart Building technology can be installed during building planning and construction or retrofitted to address existing building needs. Intelligent technology (IT) can provide intelligent control to manage connected devices, equipment, or groups of equipment with networked systems and an overall supervisory system. Many of these systems involve machine-to-machine (M2M) communication and require open system responses to accommodate connectivity between all of the equipment and the systems in the building. Applications can be designed for intelligent control of electricity to manage lighting and general electric use, heating and air conditioning systems, security systems, telecommunication systems, loading dock delivery areas, parking garages, exterior parking and building campus areas, and architectural lighting. The list is defined by the building owner's needs.

Quick detection of any system malfunction is another asset of Smart Buildings. Maintenance response is exacting and no labor time is wasted for necessary replacements or repairs. Maintenance can be proactively planned and not reactively performed. Fundamentally, smart buildings will provide services that make all occupants and visitors comfortable and productive. Lighting, thermal comfort, air quality, safety, security, refuse removal, sanitation, and bridging to the world beyond the building walls will allow integration of data gleaned from many sources to provide energy efficient and cost effective building management through systems that share information and optimize building performance.

In 2015, the US Government Services Administration (GSA) plans to cut the energy levels of all government buildings by 30%. This reduction can not happen with technology alone, but must involve human understanding, acceptance, and participation. Building occupant's responses and suggestions to these changes add to the information data used to improved efficiency into the future. The ideal approach to Smart Building functions contains the following connected components:

- Integrated building systems
- Technological and human intelligence
- Addressing bottom line expenses
- Awareness of global environmental issues
- Connection to the Smart Grid
- Development of future enabled intelligence solutions

The practical approach to Smart Buildings contains elements that work with the people using the facility, facility owners, and considerations beyond the facility. Using an office building as an example of the interconnection of the three aforesaid elements, the intelligent use of office light can be analyzed and redefined. The small electron voltage in the sensitized coating of electromagnetic windows will allow those windows to darken or lighten in direct response to the outside sunlight. These windows darken when the sun is brilliant upon the outside of the window and reduce the solar heat within the room. Conversely, if the sun is setting or the day cloudy, the windows react to become transparent to allow maximum light into the room. These features, automatically and remotely controlled, alleviate light and room temperature fluctuations, thus reducing costs. Automatic controlled shading can be combined to contribute to balanced room temperatures and cost free lighting.

LED Lighting and Smart Building Efficiency

LED lighting can provide dimmable light fixtures that use efficient electronic ballasts and allow for sensor control. SunView LEDs are the finest bulbs on the market with the highest lumens and the lowest wattage. Using these LEDs will further reduce electricity power consumption and lower electricity costs. Rooms can be fitted with occupancy sensors that reduce lighting, heating, or air conditioning needs as a room is filling or emptying of occupants. These sensors can also be integrated to security systems.

These same practical principles can be applied to residential Smart Building use. Smart Electric Meters will be a critical link between the intelligent home network and the Smart Grid. These meters will calculate energy use in 15 minute or less intervals and record usage over time periods. Customers will be able to view their energy and time use and compare this to the peak and off-peak energy use rates. This will allow them to choose using electricity at a lower cost time period. In cases of power outages or malfunctions, the necessary information can be exactly pinpointed thereby alleviating excessive downtime or wasted maintenance detection time. This 'Smart Building' function will give home owners more efficient, effective electricity service and allow them to chart and choose their price points for service. In certain applications, a home owner will be able to collect energy, share it, or sell it back to the utility company for discounts, refund, and/or payment to the home owner.

Just as an office building intelligently connects its systems and equipment for remote control and efficient management, a homeowner will be able to perform similar tasks through use of their 'Smart Appliances.' These appliances are already on the consumer market. They contain computerized programmable chips with wireless and remote capabilities that will allow an owner to remotely switch on/off their appliances to take advantage of peak and low energy use rates. Plug in switches at a residence that are connected to the Smart Grid will allow an owner to plug in their electric vehicle to charge batteries at optimum times. The goal of residential Smart Building is essentially the same for any other building. The end user can monitor energy consumption, in-place or remotely, adjust their energy use for personal preferences or needs, and save on energy costs. Distribution operators will be able to program a customer's devices, limit peak hour consumption, and, if necessary, switch a device to off. A consumer becomes proactive with the energy distributor and can decide how their energy will be consumed. Through this dynamic power consumption, a consumer's role changes from one who merely receives energy, to one who is able to choose the lowest energy cost and possibly become a 'prosumer' who can sell excess energy back to the utility grid.

These intelligent network systems must be created with the interoperability of open systems in order to accommodate the multiplicity of devices, the maximum choices, and the full functional integration of the system. Because APANET Green Technology Systems utilizes only LonWorks technology, we can offer the interoperability that will allow a customer to develop layers of programs that will adapt and allow future technological upgrades. Financial budgets require technology that people who use, operate, and manage a building can understand and utilize with ease. LonWorks technology is that choice. Many people learning to use LonWorks technology become easily proficient as the technology is designed with people in mind. A building may be smart, but it is the people managing the intelligence who really define the level of intelligence.

Global Environment and Functional Connection

Building management systems have historically focused only on function, meeting comfort and safety standards, and providing security for occupants in whatever roles required by the building's activity. Until recently, the tracking and reduction of pollutants was not a primary focus. The sustainability for buildings, cities, and nations is now fundamentally tied to sustaining the environment by the reduction of CO2 and Greenhouse Gas Emissions (GGE). Smart Building intelligence systems can capture this data and develop operational systems that can reduce environmental pollution and decrease energy power use. These systems allow an organization to participate actively in global environmental sustainability efforts and mange their own carbon footprints for the future. The Smart Building will ultimately connect to the informational data and knowledge base beyond the building complex walls and into the Smart Grid. This connection will allow building owners and managers dynamic participation in their own electricity consumption and give their occupants and the public information on a variety of levels to create a future sustainable environment.

On a functional level, Smart Buildings are able to impact the security and safety of both human and capital resources. Equipment can be maintained more efficiently and effectively. Humans can experience better health and safety. The building itself becomes a source of accessible information that can be utilized for public welfare. With large building complexes, connection to the Smart Grid allows that building the potential to become a virtual power generator by which owners are able to sell excess electricity back into the market. This process can assist the electric grid to offset electrical outages due to malfunctions, brown or blackouts, or natural disasters. Smart Buildings become contributors to social well being and not simply consumers of energy.

These real benefits for the building and for society are not temporary solutions, but are resources that extend over the building's lifetime. Therefore, the building is not just a structure of concrete, stone, and metal. It becomes animated with intelligent purpose and ability to provide an information infrastructure that is connected to the intelligent system network of the future.

Please download our informative Smart Lighting Technology Brochure for more detailed information. You can also download our Interoperability Brochure and our Sunview Company Overview Brochure from the 'Virtual Brochures' tab on the website.

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