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Smart Building Management System

Aditya Uddhavesh Amritkar, Gaurav Sharad Bagul,
Suraj Vishnu Sandhan
Electrical Engineering Departement
Lokenete Goplraoji Gulve Polytechnic
Nashik, Maharashtra, India

Milind Dharma Suryawanshi
Electrical Engineering Departement
Lokenete Goplraoji Gulve Polytechnic
Nashik, Maharashtra, India

Abstract— Buildings today are becoming more and more advanced and the demands on building services are increasing. A modern building is expected to provide a number of services with high security, energy efficiency and convenience. For a building with complex requirements due to the activity, such as a hospital, the services provided are even more advanced and the requirements on them are higher. This implies for the need of a building automation system. These systems come with a cost and have some drawbacks. This paper will take on the task to study how to benefit from the possibilities with building automation systems while minimizing the drawbacks. The aim is to find guidelines for how to design, procure and manage a building automation system in residential in an effective way. The building energy management systems its control and automation in buildings has significant role. These systems can play an important role in regular energy monitoring and management and therefore to save the possible energy and cost. The key point of the building automation market is focused upon better facilitation to the user in terms of comfort at reduced operation cost. Energy efficiency improvement will also contribute to environmental protection. Therefore there have been regulations and rating systems made that mandates the requirement of energy monitoring and control in a building. For example, the above mentioned building utilities and equipment control and automation plays an integral role in achieving the green building rating points from certifying authorities such as GRIHA and IGBC. The proposed system is to control the active systems such as lighting including artificial lighting (on/off & dimming control), air conditioners and safety features like fire alarm & gas alarm. In future the existing idea can be implemented for the whole building, i.e. various rooms or areas and then all of them can be integrated on a common platform for monitoring and control of different equipment.

Keywords—SBMS (smart building management system)

I. INTRODUCTION

Building management is the automatic centralized control of a building's Heating ventilation and air conditioning, lighting and other systems through a Smart building management System or building automation system.

SBMS core functionality keeps building climate within a specified range, provides light to rooms based on an occupancy schedule.

The term building automation system, loosely used, refers to any electrical control system that is used to control a buildings heating, ventilation and air conditioning (HVAC) system. Modern SBMS can also control indoor and outdoor lighting as well as security, fire alarms, and basically everything else that is electrical in the building. Old HVAC control systems, such as 24 V DC wired thermostats or pneumatic controls, are a form of automation but lack the modern systems flexibility and integration.

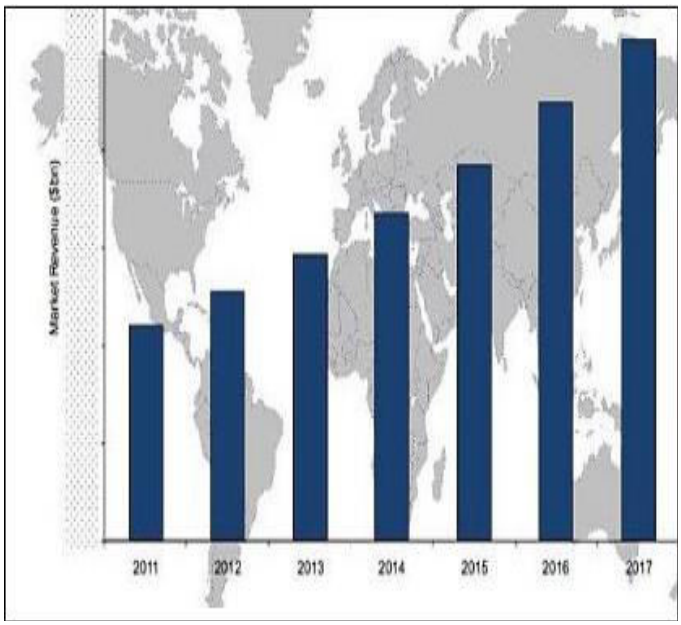

Figure 1 Popularity of Smart home in market

It grant to people and things to be connected Any-time, anyplace, with anyone, ideally using any network and any service . Automation is another important application of this technologies. It is the monitoring of the energy consumption and the Controlling the environment in buildings, schools, offices and museums by using different types of sensors and actuators that control lights, temperature, and humidity.

The Smart home known as House automation, with the use of new technology, to make the domestic activities more convenient, comfortable, secure and economical. The home automation system includes main components which are:

A. User interface: as a monitor, computer, or Phone, for example, that can give orders to control System.
B. Central Controller: It is hardware interface that communicates with user interface by controlling domestic technology, and complex user interfaces. With the advancement of time, rapid development in technology and processing power which leads to a considerable reduction in device cost and size. All of these factors have contributed to the popularity of electronic devices today, so people are no longer confused or unsure about the use of the computer, mobiles, or tablets. Moreover, a lot of home automation protocols, communication and interface standards.

II. LITERATURE REVIEW

In this section, discussed different Home Automation System with their technology with features, benefit and limitations.

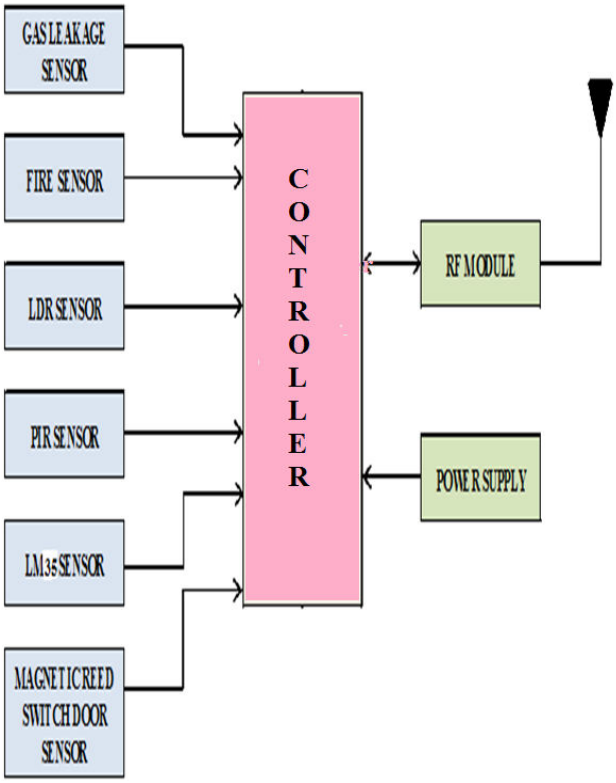

Figure 2 Basic Block Diagram of SBMS

A Smart Building Management Sytem (SBMS) is an example of a distributed control system. Modern Smart Building Management System do not only provide improved comfort but offer significant energy cost savings, especially in office buildings and production halls, because of intelligent control systems such as lighting and sunblind functions. SBMS explains functionalities provided by building control system, which is a computerized, intelligent network of electronic devices, designed to monitor and control the mechanical and lighting systems in building. The main application of Building A Smart Building Management System is to increasing user comfort at minimum operational cost and get optimized control schemes for Heating, Ventilation and Control Systems (HVAC), shading and lighting. The SBMS must be loosely coupled so that the controllers can communicated with any other application. It is difficult to for integration across SBMS which may adopt different communication protocols e.g.,lon protocol, Bacnet protocol and integrating SBMS with existing enterprise applications.[2]

Buildings are constructed using sustainable materials, smarter buildings are designed to run more efficiently and, more importantly, communicate with and about their various systems. With the unprecedented proliferation of sensors and control systems over the last decade, many buildings have the ability to measure, sense and see the exact condition of practically everything in them. This has made intelligent building management, which is an integration of building, infrastructure, and enterprise systems to promote sustainable and cost-effective operations, a reality for today.[3]

Buildings, both residential and commercial, represent one of the highest energy consumption fields in the world. This tendency is particularly pronounced in developed countries, where between 20% and 40% of the total energy consumed is related with buildings Reduction of the carbon footprint on a global scale as well as ensuring energy efficiency of buildings are key goals of high priority for multi-disciplinary researchers in the fields of building engineering and energy policy. International actions to improve energy efficiency in buildings have already been proposed [4]

Buildings should evolve and adapt to accommodate their users. It is therefore important to incorporate the user into the design of buildings and allow them control over their environment. Smart buildings should be responsive to their inhabitants in order constantly to improve living conditions. William Webb observes that, although the concept of the smart home has been around for at least 40 years, “it has been messed up every which way, with misaligned objectives between end users and those who design the smart system”. He suggests that architects and smart technologists resist anticipating the needs of users, instead consulting with them at the start of the design process. Close observation of the behavior of occupants is important when retrofitting smart technologies to existing buildings in order to provide appropriate services. Simon Erridge also recommends that architects and installers remain mindful of the human need to feel in control of the immediate environment. “People want to engage with the controls rather than feel at the mercy of a technological hand of God”, he says. As well as soliciting the opinions of users, building designers should embrace their role as service providers and collaborate more closely and creatively with clients to create innovative buildings.

III. RELEATED WORKING

Although much interest has been put into smart building technologies, the research area of using real-time information has not been fully exploited yet. In order to obtain an accurate simulation model, a detailed representation of the building structure and the subsystems is required, although it is the integration of all systems that requires the most significant effort. With the incessant progress of sensor networks, new

applications to improving energy efficiency are constantly emerging. For instance, in office spaces, timers and motion sensors provide a useful tool to detect and respond to occupants while providing them with feedback information to encourage behavioral changes.

Intelligent system able to manage the main comfort services provided in the context of a smart building, i.e., HVAC and lighting, while user preferences concerning comfort conditions are established according to the occupants' locations. the authors only propose the inputs of temperature and lighting in order to make decisions, while many more factors are really involved in energy consumption and should be included to provide an optimal and more complete solution to the problem of energy efficiency in buildings.

A. Optimization of Energy Efficiency: Optimizing energy efficiency in buildings is an integrated task that comprises the whole lifecycle of the building. the main stages are:
• Design, using simulations to predict the energy performance.
• Construction, testing individual subsystems.
• Operation, monitoring the building and controlling actuators.
• Maintenance, solving infrastructure problems due to energy deficiencies.
• Demolition, recycling materials and usable elements.

B. Information Management: An intelligent management system must provide proper adaptation countermeasures for both automated devices and users, with the aim of satisfying the most important services provided in buildings (comfort) and energy efficiency requirements. Therefore, energy savings need to be addressed by establishing a tradeoff between the quality of services provided in buildings and the energy resources required for the same, as well as its associated cost.

C. Holistic Platform for Smart Buildings: A smart building provides occupants with customized services thanks to the intelligence of their contained objects, be it an office, a home, an industrial plant, or a leisure environment. Since the building environment affects the quality of life and work of all citizens, buildings must be able of not only providing mechanisms to minimize their energy consumption (for instance, integrating their own energy sources to ensure their energy sustainability), but also of improving habitability and productivity. Sensor and actuator deployments in buildings need to be optimized in such a way that the associated cost is offset by the economic value of the energy saving. Note that monitoring the whole area of large buildings is not feasible nor realistic. Moreover, to the behavior patterns obtained after data monitoring, real sensor data about such inputs should be considered in the final energy management system. In this way, the system is able to adapt itself to changes in the building context as well as to new situations not included in the initial models.

D. Common Working*:* The most common primary function of the SBMS is the control of a buildings fault Management and Alarming as well as Heating, Ventilation and Air Conditioning Systems.

- Power Distribution & Consumption
- Fire Safety/Extinguishing
- Elevator Control
- Security, Observation
- Illumination Control
- Plumbing
- Building Access Control
- Renewable Energy
- Zone Controls

E. Maintaining systems**:** Integrating digital, electronic and mechanical systems to create a smart building promises great benefits, but only if the SBMS is well-maintained.

IV. CONCLUSIONS

This paper demonstrates that implementing an smart building management system can be an incremental thing, without a need for a total rebuilding of a facility nor that size matters. Single parts of a complex enterprise can use the reference architecture and select the steps that are the most appropriate to start a transformation that will improve the daily job, reduce operational costs and provide a level of visibility that sometime is hidden to the rest of the organization.

V. FUTURE SCOPE

Android app will also develop for easily use. In Android app there will be direct buttons for ON or OFF the system or to receive the OTP. For more security purpose camera module can also be implemented on the system. If any person attempt to enter in home with more than three time wrong password then at that time camera module will be activate. And camera module will capture the image of person who trying to attack on system.

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