

# IOT Based Intelligent Building Management System

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**Abstract**— Today, technologies allow people to access and monitor everything from everywhere. Thus interconnected things using networks like LoRaWAN, ZigBee and traditional Wi-Fi, are often described as the Internet of Things (IoT). This paper describes an Internet of Things sensors project. Combining sensors and actuators smart buildings, which can be offices or apartments, allow owners to save energy, increase security, give information to users on their environment and act directly on the building using the Internet. The paper presents the definition, development and outcomes of a project to use sensors in a typical apartment to monitor and conditions in the apartment using IoT technologies. The layout and placement of sensors is described, followed by a description of the sensors used, and of the wireless interfaces and cloud technologies used. The project outcomes, based on use of Bluemix with Node Red are presented.

## INTRODUCTION

It involves review of a number of publications and referred academic journals organized under central themes. This will lead to reduction in energy consumption in buildings –most especially commercial buildings such as factories, hospitals, hotels, office complexes, shopping malls etc. by 30 – 40% (ARUP, 2016). This research investigates the importance of building management systems (BMS), its processes, workflows, current trends, available technologies, and the future of BMS utilization. Specific areas to determine which factors may predict successful adoption, integration and deployment in commercial buildings was also reviewed. In this era, where energy management is the concern of everyone, buildings are being constructed in a manner to provide maximum comfort and ease to the people with minimum energy utilization. This is only possible with the help of controlling devices that are to be installed in a building during construction. This control can be of any type, from simple switching on and off of lights, to water motor control and many more. Therefore the main idea of designing this system is to automate these building operations in the

most resourceful manner (Swarnalatha, 2011). Besides controlling, security factor has also been kept as a concern with password protection. Cameras, fire alarms systems, main gate security and main gate barrier automation has been put at priority in this systems (BMS). Another feature which is required in a multiple story building is elevator, which can also be found in building systems. Building Management System (BMS), otherwise known as Building Automation System (BAS), is a computer-based control system installed in buildings that controls and monitors building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire and security systems. BMS consists of software and hardware; the software program, usually configured in a hierarchical manner, can be proprietary, using such protocols as C-Bus, Profi bus, and so on. Vendors are also producing BMS that integrates the use of internet and open standards such as DeviceNet, SOAP, XML, BACnet, LonWorks and Modbus. It analyses specific necessities of a particular building by controlling the associated plant installed in it and helps save energy (Daintree Networks, 2009). Devices installed outside the buildings are connected with panels which can be switch on or off over different sets of instructions. The working of BMS is totally based on the input inform of information by the devices such as sensors. Once the information is collected it can be processed with the help of controller that will further instruct the system to perform a specific task. In BMS technology, switching on and off of the plant can be controlled in the same manner. Plant can be set to a respective temperature in order to provide heating and cooling with respect to the temperature outside the building. BMS serves as a tool for potential increase in economics and energy efficiency, and thus, must be clearly defined a understood before its implementation in both private and commercial buildings, especially in the later where it seems to provide enormous cost savings due to minimized

energy consumption it yields when installed in a building. The evolution, benefits, limitations, efficiency, application and adoption of BMS are reviewed.

## II.RELATEDWORK

### A. Literature review

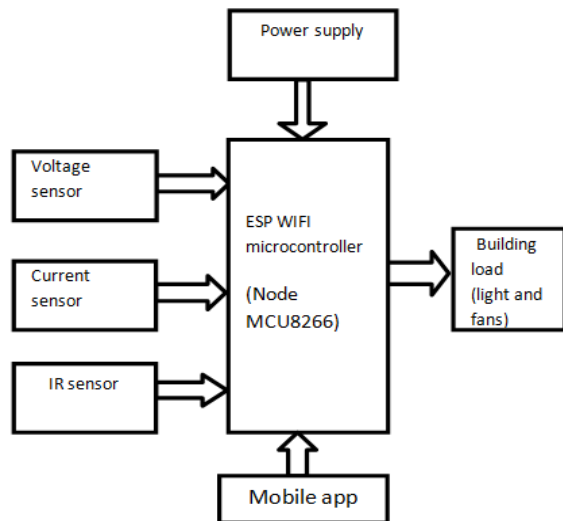
As per our survey, there exist many systems that can control home appliances using Android based phones /tablets. Each system has its unique features. Currently certain companies are officially registered and are working to provide better home automation system features. Following models describes the work being performed by others.

N.Sriskanthan implemented the model for home automation using Bluetooth via PC. But unfortunately the system lacks to support mobile technology.

Muhammad IzharRamli [2] designed a prototype electrical device control system Using Web. They also set the server with auto restart if the server condition is currently down.

Amul Jadhav [3] developed an application in a universal XML format which can be easily ported to any other mobile devices rather than targeting single platform.

## III.METHODLOGY



1) Block diagram of intelligent building management system

1.Hardware and software requirements

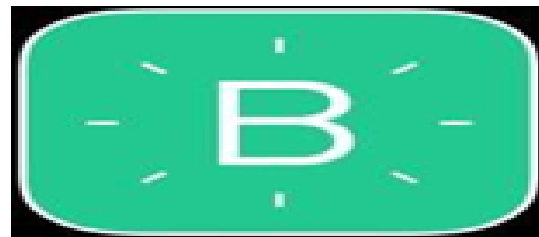
a)Hardware ESP wifi microcontroller Voltage sensor Current sensor



IR sensor Power supply

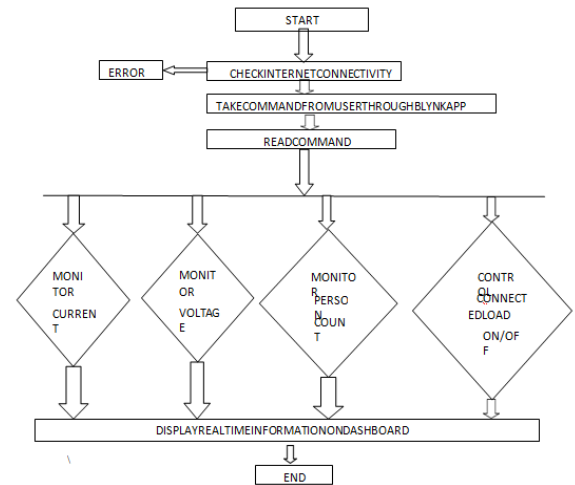
i) Software:

ARDUINOIDE: The Arduino Development Environment (IDE) is a cross- platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards Blynk: A typical program used by beginners, akin to Hello, World!, is "blink", which repeatedly blinks the on-board LED integrated into the Arduino board. This program uses the functions pinMode(), digitalWrite() and delay() , which are provided by the internal libraries included in the IDE environment. The method for making the building intelligent is firstly choose the components which measures current and voltage level in the building. IoT is also a very essential part now days so blynk app which is one of the platform is used. Microcontroller is the brain of the project it accepts the inputs from sensors and take action according to code entered in embedded c language. programming software used for it is Arduino IDE .The current and voltage level measuring components are voltage and current sensors.



IR sensor is recognise the people entering in building and led blinks. All the process in the building is handled by one or many of the person who's network is connected to building platform from anywhere. The project is fully based to make building intelligent for saving energy, man power and timesaving.

IV.FLOWCHART



VI. RESULT



VOLTAGE MONITORING



CURRENT MONITORING



VII.CONCLUSION

The conclusion of this project is that we can use ESP wifi microcontroller to control the System without Human Interference. Voltage sensor is monitor voltage. Current sensor is monitor current and IR sensor keep track on count people entered into the building

REFERENCES

- [1] Advance Control Corporation(2013) Intelligent Building Management system[online]at: <http://advancedcontrolcorp.com/blog/2013/03/intelligent-building-management-systems-in-miami/>[Accessed 23 Oct,2018]
- [2] ARUP (2016).Building Energy Efficiency Guideline for Nigeria, Abuja: Federal Ministry of Works Power and Housing.
- [3] BenU.I. and MargaretC.I.(2014).Adopting Intelligent Buildings in Nigeria: The Hopes and Fears, 2<sup>nd</sup> International Conference on Emerging Trends in Engineering and Technology (ICETET'), May30-31, 2014 London(UK).
- [4] BTL2018).The Evolution of the Smart Building: Past, Present and Future[online] Available at:

- [https:// btlnz.co.nz/news/the-evolution-of-the-smart-building /](https://btlnz.co.nz/news/the-evolution-of-the-smart-building/)[Accessed14 October,2018]
- [5] Albert Ping Chuen Chan, Amos Darko and ErnestEffahAmeyaw Strategies for Promoting Green Building Technologies Adoption in the Construction Industry—An International Study. Sustainability 2017, 9,969; doi: 10.3390/su9060969
- [6] Clarke, E. (2008). The Truth about Intelligent Buildings [online] Available at: <http://www.climatechange.org/content.asp?ContentID=5471>[Accessed22October,2018]
- [7] ComlyWilson(2017).4Limitations of Building Management System (BMS) Data[online] Available at: <https://www.enertiv.com/resources/4-limitations-bms-data>[Accessed25Oct,2018]
- [8] Daintree Networks (2009)—Lighting Control Saves Money and Makes Sense. [online] Available at: <http://www.daintree.net/downloads/whitepapers/smart-lighting.pdf>[Accessed15Dec,2018]
- [9] Domingues, P., Viera,R. and Wolfgang, K.(2015). Building Automation: Concepts and Technological Review, Austria, Elsevier 22(5) pp.23 – 28.
- [10]Dounis, A.I., Tiropanis, P., Argiriou, A., and Diamanti, A. (2011). Intelligent Control System for Reconciliation of the Energy Savings with Techniques. Energy and Buildings, 43(1), pp.66-74