International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Distributive Control Framework for Lighting Applications

Shwetha R[1], Vishalakshi Prabhu[2], Manmath Ray[3]

[1]PG Scholar, Department of CSE, R V College of Engineering, Bengaluru, India

[2]Assistant Professor, Department of CSE, R V College of Engineering, Bengaluru, India

[3]Product Architect, Philips Lighting India Ltd, Bangaluru, India

Abstract: ***Brightness is a key factor of environment, the quality of it can influence task performance, comfort and well-being. On the other side, brightness can be used to direct the viewer's attention to particular elements in the environment. The Communication Protocol uses a system strategy of distributed intelligence to definethe relationship between the user interfaces and the load controllers. This details how each device manages its responsibility within the system to ensure continuous operation. All devices support at least one protocol port, with the same protocol used for system Commissioning and the day-to-day operations of the system. The channels in an area are used by the system to alter any electronically controlled dimension of a space. Presets then simultaneously recall the individual levels for a group of channels. The preset states can also be used throughout the system by sequential and conditional logic to perform an endless variety of sophisticated tasks.***

Keywords: DALI, Dynalite, VLC, POE

1. Introduction

Indoor lighting is experiencing a noteworthy change with the appropriation of LED light sources [1]. Practical lighting with LED luminaires can be conveyed with high vitality efficiency and great enlightenment quality. The following change in lighting is towards savvy LED lighting frameworks, and specifically IoT frameworks. An IoT keen LED lighting framework comprises of numerous LED luminaires with an IP address, distinctive sorts of sensors and controllers that are associated together, and can adjust to their condition. Utilizing inhabitance and light sensors, artificial lighting might be adjusted to client nearness and sunshine changes. Different sensors, for example, for measuring air quality or temperature, might be additionally utilized for detecting natural parameters. Together with control systems, sensors in this manner empower coordination of physical data identified with a building situation into framework plan and convey rich information into the Internet [2]. This detecting data might be utilized to enhance building control frameworks, give remote office administration and get to and give examination driven administrations. We consider VLC for giving network among sensors and luminaires in an IoT indoor lighting framework. We consider an IoT indoor office lighting system with various luminaires, a focal controller and sensors in the office condition. These sensors are situated at the luminaires and furthermore at different areas, for example, at work areas, seats, and dividers. The sensors might be of different modalities, for example, light sensors at luminaires/work areas for measuring illuminance and weight sensors at seats for deciding seat inhabitance.

The luminaires are associated with the Internet utilizing Power over Ethernet (PoE) [3][4], for instance, and have an interesting IP address. The IP address of a luminaire gives an all inclusive open point from which information gathered at the luminaire might be gotten to and furthermore gives an activation point. Correspondence among sensors and luminaires is required to drive various applications. As cases, between luminaire correspondence is required for arranged lighting control to adjust darkening of luminaires granularly to neighborhood inhabitance and sunlight changes [3], [5], [6], and furthermore to realize dynamic lighting impacts adjusted to client developments [5].For streamlining floor space use, situate inhabitance should be evaluated and checked [4]. This might be finished by conglomerating information from weight sensors at seats got to by means of related luminaires, this obliges sensor to luminaire network and extra data on coarse area of the sensor. In individual control applications, clients can change brightening in their surroundings by conveying their inclinations utilizing a client gadget to the lighting framework [1], [5]. To acknowledge such applications, we consider VLC for giving availability. We expect that each of the cooperating gadgets in the office condition is outfitted with a VLC handset. We dissect the execution of a VLC framework with time opened facilitated correspondences and utilizing abundancy regulation with paired Manchester coding for encoding data [1], [3]. A strategy for evaluating optical channel increases and sunlight at each luminaire is exhibited. These evaluated qualities can be utilized as a part of organized lighting control. Evaluated additions are likewise utilized for partner a transmitting sensor in nature with at least one PoE luminaires in closeness. Constrained writing exists on IoT savvy lighting frameworks. A various leveled organizing engineering for IoT based keen lighting frameworks was considered in [2] and issues required in systems administration and remote interfaces were talked about. Past work in shrewd office lighting frameworks has concentrated on lighting control models and techniques for sunlight and inhabitance adjustment [3], [1], [5], [6], [7].For organized lighting frameworks, network was expected as wired interfaces or with remote radios (e.g. ZigBee). In [7], VLC was utilized as a part of lighting control to impart from light sensors at work areas to the luminaires.

2. Flow Chart

Load controllers get guidelines from the DyNet network and change their yields as desired. It carrys every one of the components – the supply of the power, the system ports, the yield drivers and the chip administration – expected to work the lighting bunches for which they are capable. Also, channel renaming data, channel tending to, intelligent range tending to and they are put away inside the heap controller. System sensors which are generally ready to oversee nearness recognition and light level estimation in the meantime. The sensors impart straightforwardly to heap controllers and different gadgets on the network and can get organize guidelines to offer them diverse practices. The sensor run incorporates diverse placing choices, operation, IR-get ability, in addition to 360° or 90° inhabitance recognition. They can play out an extensive variety of standard capacities, for example, presets, channel exchanging/diminishing, one touch darkening ,room join or board impair. User Interfaces options additionally incorporate programming uses for PCs, advanced cell gadgets and tablets. They will take into account lighting control framework and when they are incorporated additionally , ready to control dazzle engines and set indoor regulator degrees. A scope of various system entryways empower incorporation with a far reaching cluster of outsider system frameworks .These gadgets enable numerous frameworks that are under a solitary UI.

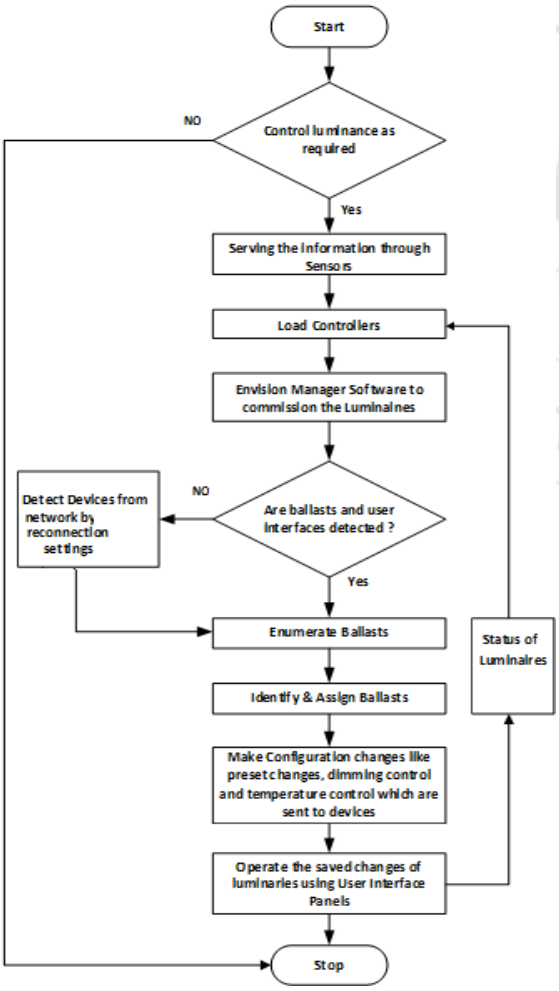

Figure 1

3. Overview of the Design

From the figure 2. The DALI load controller speaks with the counterweights by methods for its DALI interface. It can send messages to the balances and get messages from the stabilizer. The DALI Controller screens and stores the settings and electrical attributes from the DALI lighting framework. Bi-directional data stream empowers the stabilizer to give criticism to the system on data, for example, luminaire state (on/off), light level and light and weight condition. Furthermore, weights can likewise be arranged with parameters held in the memory of the counter balance itself.

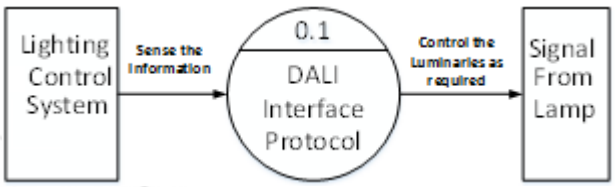

Figure 2: Level 0, Data Flow Diagram

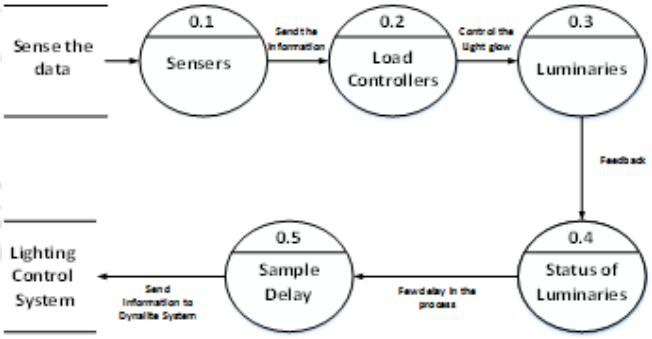

Figure 3: Level 1, Data Flow Diagram

The Envision Project programming bundle empowers full dispatching of all gadgets without the requirement for extra additional items. The product can show alternate points of view of the framework, for example, a general system see, individual coherent zones and floor arranges. These empower the appointing architect to have an unmistakable perspective of the whole framework – or careful parts of the framework – to lessen set-up time. As a necessary piece of the appointing procedure, setup information is traded to the Envision Manager programming so that all pertinent framework data is made accessible to the end-client.

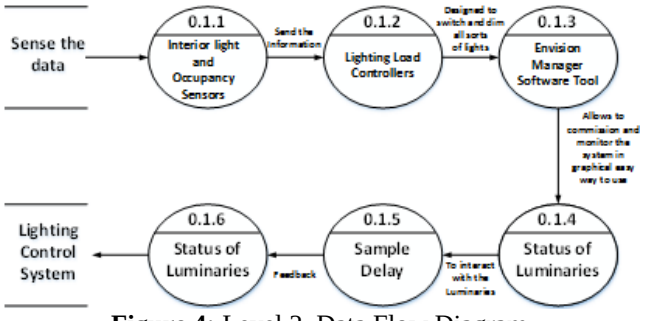

Figure 4: Level 2, Data Flow Diagram

4. Experimental Analysis and Results

Working of DALI system
Conventional DALI considers singular light fittings to be organized. The DALI convention takes into account a most extreme of 64 fittings on a solitary system with 16 diverse territory groupings.

Management of Power
DALI fittings control the yield level of the lights. In any case, once a light has been told by the control framework to diminish to 0 percent, it is as yet devouring a standby current utilization. While singular light standby power utilization may not appear to be critical, duplicated by the aggregate number of lights inside a venture and it winds up noticeably extensive

Limitless Scalability of Networks of DALI
A venture floor format is not known until the late phases of development, which implies electrical installers need to change the DALI transport to coordinate the coveted floor arrange, guaranteeing that every range does not cross the physical limit from one DALI organize into another. The Philips Dynalite framework beats these limitations by specifically interfacing each of the heap controllers in the electrical switchboard by means of DyNet.

DALI Maintenance and Control
Regularly a venture requires more than DALI to be introduced. For example, lighting bunches that require stage cut diminishing, exchanging control or visually impaired coordination, will require more than a DALI framework. The Philips Dynalite stage underpins the full scope of UIs, sensors, stack controllers and mix passages.

Monitoring of Group Lighting and Emergency Lighting
The DALI determination considers a most extreme of 64 lights for each system, which can be separated into 16 unique gatherings. DALI crisis leave fittings are likewise good, taking into account planned testing of the light and battery with the Philips Dynalite EnvisionManager programming. This makes the checking of crisis leave fittings simple.

Network cabling is reduced to 50 percent
A DALI framework ordinarily comprises of DALI good light fittings and a DALI controller. Typically, the DALI framework has all fittings associated in one system and the sensors associated on a different control arrange.

5. Conclusion

Making a stride further, shrewd lighting has developed because of colossal infiltration of sensors and actuators in day-today exercises. For reasons unknown the flexibility given by a wired interface, for example, DALI can't be considered sufficient. Exceptionally, considering the plan requirements lighting frameworks. the pattern is to supplant the wires among switches and DALI controller by a remote interface, for example, Zigbee. This is also shown in any of other IoT applications as well. Notwithstanding, we contend that Zigbee migth not be the ideal decision. The fundamental goal of this is to emphasize the key difficulties in acknowledgment of IoT. As a by item, we see that the momentum issues in the area of the expectation that the article will help in research endeavors.

6. Acknowledgement

I would like to thank my manager Mr. Sanjeev Kumar,R&D Group Manager Mobility, Analytics, Philips Lighting, Bengaluru, for providing guidance and all required facilities. I am thankful to Philips Lighting Pvt. Ltd., Bengaluru, India for providing the resources for this work.

References

[1] H. Wang, A. Pandharipande, D. Caicedo and P. P. J. van den Bosch, “Distributed lighting control of locally intelligent luminaire systems”, IEEE International Conference on Systems, Man and Cybernetics, pp. 3167-3172, 2012.
[2] D. Zhang, L. T. Yang, C.-H. Hsu, and M. Chen, Min Guo, “A real-time locating system using active rfid for internet of things,” IEEE Systems Journal, pp. 1–12, 2014.
[3] S. Naghibzadeh, A. Pandharipande, D. Caicedo and G. Leus, “Indoor granular presence sensing and control messaging with an ultrasonic circular array sensor,” IEEE Sensors Journal, pp. 4888-4898, Sept 2015.
[4] M. Chen, “Towards smart city: M2m communications with software agent intelligence,” Multimedia Tools and Applications, pp. 1–12, 2012.
[5] N. van de Meugheuvel, A. Pandharipande, D. Caicedo and P. P. J. van den Hof, “Distributed lighting control with daylight and occupancy adaptation”, Energy & Buildings, pp. 321-329, June 2014.
[6] D. Caicedo and A. Pandharipande, “Distributed illumination control with local sensing and actuation in networked lighting systems,” IEEE Sensors Journal, pp. 1092-1104, Mar 2013.
[7] X. He and A. Pandharipande, “Location-based illumination control access in wireless lighting systems,” IEEE Sensors Journal, DOI: 10.1109/JSEN.2015.2449276, 2015.
[8] Syed Ali Raza Zaid, Ali Imran, Des. C. McLernon, Mounir Ghogho “Enabling IoT Empowered Smart Lighting Solutions:A Communication Theoretic Perspective,” IEEE Journal ,DOI: 10.1109/WCNCW.2014.6934875,2014.
[9] Yao-Jung Wen, Alice M. Agogino “Personalized dynamic design of networked lighting for energy-efficiency in open-plan offices.”2011.03.036,2011.