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STREET LIGHT – IOT DYNAMIC CONTROL OF STREET LIGHTS WITH HUMAN MOBILITY, ILLUMINATION, CURRENT SENSING WITH DUSTBIN REPORTING SYSTEM

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Abstract - *In the Existing system, The higher amount of energy consumption associated with street lights is mainly contributed by the inefficient system, in which luminaries require high amount of energy. In the Proposed system, Intelligent street lights have different sensors to monitor and control luminaries. It includes temperature, luminosity and power metering sensors to control the dimming level and to check the status. These luminaries are networked together in a Zigbee mesh network. In the Modification, Cloud & IOT based setup is implemented. Sensors values are measured by the remote server called Cloud via Zigbee based communication. It is also deducting Power theft happening. We also include Dustbin notification also along with this street light concept. Automatic notification is communicated to the corporation in case full of Dustbin. Street light illumination is adjusted or increased whenever people come closer to the lights.*

***Key Words*: Energy consumption, Monitor and Control Luminaries, Power theft, Dustbin notification, Light Illumination.**

1. Introduction

Wireless sensor network (WSN) with its ubiquitous nature and easy to monitor and control capability is the back bone of large variety of cyber physical systems (CPS) applications in every domain. In terms of outdoor smart lighting, WSN integrated with networked LED luminaires has potential to conserve considerable amount of energy with the capability of centralized sensing and computing, power management, and dynamic demand response. The low power, less complex and more reliable WSN offered by ZigBee has emerged as a preferable choice for energy efficient indoor and outdoor lighting. Specifically addressing the energy efficient smart street lighting, the combination of LED and ZigBee protocol offers adaptable dimming in accordance with ambient conditions, occupancy control and automatic fault detection. These features have allowed many systems to demonstrate considerable amounts of energy savings with greater monitor and control capability, and reduced maintenance. Energy efficient wireless systems using LED luminaries with illumination and integrated monitoring and control is not new. However, in this article, the concept of smart street lighting with adaptive traffic control is introduced as the next level of 'intelligence'. The major contribution of this paper is to adjust the luminance intensity of smart LED lights according to the changing diurnal traffic volume present on the road. This experimentally implemented adaptive control can be used to conserve the optimal amount of energy in accordance with varying seasonal day light timing, as well as to reduce the emissions to a minimum level. Moreover, the smart grid platform with demand response (DR) and advanced metering information (AMI) provides the possibility for the smart street lights to be an integrated part of future green cities.

1.1Exiting System

The higher amount of energy consumption associated with street lights is mainly contributed by the inefficient system, in which luminaries require high amount of energy.

1.2Proposed System

Intelligent street lights have different sensors to monitor and control luminaries. It includes LED based lighting system using temperature, luminosity and power metering sensors to control and to check the status. These luminaries are networked together in a Zigbee mesh network.

1.3 Modification

Cloud & IOT based setup is implemented. Sensors values are measured by the remote server called Cloud via Zigbee based communication. It is also deducting Power theft happening. We also include Dustbin notification also along with this street light concept. Automatic notification is communicated to the corporation in case full of Dustbin. Street light illumination is adjusted or increased whenever people come closer to the lights.

2. Zigbee

Zigbee technology is one of such progression in wireless technology. Wireless is not a new technology as wireless networking and wireless internet are already in use, yet Zigbee technology set a new aspect in wireless technology. That's why it's usually referred as Zigbee wireless Technology. Day by day advancement in technology is introducing novel and supportive devices which are used to make life easier and Zigbee Technology is one of them. To better understand the Zigbee technology it is necessary to know what is zigbee technology?

Using the networking system Zigbee technology can connect machine and control machines and control through one connection whiles consuming less power. So Zigbee is the cost-effective wireless technology for controlling and monitoring.

Zigbee technology allows wireless networking to connect several units to control through one button like in business industry. This wireless networking avoids the threat of shot circuiting. Centralization control system reduces the man power.

Zigbee technology used in the remote control devices helps to control the function at a specific range .This feature of zigbee technology is very attractive and effortless as all the home application are mostly coming with remote control system which is the essence of this zigbee wireless technology . In industry all the units are centralized in one place with the help of remote control or switch-based system

As zigbee technology based devices are designed on low-power frequency therefore are reliable. Low power consumption feature of zigbee technology helps to run a device for a long duration or sometimes this bluetooth application gives a unique feature of transferring information or data from one place to another in a far better way than Bluetooth itself.

Zigbee technology is used in three different types of devices which are used in networking according to its functionality. As prominently Zigbee is a wireless is a wireless technology for making a network system, coordinates are the primary devices to help n activation of the system by collecting the data in form of memory. Then router comes as a secondary devices to perform the function by sending information to the destination. Third types of zigbee based devices are the end user devices. These are basically receiver so are not able to send information itself. It remains in sleep mode while not in use so less amount of battery uses and resultantly longer life

3. Modules

3.1 Server Development

The Server will monitor the entire street light, dustbin information in their database and verify them if required. Also the Server will store the entire information in their database. Also the Server has to establish the connection to communicate with the Users. The Server will update the each street light, dustbin details in its database.

3.2 Android Registration

Mobile Client is an Android application which created and installed in the User's Android Mobile Phone. So that we can perform the activities. The Application First Page Consist of the User registration Process. We'll create the User Login Page by Button and Text Field Class in the Android. While creating the Android Application, we have to design the page by dragging the tools like Button, Text field, and Radio Button. Once we designed the page we have to write the codes for each. Once we create the full mobile application, it will generated as Android Platform Kit (APK) file. This APK file will be installed in the User's Mobile Phone an Application.

3.3 Embedded Hardware Construction

In this module we are going to interface the Embedded Kit, by which IR sensor, current sensor values can be observed. And sensors are communication via zigbee network is interfaced with the Microcontroller. The ZigBee Alliance is an association of companies working together to define an open global standard for making low-power wireless networks. The intended outcome of ZigBee Alliance is to create a specification defining how to build different network topologies with data security features and interoperable application profiles.

3.4 User Mobility & Sun Light Monitoring

In this module, we will implement to the user mobility. Once people cross the street light means automatically it will be on state, then people crossed the light means automatically it will be off state. These overall process based on the user mobility. This process is used to the power saving process. Also in this project we will implement automatically image capturing when every humans are crossing the road.

3.5 Power Theft & Fire Monitoring

In this module, we can design and implementation of power theft detection and fire monitoring. Electricity is now more than a necessity. The need of electricity is increasing day by day. With increasing need of electricity the power theft is also increasing. It has become a must to develop a system to avoid the increasing theft. So in this project we will propose the power theft detection.

3.6 Android Based Garbage Reporting

In this module, we will design and implementation of garbage reporting process that is dustbin is full or not. In previous days there is no automatic notification system for garbage. In case full of dustbin means automatically is communicated to the corporation. So corporation is immediately taking some remedies.

4. Data Flow Diagram:

Level 0:

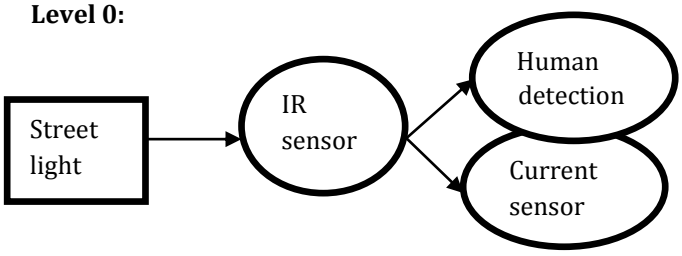

Figure1: This shows how the street light works when human begins were present in the street.

Level 1:

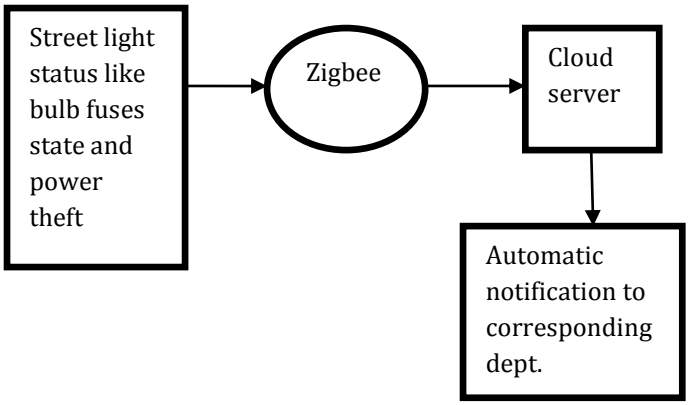

Figure 2 : This shows how the notification is generated over the zigbee technology.

Level 2:

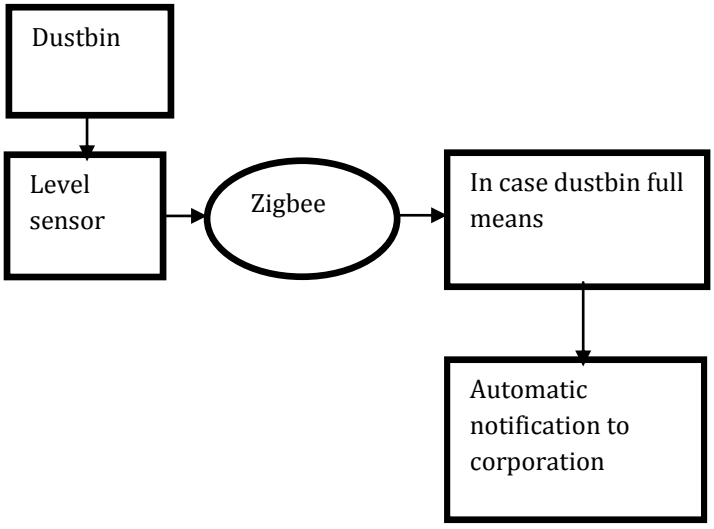

Figure 3: This shows how the dustbin works with the help of sensors

5. Architecture Diagram

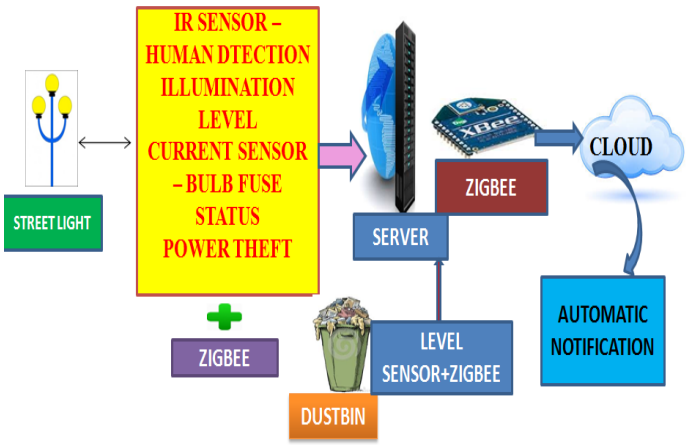

Figure 4: System Architecture

6. Conclusion

The huge amount of energy and cost associated with lighting applications has driven the need to address both budget issues and environmental concerns. In this work, a smart, efficient LED lighting system is proposed and implemented, exploiting the unique opportunities of both LED and sensor and control technologies. Unlike previous works, a probabilistic approach followed by a statistical analysis of varying-time-based traffic has been considered to implement an optimal system. The system combines the additional benefits of LED technology, such as the use of a wireless control system for traffic-based dimming to conserve energy, at a savings of 80 % over previously-installed metal halide bulbs. Increased reliability, enhanced system life, and reduced GHG emission are additional advantages of this system. Since ZigBee is considered a potential candidate for AMI/DR platforms based on wireless senor networking technology with strong mesh capability, the proposed design utilises a remote operator, and can be extended in multiple ways. For example, to increase the transmit power with a high-gain antenna, widening the scope of the project to cover the entire campus, or to use a hybrid approach via ZigBee and PLC, where the propagation of RF signals among nodes to communicate wirelessly is unmanageable due to both natural and man-made obstacles. Utilizing essential components and basic infrastructure, the proposed system also facilitates the possibility of integration into future smart vehicle networks

6.1 Future Enhancement

In future work, we intend to implement the proposed system on a larger scale, equipping vehicle detection sensors on the roadway to provide feedback to the smart controller for adaptive dimming; the ability to make decisions. We have already analyzed the reliability of the ZigBee mesh network for a long road (9 Km), where it is essential to continuously illuminate an unattended space, bridging the gap between the energy user and utility in order to minimize energy consumption for the benefit of users and the environment.

7. Reference

[1] J. Crowther, C. Herzig, G. Feller, “The time is right for connected public lighting within smart cities”, IBSG., Cisco System, San Jose, CA, Oct. 2012.

[2] International Energy Agency (IEA), “Light’s labour’s lost, policies for energy efficient lighting,” Paris, 2006.

[3] European Expertise Centre (EPEC), “Energy efficient street lighting,” 2013.

[4] Koninklijke Philips Electronics, “Road lighting, feel safe on roads,” August, 2013.

[5] D. Caicedo and A.Pandharipande, “Distributed illumination control with local sensing and actuation in

networked lighting system," IEEE Sensor J., vol. 13, no. 3, pp 1092-1104 , March. 2013.

[6] M. Magno, T. plonelli, l. benini, E. popovivi, "A low cost, highly scalable wireless sensor network solution to achieve smart LED light control for green buildings," IEEE Sensor J., vol. 15, no. 5, pp 2963-2973, May. 2015.

[7] S.D.T Kelly, N.K. Suryadevara, S.C. Mukhopahyay, "Towards the implementation of IoT for environment condition and monitoring in homes," IEEE Sensor J., vol. 13, no. 10, pp 3846-3853, Oct. 2013.

[8] A. Lwayemi, yi. Peizhong, Liu. Peng, Chi. Zhou, " A perfect power demonstration system," in Proc. ISGT, Gaithersburg, MD, 2010, pp. 1-7.

[9] N.Javaid, A. Sharif, A.Mahmood, S. Ahmed, U. Qasim, Z.A. Khan, " Monitoring and controlling power using Zigbee communications," in Proc. BWCCA, Victoria, BC, 2012, pp. 608-613.

[10] T. Wang, B. Zheng, Z-L Liang, " The design and implementation of wireless intelligent light link control system based on Zigbee light link," in Proc. ICCWAMTIP, Chengdu, 2013, pp. 122-125.

[11] C-L Fan, Y. Guo, " The application of a Zigbee based wireless sensor network in the LED street lamp control system," in Proc. IASP, Hubei, 2011, pp. 122-125.

[12] F. Lecces, "Remote-control system of high efficiency and intelligent street lighting using a ZigBee network of devices and sensors," IEEE Trans. On Power Del., vol. 28, no. 1, pp 21-28, Jan. 2013.

[13] D. Huaqiu, X. Li, X. Huaqiang, " Wireless network node of LED lamps," in Proc. EIT, Dekalb,IL, 2015, pp. 207-209.