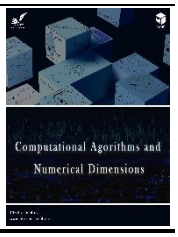
Computational Algorithms and Numerical Dimensions

www.journal-cand.com

Com. Alg. Num. Dim Vol. 1, No. 4 (2022) 137–140.



Paper Type: Original Article

Automated Street Light System by Using Wireless Sensor Networks

Alhanouf Alburaikan*

Department of Mathematics, College of Arts and Sciences, Al-Badaya, Qassim University, Buraydah, Saudi Arabia; a.albrikan@qu.edu.sa.

Citation:

Alburaikan, A. (2022). Automated street light system by using wireless sensor networks. *Computational algorithms and numerical dimensions, 1*(4), 137-140.

Received: 07/03/2022 Reviewed: 10/04/2022 Revised: 16/04/2022 Accept: 24/06/2022

Abstract

Consumption of power is essential for the sustainability of future generations. The constant developing world makes everyone run beyond the capabilities and to meet the needs of the growing world. Conservation of electricity is the least concern of the today's man. Concern to this problem, automated street light system can play a part in the electricity guard. The street light is combined with Light Dependent Resistor (LDR) to make it automatically identifying the range of visible light and perform decision making whether to turn on or turn off the light.

Keywords: Street light, Sensor network, Energy saving.

1 | Introduction

Street light are the basic necessity for night travel and to avoid accidents. They make the road safer to travel in the dark [1]. Although no one cares in conserving the electricity while they are unused [2]. Without the light we are not able to do any kind of work. In today's competitive world we are not able to survive while seeing the comparison of day and night [3]. Only with the help of light we are now able to survive in the world. Now we are knowing the importance of the energy and we cannot waste it unnecessarily [4]. To overcome unnecessary kind of usage of energy for a particular task we are explaining here [5]. By the usage of wireless sensor in street lights we can save the energy and reduce the accidents [6]. But the man power can also be avoided by making it automatic. This automatic street light system helps in reducing the electricity without involving human hand [7]. It can automatically turn on and turn off based on the intensity of the light in the surrounding using the sensor. Here the sensors involved in this model are resistors [8].

The model is constructed using three essential elements. They are,

I. Light Dependent Resistor (LDR).
II. Sensor.
III. Micro-controller.

Corresponding Author: a.albrikan@qu.edu.sae

https://doi.org/10.22105/cand.2022.161805

2 | Existing Work

With the help of light dependant resistor, the street lights are turned off during the daytime as the intensity or frequency of light is of high resistance [9]. As the light goes off slowly, as it grows dark, the resistance gets low and the street lights will turn on automatically due to low light intensity in the surroundings [10]. The sensor is helpful to detect the object or the vehicle that passes through the road, when a vehicle gets detected; the lights get turned on [11]. When the road is empty, the lights get turned off automatically without any involvement of human [12]. This helps in conserving the electricity when there is not necessary [13].

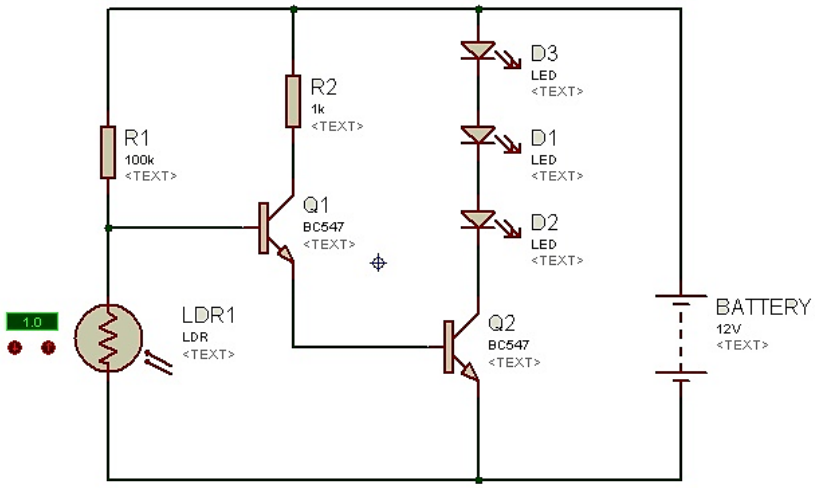
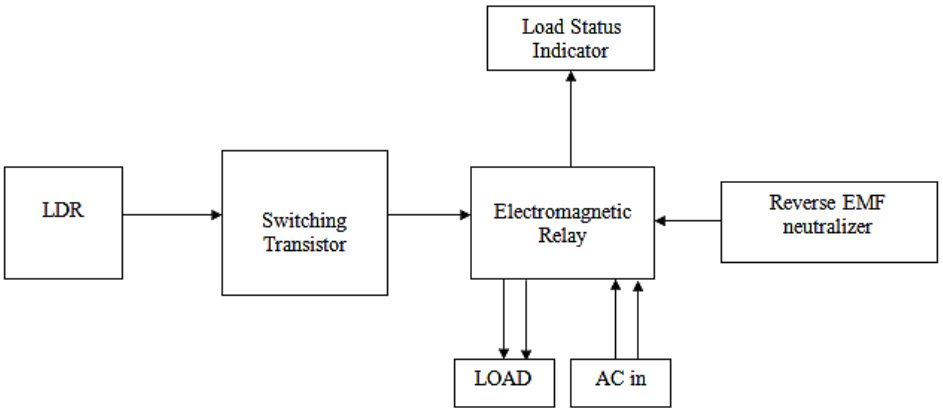


Fig. 1. Circuit diagram.



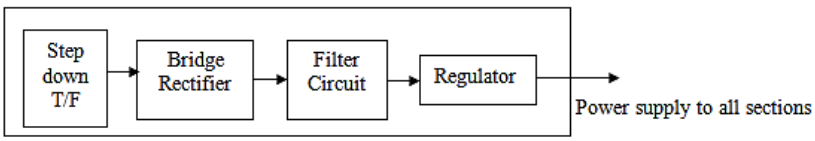


Fig. 2. Block diagram.

Alburaikan | Com. Alg. Num. Dim. 1(4) (2022) 137-140

3 | Working

The proximity sensor is kept at a distance, such that when the vehicle is detect by the sensor a signal will be passed to the LDR [14]. Where it detects the light frequency or intensity, if intensity of light is low the LDR detects high resistance and this indicates the light is dim and the street light gets automatically turned on. The on and off of light is completely dependent on two main constraints [15]. One is the resistance value at the LDR and the other one is the sensor [16]. If constraints are satisfied, only then the light gets turned on, otherwise it will always remain turned off [17]. This leads to conservation of electricity by utilizing energy only when it required.

Hardware/Software Requirements

- *LED's*
- *Batteries*
- *Resistors*
- *Capacitors*
- *LDR*
- *Proximity sensor [18]*
- *Compiler*
- *Assembly language*
- *Micro Controller unit*

Advantages

- *Cost effective*
- *Automatic system*
- *Reduces human work [19]*
- *Reduces electricity consumption*
- *Easy to build*

Disadvantages

- *The power cut can be considered as a biggest problem when no sensor or the system may not work [20].*
- *Sensor should know the difference between the humans and animals in order to avoid unwanted light on [21].*
- *Sensors should not get defective which will not give accurate output and may cause accidents [22].*

4 | Conclusion

This is an automated street light type project which is costless to effort by government at initial stage, by this we can save the renewable energy which is exhausting in now a days and we can saves the lives of the people by avoiding the accidents [23]. By using the sensors can automatically activated when the object is certain distance from the sensors. By this we can analyse movement on the road which can helps in the further analysis. By using LED lights, we can save power (KWH) up to 50%. By using this technology, we can create every city as a smart city. To avoid the disadvantage of this automated light system, we can use solar street light where the solar energy is stored and can be used as energy for street lights. This can be considered as a sustainable solution for this problem but it is a bit cost effective. So, automatic solar street lights are the better solution which can be more beneficial to the environment and man-kind.

References

[1] Mohapatra, H., & Rath, A. K. (2020). Fault-tolerant mechanism for wireless sensor network. *IET wireless sensor systems*, *10*(1), 23-30.

[2] Mohapatra, H., & Rath, A. K. (2019). Fault tolerance in WSN through PE-LEACH protocol. *IET wireless sensor systems*, *9*(6), 358-365.

[3] Mohapatra, H., & Rath, A. K. (2019). Detection and avoidance of water loss through municipality taps in India by using smart taps and ICT. *IET wireless sensor systems*, *9*(6), 447-457.

[4] Mohapatra, H., & Rath, A. K. (2020). Survey on fault tolerance-based clustering evolution in WSN. *IET networks*, *9*(4), 145-155.

[5] Mohapatra, H., & Rath, A. K. (2021). Fault tolerance in WSN through uniform load distribution function. *International journal of sensors wireless communications and control*, *11*(4), 385-394.

[6] Mohapatra, H., & Rath, A. K. (2020, October). Nub less sensor based smart water tap for preventing water loss at public stand posts. *2020 IEEE microwave theory and techniques in wireless communications (MTTW)* (Vol. 1, pp. 145-150). IEEE.

[7] Mohapatra, H., & Rath, A. K. (2022). IoE based framework for smart agriculture. *Journal of ambient intelligence and humanized computing*, *13*(1), 407-424.

[8] Mohapatra, H., & Rath, A. K. (2021). A fault tolerant routing scheme for advanced metering infrastructure: an approach towards smart grid. *Cluster computing*, *24*(3), 2193-2211.

[9] Mohapatra, H., & Rath, A. K. (2021). An IoT based efficient multi-objective real-time smart parking system. *International journal of sensor networks*, *37*(4), 219-232.

[10] Mohapatra, H., & Rath, A. K. (2019). Fault tolerance through energy balanced cluster formation (EBCF) in WSN. In *Smart innovations in communication and computational sciences* (pp. 313-321). Springer, Singapore.

[11] Panda, H., Mohapatra, H., & Rath, A. K. (2020). WSN-based water channelization: an approach of smart water. In *Smart cities—opportunities and challenges* (pp. 157-166). Springer, Singapore.

[12] Mohapatra, Hitesh; Rath, Amiya Kumar: 'IoT-based smart water' [Control, Robotics & Sensors, 2020], 'IoT Technologies in Smart Cities: From sensors to big data, security and trust', Chap. 3, pp. 63-82, DOI: 0.1049/PBCE128E_ch3, IET Digital Library.

[13] Mohapatra, H. (2021, September). Socio-technical challenges in the implementation of smart city. *2021 international conference on innovation and intelligence for informatics, computing, and technologies (3ICT)* (pp. 57-62). IEEE.

[14] Mohapatra, H. (2020). Offline drone instrumentalized ambulance for emergency situations. *IAES international journal of robotics and automation*, *9*(4), 251-255.

[15] Mohapatra, H., & Rath, A. K. (2020). *Fundamentals of software engineering: designed to provide an insight into the software engineering concepts*. BPB Publications.

[16] Mohapatra, H. (2021). *Designing of fault tolerant models for wireless sensor network* (Doctoral Dissertation, Ph. D Dissertation, Veer Surendra Sai University of Technology). Retrieved from http://hdl.handle.net/10603/333160

[17] Mohapatra, H., & Rath, A. K. (2020). Social distancing alarming through proximity sensors for COVID-19. *Easy chair*, *18*. https://wvvw.easychair.org/publications/preprint_download/dMGk

[18] Mohapatra. H. (2021). Smart city with wireless sensor network, ISBN-13: 979-8791261380, KDP, 2021.

[19] Mohapatra, H. (2018). *C Programming: practice.cpp*. Independently Publisher.

[20] Mohapatra, Hitesh; Rath, Amiya Kumar, 'Smart Bike Wheel Lock for Public Parking', Application Number: 336834-001.

[21] Mohapatra, H., & Rath, A. K. (2020). Advancing generation Z employability through new forms of learning: quality assurance and recognition of alternative credentials. DOI: 10.13140/RG.2.2.33463.06560

[22] Mohapatra, H. (2009). *HCR using neural network* (PhD's Desertion, Biju Patnaik University of Technology). Retrieved from https://www.academia.edu/29846341/HCR_English_using_Neural_Network

[23] Mohapatra, H. (2019). *Ground level survey on sambalpur in the perspective of smart water* (No. 1918). Retrieved from https://easychair.org/publications/preprint/CWpb