

**2022 Joint Conference - 11th  
International Conference on Energy  
Efficiency in Domestic Appliances  
and Lighting & 17th International  
Symposium on the Science and  
Technology of Lighting  
(EEDAL/LS:17)**

**Toulouse, France  
1 – 3 June 2022**



**IEEE Catalog Number: CFP21AE9-POD  
ISBN: 978-1-6654-3143-9**

**Copyright © 2022, University of Toulouse III  
All Rights Reserved**

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

|                         |                   |
|-------------------------|-------------------|
| IEEE Catalog Number:    | CFP21AE9-POD      |
| ISBN (Print-On-Demand): | 978-1-6654-3143-9 |
| ISBN (Online):          | 978-2-492754-00-5 |

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# TABLE OF CONTENTS

|  |    |
|--|----|
| Light Propagation for Underwater LED as Fish Attraction Lamp..... 1<br><i>Ahmad Nazri Dagang, Chong Geen Jun, Azhar Mohd Sinin</i>   | 1  |
| LED Device of Psychophysiological Express Diagnostics of Human Functional States ..... 5<br><i>Andrei. V. Aladov, Dmitrii N. Berlov, Anton E. Chernyakov, Yulia A. Chiligina, Alexander L. Zakgeim</i>   | 5  |
| EU Ecodesign Requirements for Waste Handling of Lighting: Perspectives from France and Sweden ..... 9<br><i>Annika Jägerbrand, Georges Zissis, Christoph Merschbrock, Maria Nilsson Tengelin</i>   | 9  |
| Strategies to Decrease Energy Consumption in Tunnel Lighting: The Feasible Compromise Between Safety and Sustainability ..... 14<br><i>Antonio Peña-García</i>   | 14 |
| Numerical and Experimental Visualization of Natural Convection Around a LED Dissipator ..... 18<br><i>Zouhour Araoud, Laurent Canale, Khaoula Ben Abdelmalek, Mohamed Ridha Kouki, Kamel Charrada, Georges Zissis</i>  | 18 |
| Design and Implementation of an Energy Metering System to Recognize the Household Electrical Energy Consumption Pattern Through an IoT Network..... 22<br><i>Johnny A. Arévalo-López, Nicolas Ávila-Peñuela, Enrique Estupiñan-Escalante, Omar A. Parra-Urrego, David A. Cano-Tirado</i> | 22 |
| Color-Mixed White Light LEDs and Visible Light Communication Integration: Benefits, Perspectives, and Challenges..... 28<br><i>Gustavo Rodrigo Kerkhoff Assmann, Thais Ertmann Bolzan, Lucas Teixeira, Vitor Lorenset Padoin, Marco Antônio Dalla Costa</i>                              | 28 |
| Behavioral Analysis of Dishwasher Consumers During Coronavirus Outbreak (2021) ..... 33<br><i>Onder Sunetci, Selin Buket Aydogdu, Hasan Izmitligil</i>   | 33 |
| Numerical Simulation of a LED with the Effect of a Thermoelectric Module on the Junction Temperature..... 39<br><i>Ahlem Ben Halima, Georges Zissis, Zouhour Araoud, Laurent Canale, Kamel Charrada</i>  | 39 |
| Effect of Chip Spacing on Thermal and Optical Behavior of Circular Multi-Chip LEDs Package ..... 42<br><i>Khaoula Ben Abdelmlek, Zouhour Araoud, Laurent Canale, Kamel Charrada, Georges Zissis</i>  | 42 |
| A Generic Approach to Assessing Lighting Designs for Horticultural Applications: Part I - HID and LED Lightsources ..... 47<br><i>Kévin Bertin, Georges Zissis, Peter Raynham, Afroditi Moutsis, Stuart Mucklejohn, Barry Preston</i>  | 47 |
| A Generic Approach to Assessing Lighting Designs for Horticultural Applications: Part II – Life Cycle Assessment..... 53<br><i>Kévin Bertin, Georges Zissis, Peter Raynham, Afroditi Moutsis, Stuart Mucklejohn, Barry Preston</i>   | 53 |
| Visual, Non-Visual and Psychological Effects of Light on the Textile and Clothing Factory Workers ..... 59<br><i>Lamia Bouzgarrou, Asma Aziez, Taoufik Khalfallah, Zouhour Araoud, Laurent Canale</i>  | 59 |

|   |     |
|---|-----|
| Impact of Personalized Lighting on the Psychophysical State of a Human .....  | 63  |
| <i>Tatiana Bragina, Svetlana Roslyakova, Ekaterina Zemlyanova, Anastasia Laushkina, Olga Gofman, Daria Klimova, Ilya Filippov, Arseniy Brusnitsyn, Oleg Basov</i> |     |
| Design and Implementation of LEDs Boost Driver for Street Lighting System .....   | 69  |
| <i>Brahim Mohamed Mrabet, Abdeljelil Chammam, Laurent Canale, Georges Zisis</i>   |     |
| Discomfort Glare in Motion .....  | 76  |
| <i>Villa Céline, Brémond Roland, Dumont Eric</i>  |     |
| Electrical Behavior of an Excimer Lamp Excited by an Argon-Based Dielectric Barrier Discharge .....   | 80  |
| <i>Bruno Caillier, Sarra Belouadi, Ahmed Belasri, Khelil Abdelbacet, Nadjjet Larbi Daho Bachir</i>  |     |
| International Actions to Reduce Miscellaneous Electrical Loads Energy Consumption.....  | 83  |
| <i>Joshua Butzbaugh, Alan Meier, Roshan Kini</i>  |     |
| Experimental Investigation of the Electrical and Optical Properties of a DBD Photon Source in a Ne/Xe Mixture.....  | 93  |
| <i>Abdelali Bouchachia, Sarra Belouadi, Juslan Lo, Nadjjet Larbi Daho Bachir, Bruno Caillier, Ahmed Belasri</i>   |     |
| Fundamental Spectral Boundaries of Circadian Tunability Under Different Duv Constraints .....   | 95  |
| <i>Jeroen Cerpentier, Youri Meuret</i>  |     |
| The Role of Adaptive Lighting in Street Lighting Applications .....   | 98  |
| <i>Christina Skandali, Nikolaos Papatzelakis, Lambros T. Doulos</i>   |     |
| Contemporary Issues with Temporal Light Modulation of Lighting Systems .....  | 102 |
| <i>Christophe Martinsons, James Gaines, Jonathan Vollers, Robert Nachtrieb, Howard Wolfman, Georges Zisis</i>   |     |
| Exploring the Energy Consumption of Blockchains Through an Economic Threshold Approach .....  | 109 |
| <i>Vlad C. Coroama</i>  |     |
| OLED Aging Detection Through Voltage Noise Characterization Under Constant Current .....  | 119 |
| <i>Mustapha El Halaoui, Pascal Dupuis, Laurent Canale, Cédric Renaud, Adel Asselman, Georges Zisis</i>  |     |
| A Multi Channel LED Luminaire with Bluetooth Control for Optimal Retail Lighting .....  | 125 |
| <i>Kaveh Ahmadian Tazehmahaleh, Esmat Kishani Farahani, Hamideh Godazgar, Kevin A. G. Smet, Peter Hanselaer</i>   |     |
| Design of an Adaptive Lighting System Able to Consider the Evolution of Pavement Reflection Properties According to Their Moisture State .....                    | 131 |
| <i>Greffier Florian, Muzet Valérie, Monnet Gautier, VERNY Paul, Tardieux Patrick</i>  |     |
| General Considerations for Pulsed Power Circuit Topologies for Gas Lasers .....   | 137 |
| <i>Harpreet Singh Grover, Francis Dawson</i>  |     |
| Human Centric Lighting for the Benefit of the Elderly.....  | 143 |
| <i>Estelle Guerry, Lorrain Caumon, Georges Zisis, Céline Caumon, Elodie Becheras</i>  |     |
| Characteristics of Brightness Perception with Two Light Sources Presented to Peripheral Vision .....  | 147 |
| <i>Hiroshi Takahashi, Shogo Tsuchida</i>  |     |

|  |     |
|--|-----|
| Highly-Efficient LEDs by Combining Traditional Phosphors with InP/ZnSe Red Quantum Dots:<br>Impact of Quantum Efficiency .....                                       | 150 |
| <i>Bega Karadza, Meuret Youri</i>  |     |
| A Multi Channel LED Luminaire with Bluetooth Control for Optimal Retail Lighting .....   | 154 |
| <i>Kaveh Ahmadian Tazehmahaleh, Esmat Kishani Farahani, Hamideh Godazgar, Kevin A. G. Smet, Peter Hanselaer</i>  |     |
| Preference Lighting Model: Generalization of Lighting Preferences for Individual Users .....   | 160 |
| <i>Klir Stefan, Fathia Reda, Benkner Simon, Babilon Sebastian, Tran Quoc Khanh</i>   |     |
| Lighting Quality and Work Performance Based on Glazing Types and Dynamic LED Lighting.....   | 166 |
| <i>F. Büsra Köse, Gökmen Tayfur, H. Engin Duran, Z. Tugçe Kazanasmaz</i>   |     |
| Measurement of the Light Vector and the Illumination-Distribution Solid Using Raspberry Pi.....  | 172 |
| <i>Jan Krüger</i>  |     |
| Implementation and Preliminary Verification of an Alternative Flicker Observer Model .....   | 175 |
| <i>Leoš Kukacka, Pascal Dupuis, Georges Zissis</i>   |     |
| The Influences of a Variety of Light Parameters on Biomass Production and Energy Efficiency of<br>Spirulina .....  | 181 |
| <i>Wenqi Li, Muqing Liu, Xiaolin Zhang, Jiali Yang</i>   |     |
| Genetic Algorithm Modeling of Plants' Growth Based on Photosynthesis-Action Spectrum .....   | 187 |
| <i>Claudio Lopez Osses, Charles E. Hunt</i>  |     |
| Nanophosphors, a Catalyst for micro-LED Technology Development.....  | 191 |
| <i>Pierre Martin, Audrey Potdevin, Geneviève Chadeyron</i>   |     |
| “LED-HBES” High Efficiency Lighting Systems: A Case Study of a University Historical Building.....   | 197 |
| <i>Riccardo Loggia, Alessandro Flamini, Andrea Massaccesi, Cristina Moscatiello, Luigi Martirano</i>   |     |
| Eight Years Measurement Data of a Deep Renovated Residential Building.....   | 206 |
| <i>Matthias Haase</i>  |     |
| Light Quality, Color Perception and Emotions in the Interior Space .....   | 211 |
| <i>Olfa Mekki, Pascal Dupuis, Chéma Gargouri Hbaieb, Laurent Canale, Georges Zissis, Morched Cheikhrouhou</i>  |     |
| How Innovative Light Design Can Improve Microalgae Production .....  | 215 |
| <i>Nicola Trivellin, Lisa Borella, Elena Barbera, Matteo Meneghini, Gaudenzio Meneghesso, Eleonora Sforza</i>  |     |
| Investigating the Methods and Health Outcomes of Research Studies on Light Pollution and<br>Human Physiology and Behaviour: A Systematic Review.....                 | 220 |
| <i>Dorukalp Durmus, Maria Nilsson Tengelin, Annika Jägerbrand</i>  |     |
| Towards a Digital Twin for Smart Street Lighting Systems Using a Virtual Reality Interface.....  | 226 |
| <i>Luca Piovano, Gonzalo Calderon, Guillermo Del Campo, Edgar Saavedra, Francisco Luque, Asunción Santamaría</i>   |     |
| A Baseline Assessment of Residential Utility Rates and Compensation Mechanisms that Influence<br>the Value Proposition of Grid-Interactive Efficient Buildings ..... | 232 |
| <i>Danielle Prezioso, Philip Odonkor</i>   |     |

|   |     |
|---|-----|
| Applying the Unified Glare Rating for a Non-Uniform Residential Luminaire.....  | 243 |
| <i>Rik M. Spieringhs, Thanh H. Phung, Peter Hanselaer</i>   |     |
| Novel Laser-Diode Based White Light Source with Increased Radiant Flux .....  | 247 |
| <i>Rondelez Nick, Meuret Youri</i>  |     |
| Combining Optical and Electronic Simulation Models for the Assessment of Visible Light<br>Positioning Systems .....                   | 250 |
| <i>Saman Zahiri-Rad, Andreas P. Weiss, Franz P. Wenzl, Felix Lichtenegger, Claude Leiner,<br/>Christian Sommer, Erich Leitgeb</i>     |     |
| Addressing Skills Needs of Lighting Professionals.....  | 254 |
| <i>Spiros A. Borotis, Lambros T. Doulos, Stylianos Zerefos</i>  |     |
| Simulation Based Design of an UVC-LED Emitter for Disinfection of High-Touch Environmental<br>Surfaces .....                          | 258 |
| <i>Thorsten Mally, Linda Steinhäüßer, Thomas Westerhoff, Ulla König</i>   |     |
| Case Study – Modelling of Visible Light Communication on Luminous Intensity Distribution<br>Curve of LED Low Beam Car Headlamps ..... | 264 |
| <i>Tomas Novak, Jan Latal, Stanislav Hejduk, Ales Vanderka, Pavel Valicek, Lukas Hajek, Petr<br/>Becak, Miroslav Slouka</i>           |     |
| Horticulture LEDs in Soybean Outdoor Light Supplementation - A Case Study.....  | 269 |
| <i>Igor Gass Vegner, Guilherme Buriol, Marco Antônio Dalla Costa, Darlan Balest, Nereu<br/>Streck</i>                                 |     |
| Road BRDF Construction from Measured R-Tables .....   | 273 |
| <i>Boucher Vincent, Lileke Steve, Lebouc Laure, Greffier Florian</i>  |     |
| Sit-to-Stand and Stand-to-Sit Activities Recognition by Visible Light Sensing .....   | 278 |
| <i>Ziad Salem, Andreas Peter Weiss, Franz Peter Wenzl</i>   |     |

**Author Index**