

## 隧道照明闭环反馈智慧控制系统

秦莉, 董丽丽\*, 许文海, 张乾

大连海事大学 信息科学技术学院, 辽宁 大连 116026

## Closed-loop feedback intelligent control system for tunnel lighting

QIN Li, DONG Li-li\*, XU Wen-hai, ZHANG Qian

College of Information Science and Technology, Dalian Maritime University, Dalian 116026, China

摘要 图/表 参考文献(0) 相关文章(15)

全文: PDF (1713 KB) RICH HTML <sup>NEW</sup>

输出: BibTeX | EndNote (RIS)

## 摘要

为了解决当前隧道照明中存在的耗电量大,照度测量繁杂,难以实时保证实际照明亮度等问题,设计了一种隧道照明闭环反馈智慧控制系统。该系统能够根据车辆有无、车辆行为信息和环境信息实时调整照明状态实现按需照明;采用摄像机图像亮度测量方法,通过图像灰度与亮度转换来实时获取隧道路面的亮度。为保证照明需求,系统采用PID闭环反馈调节方法,以照明所需亮度和实际测量亮度为基础,实时调节照明系统输出。实验证明,设计的系统安全可靠,自适应性强,具备实时亮度测量和闭环反馈调节功能;实现了按需照明,能保证实际照明亮度实时达到标准要求,同时最大限度地节能降耗;并能在保证行车安全的同时使人眼获得最佳的视觉感受。

**关键词** : 隧道照明, PID闭环反馈, 节能, 亮度, 智慧控制系统

## Abstract :

To solve the current problems in tunnel lighting, such as power consumption, illumination measuring complex, and difficult to ensure the actual luminance in real-time, a tunnel lighting closed-loop feedback intelligent control system is presented in this paper. The system realizes the lighting by need through adjusting lighting states based on the vehicle behavior information and environmental perception information collected by a sensor. It uses a camera image to measure luminance, and acquires pavement luminance in real-time through the transformation relationship between the image gray and pavement luminance. To meet the required luminance by lighting, the PID closed-loop feedback adjustment method is used to adjust the output of the lighting system in real-time and to ensure the actual luminance. The experiment shows that the designed system is secure and reliable and has higher adaptive ability. It is characterized by luminance measurement in real time, closed-loop feedback adjustment, lighting by need and can ensure the actual luminance to meet standard requirements. Meanwhile, it reduces energy consumption and offers an optimum visual experience for human eyes at safety driving vehicles.

**Key words** : tunnel lighting PID closed-loop feedback energy-saving luminance intelligent control system

收稿日期: 2015-03-20

中图分类号: U453.7

## 基金资助:

中央高校基本科研业务费专项资金资助项目(No.3132014301)

**通讯作者**: 董丽丽(1980-),女,博士,副教授,2002年、2004年、2008年于哈尔滨工业大学分别获得学士、硕士、博士学位,主要研究方向为光电信息与光电检测等。E-mail: dll\_lili@163.com **E-mail**: dll\_lili@163.com

**作者简介**: 秦莉(1990-),女,安徽砀山人,博士研究生,2013年于大连海事大学获得学士学位,主要从事光电检测、信息处理等方面的研究。Email:1073015583@qq.com

## 引用本文:

秦莉, 董丽丽, 许文海, 张乾. 隧道照明闭环反馈智慧控制系统[J]. 光学精密工程, 2015, 23(9): 2473-2481. QIN Li, DONG Li-li, XU Wen-hai, ZHANG Qian. Closed-loop feedback intelligent control system for tunnel lighting. Editorial Office of Optics and Precision Engineering, 2015, 23(9): 2473-2481.

## 链接本文:

<http://www.eope.net/CN/10.3788/OPE.20152309.2473> 或 <http://www.eope.net/CN/Y2015/V23/I9/2473>

## 服务

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ E-mail Alert
- ▶ RSS

## 作者相关文章

- ▶ 秦莉
- ▶ 董丽丽
- ▶ 许文海
- ▶ 张乾

访问总数:6353313

版权所有 © 2012《光学精密工程》编辑部

地址: 长春市东南湖大路3888号 邮编: 130033 E-mail: gxjmgc@sina.com

本系统由北京玛格泰克科技发展有限公司设计开发

