

激光与光电子技术应用

铅球运动参量光电测试系统设计

焦宁¹, 连素杰², 姜爱华¹, 王高¹, 刘丽双¹, 殷军勇¹, 闻强¹, 郭伟平¹

1. 中北大学 电子测试技术国家重点实验室, 太原 030051;
2. 中国人民解放军63856部队, 吉林 137001

摘要: 为了帮助铅球运动员快速提高成绩,设计了一种新的铅球运动参量测试系统。该系统由一组基于菲涅耳透镜的激光平行光幕和光敏二极管阵列组成,采用现场可编程门阵列进行信号处理。该方法可以方便地测试铅球的出手角度和速度,并将测试结果直观地显示在液晶显示屏上。结果表明,该系统设计新颖、结构简单、成本低廉,可作为运动员日常训练之用,具有广泛的应用前景。

关键词: 测量与计量 激光技术 角度 光敏二极管阵列 速度 现场可编程门阵列

Design of an optic-electric system for measuring shot motion parameters

JIAO Ning¹, LIAN Su-jie², JIANG Ai-hua¹, WANG Gao¹, LIU Li-shuang¹, YIN Jun-yong¹, WEN Qiang¹, GUO Wei-ping¹

1. National Key Laboratory for Electronic Measurement Technology, North University of China, Taiyuan 030051, China;
2. 63856 Unit, Chinese People's Liberation Army, Jilin 137001, China

Abstract: In order to help shot athletes improve their score quickly, a new shot motion parameter measuring system was designed. The system consists of a set of laser parallel light curtain based on Fresnel lens and photodiode array, using field-programmable gate array (FPGA) for processing signals. The method can measure the shot angle and velocity conveniently and display the measurement results on the liquid crystal display(LCD) monitor intuitively. The results show that the system design is novel, structure-simple and low-cost, which can be used by athletes for daily training and has wide application prospects.

Keywords: measurement and metrology laser technique angle photodiode array velocity field-programmable gate array

收稿日期 2013-01-17 修回日期 2013-04-24 网络版发布日期 2013-09-24

DOI: 10.7510/jgjs.issn.1001-3806.2013.06.005

基金项目:

通讯作者: 刘丽双

作者简介: 焦宁(1986-),男,硕士研究生,主要从事光电仪器方面的研究。

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(2179KB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 测量与计量
- ▶ 激光技术
- ▶ 角度
- ▶ 光敏二极管阵列
- ▶ 速度
- ▶ 现场可编程门阵列

本文作者相关文章

- ▶ 焦宁
- ▶ 连素杰
- ▶ 姜爱华
- ▶ 王高
- ▶ 刘丽双
- ▶ 殷军勇
- ▶ 闻强
- ▶ 郭伟平

PubMed

- ▶ Article by JIAO Ning
- ▶ Article by LIAN Su-jie
- ▶ Article by JIANG Ai-hua
- ▶ Article by WANG Gao
- ▶ Article by LIU Li-shuang
- ▶ Article by YIN Jun-yong
- ▶ Article by WEN Qiang
- ▶ Article by GUO Wei-ping

参考文献:

- [1] SUN J, GUO Sh R. The further development of the instrument measuring speed for the thrown ball from hand[J]. Journal Tianjin Institute of Technology, 1993(2): 7-10(in Chinese).
- [2] DAN H X, JIN J Ch. A study of real time flying variables feedback system for shot put[J]. Journal of Xi'an Institute of Physical Education, 2004, 21(4): 43-46(in Chinese).
- [3] ZHANG Y Y, GONG K, HE Sh F, *et al.* Progress in laser doppler velocity measurement techniques[J]. Laser & Infrared, 2010, 40(11): 1157-1162(in Chinese).
- [4] ZHANG R F, KONG L H, LU Ch G. Design of constant-current source for high power semiconductor laser diode[J]. Laser Technology, 2012, 36(1): 80-83(in Chinese).
- [5] TANG D Y, LI X N, YANG P Q, *et al.* Aberration comparison of biconvex and plane-convex Fresnel lenses[J]. Journal of Applied Optics, 2008, 29(5): 719-723(in Chinese).
- [6] LUO Q, LIU W H, ZHANG Q Y. Application of photodiode array detector in analytical instrument[J]. Journal of Zhejiang University of Technology, 2001, 29(4): 374-378(in Chinese).
- [7] HAN L Y, ZHOU H Ch, ZHAO D E. Study on the parallelism and uniformity of semiconductor laser screen[J]. Journal of Missiles and Guidance, 2008, 28(5): 281-282 (in Chinese).
- [8] CHEN Zh, LI H, CHEN X. Design and implementation of large—screen LCD controller[J]. Computer Technology and its Applications, 2011, 37(6): 123-126(in Chinese).
- [9] MA X L, YAN Zh M, DONG L, *et al.* Design of velocity measuring system with single light curtain based on FPGA[J]. Modern Electronics Technique, 2009, 32(12): 1-3(in Chinese).
- [10] XIA Y W. Verilog digital system design guide[M]. Beijing: Aeronautics and Astronautics University of Beijing Press, 2008: 102-121(in Chinese).

本刊中的类似文章

1. 陈爽, 冯莹, 王玲. 基于GLM的多模光纤放大器模式控制研究[J]. 激光技术, 2010, 34(1): 128-131
2. 于益, 王卫民, 鲁燕华, 谢刚, 彭跃峰. 二极管激光光谱合束技术实验研究[J]. 激光技术, 2010, 34(1): 138-140
3. 张芳沛, 楼祺洪, 李红霞, 韩文杰, 邢宇华, 董景星, 沈严, 薛海中. 1064nm激光诱导等离子体开关控制355nm脉宽可调输出[J]. 激光技术, 2010, 34(1): 17-19, 40
4. 卢彦兆, 王新兵, 董句, 张学玲. 双波长可调谐TEA CO₂激光器的脉冲输出特性[J]. 激光技术, 2010, 34(1): 88-90, 94
5. 何建平, 周智, 吴源华, 欧进萍. 光纤布里渊与布喇格光栅共线技术的温度互补补偿[J]. 激光技术, 2010, 34(1): 13-16
6. 余阳春, 王春明, 余圣甫. 5A06 铝合金的激光填丝焊接头组织与性能[J]. 激光技术, 2010, 34(1): 34-36, 52
7. 杨晓杰, 周冰, 应家驹, 周中亮. 凝视激光探测系统的探测灵敏度测试方法[J]. 激光技术, 2010, 34(1): 132-134
8. 秦海永 张永康 尤建. 高能激光辐照诱导声波频率特性的实验研究 [J]. 激光技术, 0, (0): 105-105
9. 储晓猛, 顾佩兰, 杨建新. 高密度聚乙烯塑料激光焊接工艺参量试验研究[J]. 激光技术, 2010, 34(1): 116-119
10. 李建民, 王蕴芬, 田野, 牛振凤, 刘伟东, 韩冰, 刘钰, 马艳丽. 基于远场干涉测量棱镜内气泡直径[J]. 激光技术, 2010, 34(1): 67-70