

## 一种投影几何失真校正的硬件架构设计

任力飞<sup>1</sup>, 谢翔<sup>1</sup>, 李国林<sup>2</sup>

(1 清华大学 微电子与纳电子学系, 北京 100084; 2 清华大学 电子工程系, 北京 100084)

**摘要:** 针对投影式移动设备的投影图像几何失真问题, 提出了一种基于图像变形算法的投影图像几何失真校正的硬件架构, 并针对硬件实时性及功耗问题提出了解决方法。本架构设计了基于奇偶存储机制的双行缓存, 实现了片外插值像素的并行获取, 降低读取延时; 基于数据复用原理设计了冗余消除单元, 有效避免片外像素的重复读取及功耗, 读取次数平均减少 61.5%, 减小读取功耗; 存储空间消耗仅为 11.9 kB。本设计还引用了无除法的中点算法进行坐标的透视变换, 并设计了坐标变换查找表, 实现了像素的低复杂度片外和行缓存寻址。

**关键词:** 投影几何失真校正; 图像变形算法; 硬件架构; 缓存设计

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## A Hardware Architecture Design for Projector Geometric Distortion Correction

REN Li-fei<sup>1</sup>, XIE Xiang<sup>1</sup>, LI Guo-lin<sup>2</sup>

(1 Institute of Microelectronics and Nanoelectronics, Tsinghua University, Beijing 100084, China;

2 Department of Electronic Engineering, Tsinghua University, Beijing 100084, China)

**Abstract:** A hardware architecture is proposed to correct the projector geometric distortion for projective mobile devices. A double-line buffer is designed based on odd-even storage mechanism to realize parallel access of off-chip pixels. A redundancy elimination unit is designed based on data reuse to effectively avoid repetitive access of off-chip pixels, and the access is reduced by average 61.5%. The occupied storage size is only 11.9 kB. Furthermore, the division-free midpoint algorithm is adopted, combined with coordinates LUT, to realize low complexity off-chip and buffer addressing.

**Key words:** geometric distortion correction; image warping; hardware architecture; buffer design

### 作者简介:

**任力飞** 男, (1989-), 硕士研究生, 研究方向为数字集成电路设计和图像处理. E-mail: 1003889037@qq.com.

**谢翔** 男, (1971-), 副研究员. 研究方向包括集成电路设

计、图像处理、生物医学电子等.

**李国林** 男, (1970-), 副教授. 研究方向包括集成电路设计、互连分析以及 RFIC 设计.

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