Using homography relationship for auto-calibration in mobile smart-project device system

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Abstract As technology advances, mobile devices have become indispensable 3C products. Smart phones and tablet computers have become the favorite products of technology, and they are commonly seen everywhere. In addition to making phone calls and sending messages, people also use smart phones and tablet computers to browse the Internet, listen to music, take videos and pictures, and play games, all of which have become an integral part of people's lives. In addition, according to a market survey, the most expected function of future smart phones by consumers is the projection. However, the projection will accelerate the battery power consumption. In this paper, we conducted an auto-calibration based on homography relationship in mobile smart-project device system to take advantage of the capability of the projector to project an image onto any opaque and unflat plane, thus breaking through the restricted display interfaces of mobile devices. Moreover, we also proposed the method that named FDPA (standing for Fast Detecting Projection Area) to reduce the battery power consumption via decreasing the calculation cost of the auto-calibration. The experimental results show that FDPA is able to improve the dynamic projection performance and to reduce battery power consumption in the mobile smart-projector device system. This was expected to help further develop an interactive projection system between mobile devices, adding diversity to mobile device applications and development.

Keywords Mobile device · Dynamic projection · Camera-projector · Homography relationship · Auto-calibration

1 Introduction

1.1 Research motives and background

Due to the penetration of mobile devices and the wide use of mobile phones, they are now used to take pictures, browse the Internet, listen to music and play games, in addition to

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