

A Camera to Screen Calibration Algorithm

Student



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Introduction: This study introduces an algorithm, to determine the relative position between a front-facing smartphone camera and its screen. The algorithm uses mirrored reference points and geometric transformations to calculate this relative position. The method involves a high-dimensional optimization to address this challenge. Simulation results demonstrate the effectiveness of the algorithm and its robustness against measurement noise. It achieves consistent performance with reasonable projection errors. The findings suggest, that the algorithm can reliably converge to an accurate solution, making it a valuable tool in the domain of computer vision and mobile technology.

Approach: Determining the relative position poses a challenge, as the screen is not directly visible to the front-facing camera. This study proposes an algorithm, to compute the relative position between the screen and the this camera. The problem is overcome by positioning a mirror in front of the camera, enabling it to capture the screen's reflection. The method requires images of the screen, displaying a calibration sheet, taken from various mirror positions, and calculates the relative position of the camera to the screen.

Conclusion: In conclusion, the algorithm represents a significant step forward in smartphone camera calibration. Its potential applications in areas such as augmented reality, health monitoring, and gesture control make it a valuable contribution to the field of computer vision and mobile technology.

Situation of the smartphone (green), the mirror (red) and the calibration points (blue).
Own presentation

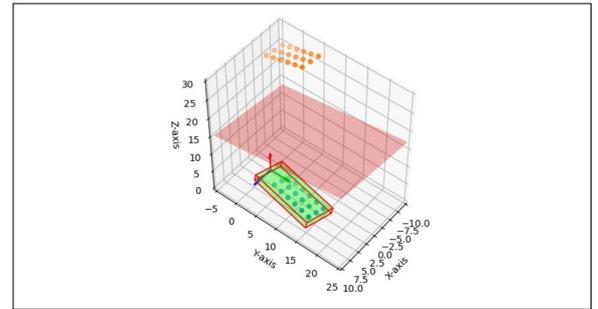
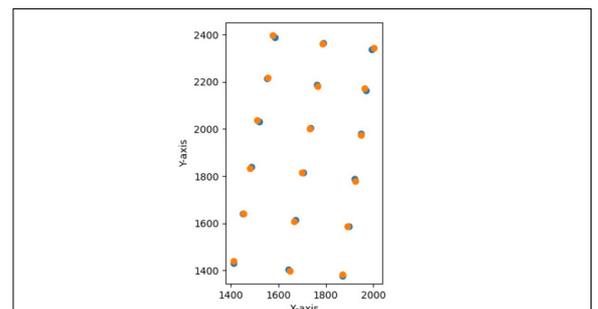
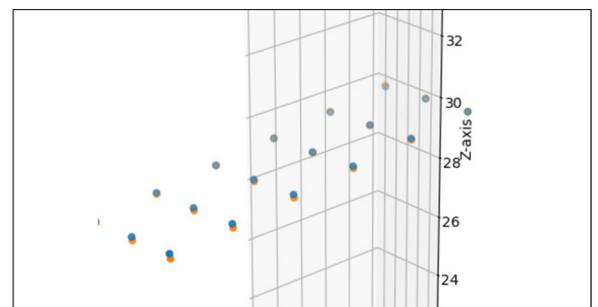


Image closeup with noise
Own presentation



Projected points, original (blue) and reconstructed (orange)
Own presentation



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Subject Area

Computer Science, Mechatronics and Automation