Abstract

Increasing emphasis on accurate camera calibration algorithm has been receiving extensive attention over the past decade. Camera calibration is becoming a very active topic in both research and applications. In general camera calibration includes mathematical model for camera types which is depended on internal and external parameters especially when accurate metric information is required.

In this thesis, a study of camera calibration algorithm was carried out and evaluations of the effect of temperature and illumination under different conditions on range measurement are carried.

The model was first simulated to obtain the effect of camera calibration using different effects as the change of number of images and feature points on camera parameters, and then a noise level effect was evaluated.

In order to find the effect of temperature and illumenation on range of measurements, an experiment was done by using digital camera HPPC406t. The range of distance was between 64cm – 144cm, temperature up to 56°C while the illuminations changed between (1650- 17000) lux.

In this work the selected lens distortion model to estimate camera parameters was used, which reduces the minimum total error (0.25004 pixels in horizontally) and (0.22405 pixels in vertically). The experimental results showed that the selected model has an encouraging performance.

The selected lens distortion model gives the optimum error estimation for the taken set of images compared with fixed model. The effect of increasing temperature and illumination results in changing the value of Position in proportional term. Consequently, give higher error in range measurement.