

Flying Laser Range Sensor

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In a measurement operation with a laser range sensor placed on the ground, when an object becomes larger or higher, the occluded region increase more and more. We generally put up scaffolding in such cases and measure from the top. This scaffolding technique is a practical solution but time and cost consuming. If we are unable to erect scaffolding due to some problem, its measurement operation should be discontinued. To overcome these situations, we have been developing a novel laser range sensor system that is designed to be suspended beneath a balloon platform. The movement of the sensor system causes some distortion in obtained range data. So, we have also proposed two types of distortion correction techniques. The first technique is correcting distortion by means of a deformation registration algorithm. The second technique involves the use of video sequence images and a correlation operator. Finally, the effectiveness of this aerial sensing system is confirmed by presenting fieldwork results.

Publications

1. Yuichiro HIROTA, Tomohito MASUDA, Ryo KURAZUME, Koichi OGAWARA, Kazuhide HASEGAWA and Katsushi IKEUCHI, "DESIGNING LASER RANGE FINDER SUSPENDED UNDER A BALLOON", Proc. of Asian Conference on Computer Vision 2004, Jan. 2004
2. Kazuhide HASEGAWA, Yuichiro HIROTA, Koichi OGAWARA, Ryo KURAZUME and Katsushi IKEUCHI, "Laser Range Sensor Suspended beneath Balloon Platform", Proc. of Meeting on Image Recognition and Understanding 2004, July 2004 (to appear)

FLRS (Flying Laser Range Sensor)

Sensor Specifications:



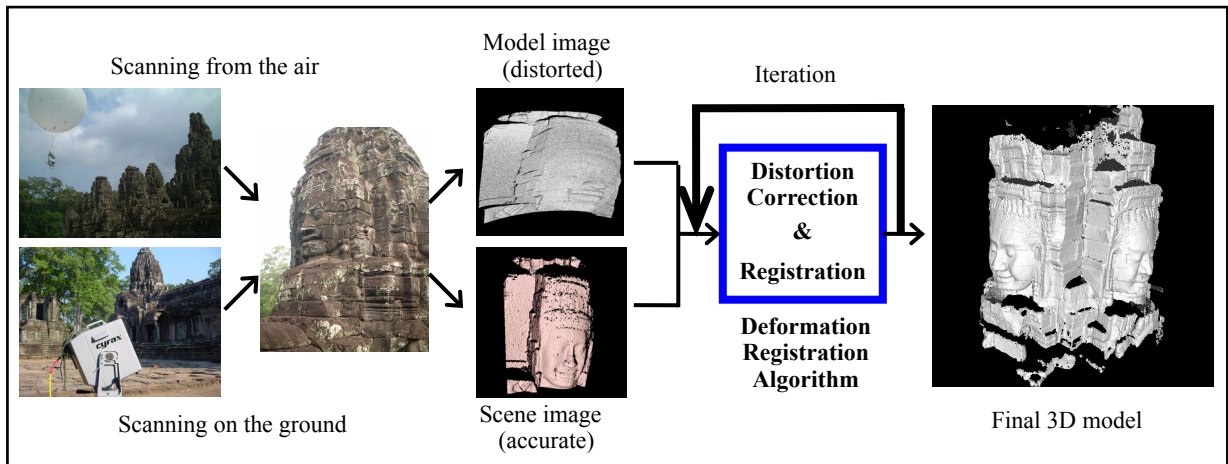
Balloon platform

- Diameter: 4.5 m
- Filled up with helium gas
- Maximum float capability: 46 Kg

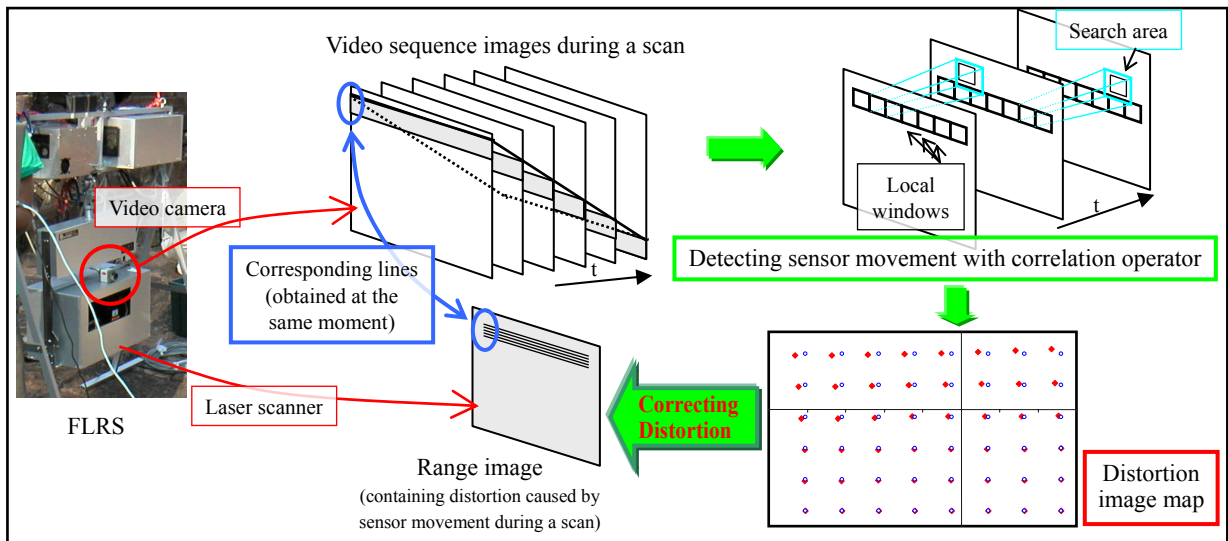
Laser scanner

- Weight: 21.2 Kg (+ Control PC & Interface box: 16kg)
- Dimensions: 27 * 53 * 30 cm
- Measurement speed: 1 sec
- Spot laser radar unit (Lara25200 Z+F Inc.) & 2D deflection mechanism
- Range image resolution: 1800 * 160 pixels
- Ambiguity interval: 25.2 m (spec. of Lara)
- Laser source: 23mW, 780nm (spec. of Lara)
- Linearity error: < 3mm (spec. of Lara)

Distortion Correction in Deformation Registration Algorithm



Distortion Correction by Motion Analysis



Fieldwork Results

Bayon temple in Cambodia:

