International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 5 Issue 09, September-2016

High Perfection with Close Range Photogrammetry and PhotoModeler Measurement

Assistant Lecturer Bashar Halleem Muhsen Al-Yasery
College of Engineering
Kufa University
Najaf, Najaf - 00964 ,
Iraq.

***Abstract*—The coordinates of points for regular/irregular surface objects are known or calculated. Obtaining the three dimension model of the irregular surface objects need multitude of points to represent the surface exactly. These points can be obtained by the traditional method and from the measurements of the (photograph). In this paper PhotoModeler Scanner (version 6) program software was used as a measuring tool for a sample of house. There were two cases of measuring the sides of such house, the first case used coded targets were defined automatically to the program. These targets were fixed on the sides of the sample. The accuracy of measurement was high, ranging from (10) to (30) micrometer. The second case measures without coded targets, the points defined manually using mouse to referencing points in images and production of a 3D points to measure a distance between points, the accuracy from this case was about (0.1) to (0.5) mm. A PhotoModeler needs to include any known distance between two points on the object to the PhotoModeler software, and then the program will calculate the three dimensional coordinates to any points.**

Keywords*— *PhotoModeler Scanner (version 6) program software; close range photogrammetry

I. INTRODUCTION

Today, three dimensional models were used widely. However, in most application of three dimensional modeling and visualization , large and complex three dimensional models the data are required.

For this project, an experiment has been conducted to check the accuracy of the (Three Dimension) model generated using the photogrammetry technique. The orientation and has been automatically or manually according to the photographs so as the calibration. The object selected a small model of building, In this paper, there are two cameras used: Nikon Coolpix AW100, and SANYO E1075. The work was done using the photogrammetry software PhotoModeler Scanner (version 6). The tradition of any research in photogrammetry, we need a known control points to complete the project. In this paper, there is another approach to work with photogrammetry is PhotoModeler software. In such approach, it needs to include any known distance between two points in the object to the PhotoModeler software, and then the program will calculate the three dimensional coordinates to any point on the object, as well as the distance between any two points, area and size.

II. 3D MODEL ESTABLISHMENT AND RESULTS ANALYSIS

In this study before each of these cases calibration of the camera will be done after that photo will be taken to the object; second case takes three photos to the small solid model in this case selected minimum five or more points with code target and without code target to reference manually to orient the photos. After orientation each point has three coordinate values (x, y, z) and the distance between points in this study were compared between PhotoModeler and Vernier device as a measurement tool.

III. DATA PROCESSING WITH PHOTOMODELER SOFTWARE

Before The data processing with PhotoModeler can be summarized as follow as:

1. Camera calibration
2. Relative orientation
3. Absolute orientation

because of the fact that PhotoModeler represents an update development in close range photogrammetry. The calibration process by PhotoModeler software

IV. USING PHOTOMODELER AS A MEASUREMENT TOOL

One of the important current developments in digital close range photogrammetric systems is the full automation of the measuring process. The very first step when starting an experimental model analysis project is the definition of the geometry used for visualization of the resulting mode shape. This geometry includes measurement points with a labeled and corresponding coordinates, and usually connections and surfaces allows a good visualization of the measured mode. When doing an experimental model analysis, one of the first tasks is the definition of the point to be measured, and to identify these points on the structures, then create a 3D model representing these measurement points. The scenarios is possible a comparison between the measurement of the points with targets and without targets (using small solid model).

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V. MEASUREMENT OF THE POINTS

The targets (points that are going to be measured) need to be marked. Mark is the process of creating and positioning an object on a photograph. This can either be done manually, by mouse-click on the appropriate location on the photograph or in an automated mode. For automated mode, circular targets with a high contrast background should be used. Therefore the points need to be referenced (at least six points each photo was selected). Referencing points is the process of telling the software that two points, marked on two different photographs, represent the same physical point in space. The software will first calculate the relative camera positions, and then recalculate all the 3D coordinates of the points; by PhotoModeler we can measure 3D coordinates of the points or the distance between any two points directly. Vernier used to check real distances between the points, see figure (1) below, the left photograph is without targets and the right photograph is with targets.

Fig 1. The photographs with targets and without targets.

The distance between points are presented in Table (1) measured by Vernier, Table (3) with targets and Table (4) without targets, respectively.

TABLE I. ACTUAL DISTANCE (MM) BY VERNIER.

No	Measurement		Actual Distance (mm)
	From	To	
1	1	2	107.78
2	3	4	140.67
3	5	6	41.00
4	7	8	77.01

TABLE II. THE THREE COORDINATES OF POINTS BY PHOTOMODELER

No. of point	X (mm.)	Y (mm.)	Z(mm.)
1	-294.005	108.353	69.155
2	-401.005	109.140	61.472
3	-273.151	50.313	33.175
4	-413.139	49.976	17.937
5	-304.630	50.009	24.021
6	-318.115	49.509	13.899
7	-319.980	46.606	6.702
8	-356.622	46.942	1.166

TABLE III. THE DISTANCE BETWEEN POINTS WITH TARGETS.

No	Measurement		Distance (mm)
	From	To	
1	1	2	107.767
2	3	4	140.648
3	5	6	40.988
4	7	8	77.043

TABLE IV. THE DISTANCE BETWEEN POINTS WITHOUT TARGETS.

No	Measurement		Distance (mm)
	From	To	
1	1	2	107.988
2	3	4	140.816
3	5	6	40.417
4	7	8	77.154

After measuring the distance between the points by PhotoModeler with targets and without targets and compare with the actual distance by Vernier, the accuracy obtained from this results are ranges between (0.01 – 0.03) mm with target and ranges between (0.1 – 0.5) mm without targets, as in Table (5).

TABLE V. THE ACCURACY OBTAINED FROM THE PHOTOMODELER

No	Measurement		Measurement with targets	Measurement without targets
	From	To	Absolute error (mm)	Absolute error (mm)
1	1	2	0.013	0.199
2	3	4	0.022	0.146
3	5	6	0.012	0.583
4	7	8	0.033	0.144

It is obtained that, from the above tables, and for the purpose of getting the proposed accuracy from photogrammetry by evaluating the three dimensions for the located points, such points should be well defined features by using targets.

VI. CONCLUSIONS

High accuracy obtained from this study (using normal close range photogrammetry and PhotoModeler), this accuracy ranging from (10 - 30) microns, the measuring using coded targets.

REFERENCES

[1] Jose Luis Lerma and Antonio Garcia., (2004). "3D City Modelling and Visualization of Historic Centers", Int workshop on vision techniques applied to the rehabilitation of city centers, 25-27 oct, Lisbon, Postugal.

[2] Mila Koeva., (2004). "3D Realistic Modeling and Visualization of Buildings in Urban Areas", Intsym on modern technologies, technologies, education and professional practice in geodesy and related fields, sofia, 04-05 nov.

[3] Ulrike Herbig and Peter Waldhausl., (1997). "Architectural photogrammetry information system", ISPRS-International Archives of Photogrammetry and Remote Sensing, Volume XXXII, Part 5C1B.