UNIVERSITI TEKNOLOGI MARA

QUANTITATIVE ASSESSMENT OF "UAV" PHOTOGRAMMETRY AND LIDAR DIGITAL SURFACE MODEL (LiDSM)

THUAIBATUL ASLAMIAH BINTI MASTOR

Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Architecture, Planning and Surveying

November 2016

ABSTRACT

Digital Surface Model is extensively used in many fields such as surveying, construction, environmental engineering, and disaster management and so on. Generally, the need of accuracy and every detail of ground information on DSM extraction is crucial for most applications. The innovation of technology in Photogrammetry field resulted in invention of a small aerial vehicle that carrying sensor such as a compact camera. The DSM can be extracted from digital aerial imagery of small format cameras. Meanwhile, the LiDAR technology offer the ground information in term of point cloud and in 3D makes this technology is popularly used as a technology to produce high resolution maps. This study is performed to assess the accuracy of DSM derived from both data that has been utilized by using a different platform which is UAV and LiDAR platform. Sony is utilized as non-metric camera for the ground information acquisition. In this study 39 points in 3 dimensional were established using Rapid Static method GPS technique and 10 point used as ground control for aerial triangulation. 39 points collected also used for Checkpoint (CP) for accuracy assessment. The research output is then evaluated for planimetry and vertical accuracy, using Root Mean Square Error (RMSE). Based on the analysis that has been made, sub-meter accuracy for both RMSE(x,y,z) was obtained. Refer to the result obtained, UAV Photogrammetry constantly produced the highest planimetry accuracy on the earth's surface which is RMSE(x) = 0.277m and RMSE(y) = 0.202m. While the accuracy of RMSE(x) for LiDAR data is 0.284 m and RMSE (y) =0.208m. In contrast, LiDAR DSM gives the best result of RMSE (z) which is 0.132m. Meanwhile UAV Photogrammetry give RMSE (z) is 0.253m. Overall, UAV Photogrammetry provides more accurate monitoring data in term of planimetry accuracy while LiDAR data give the best result on vertical accuracy which RMSE (z). Although, based on some cases, it is more careful Photogrammetry processing is necessary to attain monitoring accuracy requirement especially in vegetated areas.

ACKNOWLEGMENT

First of all, I would to express my highest gratitude to Allah SWT for blessing and granting me the will and the strength to finish my thesis. I would to give special thanks to my thesis supervisor, Assoc .Prof Sr.Dr Hj. Abd Manan bin Samad and my parents for their guidance, sacrificed and encouragement to help and giving a lot of essential advices for me to conduct this thesis. Special thanks to Ministry of Education Malaysia (MOE) for sponsorship of MyBrain15 throughout my research for my study fees. A lot of thanks also dedicated to Faculty of Architecture, Planning and Surveying, UiTM Shah Alam, Centre of Studies Surveying Science and Geomatics, Research and Management Institute (RMI-UiTM) and Pixelgrammetry and Al-Idrisi Research Group *(Pi-ALiRG)* for support me in many ways to complete this research.

I would to thanks to Malaysia Centre for Geospatial Data Infrastructure (MaCGDI), Department of Surveying and Mapping Malaysia (JUPEM) for their cooperation in delivering the data wanted as applied.

Special thanks to staff and lecturers of Department of Surveying Science and Geomatics, Faculty of Architecture, Planning and Surveying for their guidance and opinion on helping me to finished my research.

Last but not least, I would like to convey my love and care for my family and friends or giving me all support and help that I need in making this thesis reality. Thanks you for the inspirations given to me and to all peoples who involved directly and indirectly during the making of my thesis project.

TABLE OF CONTENTS