UNIVERSITI TEKNOLOGI MARA

EXTRACTION OF BUILDING OUTLINE USING LIDAR DATASETS

MUHAMAD AKMAL BIN HILMI

Disertation submitted in partial fulfillment
of the requirements for the degree of
Bachelor of Surveying Science and Geomatics
(Honours)

Faculty of Architecture Planning and Surveying

August 2022

ACKNOWLEDGEMENT

To begin, I want to express my gratitude to God for providing me with the opportunity to pursue my Bachelor's degree and for successfully completing this lengthy and difficult journey. I would like to express my gratitude and appreciation to my supervisor, Dr Roslina Binti Idris and my co-supervisor, Dr Khairulazhar bin Zainuddin.

I would like to express my gratitude to Geiod Hitech Industries Sdn. Bhd. for providing the facilities and assistance during the data collection process. I'd would like express my gratitude to my colleagues and friends for their assistance with this project.

Finally, this thesis is devoted to my father and mother, who had the vision and determination to educate me. This triumphant fragment is dedicated to both of you.

ABSTRACT

LiDAR is a new tool that can provide very precise, accurate and high-resolution images of the surface of the earth, vegetation and environment. LiDAR uses a laser range which is mounted in a navigated aircraft to scan earth surface at very high rates and collect very dense cloud which has x y and z coordinates. In this study, building outline is extracted using LiDAR dataset. The study area is located at Presint 11, Putrajaya and the survey area is 1 km x 1 km per square. There were 43 check points collected. The points must be well defined. For accuracy assessment, there are 2 types of accuracy assessment. For quantitative assessment, the RMSE (x,y) between LiDAR data and aerial photos. For qualitative assessment, the orthophoto is overlay with LiDAR DSM. The accuracy result for both data are within tolerance under 2.5 m for class 1 with scale of 1: 10,000 according to ASPRS 2014. This research provides new and important information to the currently limited knowledge of the utility of LiDAR.

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter will explain the research background, problem statement, aim and objective, research question, scope of study, general methodology and expected outcome of this research.

1.2 Research Background

Building information is important for many applications such as urban development, telecommunication, environment monitoring and others. There are many photogrammetry research that has been focused on the development of techniques to rebuild the boundary representation building of object in high density urban area. Using high resolution Light Detection And Ranging (LiDAR) data it is easy to detect building and approximates outlines and it also can extract roof faces and plus to create models roof structure. Regarding the building extraction from LiDAR data, it has been defined as a filtering problem of the Digital Surface Model (DSM). In order to overcome the limitations of image based and LiDAR based technique, it is an advantage to use the combination of the technique. DSM can provide very useful clues for building locations. Stereo images matching is a standard photogrammetry to generate DSM. However, the technique is only suitable and can be used for open smooth terrain. The aerial photograph are sometimes is typically very complex and the building extraction from aerial photograph has been proven to be quiet difficult. Airborne LiDAR however become an accurate, cost-effective alternative and conventional technologies for the creation of DSM at vertical accuracies of 15 cm to 100 cm (Hill et al., 2000). This study proposed on approach for building outline based on LiDAR data. The detailed approach to extract building outline is described. The site location for this project took place at Presint 11, Putrajaya and the survey area is approximately 1km x 1km per square.

TABLE OF CONTENT