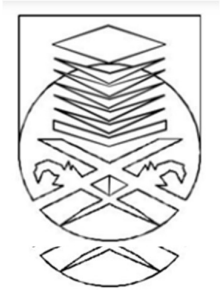
COMPARISON OF UAV FLYING HEIGHT PARAMETER FOR CRACK DETECTION APPLICATIONS

WAN NURDAYINI BATRISYIA BINTI WAN GHAZALI
2022855604



SCHOOL OF GEOMATICS SCIENCE AND NATURAL RESOURCES
COLLEGE OF BUILT ENVIRONMENT
UNIVERSITI TEKNOLOGI MARA MALAYSIA

JULY 2024

COMPARISON OF UAV FLYING HEIGHT PARAMETER FOR CRACK DETECTION APPLICATIONS

WAN NURDAYINI BATRISYIA BINTI WAN GHAZALI
2022855604

Thesis submitted to the Universiti Teknologi MARA Malaysia
in partial fulfillment for the award of the degree of the
Bachelor of Surveying Science and Geomatics (Honours)

JULY 2024

DECLARATION

I declare that the work on this project/dissertation was carried out by the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

If my project/dissertation is found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree of the Bachelor of Surveying Science and Geomatics (Honours) and agree to be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

Name of Student	: Wan Nurdayini Batrisyia binti Wan Ghazali
Student's ID No	: 2022855604
Project/Dissertation Title	: Comparison of Flying Height Parameter for Crack Detection Applications
Signature and Date	:

Approved by:
I certify that I have examined the student's work and found that they are following the rules and regulations of the School and University and fulfill the requirements for the award of the degree of Bachelor of Surveying Science and Geomatics (Honours).

Name of Supervisor	: Sr Dr. Khairil Affendy bin Hashim
Signature and Date	:

ABSTRACT

The key concern of this thesis is to determine the influence of flying height parameters on crack detection using UAVs. Looking at the current scenario of development and the age of the structures in urban areas, there is a high significance of efficient and accurate building inspection methods. Conventional methods of inspection of constructions are time-consuming, require much labor, and make people stand in hazardous conditions. Some of these traditional approaches may not offer the level of accuracy required to identify emerging structural problems such as cracks that are in their early stage and may cause additional structural problems in case they are not well attended to. UAVs especially those that are fitted with high-end cameras have become a new way and safer way of conducting building inspections. The objectives of this research include assessing the impact of UAV height and applying the Difference of Gaussian (DoG) Algorithms in crack identification. The goal here is to establish the level of effectiveness of the DoG algorithm in detecting cracks in images derived from orthomosaics at different heights. Aerial photographs were taken using UAV at various heights and the images were then rectified to get the orthoimages. Next, the DoG algorithm was applied for the detection of visible cracks, and the results were compared with manually outlined cracks to determine the degree of the algorithm's credibility. The study also demonstrated that flying at a lower height increases the crack detection rates, with the result differing statistically from the rates achieved at 25 meters and above. Moreover, the study also pointed out the limitations of the manual and automatic crack detection system and underlined the fact that flight planning is one of the most critical parameters in the context of UAV-based inspections. The findings contribute to the improvement of existing UAV-based inspection practices and recommendations that can be useful in improving the overall efficiency of inspections of buildings' structural conditions. Therefore, it is evident from this research that there is a possibility of using UAV technology and complex image analysis to improve the traditional techniques of building inspection.

Keywords: UAV, Crack Detection, Difference of Gaussian (DoG) Algorithm, Orthomosaic Images, Flying Height Parameters

TABLE OF CONTENTS