

# Enhancing Ambulance Accessibility in Deprived Regions: A Drone-Based Spatial Data Solution for Ashaiman, Greater Accra

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## SUMMARY

Accessibility to emergency medical services is a critical factor in saving lives, particularly in deprived regions like Ashaiman in Greater Accra, Ghana. The existing open-source ambulance management system may have its challenges. This is due to the lack of sufficient and up-to-date spatial data. The continuously changing urban structure within the study region poses a significant problem. This is one of the reasons ambulances may miss their way while not using optimal routes. This results in a delay in response times.

The objective of this project is to provide an efficient and up-to-date spatial dataset for Ashaiman. This will in turn facilitate accurate navigation for ambulances within the project area. Value-added spatial data can be extracted from processed aerial imagery. The availability of a drone platform is leveraged in line with our goal. Through the use of drone photogrammetry techniques, stereoscopic coverage of the study region is obtained. This subsequently ensures the generation of precise and high-resolution imagery. Digital orientation processes are used to produce orthomosaics, which serve as a foundational dataset. Furthermore, generation of a DEM from stereophotos is explored. A point cloud was created as a by-product for subsequent classification of pot-holes - this is required to assess road quality.

The flight parameters were carefully determined to optimize data collection. A front overlap of 80% and a side overlap of 75% were chosen to ensure total coverage and minimal information loss. A flying height of 90 meters was selected, striking a balance between two criteria - achieving a ground sampling rate between 2 and 5 cm/pixel and saving time during data acquisition.

This project seeks to contribute to the improvement of the current state of the ambulance management system in Ashaiman. The outcome of the improved navigation capabilities will

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contribute to saving lives in this deprived region. An added result of this improvement is the reduction in response times. These results, which are the products and resultant maps provide knowledge that is needed for addressing accessibility issues.

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