

Determination of Unreachable Cracks on Concrete Structures and Plasters Utilizing an Unmanned Aerial Vehicle

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Concrete structures and plasters are exposed to the formation of cracks over time. If they are not properly treated, the existence, safety, and durability of the concrete structures will be affected. However, conventional techniques like crack meters, joint meters, visual inspection, etc. are not appropriate since they take a long time, and lots of effort, and can be risky when used to find cracks in locations that are difficult to access. To circumvent the limitations of manual methods and visual examination, Unmanned Aerial Vehicle (UAV) technology has recently been deployed to crack evaluation. This paper presents a complete method for identifying the locations of cracks and their length, width, and permutability in an unreachable place of concrete structures and plasters using a Three-dimensional (3D) model. The primary data was gathered by field observations conducted in the front part of a single building with three walls. Grid coordinates for the Ground Control Points (GCP) were measured by classic methods (Total Station and Levelling). For inspections of cracks, UAVs offer a low-cost, open-source, and customizable technique. The Mavic 2 enterprise dual was utilized for data collection. To generate a 3D model, all the images were processed through Pix4D Mapper software. Furthermore, evaluation of the findings, grid coordinates, manual tape measurements, and pixel inspector were used. In this study, many cracks were detected and from them, a serious crack was identified with 87 cm length and 5 cm width which needed immediate action. The depth of some two cracks was obtained by closely inspecting the 3D model. The findings and evaluations indicated that the presented methodology facilitates the precise identification of cracks accurately even in an unreachable place.

Keywords: Crack, Unmanned aerial vehicle, Pix4D, Pixel inspector

Acknowledgement: The authors pay their sincere appreciation to the Faculty of Built Environment and Spatial Sciences of General Sir John Kotelawala Defence University for the support provided for the successful completion of the study.