

## **Crack identification method for concrete using RGB-D camera considering angle of view**

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### **ABSTRACT**

The concrete crack has been one of the essential factors in the maintenance of civil infrastructure. Visual inspection is a common practice for concrete crack monitoring, while it is known to be ineffective in terms of cost-effectiveness, inspection time, safety issues, and assessment accuracy. Digital image processing is a promising alternative to the visual inspection for efficient and objective determination of crack information including crack existence, location, length, and width. Recently, deep learning has been introduced enabling automated identification of crack existence and location. An important challenge for the use of the image processing in practice is how concrete surface images need to be processed when the camera is not aligned to be perpendicular to the concrete surface, which is a basic assumption in most studies in crack identification using digital image processing in the literature. As the camera and concrete surfaces are expected to be not completely aligned with 90 degrees, this issue needs to be addressed for a wide adoption of the digital image processing for crack identification in practice. This study proposes a crack image measurement and processing scheme using RGB-D camera that can extract crack information considering general angles of view. The RGB-D camera provides RGB and depth information that can be combined to provide the three-dimensional coordinates of concrete cracks, which allow to determine the crack length and width when the camera is looking at the concrete surface with 90 degrees. Experimental validation is conducted using surface images of a concrete wall taken from the student union building in the UNIST campus. The proposed method is shown to consistently estimate crack information regardless of the angle of view.

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