Automatic localization of shear connectors using point cloud data reconstructed from UAV-captured images

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ABSTRACT

Assembly of girders and precast panels for a bridge deck is one of the most important processes in the prefabricated bridge construction. Knowing locations of shear connectors on bridge girders prior to the assembly is critical to ensure high-quality construction (Yoon et al., 2017). This study proposes an automated framework for localizing shear connectors. This framework involves image acquisition using unmanned aerial vehicles (UAV) and structure from motion (SfM) that leads to obtaining point cloud data (PCD). Subsequently, PCD segmentation extracts points associated with the shear connectors using a combination of PCD processing algorithms. We validated the proposed method using a test structure that consists of two steel girders to which shear connectors are attached. Shear connectors are successfully identified as shown, of which measured locations are 11 mm different from the reference obtained using a total station.

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REFERENCES
Yoon, S. H., Wang, Q., & Sohn, H. (2017). Optimal Placement of Precast Bridge Deck Slabs with respect to Precast Girders using LiDAR. In ISARC. Proceedings of the International Symposium on Automation and Robotics in Construction (Vol. 34). IAARC Publications.

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