

Feasibility Analysis of Engineering Monitoring Using the VLP-16 LiDAR Puck: A Case Study in Henglingshan Tunnel

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This study is aimed at monitoring structural stability of time series using a low-cost remote sensing instrument, the VLP-16 LiDAR Puck. Natural disasters, such as typhoons and earthquakes, usually cause hidden damaged on engineering structures. In the past, structural stability monitoring can be done by a traditional 3D laser scanner. However, the price is high. In the study, a small-scale and low-cost scanner, the VLP-16 LiDAR Puck, is used for tunnel deformation monitoring. The study location is in the Henglingshan Tunnel, Taichung, Taiwan. This tunnel is almost 400m long and its appearance is shown in the attached figure. The results from the VLP-16 LiDAR Puck is well compared with those from the Reigl VZ-1000 LiDAR scanner. The comparisons between two scanners include their spatial resolution, accuracy, practicality, convenience, and cost-performance ratio. If the VLP-16 LiDAR Puck is proven to be feasible for tunnel deformation monitoring, we will further investigate its practicality on the other engineering structure monitoring, such as retaining walls, buildings, bridges, and sand-blocking dams.

Keywords: Remote sensing, LiDAR, Tunnel deformation monitoring

