

# Automated Surface Documentation of Large Water Dams Using Image and Scan Data of Modern Total Stations

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## SUMMARY

Large water dams have to be monitored in regular intervals with geodetic and geotechnical sensors to detect anomalies in their behaviour. An important aspect of dam safety is the concrete's state, which is currently assessed by visual inspections performed by the operating staff and documented with photographs. This methodology has several insufficiencies, which is why new technologies such as Terrestrial Laser Scanning (TLS) and Imaging with inspection drones have been tested by different research groups. In this paper we present a new approach for surface documentation and evaluation of concrete dams, considering scan and image data of a state-of-the-art total station. In a case study at an Austrian concrete dam, we demonstrate the potential of merging geometry and texture information to derive a digital surface model of the dam. Consequently, rectified images are obtained and thus measurements are performed on the dam's surface without the need of direct access. In our proposed approach, overview images are used to automatically identify existing and new concrete defects on site such as cracks, erosion and sinter formations. Using the high optical magnification of the telescope, high resolution images are captured with the coaxial camera for a detailed documentation of such defects. With multiple image sequences of the same region, surface changes are automatically detected and quantified using image processing techniques. The proposed approach aims to provide a valuable basis for an objective assessment of the concrete's state of large water dams.

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