A Smartphone-based Reality Capture Solution for Digital Mapping of Subsurface Utilities

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SUMMARY

Inaccurate and inconsistent documentation of subsurface utilities is a recurring problem in the construction industry, affecting not only end-users but everyone involved in designing, constructing, and maintaining underground pipes, cables, and other utilities. This paper explores a new method for 3D capturing subsurface utilities based on a recently developed Smartphone-based Reality Capture (RC) solution. Reality Capture is increasingly accessible, and the results can be highly detailed and feature-rich. Using this approach, LE34 constantly strives to make the workflow of capturing excavation pits containing utility components as easy as possible. Together with a few water utility companies, we have collected Reality Captures from over 10,000 excavation pits. This paper will present the findings and results, discuss achieved accuracy, and explore future perspectives.

Some countries already have detailed mappings of underground infrastructure from different utility owners, and various systems are available for obtaining an overview of subsurface utilities before digging. However, reality captures of excavation pits are still helpful, even when detailed maps of the underground infrastructure are available. The approach helps people understand the maps better and fill in any gaps in the information about pipes, cables, and other utilities. A question answered by this paper is: What can be done when detailed plans of subsurface utilities are not available? In such cases, Reality Capture can be a true game changer for the construction industry.

This paper aims to motivate utility companies to document all excavation work using reality capture, especially in countries with limited underground infrastructure spatial data. Suppose many entrepreneurs and utility companies in these countries use reality capture; then, a comprehensive

database of all unknown and hidden infrastructure will be captured quickly.

The benefits of documenting subsurface utilities using the developed Smartphone-based Reality Capture solution include cost-effectiveness and ease of data access for future work, allowing the industry to protect the substantial value of utility infrastructure. Additionally, utility owners can update the spatial information of their pipelines, creating the foundation for a more efficient operation.