

3. **XR-based Visualization and Monitoring System for Soil Stabilization Work** **- Real-time On-Site 3D Visualization of Construction Progress and Soil Displacement -**

Fujiko Yoshimura, Iwao Miyata, Mitsuo Shiroy, Kazutoshi Imaizumi

Monitoring field conditions during soil stabilization work is crucial for averting issues such as ground uplift and water leakage. We developed a system that improves monitoring by sensing the construction depth and displacement of the surrounding ground and visualizing this data. The sensor data is uploaded to the cloud and can be viewed in real-time on devices with XR technology. We expect this system to improve personnel assignments, allowing staff lacking strong spatial reasoning skills and experience in supervising ground work to function as inspectors. The system will allow inspectors to track work progress and look for abnormal displacement. The capacity to share images will further communication and shared understanding.

We assessed this system at an actual construction site. The values of the vertical displacement meters and the length of the piles being constructed underground at the time were successfully visualized via HoloLens and iPad. The results indicate this system is capable of effectively visualizing sensor data in the context of the surrounding landscape and preventing unintended and negative impacts on the surroundings.

Keywords: soil stabilization, field observation, IoT Sensor, XR, visualization