

## **UGS Convergence R&D Project (2014-2017): Geological Aspects of Road Collapse in the Urban Areas, Republic of Korea**

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UGS Convergence R&D program from Korean Government began in Dec. 2014 to address important social and scientific issues. The project entitled to “Development of Internet of Things (IoT)-based Urban Underground Utility Monitoring and Management System”, shortly, UGS project is aiming to prevent artificial road collapse and urban sinkhole events in the urban areas (e.g. Seoul, Daejeon, and Busan). The consortium of four government-funded research institutes (ETRI, KICT, KRRI and KIGAM) is actively seeking solution for efficient underground monitoring and management system, and for securing safety from the unexpected subsurface events. This presentation will mainly focus on the geological aspects of research performed by KIGAM.

During the last year, we exerted efforts on the understanding road collapsing mechanism by various field and in-lab techniques, such as instantaneous groundwater geochemical monitoring, sand box simulations both in field and in-lab scales, and electromagnetic surveying. In this year, we plan to establish a pilot underground facility monitoring system in Daejeon area with IoT-equipped real-time groundwater geochemical monitoring and a central database platform. Additional geographical information from InSAR imaging, geophysical surveying and well logging, and drone-taking roadside thermal imaging will also be added to the database for further comprehensive risk analysis. Besides the geological aspects, the UGS Convergence Research Group is also working on civil engineering aspects of the problem, focusing on detecting failures in the urban railroad, water supply, and sewage systems. Collected big data from the above methods will be used for generating an underground safety map, which alerts possible road collapse and/or sinkhole risk to local municipalities.