

News Article for RISUD Strategic Focus Area (SFA) Scheme

	Name	Department
1. Principal Investigator:	<u>Xiaoli Ding</u>	<u>LSGI</u>
2. Name of SFA:	<u>Smart Utilities</u>	
3. Project Title:	<u>Development of a Strategic Focus Area (SFA) in Utility System Research</u>	

4. **First Year Progress/Achievement**

We have developed satellite radar remote sensing technology for studying ground deformation related to underground utility systems and impacts of ground deformation on conditions of the systems. Interferometric Synthetic Aperture Radar (InSAR) technology has been extended to enhance its capability in detecting small-scale (both in terms of the affected area and magnitude of the deformation) so that deformation related to underground utility systems can be better detected. Test sites in both Hong Kong and Shenzhen have been used to validate the methods developed.

Research has been carried out to enhance accuracy of some electromagnetic methods for detecting underground utilities. Extensive laboratory tests have been conducted to study the electromagnetic fields generated by underground pipes and cables, especially the coupling effects of closely spaced pipes and cables. The effects of the induction frequency on the accuracy of utility detections have also been studied.

Work has been carried out to study the conditions of underground sewer liners via active and passive infrared thermography. Experiments have been carried out to capture thermographic images of sewer liners using a robotic system. Methods have been proposed to detect areas of debonding of sewer liners based on the images. Comparison with optical images has shown satisfactory results.

An UAV system that is able to fly in closed space where GNSS signals are not available has been developed and tested. Experiments have shown that the technology works well in indoor environments. The technology will be useful for developing UAV based pipe or tunnel condition inspections.