

Toward Creating a Subsurface Camera

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In this poster, the framework and architecture of a Subsurface Camera (SAMERA) are envisioned and described. SAMERA is a geophysical sensor network that senses and processes geophysical sensor signals and computes a 3D subsurface image in-situ in real time. The basic mechanism is geophysical waves propagating/reflected/refracted through subsurface enter a network of geophysical sensors, where a 2D or 3D image is computed and recorded; control software may be connected to this network to allow view of the 2D/3D image and adjustment of settings such as resolution, filter, regularization, and other algorithm parameters. System prototypes based on seismic imaging have been designed. SAMERA technology is envisioned as a game changer to transform many subsurface survey and monitoring applications, including oil/gas exploration and production, subsurface infrastructures and homeland security, wastewater and CO₂ sequestration, and earthquake and volcano hazard monitoring. System prototypes for seismic imaging have been built. Creating SAMERA requires interdisciplinary collaboration and the transformation of sensor networks, signal processing, distributed computing, and geophysical imaging.

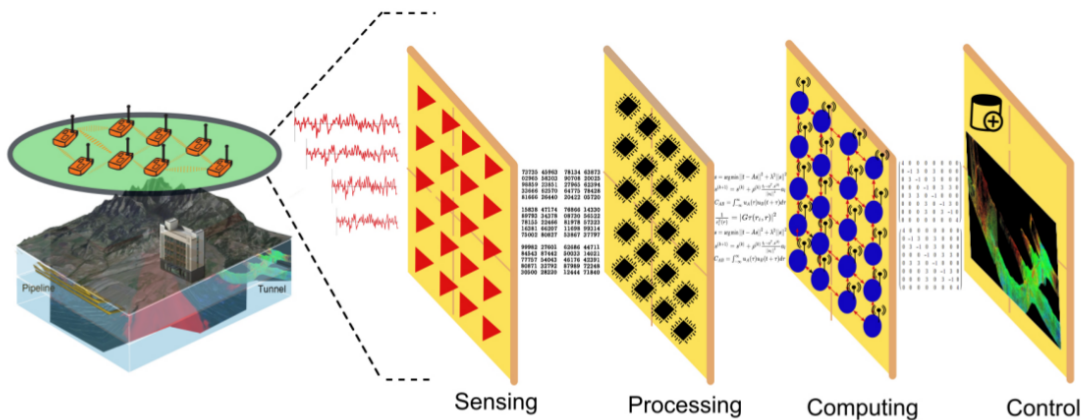


Figure 1: Subsurface Camera (SAMERA) system architecture: sensing, processing, computing and control.