A realistic field monitoring application to evaluate close proximity tunneling effects of a new tunnel on an existing tunnel is presented. A blind source separation (BSS)-based monitoring framework was developed using sensor data collected from the existing tunnel while the new tunnel was excavated. The developed monitoring framework is particularly useful to analyze underdetermined systems due to insufficient sensor data for explicit input force-output deformation relations. The analysis results show that the eigen-parameters obtained from the correlation matrix of raw sensor data can be used as excellent indicators to assess the tunnel structural behaviors during the excavation with powerful visualization capability of tunnel lining deformation. Since the presented methodology is data-driven and not limited to a specific sensor type, it can be employed in various proximity excavation monitoring applications.

Major: Civil Engineering / Structural and Geotechnical

Educational Career:
Bachelor's of Civil Engineering, BS, 2006, Garyounis University

Committee in Charge:
Hae-Bum Yun, Chair, Assistant Professor
Dr. Manoj Chopra, Associate Professor / Civil Engineering
Dr. Amr Sallam, Adjunct Faculty / Civil Engineering

Approved for distribution by Hae-Bum Yun, Committee Chair, on January 1, 2013.

The public is welcome to attend.