

## Nonlinear sensor validation and reconstruction for air quality control and management

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In the tunnels or subway stations, tele-monitoring(TMS) system is constructed to monitor several key air pollutants for indoor air quality management to control the quality of air pollutants. To ensure correct operation of monitoring systems, the measurement and control equipments in a subway station must be mutually consistent. However, sensors in subway stations are notorious for poor data quality and sensor reliability due to the hostile environment in which the measurement equipment has to function. In this paper, a new sensor validation and reconstruction method based on the kernel principal component analysis (KPCA) is proposed and applied to a real time TMS dataset of nine air pollutants in a real subway station, which are NO, NO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO, CO<sub>2</sub>, temperature and humidity. Faulty sensors were identified and reconstructed by tracking the nonlinear filtered residuals of KPCA and other indices against confidence limits. The reconstructed sensor can be used to develop more reliable prediction models. Acknowledgement) This work was supported by the Korea Research Foundation by Grant funded by the Korean Government (MOEHRD) (KRF-2007-331-D00089) and funded by Seoul R&BD Program (CS070160).