

Sensor Fault Monitoring of Underground Indoor Air Quality Based on Fisher Discriminant Analysis

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The aim of this study is to propose a fisher discriminant analysis (FDA) based sensor validation technique to improve the monitoring performance of the indoor air quality (IAQ) in the underground subway stations. As a supervised linear dimensionality reduction technique, FDA aiming at searching for the directions that maximize the separation between normal and faulty data by maximizing the between-class scattering while minimizing the within-class scattering is used to detect faulty sensors. Then, the pattern matching method like the similarity factor between the test discriminant vector and the optimal discriminant vector calculated from historical data is used for fault diagnosis. Four typical types of sensor faults including bias fault, drifting fault, complete failure fault and precision degradation fault are evaluated using the FDA method in this study. The results indicate that the proposed FDA monitoring approach has the capability of detecting and discriminating the sensor faults in the real subway system.

Acknowledgement: This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MEST) (No. 2012-0000609) and the Seoul R&BD Program (CS070160).