Thesis Project Portfolio

Developing an Environmental Monitoring Dashboard to Identify Construction Activities That Affect On-Site Air Quality and Noise

(Technical Report)

Protecting Data Privacy in Response to Data Breaches

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Spring, 2023

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Sociotechnical Synthesis

Construction sites are well known for being significant sources of air and noise pollution, impacting both individuals who work on those sites and surrounding communities. While the presence of dust and other sources of pollution has been observed across jobsites, existing site management techniques do not provide opportunities to understand the causes or extent of various pollution events. The purpose of this project is to develop a prototype environmental monitoring dashboard which incorporates real-time data from air and noise quality sensors installed on-site, and link the data to specific construction activities on a detailed as-built schedule. The development of this type of monitoring system has become much more feasible in recent years due to the increased availability of affordable and reliable sensors and this project shows this type of technology can be utilized in a construction context. Sensors are installed in high traffic locations on-site including on the first two floors of the building under construction and in the jobsite trailer to specifically track noise, CO2, VOC, PM2.5, temperature and humidity levels at 5 minute frequency. Information related to on-site activities is collected through an analysis of construction documents, like a detailed schedule and plan sheets. Spatial trends found included the first floor of the site having higher PM2.5 levels, PM2.5 levels decreasing from the roadside to trailer side, and the second floor having higher noise levels. Time trends include lower noise and PM2.5 levels at noon and higher levels between 8AM-11AM and 1PM-3PM. Lastly, there the middle first floor sensor PM2.5 levels was found to be significantly correlated with a masonry subcontractor's daily hour with an R squared value of .6125.

Employee monitoring systems give rise to employee concerns about data security and storage, specifically that of health data. Social construction of technology (SCOT) may be

applied to data security systems as there are multiple social groups that influence their design, such as the owner of the system, its customers, its employees, and the government. Generally, these groups value a secure system and view it initially as secure. However, a data breach may change this perception and lead to changes. To see how SCOT applies, four data breach cases were described and analyzed. They were described based on how they occurred and what harm could have resulted from the stolen data. The response from the owner of the data storage system was analyzed to observe if any improvements were made. In all four cases, upgrades were made since the owner now perceived the system as having failed after the breach. In some cases, more upgrades were required by the government to ensure the system's security. The organization running the system should strive to initially create the most secure data security system possible since it will be beneficial to them and their users.