

Thesis Portfolio

A User Interface Informing Medical Staff on Continuous Indoor Environmental Quality to Support Patient Care and Airborne Disease Mitigation
(Technical Report)

Researcher Communication Strategies Via Twitter to Bridge the Knowledge Barrier Between Scientists and Citizens Amidst the COVID-19 Infodemic
(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering and Applied Science

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Thesis Prospectus

Sociotechnical Synthesis

Scientific researchers produce a wealth of knowledge and discovery untapped by society at large. While this information exists, the problem becomes communicating these findings in an easily interpretable, accessible manner on a broad scale. The works included below aim to breakdown this knowledge barrier as the technical project provides insights on readily-available data to assist medical staff in patient care, and the sociotechnical synthesis produces a framework for sharing knowledge via Twitter, one of the world's most popular social media platforms.

The COVID-19 pandemic has increased awareness of Indoor Environmental Quality (IEQ) in the hospital setting with regards to airborne virus exposure and occupant health. To provide insight into IEQ in the University of Virginia (UVA) Hospital Emergency Department (ED), the team designed a user interface to provide informatics about IEQ factors and allow healthcare workers to optimize environmental quality for themselves and their patients. Design considerations were iterated in agile development through interviews with relevant stakeholders, and sought to portray critical insights with minimal mental burden in a functional Django application prototype. This work demonstrates the opportunity to assist and improve patient care with environmental data presented in an easily interpretable format.

This sociotechnical analysis seeks to establish the methods and motivations behind researcher communications via Twitter and in the context of the COVID-19 Infodemic. In a synthesis of existing literature backed by relevant examples from Linsey Marr, a researcher at the forefront of critical knowledge sharing, researchers were found to communicate with experts (peer groups) and non-experts (out-groups) in specific ways for specific purposes. Researchers communicate with peers in their field

over Twitter in a neutral tone predominantly using retweet and quote tweet functionalities to collaborate on and promote one another's work and bolster their internal and external network. They communicate with non-experts in expressive, sometimes negative, and easily-interpretable tones primarily using visualizations and metaphors to promote general public health knowledge and empower decision makers with accurate and relevant information. These findings establish a basis for effective scientific communication to reach a massive audience over Twitter.

While the objectives of the technical and sociotechnical works adapted throughout the year, the end products provide value through applications in aiding UVA ED operations and assisting researchers in effective communication via Twitter. Both undertakings highlighted the importance of flexibility and practicality in project execution. Flexibility was crucial in the technical capstone as the project scope adapted from exclusively COVID-19 mitigation to applications in patient processing and outcomes, department operations, and more. As these countless applications were evaluated during the implementation of the final prototype, the team remained practical by thoroughly documenting these applications and extensions while still producing a functional, highly adaptable product. These same principles held true in the execution of the sociotechnical thesis as an originally too-specific objective (scientist communication strategies exclusively during the COVID-19 Infodemic) quickly transitioned to a condensed, relevant, and feasible synthesis of literature with clear significance (effective researcher communication via Twitter amidst misinformation).