Thesis Project Portfolio

Developing a Dynamic Control Algorithm to Improve Ventilation Efficiency in a University Conference Room

(Technical Report)

Why Universities and Industry Build Healthy Buildings

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

Heating, Ventilation and Cooling (HVAC) control systems waste money by cleaning air all day, even for empty rooms. To solve this, my capstone team is making a dynamic HVAC control system that reduces ventilation to empty rooms. Our system also increases ventilation rates to occupied rooms for better air quality. This shift to a dynamic system can save wasted money for the university while improving occupant health in rooms with increased ventilation.

The social construction of technology (SCOT) comes into play by describing building occupants as potential designers in the University's future – a social group shaping technology within a sociotechnical system. Occupants may share values like environmental sustainability and worker productivity, and tracking these values drives better decision-making. SCOT also explains why businesses and universities prioritize occupant health in building designs. To observe SCOT in practice, I tracked word usage in articles describing seven different healthy buildings to find important themes in their construction. Keywords including, "air" and "sustainability", identify different values for the community in charge of each building. Through this search, I found that industries tend to focus on how healthy buildings contribute to a productive work environment while universities tend to emphasize the role of the healthy building in the context of sustainability and campus spaces.

Considered together, SCOT and dynamic HVAC systems push building technology towards a healthier, more sustainable future. SCOT harnesses community sentiments for better decision-making, and dynamic HVAC offers a replacement for wasteful HVAC systems.