Thesis Project Portfolio

Window Automated Natural Daylight Assistant

(Technical Report)

Discussions Around Implementing Better Lighting in the Workplace

(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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Sociotechnical Synthesis

Due to the nature of working indoors, employees are exposed to low levels of natural light. Therefore, office workers are unable to receive the numerous beneficial effects of sunlight such as improved productivity and health. Additionally, privacy concerns arise as the pandemic has forced employees to work from home. The technical thesis seeks to address these problems and the STS thesis examines the ongoing discussion of proper lighting.

The technical thesis proposes an automated window blinds design that ensures user privacy. The goal of this project was to develop a smart home device appropriate for the recent pandemic by maintaining confidentiality and energy conservation through the replacement of the wand. A motion detector was implemented to identify suspicious movement outside in order to deny visibility into the house from onlookers. Furthermore, a light sensor was used to examine the current illuminance levels and appropriately adjust the tilt of the blinds to provide optimal lighting. For easier accessibility, a mobile application was created to remotely configure and control the device via Wireless Fidelity (Wi-Fi). The team was able to successfully complete a working prototype and notes potential improvements for future designs.

The STS thesis documents emerging discussions around implementing proper lighting in the workplace environment and how various stakeholders define good lighting. Specifically, existing literature produced in the last thirty years such as standards, journals, and magazines were analyzed. The paper was able to determine a shift in how relevant stakeholders think about lighting and inspect how new knowledge on lighting was dealt with through a Social Construction of Technology approach. The results of the research reveal that proper illuminance levels within the office require further definition as health and profits are directly correlated to lighting.

Finally, I would like to thank my team members, Kwadwo Tenkorang, Mesgana Dinare, and Edward Agyeman for their contributions to the technical project as well as Sean Ferguson, Harry Powell, and Adam Barnes for their support and guidance on my undergraduate thesis.