

Thesis Project Portfolio

Event Clock for Shared Spaces

(Technical Report)

Being Cautious: The Dangers From Digital Contact Tracing Systems

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Our globalized economy never expected to come to a screeching halt at the advent of the COVID-19 pandemic. A novel strain of an airborne virus was discovered in late 2019, early 2020, that spread through close contact with other people or being carried in the air. Our modernized economy thrives in the interconnectedness of trade and travel, which allows for continuous progress in knowledge and standard of living. As the world became aware of the danger posed by COVID-19, governing bodies all scrambled to enact policies to contain the spread of the virus while trying to curb its effect on the economy. Thus, many governments deemed it necessary to implement contact tracing technology by using smartphones to alert people at risk of contracting COVID-19 by proximity to other infected individuals. While the actions and implementations seem well intentioned, the far-reaching privacy and security implications of having a constantly broadcasting geolocation tracking app implemented under a short-term view can have serious dangerous consequences. Thus, my STS research explores the long-term view of implementing such a tracking technology. The dangers posed by implementing state surveillance technology in our daily lives without understanding the broad reaching civil liberty and privacy implications of such technology inspired me to explore the topic further. If such technology were to be implemented, it would have to follow strict ethical engineering practices in order to gain the trust of the public, unlike the actions of the current duopoly in the smartphone market.

In my STSRP, I look into the implications of implementing a COVID tracking app and how it raises concerns that the privacy and civil rights of users will be violated. The immense amount of data that can be gathered from such a technology appears extremely enticing to any governing body as it can be easily repurposed as a form of intrusive state surveillance. My paper focuses on the long-term implications of introducing such technology and normalizing it in our society, especially as such technologies are already being used as forms of forced control for populations. Additionally, the technological solutions to COVID tracking are entangled with institutions whose core business is predicated on data-driven “dehumanization” of the user.

My technical project is not closely related to the STSRP but it does take some lessons from the path chosen by the engineers in order to create an easily accessible device that is ethical in its development and application. For my technical project, I created an information clock that can be used by students in shared spaces to display relevant information on the events taking place. The device has a standard digital clock on top of a led display that shows what events are taking place in the location. The project was created as a supportive device for students and instructors and guided by the use of commodity parts and open-source development tools to apply an ethical approach to engineering. This allows the project to minimize unintended consequences and be easily reproduced in order to have a large positive impact for anyone using it.

The theme of ethical engineering guided both my topics as one explored the dangers of not following it while my technical project allowed me to work through and demonstrate how we

can follow ethical practices when designing new technology. The end output of my technical project was functional, easily replicable, and can be built upon for further functionality in the future. By using an STS mindset when designing my technical project, it guided me into creating functional but flexible designs in the hardware and code so that it is easily accessible in terms of reproducing it and minimizes cost so that a broader range of people can find interesting ways to utilize the technology. Both projects showed me how STS is integral for the field of engineering since technological innovators have broader impact in the world with their work. It is critical that engineers of the present and future follow the practices of creating ethical and sustainable innovations.