Coronavirus Disinfection Robot

(Technical Report)

A Care Ethics Analysis of Facial-Recognition Software Designed to Predict Potential Criminals

(STS Research Paper)

An Undergraduate Thesis Portfolio

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My technical and STS projects both address aspects of the socio-technical problems that surround creating a semi autonomous Coronavirus decontamination robot. In what follows, I will demonstrate how both the technical and STS aspects of this robot came together to create a greater understanding of what is needed to create an adequate robot. The technical project focuses on creating an innovative design for a robot that uses UV-C lights to decontaminate surfaces that have been exposed to the Coronavirus. While the STS project demonstrates how facial recognition softwares, one of the technologies used by the robot, can have unintended implications for society. To do this, the STS project applies the theory of care ethics to analyze the choices and actions of three programmers in creating a predictive policing facial recognition software.

The technical and STS projects each provide a unique perspective for approaching the creation and potential implications of the Coronavirus decontamination robot. The technical project resulted in the selection of a robotic arm which will disinfect surfaces past the line of sight therefore allowing it to do a more thorough cleaning of each room. The robot was designed to have a smaller frame so it can fit through all standard doorways and better maneuver through tight spaces. Lastly, the placement of lights on the robot prioritizes disinfecting high touch surfaces so it can more readily clean the most contaminated objects.

The STS project examines the case study of the design and implications of Harrisburg University's face-tracking criminal predictive software. The three designers of this software fall short by not understanding the social context in which their technology is based. They claim the software is unbiased while basing its algorithm on past criminal data, which is rooted in the biased beliefs of past law enforcement. By not understanding the context of their technology, the programmers validate and legitimize a racist system which will adversely affect black

communities who are already a target for over policing. By looking at this study through the lens of care ethics it becomes apparent that there is a responsibility to protect others and understand possible societal implications when creating new technologies. This responsibility is present in the robot's design, especially in context of its facial recognition software.

Looking at this problem from both a technical and STS perspective simultaneously allowed both projects to influence each other. The STS project idea would not have been conceptualized if I had not already started to work on the robot design. It was influenced by some of the technical research I was conducting regarding how the robot would need to change for hospitals in less wealthy areas. This allowed me to think about how race may affect how users interface with the robot, especially in its facial recognition safety features, and ultimately led to my STS project topic. At the same time, my STS project provided valuable insight for how to think about designing the robot. Because of the research I was conducting on facial recognition, my group decided to implement additional safety features including an extra camera to try to increase the chances of a human being sensed by one of these cameras when the robot is in use. Safety became even more of a priority for my group especially as I learned more about biases impeded in facial recognition softwares and began to ask critical questions about my team's proposed safety features.

Table of Contents