Thesis Project Portfolio

Information and Cyber Security: Automating the Quality Assurance Process

(Technical Report)

A Change of Environment Is Refreshing: How Current Business Models Are Engineering Ways To Utilize Human-Computer Interaction Implementations To Take Advantage Of Vulnerable Human Psyche In Social Media

(STS Research Paper)

An Undergraduate Thesis

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Jack Yang Warner

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Department of Computer Science

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Sociotechnical Synthesis

At first glance, it might seem that my technical and STS topics are worlds apart, however both focus on the idea of being a good engineer. What is a good engineer? I believe that a good engineer shouldn't only be able to solve problems, but rather solve problems in such a way that the solution doesn't result in more problems down the line. I believe that a good engineer is able to come up with solutions that are able to adapt, and that are able to keep extraneous factors not mentioned in the problem statement in mind. My technical research was regarding automating the quality assurance process of the software development life cycle, while my STS research focused on doing a deep dive into the ethicality of human-computer interaction implementations on consumers utilized in social media, both have an aspect of engineering where engineer must create a solution keeps the user at priority, not just solving a problem. Despite the benefits of social media, the rapid growth and business model for structuring these applications are a cause for concern. From a socio-technical system perspective, this complex system is only truly beneficial if both social and technical aspects are put into consideration before implementation. With social media applications utilizing advanced data science to generate algorithms and subtle human-computer interaction implementations that take advantage of the vulnerable human psyche, perhaps it's time we start looking at the problem from a socio-technical perspective. To aid in the severity of this issue, my STS research dives into features social media are currently implementing that are damaging the user's mental health as well as ways of looking into ways how we can prevent this from happening just by viewing the problem from a different perspective.

The technical portion of my research utilizes my experience in automating the quality assurance process to talk about how and what needs to be considered to make that work. My intern team and I developed a script that can generate tests based on the required and optional inputs the application utilizes. The script is able to test every single possible combination, as well as clear and set the application to either restart the testing environment or set it up for testing. While we thought it was a fairly simple script to develop, as we utilized the script we started seeing things we never foresaw before. Not only did we have to make a script that can run the required tests in less time, with full test coverage, we soon realized it is not a good script if it isn't adaptable. If the application changes, the script should be able to change accordingly as well. We at first developed a script that was able to run the current state of the application almost 3 times faster with more code coverage. However, the script itself functions like an application so moderation and maintenance are also required, thus pushing up to update the script in such a way that it is more adaptable to changes made to the application. That portion was significantly harder than the task we took on. It wasn't required but we thought it was necessary for the longevity of the script we developed. In the end, the company we worked with now owns this script, and is being utilized to test the application on a daily basis as well as utilized to train new Quality Assurance engineers.

With the newfound perspective from these opportunities, I was able to apply that to my STS research. My STS research was able to take on a systemic perspective approach looking at the way currently big social media companies' strategies are taking advantage of the users' vulnerable psyche. The research began analyzing research that

talks about the negative effects of social media use, and the unintentional effects it has on the users. With the negative effects established, we can start to approach it as a problem. I first dive into the psychology of some implementations we see currently being utilized by social media companies. Then I approach the problem of why these companies are implementing them and how to challenge the current approach to fix these problems and prevent them from happening in the future.

Both my technical research and my STS research take a problem, take it away from the straight line approach of just solving the problem, but solve the problem in a way that won't cause issues later on as well as be beneficial to the user as a whole. The combination of these two research should put our current view and implementation of engineering in the spotlight. We engineers shouldn't be content with merely solving the problem, but rather approach the problem from all aspects to ensure the problem doesn't create new problems down the line. A level of ethics needs to be incorporated so all solutions can be kept in check. If a good solution can have a significant impact, then so can a bad solution. I wish to apply this newfound aspect of engineering to my future career in the field of engineering.