Thesis Portfolio

Class Scribe: A Modern Approach to Note-taking

(Technical Report)

Using Video Games to Tackle Mental Diseases

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

The capstone portion of this portfolio focuses on a new piece of software and hardware working in tandem to give students a better note-taking experience. With the creation of tablets and other devices that allow students to take notes with a stylus on a screen-based device, studies have shown that students are less likely to retain the information and also be more distracted in class (Mueller & Oppenheimer, 2018). The benefits of digital notes are that they can be shared between devices easily, accessed anywhere, and provide more playback features when compared to traditional pen and paper. The capstone project allows students to still take notes with pen and paper, but also capture the benefits of digital notetaking. The research portion of this portfolio looks at an application of software and video games in an attempt to diagnose and/or prevent Alzheimer's Disease. Currently, no medical procedure exists that can accurately diagnose Alzheimer's in a person that is still living (only a biopsy after death can identify the disease). Technological solutions would provide a noninvasive method that would also avoid significant costs normally associated with medical procedures.

Class Scribe is a two-part solution to every students' note-taking dilemma: choosing between the accessibility of digital note-taking and the performance boost of physically writing with pen and paper. The first part is a device built to look like a lamp which will hold a Raspberry Pi (a very small computer). The Raspberry Pi is connected to a camera, microphone, and RFID scanner which will allow it to record the students notes, record the lecture audio, and verify student identification. The Raspberry Pi sends photos of a student's notes on a set interval throughout the class period to the web-app so that the student can go back and look at their notes synced to the lecture audio. The web-app is the second part of the solution and is where students can view their notes along with the notes of other students, teachers can receive assignment

submissions and attendance, and administrators can set the course schedule. This system would ideally be sold to universities which would then handle the deployment within their own classrooms and the students would not need to pay for anything. Another solution that our group considered was making a phone app; instead of using a Raspberry Pi, students would place their phone on elevated phone holder (replacing the functionality of the lamp). The Raspberry Pi solution was chosen because feedback showed that students would not give up their phone for an entire lecture and also saw it as a waste of their phone's battery. This solution is designed to increase student productivity by combining the benefits of original note-taking and the benefits of the digital age.

Have you ever wondered how our brains are affected by video games and mobile applications? This STS research paper helps find the answer specifically pertaining to parts of the brain affected by Alzheimer's disease. The research question is: To what extent can video games be used to diagnose and combat Alzheimer's disease? In order to answer this question, several case studies that examine games or applications designed to help researchers understand Alzheimer's disease will be analyzed by applying the theory of technological determinism. Studies that look at how video games in general affect the brain will also be helpful in order to understand if games affect the same parts of the brain as Alzheimer's disease. The resulting information will be used to build an argument for or against the use of video games to diagnose or prevent Alzheimer's disease. Based on the background research, the results will likely indicate that playing video games increases brain activity in areas affected by Alzheimer's disease, but will not provide a definitive test to identify instances of Alzheimer's disease or be able to fully prevent its effects. The results of this research are significant to STS because Alzheimer's disease places a heavy burden on society, not only the people directly affected by the disease.

People around those affected also share a burden because of the additional care that patients need as the disease progresses. If video games prove to be an effective method of strengthening the brain, alternative uses of technology could be introduced into the medical field as well.

After completing the research paper and capstone project, I have found that the breadth of the technological field spans far more than I ever imagined. When doing research for the paper I was shocked as to how many different medical studies had been done using video games or mobile applications. Another surprising fact that I found when researching note-taking alternatives was the number of solutions that tried to combine the benefits of taking notes with pen and paper and digital access to notes. For example, there was a tablet device that tried to recreate the feeling of pen on paper, but still stored the notes digitally in the cloud. Doing these two projects simultaneously has helped me realize that sometimes when technology does not seem to be the direct solution, it can still provide a means to reach an optimal solution. As an engineer, these projects opened my eyes to the potential impact that engineers have on society and the care that they must take when introducing innovative products into the community.

References

Mueller, P. A., & Oppenheimer, D. M. (2018). The Pen Is Mightier Than the Keyboard:

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