Thesis Project Portfolio

Demonstrating the Technical Capabilities of Mixed Reality Presentations

(Technical Report)

Exploring the Role of Microtransactions in the Video Game Industry

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Contents of Portfolio

Executive Summary

This portfolio presents a comprehensive investigation into two fields within the realm of technology: video game design and mixed reality demonstrations.

The research paper analyzes the role of microtransactions in the video game industry, analyzing different models that are being used in today's games. Microtransactions are defined as any instance of being able to pay real money for a small in-game benefit. A thorough literature review was conducted in order to have a comprehensive understanding of the topic. The research paper analyzes the history of video games as well as different trends that have emerged with regards to new business models and monetization methods. It also investigates various specific techniques used by game designers to increase monetization, such as loot crate style transactions, pay-to-win games, and cosmetic items. It also highlights how free-to-play games are generating massive amounts of revenue simply from in-game purchases that don't affect users' gameplay. This paper then explores the psychology behind why people choose to spend money on microtransactions, such as maintaining online competitiveness and personal expression. The paper evaluates the personal motivations behind spending money on in-game experiences, using real player stories to highlight their effectiveness. The advent of "freemium" games is also discussed, or games that appear to be free to play, but require purchases to overcome large time-consuming actions, in order for the game to be enjoyed. It also discusses the legal regulation (or lack thereof) regarding purchases that could be akin to online gambling, and how industry executives have managed to avoid regulation implementation thus far. This paper discusses how the business model of video games as a whole has shifted, with games now being developed less as simple one-time disc purchases and more as constantly updating and evolving

pieces of software. Finally, the paper addresses the principles of such game design techniques and underlines the importance of finding a balance between monetization without compromising user enjoyment.

The technical report is a case study detailing the effect of developing an augmented reality (AR) presentation software for Raytheon, a major United States defense contractor. As part of a recent company initiative, Raytheon required additional presentations to showcase their products. A dedicated workflow with documentation was created for future usage in creation of these AR presentations. These presentations were created using prefabricated 3D models imported into a virtual environment where animations and commands were added. These polished experiences were then deployed using proprietary software in both table and headset-based AR formats. This project helped showcase the department's capabilities to upper-level executives and other department heads, as well as creating a new step-by-step workflow for future application. This project also had implications with how it will connect to other Raytheon programs, most notably, theVirtualWorx® remote collaboration software. VirtualWorx® is intended to provide live guidance anywhere in the world on how to troubleshoot, make a repair, or conduct regular maintenance using AR. Further work for Raytheon would be considering a full implementation with VirtualWorx® to enhance the AR capabilities, as well as additional changes being made by a UX expert to the interface to be more effective and easier to use. The success of this project highlights the application for future presentation software to company executives, who can choose to utilize this software during company meetings or demonstrations.