Thesis Project Portfolio

Automated Battleship

(Technical Report)

Non-Player Characters in Violent Video Games and the Impact on Social Behaviors

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

My technical project involved recreating Battleship with a fully automated opponent. The player interacts with the digital board to communicate with the computer opponent. The automated player utilizes an algorithm that tests a randomized location and will move orthogonally on its next move in response to the result of the selection. The player can select a move by placing a game piece on the selected spot on the gameboard. The player and the computer communicate through an LCD screen and multiple LED lights displaying the game's progress.

The technical project system design was broken down into four sections: Hardware, Firmware, Software, and Mechanical. The hardware section contained six different components. The first component was designing the power supply. The power supply powered the system with a wall transformer connected to a barrel jack. Schematics for the PCB were designed, and appropriate voltages were selected based on the max power and current that the board would need. The next sector of hardware focused on player communication sensing systems. The player communication sensing system was needed to detect the player inputs. Sixty- Four Hall Effect sensors were each placed in designed grid locations. The unique grid placement ensured that the sensors' signals would not interfere with each other. After configuring player communication, a microcontroller that interfaces with the LCD, sensors, and LEDs was mounted to the designed boards. The LED subsystem consisted of an 8x8 array that held 128 LEDS. Combining the power supply, sensing system, microcontroller, LCD, and LED layouts creates a complete board layout.

The Firmware and software sections focused on controlling the entire device. The firmware managed LED control communication, hall-effect input detection, and LCD communication. The program directly communicates with the microcontroller and the whole device. The Software orchestrated the battleship game state and the computer opponent's smart logic. The battleship game state software managed the moves made by the player and computer and the game's score. The intelligent computer logic used randomization to select its next move.

The Mechanical section incorporated the physical design of the board. Due to the unique attributes of the device, the architecture was designed using CAD. After creating the

design, a 3-D printer printed board pieces and additional items. The external encasing of the hardware was created with wood.

My STS project explores the effects of non-player characters (NPCs) in violent video games on players' social behaviors. Due to the exponential growth in consumption and advancement in video games, over-exposure has been on an upward trend. Over-exposure to violent scenery or storylines concern many researchers. It is a primary concern because of the storylines and themes in violent video games. Violent video games display experiences of first-person shooting, fighting, and battle royale games.

Over-exposure to violent video games is essential because it can affect consumers' different age ranges. Violent Video games are tailored and consumed by ages between 10 and 34. With a sector of heavy consumers under 18, impressionability on one's brain and body is a growing concern. Many consumers under 18 are interacting with all Entertainment Software Review Board Ratings (ESRB) from Teens to Only 18+ ratings. Most of the top violent video games are rated M for Mature.

The content and material in top violent video games contain both positive and negative themes. NPCs convey these themes through their actions. They create conflict, add emotional depth, or provide a player companionship. NPCs often mimic human actions and appearances, such as race or gender. The appearance and actions of the characters are essential because stereotypes and inherent biases are often embedded. Consistent interaction with stereotypes at a young age can influence a player's social thoughts and behaviors. It is a precedent for exhibiting poor social relationships and behaviors.

I explore the types of NPCs stereotypes present and explore the positive and negative themes in popular violent video games through content analysis. A content analysis consisted of watching the gameplay of multiple top-rated violent video games. After viewing a game, positive and negative themes were counted and analyzed. Rating of the game was also taken into consideration.