SlapBot: Automated Slapjack Robot

The Influence of Technology on Sports Betting

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

My Capstone project, *SlapBot*, is an interactive robot designed to play the card game Slapjack. Slapjack is a card game that uses a standard 52 card deck, divided as evenly as possible among participating players. Each player then takes turns removing a card from their deck and placing the card face-up in a pile until a Jack card appears on the pile. Once a Jack card appears, the first player to slap the pile adds the pile of cards to their own deck. This sequence will continue until a player has all of the cards in their deck.

Initially, Slapjack may seem like a daunting game to play. A new player may feel discouraged from participating in a group game with a number of new individuals due to social anxiety or fear of not being quick enough to keep up with the fast-paced nature of the game. Recognizing these challenges, our project aims to create an automated version of Slapjack, designed to make the game more accessible to everyone. We aim to enable individuals who may experience social anxiety or struggle with reflex-based games to participate at their own competitive pace. Moreover, this project can offer benefits to others as well, from children and the elderly who are looking to train and develop their reflexes and reaction time, to individuals who just want to improve their skill at the game. By creating an environment that encourages growth and skill-building, we're extending the appeal of Slapjack to anyone eager to play, learn, and improve at their own pace, before transitioning into playing in a group setting.

Creating a more accessible game highlights how technology can alter user behavior, whether by encouraging participation or enhancing engagement for various audiences. This influence is also evident in the realm of sports betting, particularly, how sports gambling

platforms affect gambling behavior and the potential for addiction. The rise of sports betting in the last couple of years has become very apparent due to the recent legalization of sports betting around the United States and the rampant advertisement across all major sports and broadcasting networks. My Capstone project and sociotechnical research both center around the role technology plays in shaping user behavior and accessibility. In both casual games and high-stakes gambling, digital platforms can change the way people interact, making participation easier but also potentially reinforcing habits or dependencies.

SlapBot: How it Works

As referenced above, my Capstone project, SlapBot, is an interactive robot designed to play the card game Slapjack. In order to achieve this functionality, the project is divided into four major components: card detection, microcontrollers, a printed circuit board (PCB), and a robotic arm.

The card detection component of the project can be split into two parts: hardware and software. The hardware component includes the Raspberry Pi microcontroller with a camera module to capture the frames of the card for analysis. The software component utilizes OpenCV, an open source computer vision library used as the core for the card detection process. In order to utilize the OpenCV libraries, the main programming language used to write the code for detection will be Python due to its support for OpenCV and familiarity with all group members. Microcontroller integration for this project includes the use of the aforementioned Raspberry Pi and the STM32 microcontrollers. Noted previously, the Raspberry Pi is used to handle the card detection, while the STM32 is used to control the servo motor which in turn drives the robotic

arm. In order to control the servo motor, the STM32 is programmed in C to generate a pulse-width modulation (PWM) signal that controls the motor's slapping and resetting motions. The robotic arm will be controlled by a servo motor, which is controlled by the STM32 microcontroller to determine the movement of the arm. During play, it is possible that the arm may make contact with a player's hand. In order to mitigate this risk, protective cushioning with foam will be added to the tip of the arm. The PCB will manage the power conversion, as it will convert AC power from a wall outlet through an AC-DC adapter to supply the appropriate operating voltage and amperage to the servo motor.

To play the game, the user starts placing cards in view of the camera. Another user can act as a dealer for the robotic arm. Once a Jack card has been placed on the pile, the camera-aided Raspberry Pi detects the card and raises a GPIO (general purpose input/output) pin to 3.3 volts, indicating a high signal. Due to the shared GPIO connection between the Raspberry Pi and STM32 microcontrollers, the STM32 detects the high signal and in turn, triggers the servo motor to perform the slap motion. Once the slap motion has completed, the robotic arm will reset back to its rest position. If the user's hand is underneath the robotic arm when the slap motion has completed, the user takes all the cards in the pile at the time of the slap and adds the cards to their deck. If the robotic arm is underneath the user's hand, the robotic arm keeps all the cards in the pile and the Slapbot adds the cards to its deck. This process repeats until the user loses all the cards in their deck, or the Slapbot loses all its cards in its deck, in accordance with the rules of Slapjack.

An Analysis on Sports Betting

The sociotechnical problem that I'll be discussing is the influence of technology on sports gambling behavior, but more specifically, how online sports gambling platforms affect gambling behavior and the potential for addiction. The rapid growth of online sports gambling platforms has introduced a complex sociotechnical challenge that influences gambling behaviors and increases the potential for addiction. These online platforms, due to their ease of accessibility, allow users to engage in betting anywhere and anytime and as a result, present an increased risk of gambling-related harms (Lawn et al. 2020). The ease of accessibility of online betting presents a double-edged sword for the user: on one edge, its ease of use allows for convenient entertainment for some and those who can control their habits. On the other edge is the potential risk of gambling addiction and the resulting consequences that follow. Similarly, this very effect can be seen in an article titled The Human Cost of The Sports Betting Boom written by Rachel Epstein. In this article she argues that the rapid expansion of sports betting in the United States has led to increased gambling activity, contributing to addiction, financial ruin, and mental health crises for individuals. More importantly, it also provides a personal account of an individual who fell into a gambling addiction after using sports betting apps like FanDuel (Epstein 2023). This personal insight into an individual who was drawn into addiction by the convenience and accessibility of betting apps underscore the impact these platforms have. Additionally, the behaviors the online sports better display are distinct from less involved betters (Nelson et al. 2024). This difference of behavior could be due to the fast-paced nature of sports betting apps. The use of promotional tactics like promos, offer a sense of missing out to the participating better, making them feel like they are missing out on potential earnings if they decide not to participate.

This project will use a mix of academic journals and articles and personal accounts to investigate the behavioral impact of online sports gambling platforms. The analysis of the sociotechnical problem will operate within a framework that investigates how certain features of these platforms may condition participants to develop compulsive betting habits. The mix of academic and personal accounts offers a diverse perspective on the behavioral impacts of online sports gambling. By combining empirical research with individual narratives, this approach allows for a deeper understanding of the factors influencing gambling behaviors. Data from academic studies will provide insight into patterns observed across broader populations, while personal stories will offer context on the individual experiences of those affected by problem gambling. As an example, immediate rewards reinforce repeated behaviors, and gambling platforms often utilize this by offering cash-outs, dynamic odds, and short-term betting options that provide instant gratification. These features encourage repeated engagement, allowing users to feel a sense of control while, in reality, increasing their risk of gambling-related harm. By interpreting this evidence through analyzing the behavior, the project will highlight how online sports gambling platforms exploit behavioral vulnerabilities.

Conclusion

Finally, the capstone project, SlapBot, delivers an interactive robot designed to engage players in the classic game of Slapjack, breaking down barriers for those who may feel anxious or hesitant to participate. This project not only recreates the fun and fast-paced nature of Slapjack but also serves as an inclusive tool for people of all ages, from children to the elderly. In tandem with this capstone project, the accompanying sociotechnical analysis emphasizes the importance of understanding how technology can shape the potential dangers of online betting. As digital betting platforms grow rapidly and become increasingly embedded in everyday life through

heavy advertising, it's important to recognize how they can impact participant behavior, possibly leading to increased chances leading to addiction. Together, these deliverables address two distinct but meaningful areas: SlapBot aims to bring people together and create a supportive, low-stakes environment for social engagement and reflex improvement, while my STS paper seeks to educate individuals on the risks of online gambling. In the future, this analysis will contribute to a broader understanding of the societal challenges posed by online gambling.

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