

Thesis Project Portfolio

C.H.E.S.S.B.O.A.R.D.: An Interactive Chess Learning Aid

(Technical Report)

The Development and Market Failure of the Nintendo Virtual Boy

(STS Research Paper)

An Undergraduate Thesis

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Executive Summary

The market success of a product lives and dies by how and to whom it is advertised. This holds true for all products, but the focus of this thesis portfolio lies more predominantly in the realm of entertainment products, specifically with the intent of creating a broader player base for the game of chess. Chess itself is shown to have many benefits such as improved critical thinking skills and higher IQ scores, discussed more thoroughly within the prospects of this portfolio. To address this opportunity to encourage the adoption of the game, a smart chessboard was designed, aimed at beginner players. However, if this product is unable to reach the hands of the intended audience, the game's associated benefits will reach fewer people. Therefore, examinations of the factors which lead to the market failure of the Nintendo Virtual Boy, a video game console, were also examined such that lessons learned could be applied in a marketing campaign for the chessboard. With these two projects, my fellow technical team members and I can take the next steps to increase the adoption of chess and its associated benefits.

Firstly, the smart chessboard detailed in the technical report provides an alternative to learning chess through more traditional methods with active light-emitting diode (LED) feedback to convey possible moves, as to intuitively deliver an understanding of the basic rules and options of the game. The board additionally corrects common mistakes regarding the rules, indicating where mistakes have been made and where to move pieces to adjust the issue. To provide hints about ideal moves for any given board state, we have employed the chess bot Stockfish to output the best possible move, encouraging players to compare how their move differs from that of the chess bot. Other features developed for the board include the ability to undo moves, automatic game transcription, and various time modes. To know the current state of the board, we use linear Hall effect sensors to read the magnetic field strength of a magnet

embedded within each piece, which changes depending on the piece type and color. With these features catering to beginner players, the device itself is an effective learning tool. However, without an understanding of how products such as these fare on the market, such a device may not reach the hands of its intended audience.

Next, in the endeavor to understand the market factors which would affect such a chessboard, I conduct an examination of these factors in the case of the Nintendo Virtual Boy and how they coalesce into a commercially unsuccessful product. I conducted this examination with the Actor Network Theory (ANT) framework, distilling the individual groups responsible for the Virtual Boy's development such that the relationships between them may be more completely understood in comparison to preexisting literature on the topic. In service of this, I analyze some primary evidence, including interviews and consumer reviews regarding the console, to draw conclusions about the mindsets among the developers and consumers at the time. With this approach, I traced back much of the mass-market disinterest from the varying interpretations of the ideal audience held among Nintendo's employees, highlighted through dissonance between the various groups in the actor network. I do not claim this to be the sole reason for such failure, but one which I believe is particularly relevant for marketing a product like the one developed in the technical report.

After much challenge, the goals set out in this project were achieved, resulting in a fully functional chessboard prototype and an in-depth examination of the factors which lead to the market failure of the Nintendo Virtual Boy. With both of these tasks completed, the next step would be to refine the prototype presented in the technical report to create a product which could be mass produced for general consumers. In the time since the completion of the technical report, I and other members of the initial group have endeavored to redesign the sensing system present

in the chessboard, resulting in a more easily mass manufacturable prototype. Although there are several other factors to consider before pursuing mass production, the steps taken here have provided insight into both the process of developing for and attempting to market to a specific audience. Throughout these refinements, keeping a specific audience in mind has helped to narrow down which design elements are best suited for said audience. Although market failure or success is never guaranteed, keeping in mind aspects such as this are important to improve the chances of meeting one's goals.