

Discover DaVinci – A Gamified Blockchain Learning App

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Abstract - *Discover DaVinci* is a novel augmented reality system that incorporates blockchain technology with experiential learning to engage participants in an interactive discovery of Leonardo da Vinci's *oeuvre*. In the true spirit of this "Renaissance man", *Discover DaVinci* explores new ideas and technologies "ahead of their time".

Keywords—AR, blockchain, gamification, education, experiential learning, DaVinci

I. INTRODUCTION

In order to illustrate the emerging potential at the intersection of art and blockchain, we present a case study of a new interactive system produced at the University of Florida Digital Worlds Institute.

The technologies of mobile computing, augmented reality (AR), and blockchain are starting to merge, creating new opportunities and scenarios to interact with our environment. In AR we can look at virtual objects superimposed within a real environment and resize them, rotate them, explore and interact with them on multiple levels. With the combination of AR and blockchain, we can create a system capable of keeping track of digital assets located virtually in 3D space (i.e., spatial computing). The global scale of blockchain and related technologies heightens the potential for trade and digital distribution with a fully automated and trusted way to keep track of their creations without a "middle-man".

Discover DaVinci is a novel educational tool that teaches concepts of blockchain technology through an augmented reality experiential learning game.

II. DISCOVER DAVINCI PROJECT PARTNERSHIPS

This project was developed in collaboration with several units from the University of Florida and industry partners:

- Digital Arts & Sciences Faculty (Computer Science and Digital Worlds Institute)
- Digital Worlds Studios' Artists and Programmers
- Gator Blockchain Club (gatorblockchainclub.com) – Student-run blockchain club at the University of Florida

- Entrepreneurship and Innovation Center (UF Warrington College of Business)
- Creative Campus Committee at the University of Florida

Industry Partners:

- DLUX, decentralized content network (dlux.io)
- Steem (steem.com), and Steemit (steemit.com)

III. RESEARCH STUDY – "DISCOVER DAVINCI"

Discover DaVinci (Fig.1) utilizes the format of a digital, collectible trading & drafting card game with AR elements on the STEEM blockchain. Although each player "owns" their cards, all transactions are public. Every collectible card is a unique token, owned by the player - a digital asset registered to the player's account. The aim is to draw new question cards daily, answer the questions about Leonardo DaVinci, collect the special AR invention cards, and ultimately submit the accumulated card collection into a drawing for prizes. The app was developed to honor the 500th anniversary of Leonardo Davinci by promoting new and innovative technologies.



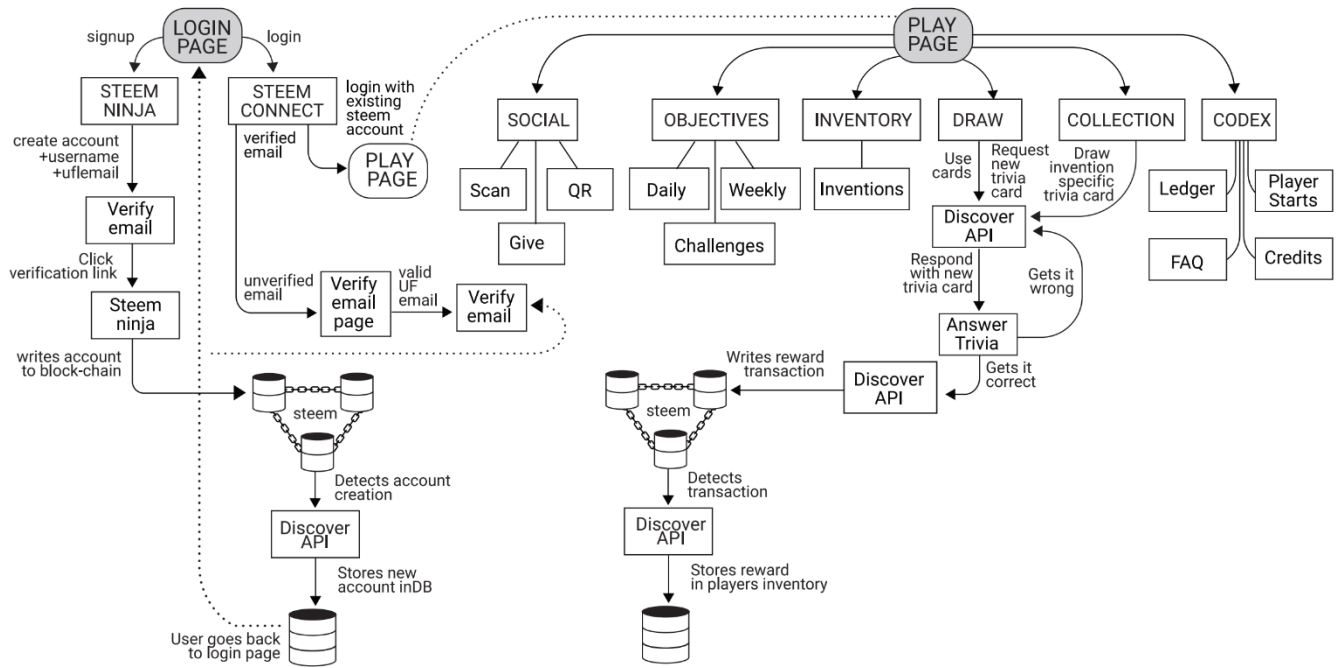


Fig.2 Discover DaVinci - System Architecture illustration, University of Florida (2019)

Fig. 1 Discover DaVinci game interface, University of Florida (2019)

By using a novel combination blockchain, and spatial computing/AR technologies, the *Discover DaVinci* mobile app allows users to explore holographic images of da Vinci's devices. By combining AR with blockchain technology, we have created a system capable of assigning unique values and user comments to these digital assets, thus providing a personal sense of ownership, the potential for trade, and a fully automated and trusted way to keep track of these digital artifacts (e.g. collected 3D objects in AR space). Finding the artifacts themselves is an act of discovery, further enhanced by subsequent investigation, collection, and sharing of the artifacts across a diverse social media ecosystem.

The blockchain system was implemented using the STEEM API, which handled the writing of new user accounts and the reward transactions to the block chain (Fig. 2 bottom). The front end was developed as a web app that rendered the various 2D and 3D/AR components of the game (Fig. 2 top right). Finally, the authentication and account creation was handled using a third-party service, called STEEM Ninja (Fig. 2. top left).

IV. DISCUSSION

We launched *Discover DaVinci* app to the initial audience of University of Florida students and faculty in November of 2019. Over the period of 60 days, we engaged ~150 participants who played the game, and left their feedback on the project's discussion board.

The player feedback has been analyzed, and the subsequent versions in the "Discover" series are currently being evaluated.

The project is intended to continue as a platform for gamified education that promotes participant interaction, and supports focused learning on a topic of choice.

We believe that this novel confluence of art, technology, and digital communications represents a tangible example of how artists and cultural researchers can leverage the potential of diverse digital resources to support both creative development and cultural inquiry. The *Discover DaVinci* app allows a diverse player community to utilize their existing mobile devices and participate in acknowledging da Vinci's life work while exploring a new paradigm of digital convergence. The outcomes included an enhanced cross-campus appreciation of personal creativity, social and cultural engagement, and a working framework that exemplifies how emerging technologies can serve esthetic ends while also ensuring fair use and exchange of intellectual property in the digital age.

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