Attached1

Graduation Work/Thesis Proposal

Spring Semester 2025

Work/Thesis	○ Work (X) ○ Thesis ( ) ※ Check the box
Title	BV: Blockchain Visualiser
GitHub URL	https://github.com/23-jose/BV
Student name (student No.) (※Write all your team member's name/student No.)	호세안툰스 José Antunes (Student No. 2021313406)

2025. 03. 12
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Academic advisor : _____ Sign _____

○ Page number must be included. ○ Do not copy other's picture/photograph. Draw the picture yourself. (But, number of image captured should be limited.) ○ Size and name of Fonts in the picture should be same with whole report. ○ Maximum size of pictures is a half of a page. ○ Picture and Table must include the caption. But, tables are at the top and pictures are at the bottom. ○ Page of proposals will be no more than 10.

Abstract: Blockchain technologies use has increasingly become a part of daily life, especially due to its role in financial services like cryptocurrencies and NFTs. Despite being promoted as alternative services that challenge more traditional ones by being transparent and decentralized, high profile fraud cases have led to growing concern about the safety of these technologies for the average individual who decides to invest. Moreover, research over time has shown that these technologies have high rates of energy consumption, leading to questions about their environmental impact. BV is being proposed as a platform that plans to offer users easy access to Bitcoin and Ethereum transaction information, in order to increase the transparency of these blockchains. BV also plans to use the data to estimate and show users the energy consumption of these blockchains in order to raise awareness of their environmental impact.

1. Needs of Assignment

Though blockchain is a relatively new technology, having only emerged less than 20 years ago, its use has steadily grown over time, and today it has become part of mainstream culture. Nowadays, most people are aware of the application of blockchain technologies to financial services, like cryptocurrencies and NFTs.

Cryptocurrencies enabled by blockchains have been promoted as a revolution in finance because of their ability to serve as decentralized currencies that allow for transparent and secure transactions; however, due to recent high profile fraud cases, there is growing concern that despite blockchains' data being publicly available, finding and understanding that information is not always easy for the average user. This, combined with a lack of regulation, has

created the opportunity for these technologies to be used to enable illegal activities.

Blockchain's energy expenditure has also become a hot button topic, and there's growing concern about the amount of energy consumed by blockchain technologies and how it may impact climate change. With the application of these technologies projected to keep growing, it has become necessary to identify what causes blockchain technologies to consume so much energy, and how this expenditure can be lowered.

With this in mind, BV is proposed as an easy-to-use platform to provide clear and understandable information about blockchain transactions and their energy expenditure, with the goal of serving as a first step for improving access to blockchain information in order to increase the transparency of the financial products tied to these technologies, and raise awareness about blockchain's energy consumption.

Lastly, it is important to note that, due to the sensitivity of the issue, BV will not be a tool that promotes, facilitates or incentivizes users to engage with cryptocurrencies. BV's main goal is to improve users' access to information not access to the blockchains themselves.

2. Precedence Research and Current Technology

As previously stated, one core feature of the identity of the blockchain as a technology is its transparency due to transaction data being publicly available. However, being publicly available does not inherently mean that it is easy to access or understand. As such, improving the average person's access to this information contributes in helping to deliver the promise of security that these technologies make. BV plans to make access to information as easy as possible, without sacrificing accuracy.

Currently, similar websites like *Blockchain.com* and *Etherscan.io* exist and offer access to the same publicly available data, however BV plans to standout by focusing on ease of use and helping users understand the data. Moreover, it is also important to point out the bias of these platforms and the angle that was taken for their development. Most of the existing platforms present this

information, as well as blockchains and cryptocurrencies in general, as interesting ways to invest and make money. Most of them also provide tools to directly engage financially with these technologies by improving the ease of access to crypto wallets. This means that the platforms were created with the intent of promoting the use of these technologies in this way, which could mean that some information is being provided uncritically, or that there is some design bias in the way the data is presented. BV aims to allow users to access to data and take their own conclusions without incentivizing participation.

Furthermore, most of the existing platform do not present any data about the energy expenditure of these technologies, which once again can be seen as a sign of bias in their perception of them. While these platforms exist to incentivize users to engage with financial services, BV focuses on giving users important information, not only about blockchain transactions but how these transactions affect the world through energy consumption. This makes BV standout since it will combine transaction data with data about their environmental impact, with the goal of promoting engaging with these technologies responsibly.

In terms of environmental impact, a lot of research was and is being conducted to estimate how these technologies affect different resources like water, electricity, carbon emissions, etc. BV aims to increase the body of research by creating a new platform with its own energy calculation model.

3. Work/Thesis Process Plan and Form

3. 1. Design with Figma

The first step of the project will be to use Figma to design the UI for the BV website. This will serve as a guide for the next step of the project where the frontend will be implemented. It will allow for careful planning of the UI, making the implementation easier and keeping the website easy and intuitive to use. The Figma design will also serve as an overview of the entire UI, making it easier to receive feedback and improve certain aspects of the website as needed.

3. 2. Frontend Implementation

After the Figma design is completed, the next step of the project will be to create the frontend of the project. This will consist of building the UI following the previously made design, and improving it as needed. Next.js will be used as the framework for this step due to its ease of use and scalability. By using Next.js, it will be possible to turn BV into a Progressive Web Application (PWA) later, in order to expand the user base to those who would be interested in using BV in their mobile devices rather than only on their desktop. After the frontend is completed, it will be deployed using Vercel in order to test the frontend and receive feedback about its intuitiveness and potential improvements.

3. 3. Blockchain Transactions and Backend Implementation

After the frontend is finalized, the next step will be to create the backend to store blockchain transaction information so that it can later be implemented together with the frontend in order to deploy BV. The blockchains that were selected to be tracked are Bitcoin and Ethereum. These are two of the most widely used blockchains at the moment, with a high number of transactions happening every day. Because of this, focusing on these blockchains will make the data tracked on BV more representative of the user base and the impact of blockchains on energy expenditure, more than it would if lesser known blockchains were selected. Moreover, focusing on these blockchains will also improve the likelihood of BV being used, since most blockchain users are familiar with Bitcoin and Ethereum.

Additionally, Ethereum specifically has significantly changed its consensus mechanism to Proof of Work (PoW) to Proof of Stake (PoS) in 2022, which reduced its energy use even though the volume of transactions and overall use kept increasing. By selecting Ethereum, it will be possible not only to compare it to a different blockchain, but also understand how a blockchain changes over time.

The APIs and backend tech stack has not yet been selected, leaving this choice open for after frontend implementation in order to select a tech stack that is best suited for the frontend that is developed.

3. 4. Energy Expenditure Calculation

Even though energy expenditure was mentioned in the previous step, the backend implementation will mostly focus on tracking and displaying transactions. Since calculating energy expenditure is expected to be a more complex task, it will be done later when BV is already working as a transaction tracking platform. Considering that these blockchains' data is publicly available, there is a lot of information that could be used to create a model to calculate energy expenditure. For example, since adding blocks to the Bitcoin network requires users to solve hashing problems, identifying Bitcoin's hash rate and comparing it to current estimates of mining hardware efficiency will show some information about the impact of blockchain technologies on energy expenditure. This step of the project will consist of building an energy calculation method and making it available on BV. This feature will allow users to visualize the evolution of blockchain use and its energy impact.

4. Expected Effect and Improvement Direction

4.1. Expected Effects

As previously stated, BV aims to be an easy-to-use platform where users can find reliable information about Bitcoin and Ethereum transactions, as well as their impact on energy consumption. So, it is expected that BV users who engage with financial services powered by blockchains will be more informed about these technologies and will be at a lower risk of falling for fraudulent cryptocurrencies.

Moreover, even though blockchain data is publicly available, it is still difficult for the average user to find and/or understand. BV hopes to improve the access to information and therefore improve both the experience of individual users but also increase the transparency of these technologies.

Lastly, by providing data about energy consumption, BV hopes to increase its users' awareness of blockchains' environmental impact and how it affects the world's resources and climate change in general.

4. 2. Improvement Direction

Due to its nature there are many ways in which this project can be improved or expanded. The more straightforward way would be by adding additional blockchains in order to provide users with more data in general, but, especially if blockchains with different consensus mechanisms are added, BV could be used as a tool to compare how different consensus mechanisms affect the energy expenditure of a blockchain.

Additionally, creating new ways to present the data would also be valuable in order to improve users understanding of the real-world impact of these technologies. For example, translating energy expenditure to money or water spent would create metrics that users can more easily relate to by bringing the data closer to their experience in their daily lives. Comparison data would also have a similar effect. For example, estimating how blockchains' energy expenditure fares when compared to a household, a computer, or a country would bring the data closer to the metrics that users can easily understand.

Lastly, turning BV into a PWA would make it easier to use and more accessible to different user bases. This would be relatively easy to implement since the frontend will be created using Next.js.

5. References

[1] Blockchain.com. https://www.blockchain.com/en/

[2] Etherscan. https://etherscan.io

[3] A. de Vries, "Bitcoin's energy consumption is underestimated: A market dynamics approach", Energy Research & Social Science (ERSS), December 2020.