Designing a Native AWS System to Classify Server Reboots in Real Time

Blockchain Technology For Carbon Credit Management: Assessing Organizational and Cultural Implications

A Thesis Prospectus
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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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Overview:

This paper focuses on the use of blockchain technology for managing carbon credits, along with its potential positive environmental impact. The approach taken in this research involves ecological thinking, examining the actors and values in the field, and questioning the environmental impact of every step in the project. The guiding question of this research is whether using blockchain technology for managing carbon credits can be implemented and prove to be advantageous. One interesting thing readers will learn from this work is the inner workings of using blockchain technology to provide transparency and efficiency in reducing carbon emissions.

Positionality:

My research goals stem from my childhood experience of living in India. Before moving to the United States, my early years were spent growing up in a heavily polluted part of India, where I was exposed to constant pollution affecting the health of the public. The air quality was poor, trash was a constant presence on the streets, and local water was often contaminated. This issue became personal to me from a young age, seeing firsthand the negative effects of pollution on the health and well-being of people in my community. My experiences and background have motivated me to find ways to use technology to mitigate these issues and make a positive impact on the environment and the people living within it. Throughout the past couple of years, I have gained lots of insight into the field of software through my experiences at CapitalOne, Amazon, along with other smaller companies. These experiences have allowed me to develop my technical skills, and slowly learn how computer science can be used to positively impact the problem of pollution. For example, I learned from other employees how machine learning and data science can help bring awareness to, and quantify pollution. However, it was my experience at Berkeley Pharma Tech that truly influenced me, giving me a sense of direction for this passion. At BPT, I was able to work on a project using blockchain technology to raise awareness and funding for a project involving Redwood Trees. We were able to drive a blockchain-based project to raise over six-figures for research involving Redwood Trees. The influence of this project spoke to me, sparking my interest to pursue research involving the use of blockchain for environmental impact. The connection between blockchain and pollution is interesting to me because it can potentially provide a secure way for individuals and organizations to financially support and invest in environmental projects, which can lead to a more sustainable future. It also allows for a transparent and decentralized system for tracking and reducing pollution. My experiences and background in India have motivated me to make a positive impact on the environment, and the potential of blockchain technology in this area is an exciting opportunity that I want to research further.

Problematization:

For my project, I will be investigating the use of blockchain technology for streamlining the tracking and management of carbon credits. Blockchain technology is a system that allows for transparency in information sharing and database management, across some kind of network. I want to investigate using this in relation to the distribution and transfer of carbon credits, which allow organizations to produce a certain amount of carbon emissions. This issue affects both organizations and the environment, as accurate tracking and management of carbon emissions is essential for reducing greenhouse gas emissions. These credits can be traded and tracked publicly, hence where the use of blockchain technology can come into play.

Guiding Question:

How can blockchain technology be effectively implemented to manage carbon credits, and what are the potential advantages and drawbacks for society as a whole?

Projected Outcomes:

Through this research, we aim to analyze how the tracking of carbon credits can be implemented via blockchain. After implementing the tracking of carbon credits through blockchain technology, we can evaluate the level of transparency it offers to the public and its potential benefits for society as a whole. Taking all of this into consideration, we can then effectively conclude whether or not there is a true advantage in using blockchain technology to manage carbon credits.

Technical Project Description:

The main part of this project will involve the deployment of ERC-20 carbon credits on an Ethereum test network. These ERC-20 carbon credits will simply be smart-contract enabled tokens that will be distributed to different organizations within an area. For example, if a city like Charlottesville has an emission limit of 5000 carbon credits, these ERC-20 carbon credits will be distributed according to the current allocation of carbon credits in the area. The credits will be viewable on the Ethereum blockchain, providing transparency to the public and allowing anyone to view who holds what amount of credit. If organizations want to transfer credits, they can do so over the Ethereum network, where every transaction is again, visible to the public. My project would aim to properly implement this system on the Ethereum network for a test region, along with making a website to streamline all of the anticipated functionality. My previous internships and project experiences in computer science and blockchain technology have prepared me for this project, as I have worked with smart contracts and the Ethereum network in the past. Through this project, I hope to gain a better understanding of the capabilities of blockchain technology in managing and tracking carbon credits.

Preliminary Literature Review & Findings:

Based on my preliminary literature review, many researchers have explored the use of blockchain technology for environmental sustainability. For example, Saraji and Borowcazk (2020) explored the potential use of blockchain technology in the carbon carbon credit market, where carbon credits could be traded transparently. Additionally, an author named Andoni (2019) proposed a blockchain-based platform for tracking and verifying the origin of renewable energy, which can help promote the use of green energy. Other researchers (Jiang, 2021) have also proposed the use of blockchain technology for managing waste and recycling.

In terms of STS, many researchers have explored the potential social and economic impacts of blockchain technology for sustainability. For example, some authors note that even though blockchain technology can help incentivize sustainable practices, it also has potential negative consequences (United Nations, 2022). One such negative consequence is increased energy consumption due to the computation needed for blockchain mining. Some of the challenges that researchers have faced in implementing blockchain-based solutions for sustainability include scalability and standardization. There are also concerns about the accuracy and reliability of blockchain data, as well as the potential need for regulation of such networks (Vogel, 2019).

My work can build on these previous approaches by further exploring the use of blockchain technology for managing carbon credits. By focusing on a specific use case, I can identify the potential benefits and drawbacks of using blockchain technology in an environmental context, and propose solutions to address any challenges I encounter. My work can help inform the broader discussion of blockchain technology and sustainability by providing valuable insights into a unique solution for an environmental challenge.

STS Project Proposal:

STS, which stands for Science, Technology, and Society, explores the relationship between technological developments and how they impact society in different ways. STS examines how different innovations affect and shape social, political, environmental, and global systems. My project is an STS project, because it aims to explore how applying blockchain technology to a certain area can positively affect social and environmental well-being. First and foremost, my project is focused on using recent technology to provide transparency to the public. The amount of carbon credits that organizations have will be publicly available, as well as any transactions or transfers made with these credits. Second, my project will explore the potential simplicity of transferring that blockchain technology can have, as well as any additional security benefits. All of these areas have some social or environmental effect, making my project an STS project.

My approach prioritizes environmental impact and sustainability. Rather than solely focusing on the technical aspect of blockchain implementation in my project, I will explore its application and use cases. By doing so, the project's focal point will center on the environmental impact. I want to divide the authors I use into two categories, the first being technically proficient experts in blockchain technology. To truly make a difference with my project, I need to be able to

understand the ins and outs of blockchain technology. I need to be able to learn about its full capabilities, in order to maximize the impact I can make with my research. The second category is computer scientists that have made environmental changes with their work. Although their projects may not directly align with mine, I can observe and understand their thought process, as well as learn any tips and tricks when doing my research.

I will be using two main approaches to investigate my topic: process methodology and ecological thinking. When using process methodology for this investigation, I will research the different actors in the field, and analyze how they compete against each other (ex. Solana vs. Ethereum, etc.). I will also study different values that have helped shape blockchain technology, from privacy concerns, to regulations, etc. I will also aim to focus on the outlook of blockchain technology, and where it tends to be progressing in the near future. Taking this approach will help me understand the relationships between the development and impact of blockchain on society as a whole, which can help the project by taking a socially responsible approach to the use of blockchain tech. The second approach I will be using is ecological thinking. Every step I take throughout this project, I will question how the environment is affected, whether that may be in a good or bad way. Doing so will help reinforce the primary focus of my research.

I anticipate that I will primarily analyze previous literature and research to accomplish my goals. There are a lot of publications involving blockchain technology, and many more involving the use of technology in positively impacting the environment. The bulk of my analysis will come from these types of texts. I also anticipate conducting a couple of interviews involving experts in this field.

Barriers & Boons

One potential limitation of my research is my lack of experience in the environmental sector. Through my education and experiences, I have a relatively strong technical background, however, I lack the in-depth knowledge regarding the inner workings of environmental issues. I plan to address this by educating myself further on the topic, reading pieces by experts to gain a better overall understanding. A financial limitation is the cost associated with deploying the ERC-20 carbon credits on the Ethereum network. This would require extra Ethereum for gas fees, which could cost a lot. To offset this barrier, I plan to deploy on a test network for our purposes, and later explore the costs associated with deploying on the mainnet. Additionally, I have very limited experience in conducting interviews, therefore communication may be a challenge when doing so. To address this, I plan to research and develop effective interview techniques, and will ensure that I conduct mock interviews before contacting field experts. Overall, while there are limitations associated with my research, I am confident that with careful planning, I can address these issues and conduct a thorough investigation into the use of blockchain technology for managing carbon credits.

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