FibreTag

Sustainable Luxury Fashion at your Fingertips

Research & Design Report

Jeevan Jutla, Artemiy Malyshau

The fashion industry is one of the most challenging sectors for sustainable development, comprising numerous social and environmental challenges. Currently, the industry is based on a complex network of global and fragmented supply chains which causes lack of transparency, traceability and sustainability. A potential solution to this issue is the application of emerging technologies such as Blockchain.

We propose FibreTag, an iOS app that uses the VechainThor Blockchain to enhance brand trust in the luxury fashion industry by combating counterfeits and promoting sustainability and transparency.

Contents

1. Problem Statement

Fashion supply chains are notoriously complex. This is due to their multilayered processes which include but aren't limited to, sourcing of raw materials, transportation to factories and distribution to consumers. This results in a triad of significant challenges: the proliferation of counterfeits, increasing environmental concerns and intense media scrutiny. The past two decades have seen an acceleration in the demand for high speed, high volume and cheap consumption, intensifying the burdens on the supply chain more than ever before. Each of these issues not only threatens the industry's profitability but also its reputation and long-term sustainability.

The demand for greater transparency in fashion supply chains has been growing for years, fueled by public outcry due to several major disasters. Between 2011 and 2013, the industry saw events such as factory fires in Pakistan's Ali Enterprises and Bangladesh's Tazreen Fashions, as well as the Rana Plaza building collapse [1]. The last of these resulted in over 1,100 factory employees killed and thousands more injured. Until then, almost no public information was available regarding the companies that were utilizing the factories involved. Some brands themselves had no idea that their own labels were found among the wreckage, due to their limited oversight of their suppliers and who these suppliers were subcontracting.

Since these events, the incentives around transparency are gradually inverting. Where before, brands kept details around their supply chains confidential, either for protecting trade secrets or not wanting to expose their business practices. Today, however, disclosing one’s sustainability and ethics can place a brand ahead of its competitors. 43% of Gen-Z say they intentionally buy from companies that have a robust sustainability reputation, according to the 2022 State of Fashion report by McKinsey & Company and the Business of Fashion [2]. Disclosing supply chain information also builds the trust of employees, labor and environmental advocates, and investors.

A leading measure for transparency in the global supply chain is the Transparency Index, created in 2016 by non-profit organization Fashion Revolution [3]. The 2021 Transparency Index found that there was a lack of public disclosure across all major brands with regards to reporting on items such as living wages for supply chain workers, purchasing practices, waste volumes, and carbon emissions in the supply chain. Among the lowest scorers were Max Mara and Tory Burch. Encouragingly, global brand H&M scored in the top 10, showcasing that scale does not preclude transparency.

Blockchain technology has emerged as a modern solution for enhancing consumer trust and combating counterfeiting, owing to its secure, tamper-resistant records. A notable early example in the fashion industry occurred in 2017 when designer Martine Jarlgaard collaborated with Provenance [4], a blockchain technology company. This partnership led to a pilot program that monitored raw materials from their origin through the supply chain until the final garment was produced. Each clothing piece received a unique digital token, enabling verification of each production stage. Customers could access this information through the Provenance app by scanning the item’s QR code or NFC-enabled label.

Similarly, designer Sarah Regensburger utilizes the blockchain platform vechain [5] for her sustainable fashion label. This technology enables her customers to learn about clothing care, sizing, design and construction processes, and the origins of organic materials. vechain also collaborates with Arket, an H&M subsidiary [6], to authenticate the organic manufacturing process of their wool beanies.

In addition to fashion, vechain's consumer-facing projects extend to luxury goods. The company has worked with Givenchy to embed NFC chips in leather products and sneakers for authenticity verification [7]. Likewise, luxury watchmakers Vacheron Constantin, Breitling, and Audemars Piguet have partnered with Arianee [8], a Paris-based firm specializing in web3 solutions for brands. Arianee's blockchain technology ensures that each Breitling watch produced after October 13, 2020, comes with a digital passport. This passport helps owners confirm the authenticity of their watch and prove their ownership.

Vechain distinguishes itself in supply chain tracking with its efficient dual-token system, which stabilizes transaction costs, and its semi-centralized architecture that ensures faster transaction speeds and greater scalability. Its integration with the Internet of Things (IoT) allows for real-time tracking and automated data entry, significantly enhancing accuracy. Additionally, vechain's robust security protocols ensure data integrity, vital for supply chain management. The platform's versatility is further demonstrated through successful partnerships across various industries, showcasing its practical applicability and reliability in handling diverse supply chain needs. This combination of efficiency, security, and versatility makes vechain a standout choice in the realm of blockchain-based supply chain solutions.

Blockchain as a solution for the fashion industry's transparency and counterfeit problem has been a well researched area over the last few years, with reports from BCG [9] and Deloitte

[10], however it still lacks mainstream adoption. We have identified 4 major barriers faced by organizations that attempt to implement blockchain as a solution:

- All or Nothing Solutions: most solutions do not play well with existing ERP systems, and often require a wholesale replacement of existing solutions and/or the purchase of expensive new hardware or software.

- Crypto-Maximalism: most solutions force users to have a deep understanding of tokenomics and force customers to use a proprietary token, a cryptocurrency wallet or both. This is not only counterproductive but also unnecessary.

- Complicated Onboarding: most solutions force users to complete a set of onboarding steps they are unfamiliar with, reducing the retention rate of the project.

- Volatile Transaction Costs: recording transactions on the blockchain is not free and the cost of these transactions can be volatile and expensive.

Our solution to overcome these barriers:

- FibreTag complements rather than replaces a company's existing system and allows for incremental integration. An organization can decide which parts of the system are most important to them and integrate them accordingly to their needs and means. We have designed our system to be flexible enough to run with commodity hardware and software.

- It requires very little understanding of tokenomics and does not force customers to use proprietary tokens or wallets, but still has all the benefits of utilizing a blockchain, allowing users to focus on managing products.

- Ensures energy efficiency and low and stable transaction costs: one of the biggest challenges for organizations is the cost of transactions. The volatile price of blockchain transactions is a problem that plagues many smart contract platforms - most recently the popular Etherum network. As the Ethereum platform becomes more popular, the transaction volume increases. As volume increases so does the valuations of its token, ETH. Since ETH is used to pay for transactions (in the form of gas), the cost of a given transaction can change rapidly and without warning. Volatile

gas costs can make it difficult for an organization to predict costs. Our solution to this problem is twofold:

1. We choose a core blockchain technology that has already solved the transaction cost volatility. vechain solves this by implementing a dual-token system - VET for currency and VTHO for gas. Because the tokens are loosely-coupled, the price of VET can rise and fall while transaction costs remain relatively stable.

2. We have created a mechanism for fractionalizing Non Fungible Records. Built into our system is the ability to construct multiple digital identities from a single NFT. For necessary items we can create an NFT and fractionalize it into multiple digital identities.

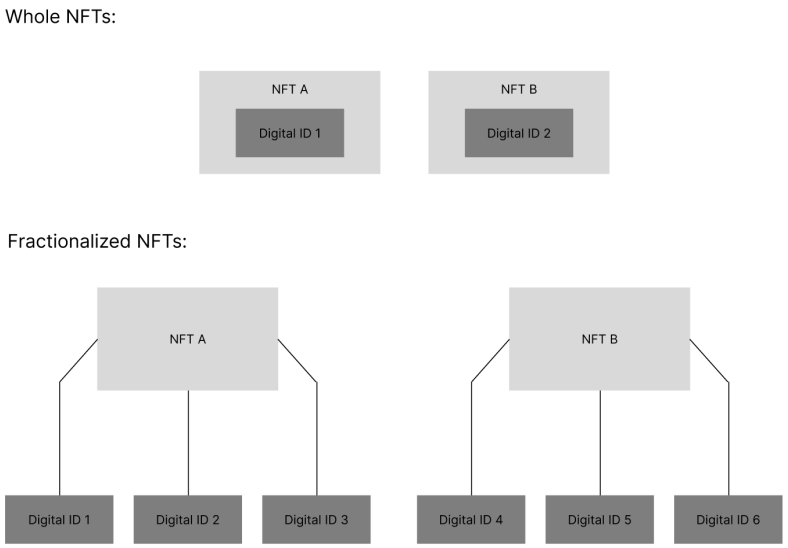


Diagram of whole NFTs vs Fractionalized NFTs

Therefore, the following are applications of FibreTag:

1. Verifiable Product Authenticity: FibreTag's product lifecycle tracking gives brands the ability to provide their customers with reliable evidence of a product's makeup including such attributes as raw materials source, location history and price tracking.

2. Verified Marketplace: Counterfeit products are becoming indistinguishable from authentic items, leaving customers at risk. Mainstream reselling platforms like StockX are still having trouble identifying counterfeits and are not able to protect their

consumers from counterfeits blending in as authentic [11]. They still employ traditional methods such as manual assessments to identify these. Marketplaces that want to protect customers from fraudulent and untested products need FibreTag as their infrastructure to prevent counterfeit products from reaching their listing. Additionally, the same anti-counterfeit protection provides an on ramp for direct to consumer engagement and secondary market insights, which can be extremely valuable for brands. The combination strengthens the consumer experience and provides a channel for communication. Customer service chatbots become more relevant to issues and can assist in registering warranties, sales or insurance of items.

3. Decentralised Finance (DeFi): When enterprises adopt FibreTag it enables them to leverage Decentralised Finance (DeFi) protocols to generate liquidity from their inventory or accounts receivables. Additionally, when end-to-end digitization is matched with stablecoins, it allows organizations to create automated payment incentives that can be executed from real world events and be protected from volatile market conditions (Fiat & Digital Currency).

2. Technical Implementation

This chapter will extensively outline what technologies will be used to implement FibreTag and what architectures will be used to build the product.

Workflow

When a user downloads the app they are presented with several login options - login as a manufacturer scanning and updating tag information or as a consumer wanting to view the history and validate authentication of an item. To allow for easy onboarding we have a conventional login using Google OAuth which is integrated through Google Firebase and to store the private keys we use Web3Auth as a non-custodial service. Upon successful account creation, certain premium features within the app are locked until activated with a valid API key.

The app provides an easy overview of the FibreTag marketplace, where FibreTag acts as a middle man for users to purchase products from companies that partner with FibreTag. Additionally, users are able to scan the physical NFC tags in the clothing to validate and ensure the validity and origins of their clothing.

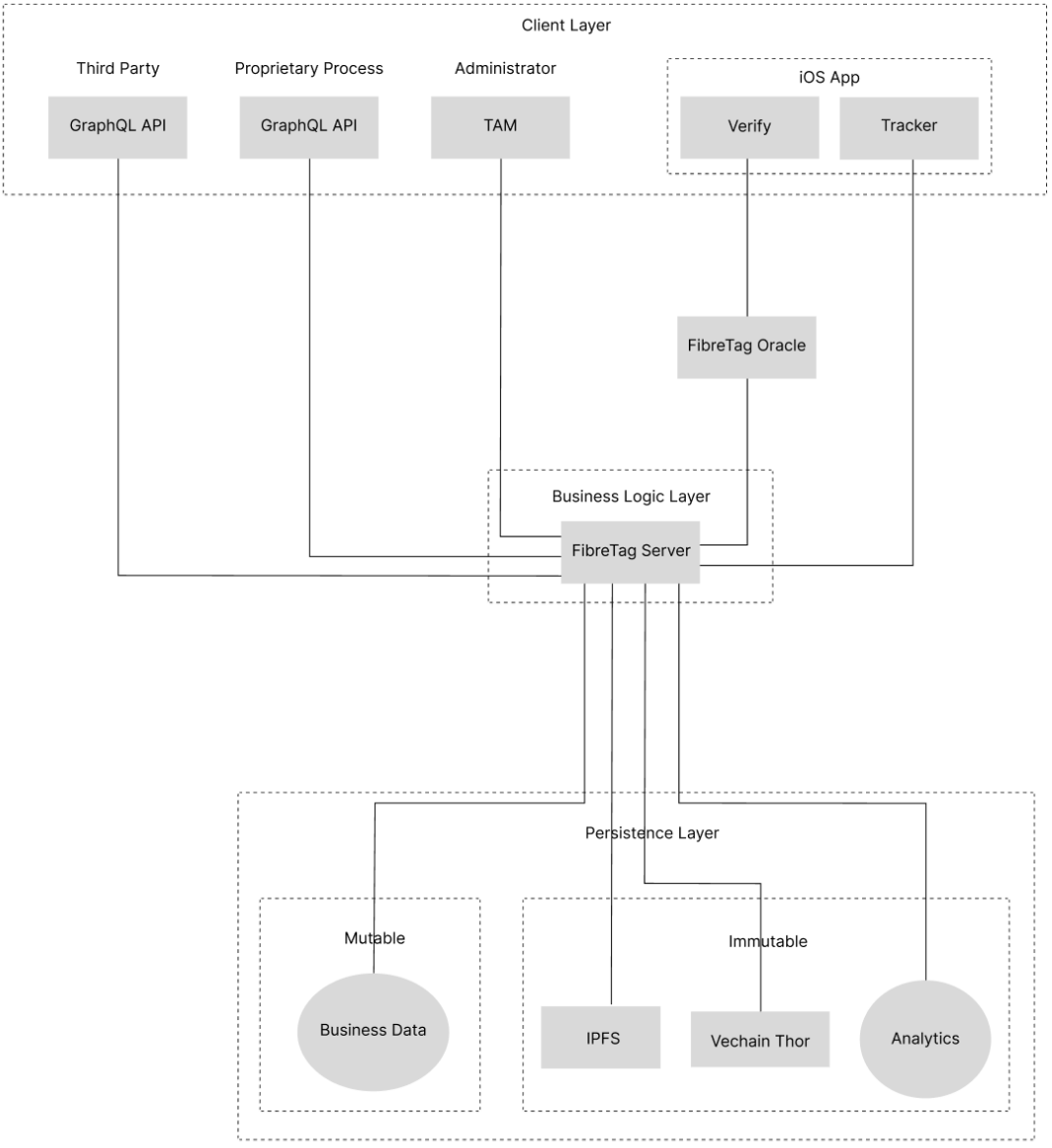
Brands and manufacturers submit requests to the backend during manufacturing. After verifying the requests, the API employs Web3.js to interact with the Solidity smart contract. Once processed on-chain, users can request the product history through a getHistory API call.

For a user to purchase an item on the luxury brand’s website the payment provider returns to the website with a specific payment ID and simultaneously informs the backend about a new NFT to be created. The backend, in turn, triggers the vechain.energy-API to mint an NFT corresponding to the purchase ID. As the user waits, the NFT, once created, is sent to their wallet, and they receive a confirmation of the successful transaction.

Components

We provide a web (brands) and iOS (brands & consumers) application along with API access options to facilitate tracking and tracing items throughout their product life cycle. Our general architecture can be divided into roughly three layers:

1. Client Layer
2. Business Logic Layer
3. Persistence Layer
    a. Mutable
    b. Immutable



General Architecture of FibreTag

TAM (Tokenized Asset Management): TAM is a web application that provides the ability to create digital identities for the brands physical items. Once a digital identity is created, TAM is used to manage and monitor those digital IDs. It’s also used to manage the buyers, administrators and smart contracts in a system.

iOS App: The iOS app is designed to allow the end-user to verify, take ownership and manage the digital identities of the assets they purchase. After a user verifies and takes ownership of an item they have access to all the content and services associated with that item. The mobile app also records tracking events to the blockchain. Tracking information such as timestamp and location is written to the blockchain and associated with that item’s digital identity. This info can also include text, photos, documents, videos and other content.

GraphQL API: We make our GraphQL API available to developers so that they can integrate our solution into existing ERP systems.

FibreTag Oracle: The FibreTag Oracle is the gateway to the wider FibreTag universe and is designed to facilitate visibility of items across the entire FIbreTag network, making a single source of truth for pricing data, lifecycle stage and more.

NFT Digital Twin Implementation

The foundation of FibreTag's technology is use of NFTs, minted on the VeChainThor blockchain at the point of sale. These NFTs act as digital twins of the physical luxury items, embedding vital details like origin, construction materials, and manufacturing intricacies. The uniqueness of each NFT creates a one-to-one relationship with its physical counterpart, ensuring secure and verifiable links.

In terms of development, the primary challenge lies in seamlessly integrating these NFTs with existing payment and sales platforms. This integration triggers the automatic minting of NFTs, encapsulating all the necessary information about the luxury item. The FibreTag iOS app is crucial in this ecosystem, providing a user-friendly interface for managing and viewing NFTs.

Each luxury item in FibreTag's system is equipped with an NFC chip, encoded with extensive details about the product. This encoding ranges from the item's origin and manufacturing specifics to the raw materials used. By scanning these NFC tags with their smartphones, users can access this wealth of information, enhancing transparency and understanding of the product's lifecycle.

The development of this NFC integration focuses on sourcing high-quality NFC chips and incorporating them into luxury products without affecting their aesthetic or functional quality. The FibreTag app is designed to offer a secure and intuitive interface for this NFC interaction, prioritizing the privacy and security of the data involved.
The NFTs in FibreTag are developed using standards like VIP180 or VIP181 on the VeChainThor blockchain, governed by smart contracts. These NFTs contain detailed metadata representing the physical product's characteristics and history. The integration with NFC technology ensures that scanning an NFC tag retrieves and displays corresponding NFT metadata, necessitating seamless integration between the NFC technology and the blockchain.

Function to Mint an NFT (Digital Twin)

This function is responsible for creating a new NFT on the blockchain, representing a digital twin of a physical product.

```
def mint_nft(product_id, product_details, blockchain_api):
    """
    Mint an NFT for a given product.

    Args:
    - product_id (str): Unique identifier for the product.
    - product_details (dict): Details about the product such as origin,
materials, and manufacturing process.
    - blockchain_api (object): An interface to interact with the VeChainThor
blockchain.
    Returns:
    - nft_id (str): The unique identifier of the minted NFT.
    """
    # Logic to interact with the blockchain API and mint the NFT
    nft_id = blockchain_api.mint_nft(product_id, product_details)
    return nft_id
```

Function to Update NFT Metadata

This function updates the metadata of an existing NFT, which is crucial for maintaining the current information about the product.

```
def update_nft_metadata(nft_id, updated_details, blockchain_api):
    """
    Update the metadata of an existing NFT.
    Args:
    - nft_id (str): The unique identifier of the NFT.
    - updated_details (dict): Updated product details.
    - blockchain_api (object): An interface to interact with the VeChainThor
blockchain.
    Returns:
    - success (bool): True if the update is successful, False otherwise.
    """
    # Logic to interact with the blockchain API and update the NFT metadata
    success = blockchain_api.update_nft(nft_id, updated_details)
    return success
```

Function to Read NFC Tag

This function reads data from an NFC tag, which is essential for retrieving the product information stored on the chip.

```
def read_nfc_tag(nfc_reader, tag_id):
    """
    Read data from an NFC tag.
    Args:
    - nfc_reader (object): An NFC reader instance.
    - tag_id (str): The identifier of the NFC tag to be read.

    Returns:
    - tag_data (dict): The data stored in the NFC tag.
    """
    # Logic to interact with the NFC reader and read data from the NFC tag
    tag_data = nfc_reader.read_tag(tag_id)
    return tag_data
```

Walletless Onboarding and Fiat Payments

As previously discussed, a common barrier with the integration of blockchain into industries is the disconnection between the regular economy and the on-boarding of users.

The onboarding can be simplified with familiar known Social Logins where the wallet is hidden away. We outline how we use a conventional Google OAuth integrated through Google Firebase to seamlessly onboard users. Fee Delegation additionally provides the ability to remove the crypto complexity.

Configuring a wallet with a seed phrase and securely backing them up can be a significant challenge for regular users. Remembering a password is already difficult enough, many users end up losing their seed phrases or storing backups in an insecure manner. We use Google OAuth integrated through Google Firebase to seamlessly onboard users the following steps are:

1. Firebase Setup: create a firebase project and enable google as a signin provider in the firebase console.
2. Client Side integration: implement google sign-in in the FibreTag iOS app, users will authenticate using their Google accounts.
3. Server Side Verification: on the server side, verify Google Oauth token to ensure its validity.
4. To store the private keys we use Web3Auth as a non-custodial service that can be claimed using Google OAuth.

The following libraries will be used to facilitate this:

- @vechain/connex: to build the raw data for contract interaction and allow a logical fork at the latest step between Web3Auth and Connex-Signing-Service.
- thor-devkit: to manually handle transaction singing.
- @vechain/ethers: for custom wallet management with a private key.
- @walletconnect/client and @web3auth/modal: for the Web3Auth implementation.

To initialize Web3Auth we use the Client ID from the chain namespace. We set this to ‘other’ as vechain is not supported by default. To create a provider that provides access to the users private key using the OpenLogin Adapter we use the following:

```
const openloginAdapter = new OpenloginAdapter({
      adapterSettings: {
            Network: WEB3AUTH_NETWORK,
            uxMode: "redirect"
      },
});
```

To complete the initialization the Adapter needs to be initialized once when the UI is ready for the user, we can use an effect to do this:

```
useEffect(() => {
      web3auth.initModal()
}, [])
```

Signing In and Out

The web3auth instance offers a connect() and logout() functionality that initiate the corresponding process:

```
const handleSignIn = async (): Promise<void> => { await web3auth.connect() }
const handleSignOut = async (): Promise<void> => web3auth.logout()
```

Wallet/Private Key Access

To get access to the wallet's private key, an event listener for the CONNECTED event of the web3auth adapter can be used. The example stores the private key in the component's state:

```
const subscribeAuthEvents = (web3auth: Web3Auth) => {
      web3auth.on(ADAPTER_EVENT.CONNECTED, (data: CONNTECTED_EVENT_DATA) =>
{
            console.log("Connected to wallet", data);

            //Store Private Key in State
            if (web3auth.provider) {
                  web3auth.provider.request({method: "private_key"})
                        .then(privateKey =>
```

```
setPrivateKey(String(privateKey)))
            }
      });
};

useEffect() => {
      subscribeAuthEvents(web3auth)
}, [])
```

This event listener listens for the CONNECTED event and retrieves the private key from the web3auth adapter. The private key can be used to sign transactions and interact with the blockchain.

Transactions

With the help of the thor-devkit transactions can be built and signed using a private key. We also use fee delegation to make the transactions gasless too.

Connecting to the traditional economy can be solved with a regular Fiat Gateway like Paypal, Stripe, or Chargebee in combination with a backend. We outline the configuration of how once a user purchases an item the NFT digital twin is minted instantly after sale and sent to the users wallet. The sequence of purchase will look like the following:

The following components will be set up:

1. ERC 721 NFT Contract
2. vechain.energy API-Key as Blockchain-Bridge
3. Backend Interacting with NFT Contract
4. Payment Processor to handle the finances

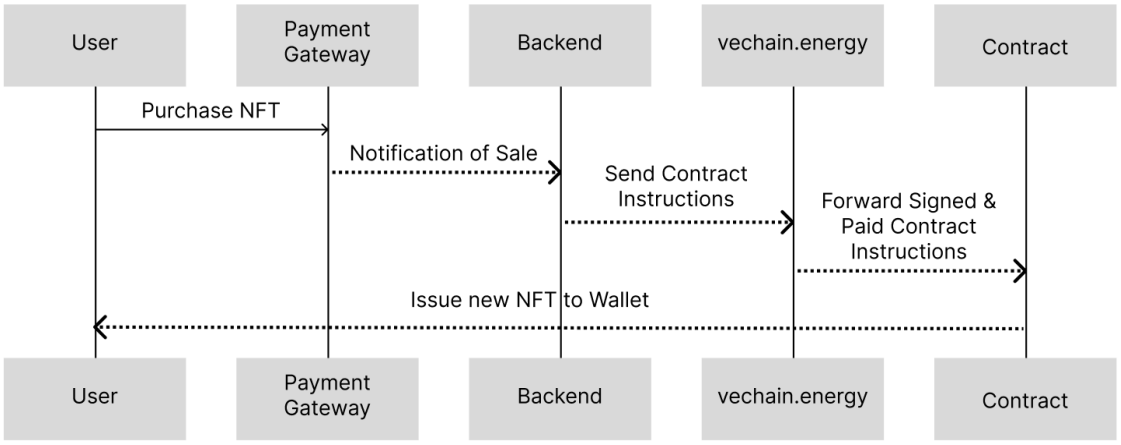


Diagram of the Sequence of the Purchase

As a modification the burning function will be overridden to be use only by a certain role:

```
function burn(uint256 tokenId) public onlyRole(MINTER_ROLE) override {
 _burn(tokenId);
}
```

API to Bridge out from the Blockchain

As an access point for the application a vechain.energy API is used. The permissions of the API key are set to interact with ‘everyone’. As every API key has its own wallet and address. This address can be guaranteed the ‘MINTER_ROLE” of the contract, to allow issuing new NFTs.

The backend connects incoming payments and issues commands to create or delete NFTs. A `fetch` triggers the functions by sending ABI and arguments. To issue a new NFT `safeMint` is called with the recipient address and the to be issued Token Id using a fetch on the vechain.energy API similar to the following structure:

```
fetch(VEN_ENDPOINT_URL, {
   method: 'POST',
   headers: {
     'x-api-key': VEN_API_KEY,
     'content-type': 'application/json'
   },
```

```
  body: JSON.stringify({
    clauses: [
      {
        "to": CONTRACT_ADDRESS,
        "abi": {
          "inputs": [
            {
              "internalType": "address",
              "name": "to",
              "type": "address"
            },
            {
              "internalType": "uint256",
              "name": "tokenId",
              "type": "uint256"
            }
          ],
          "name": "safeMint",
          "outputs": [],
          "stateMutability": "nonpayable",
          "type": "function"
        },
        "args": [address, tokenId]
      }
    ]
  })
})
```

Deleting or burning an NFT is similar, calling the `burn` function on the contact by posting the matching ABI and Token Id to be deleted.

```
fetch(VEN_ENDPOINT_URL, {
  method: 'POST',
  headers: {
    'x-api-key': VEN_API_KEY,
    'content-type': 'application/json'
```

```
  },
  body: JSON.stringify({
    clauses: [
      {
        "to": CONTRACT_ADDRESS,
        "abi": {
          "inputs": [
            {
              "internalType": "uint256",
              "name": "tokenId",
              "type": "uint256"
            }
          ],
          "name": "burn",
          "outputs": [],
          "stateMutability": "nonpayable",
          "type": "function"
        },
        "args": [tokenId]
      }
    ]
  })
})
```

Token Id Calculation

The Token Id represents the luxury item which the contract expects to be a uint256. It will highly likely be a string on the payment processors side and need to be converted into a number with the help of a sha256 hash and BigNumbers [12]:

1. Create a sha256 hash of the item identifier
2. Calculate a BigInt from the hexadecimal representation of the hash

Example of such function:

```
export async function idToTokenId(id: string): Promise<string> {
 const encodedText = new TextEncoder().encode(id)
```

```
 const digest = await crypto.subtle.digest({ name: 'SHA-256' },
encodedText)
 const hashArray = Array.from(new Uint8Array(digest));
 const hashHex = hashArray.map(b => b.toString(16).padStart(2,
'0')).join('')

 return BigInt(`0x${hashHex}`).toString()
}
```

Security

At its lowest level, our technology must guarantee the immutability of each transaction and event written to the system. We chose a distributed ledger solution that guarantees “absolute finality (or safety guarantee) on blocks and transactions" [13]. All data transmitted between our middleware clients and databases is secured by TLS. All mutable data-at-rest (sql and no-sql) is encrypted.

3. Business Model

Staking and Operational Costs

FibreTag introduced a new economic model where both brands and users actively participate in staking VET tokens. This engagement is crucial as it generates VTHO tokens, essential for covering the blockchain operational costs. The staking mechanism not only ensures a steady flow of resources to support transactional activities by also aligns the interests of brands and users with the platform's sustainability. By involving both parties in this token ecosystem, FibreTag fosters a community-centric approach, enhancing user investment in the platform's success while ensuring a sustainable model for managing blockchain transaction costs.

NFC Tag Sales and Commision

A component of FibreTag’s revenue stream stems from the sale of NFC tags, facilitated through strategic partnerships with leading NFC technology providers, who we discussed when conducting this research. This collaboration not only ensures the integration of high-quality NFC technology into luxury products but also creates a reliable source of income through commissions on each tag sold. By positioning itself at this intersection of technology provision and luxury fashion, FibreTag capitalizes on the growing demand for secure and innovative authentication methods in the industry.

API Access for Expansion

FibreTag's business model extends beyond direct product applications, offering API access to external developers and businesses. This initiative allows for the creation of an array of applications and services that build upon the FibreTag ecosystem, potentially broadening its applicability and user base. Such accessibility encourages innovation and diversification of use cases, which could attract new markets and create additional revenue streams. By opening its platform to third-party development, FibreTag not only fosters a collaborative environment but also enhances its value proposition in the market.

SaaS Premium Features

The implementation of a Software as a Service (SaaS) model allows FibreTag to offer advanced features, particularly in the realm of phygitals (physical and digital products). This approach enables scalability and flexibility in revenue generation, catering to the diverse needs of brands and individual users. By providing premium, customizable features through

a SaaS model, FibreTag aligns with the evolving demands of the luxury fashion industry, where exclusivity and personalization are key.

4. Future Work

FibreTag's roadmap includes forming strategic partnerships with leading luxury brands to position itself as the industry standard for luxury item authentication. These collaborations are aimed at bolstering brand trust and establishing FibreTag as an indispensable tool in the luxury fashion sector. By securing partnerships with prominent names in the industry, FibreTag not only enhances its credibility but also expands its reach and influence, positioning it as a pioneer in combining technology with luxury fashion authentication.

Integration of AR

An exciting direction for FibreTag is the integration of Augmented Reality (AR) technology, aimed at enriching user experience and bridging the gap between the physical and digital realms. Features like virtual try-on will enable consumers to interact with products in a virtual space, aligning with the growing trend towards immersive and interactive shopping experiences. This move towards AR not only enhances customer engagement but also showcases FibreTag’s commitment to staying at the forefront of technological innovation in the fashion industry.

Improved Fraud Detection using Machine Learning

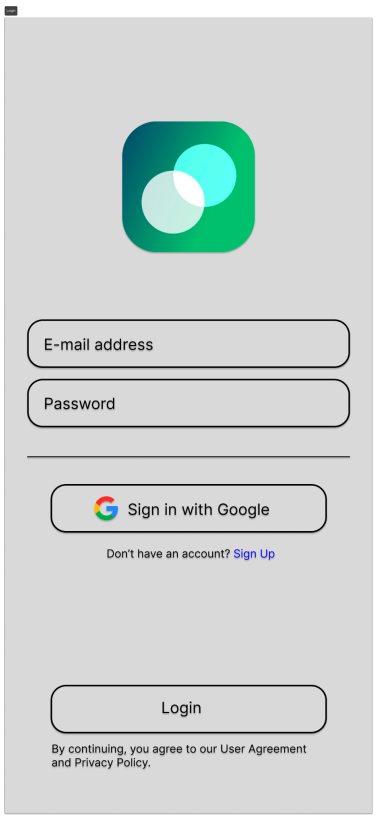
To further enhance security, FibreTag plans to implement machine learning algorithms designed to detect anomalies and potential fraudulent activities. The integration of machine learning will significantly enhance the platform’s capability to identify and mitigate counterfeit risks, reinforcing its commitment to authenticity and trust. This advanced technology ensures a robust and secure environment, crucial for maintaining the integrity and reliability of the FibreTag platform.

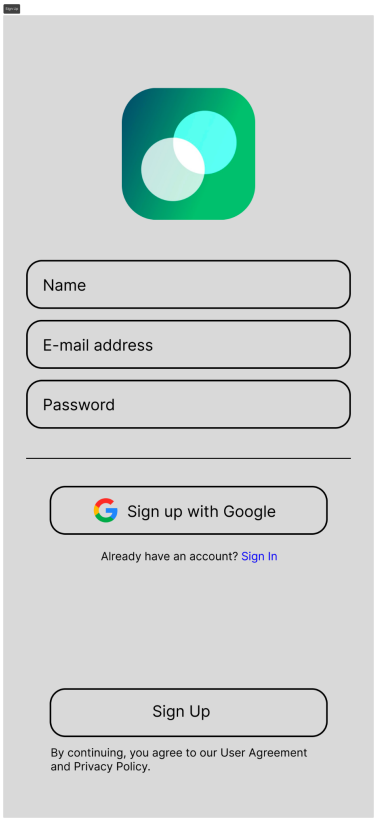
References

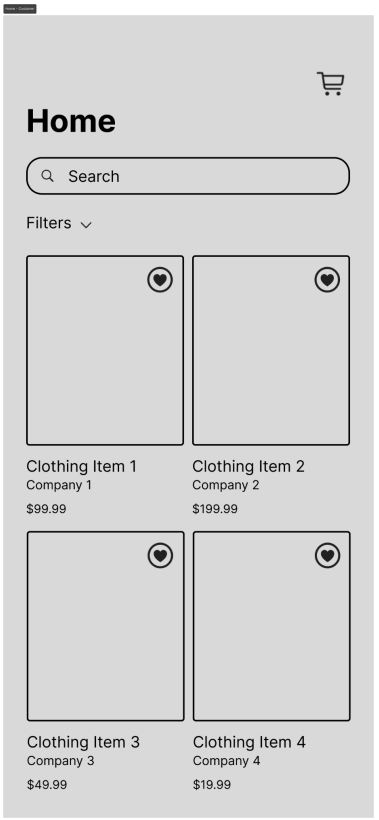
1. https://respect.international/fatal-fashion-analysis-of-recent-factory-fires-in-pakistan-and-bangladesh/
2. https://www.mckinsey.com/~/media/mckinsey/industries/retail/our%20insights/state%20of%20fashion/2022/the-state-of-fashion-2022.pdf
3. https://www.fashionrevolution.org/about/transparency/
4. https://www.fialondon.com/projects/martine-jarlgaard-x-provenance-x-a-transparent-company/#:~:text=The%20FIA%20collaborated%20with%20Martine,change%20the%20future%20of%20fashion.
5. https://cryptonews.net/news/altcoins/289148/
6. https://thenextweb.com/news/arket-hm-blockchain-cryptocurrency
7. https://vechaininsider.com/tag/givenchy/
8. https://www.ledgerinsights.com/evrythng-arianee-blockchain-luxury-goods-traceability/
9. https://web-assets.bcg.com/1e/23/d9e9792a4988b61e708794baa174/bcg-sustainability-metaverse-in-fashion-opportunity-or-threat-oct-2022.pdf
10. https://www2.deloitte.com/kz/en/pages/operations/articles/blockchain-supply-chain-innovation.html
11. https://www.complex.com/sneakers/a/brendan-dunne/stockx-fake-sneakers-nike-lawsuit-38-pairs
12. https://docs.ethers.org/v5/api/utils/bignumber/
13. https://www.vechain.org/whitepaper/

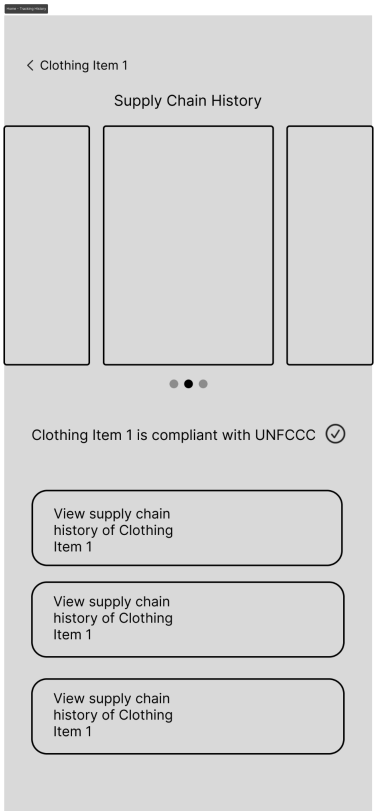
Appendices

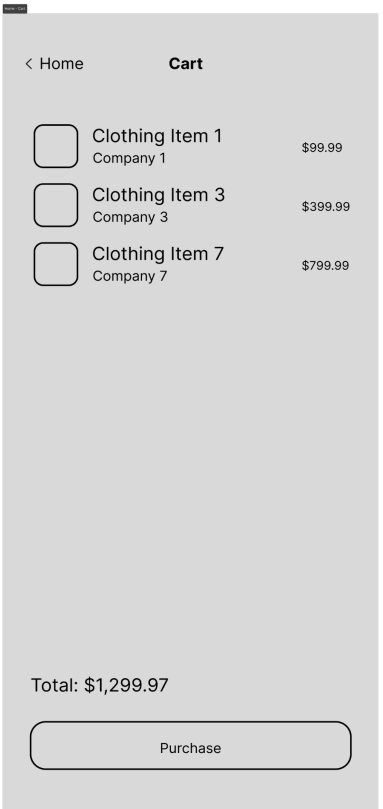
Appendix A - Wireframes of Mobile Frontend for Consumers

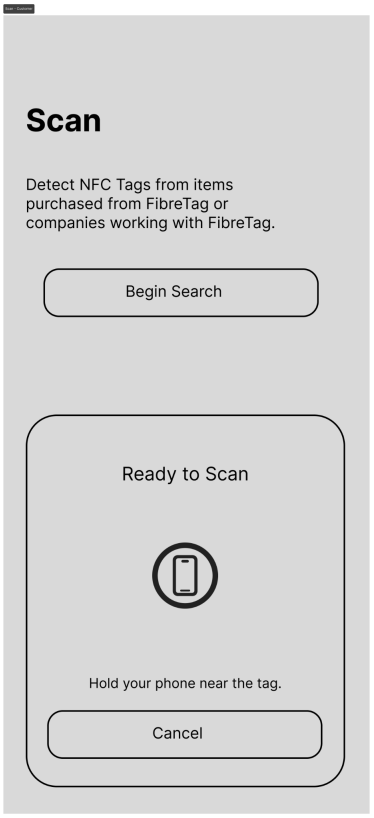


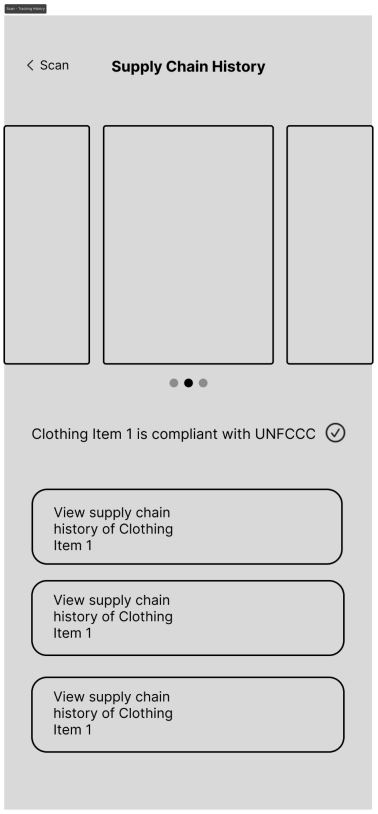


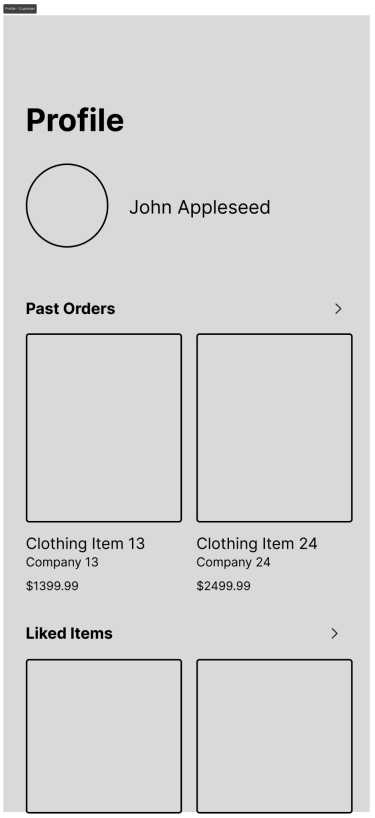






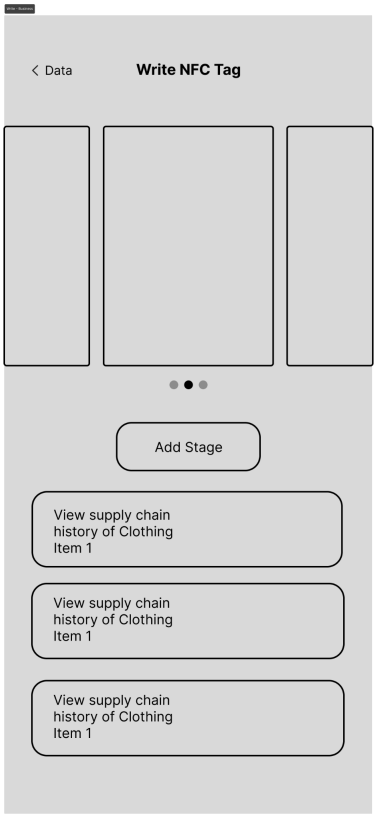

Scan
Detect NFC Tags from items purchased from FibreTag or companies working with FibreTag.
Begin Search
Ready to Scan
Hold your phone near the tag.
Cancel

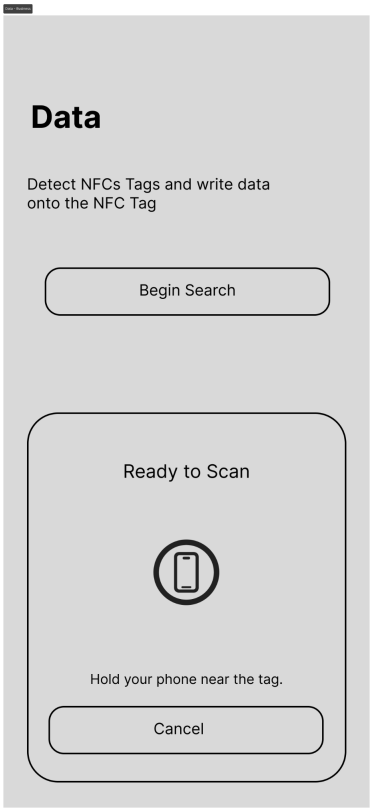

Scan
Supply Chain History
Clothing Item 1 is compliant with UNFCCC
View supply chain history of Clothing Item 1
View supply chain history of Clothing Item 1
View supply chain history of Clothing Item 1

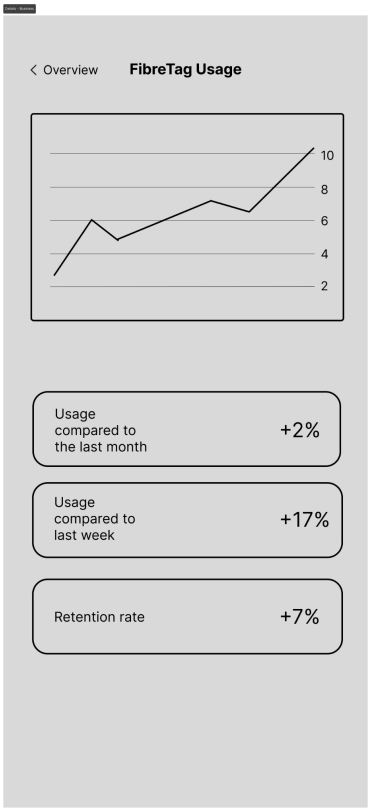

Profile
John Appleseed
Past Orders
Clothing Item 13
Company 13
$1399.99
Clothing Item 24
Company 24
$2499.99
Liked Items

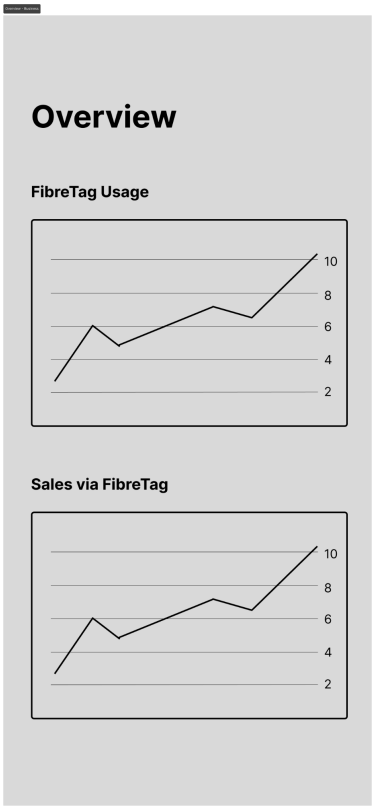

Profile
Settings
DETAILS
Name
Email
Notifications
Data Usage
WEB3 CREDENTIALS
Wallet Address
0xd212412481926182749182741 24

Appendix B - Wireframes of Mobile Frontend for Businesses









Appendix C - Wireframes of Web Frontend for Businesses