EtherWeave User Manual

Abstract

EthrWeave is an advanced blockchain based product counterfeiting solution that provides 100% traceability and authentication of products through the supply chain. EtherWeave uses the immutable properties of the blockchain to give manufacturers, suppliers and consumers a secure, tamper-proof way to verify a product's authenticity. Using QR codes or RFID tags, the system tracks every product and records every transaction and transfer of ownership to the Ethereum blockchain for each product, so the process is transparent and reliable from production to who ends up in the hands of the final consumer.

Target Users

- Manufacturers and Suppliers: Registers, updates and tracks products in the system.
- Consumers: Do a QR code or RFID tag verification for products.
- Administrators: System operations, user management, report generation are supervised.

User Expertise Levels: It is designed in such a way so that the system will be intuitive and easy for users with different levels of technical skill. Users with no technical expertise can use basic functionality and more advanced users, such as the administrators, can apply more features including reporting and managing users.

Key Features and Benefits

- Blockchain-based Authentication: Immutable blockchain records ensure that product authenticity and transparency is valid.
- Product Tracking: Real time updates for authorised users to track products through the entire supply chain.
- Real-time Verification: Scanning QR codes or RFID tags in seconds gives consumers a way to verify the authenticity of products.
- Secure and Tamper-proof: Data integrity and rejection of unauthorised modification are guaranteed by blockchain technology.
- User-friendly Interface: Web and mobile users experience seamless navigation and workflows, all made possible by the system.

Step-by-Step Guide

Logging in to EtherWeave (Manufacturers and Suppliers)

1. You'll open your web browser and go to the EtherWeave login page.
2. Type your credentials (email and password) and then press "Login."
3. After successful login, you'll be directed to the dashboard where you'll be able to manage product data.

Registering a New Product (Manufacturers)

1. Go to the Product Management section of the dashboard.
2. Select "Add Product."
3. Enter all the required product details (e.g. product's name ID, batch number and production date).
4. Relevant QR code or RFID tag is attached to the product.
5. Click "Submit" to register the product on the blockchain and guarantee tamper proof product tracking.

Verifying a Product (Consumers)

1. Using the EtherWeave mobile app, or other compatible device, scan the QR code, or RFID tag on the product.
2. The blockchain will provide the transaction history of a product and the authenticity status of the product.
3. Look over the product details to make sure it is authentic and originates.

Logging Out

1. Click on your profile icon in the top right corner of the interface to securely end your session.
2. Select "Logout."

System Navigation

- Main Menu: From the sidebar menu, you can access the system's core functions (Product Management, Reports, and User Settings).
- Toolbar: The toolbar, which sits at the top of the page, gives you access to notifications, account settings and system wide search functionality.
- Action Buttons: Action buttons such as 'Add Product', 'Submit' and 'Generate Report' can be used to do tasks in the system.
- Shortcuts: Quick access links and the search bar are used to quickly move from section to section.

Features

Creating an Account

1. Navigate to the Sign-Up page.
2. Put in personal or company details (by manufacturers and suppliers) and choose a secure password.
3. Choose your role (e.g. Manufacturer, Supplier, Consumer), and press 'Submit' to create your account.

Adding Product Data

1. From the dashboard, go to Product Management and click Add Product.
2. Enter all of the required product details like product ID, description and batch number.
3. Attach a QR or RFID tag so the product is traceable inside of the system.
4. And then click 'Submit' to finish the process.

Tracking Product Movement (Suppliers)

1. You can access the Track Product section.
2. Either enter the product ID or scan the product's QR code, and get the current status and movement of the product through the supply chain.
3. Change the product's location and status when necessary.

Generating Reports (Administrators)

1. Go to the Reports section.
2. Choose the report you want to generate – product status, system activity for example.
3. Give the input (in this case date range, product type), click on 'Generate' and define the report parameters.
4. The report can be viewed or downloaded in real time, for further analysis.

Troubleshooting Guide

Unable to Log In: Make sure you are using the right email and password. If you cannot remember your password, click the "Forgot Password" link and reset it via email.

Product Verification Failed: The QR code or RFID tag should be affixed properly and clearly visible. In case it does not work, contact the system administrator for help.

Data Not Saving: Try again, check that your internet connection is working. If it persists, refresh this page and try again.

System Architecture

EtherWeave consists of several key components, ensuring a secure and scalable architecture:

- **Frontend (Web and Mobile Applications)**: On the web and mobile side, the user interfaces are designed with React for user friendly and quick registration, verification, and tracking of the product.
- **Backend (Smart Contracts and APIs)**: EtherWeave's backend is powered by Solidity based smart contracts, which automate critical functions like product registration, ownership transfers, and verification.The APIs are used to let the frontend communicate with the Ethereum blockchain, thus users interact with the system without accessing the blockchain.
- **Blockchain (Ethereum Network)**: Underlying that is the Ethereum blockchain where product transactions are recorded and verified. An immutable ledger stores each product's lifecycle, from creation to final sale, so that product data cannot be tampered with or changed.

Technologies Used

- **React and Node.js**: It also enables efficient front end development.
- **Solidity**: A language used to develop smart contracts for registering and managing products on blockchain.
- **Hardhat and Ganache**: Simulator tools for blockchain environments used to test and deploy.

Security Considerations

- **Encryption**: End to end encryption protects user communications with the blockchain, ensuring that the sensitive data is secure and that the transactions are also secure. Data stored within the system, including user personal and transactional data, is stored in an encrypted form using AES 256.
- **Role-Based Access Control (RBAC)**: RBAC are used to control the User permission depending on their Role (i.e manufacturer, supplier, consumer) with EtherWeave. Different data can be accessed by only authorised users or only perform some tasks within the system.
- **Blockchain Security**: With its use of blockchain technology, the transactions are recorded in an immutable and transparent ledger, meaning there's no unauthorised access, no tamper with product data.

Frequently Asked Questions (FAQs)

How can I reset my password?: If you forgot your password follow the prompts to click the "Forgot Password" link on the login page and reset your password via email.

Can you use EtherWeave on mobile devices?: EtherWeave is available both through web as well as mobile apps, making it flexible for on the go users.

How do I know the product I'm buying is authentic?: The product can be scanned with the EtherWeave mobile app with either the QR code or RFID tag on the product. The product will have its blockchain verified history and authenticity immediately displayed by the system.