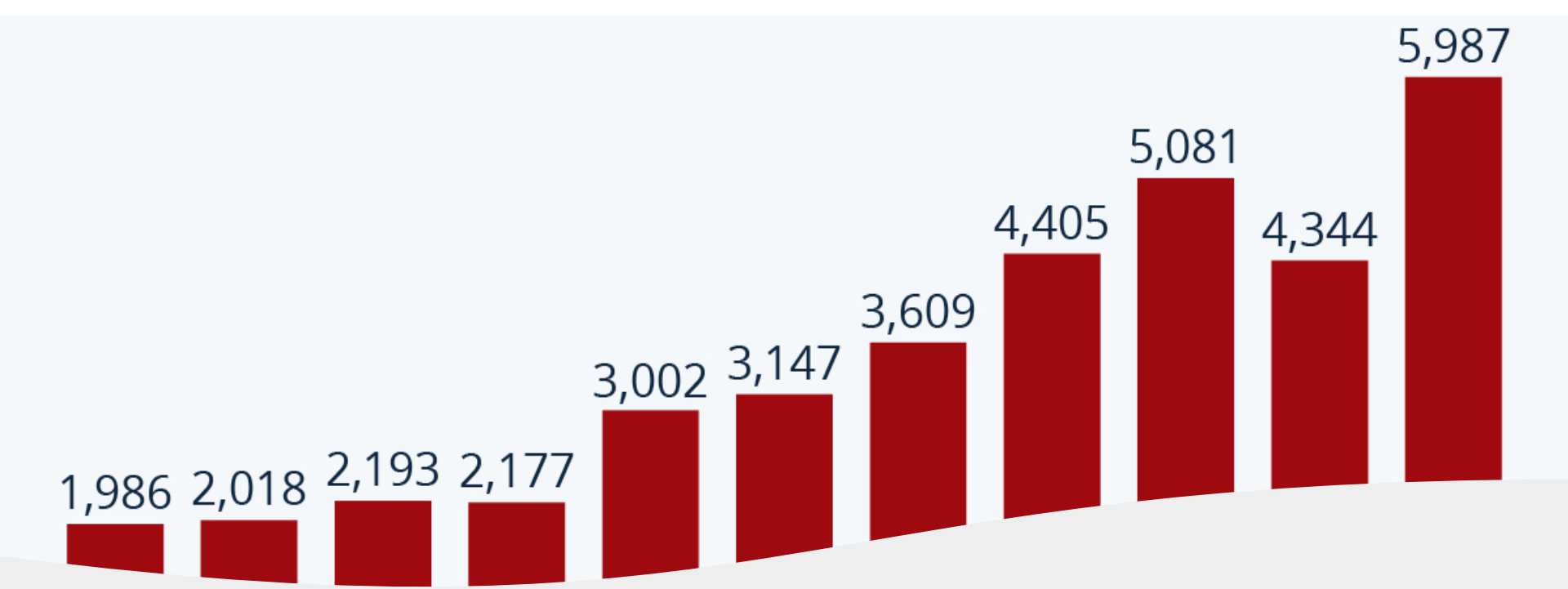


Secure Dose

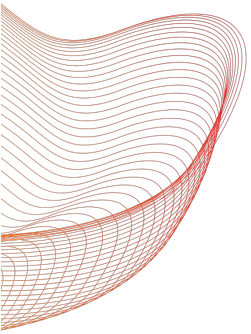
By Chris Bramley, Miguel Munoz , Ameir El Hilon, Aaron Bunting

The Problem

Counterfeit Drugs: The counterfeit pharmaceutical market has exploded since 2011 especially in third world countries.

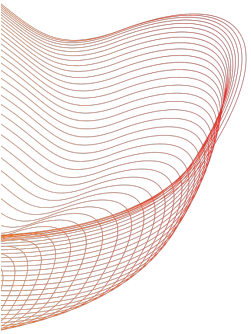
Impact: Economic losses for genuine manufacturers, health risks for consumers.

Trust Deficit: The growing mistrust between consumers and the pharmaceutical industry due to these counterfeit products.



Problem

1. "SecureDose” combats counterfeit meds via blockchain.
2. Ensures drug authenticity, WHO-identified issue.
3. Targets India's 20-70% counterfeit rate.
4. Focuses on North India's populous states.
5. Aims at 25-45 age group, tech-savvy caregivers.
6. Employs QR codes for traceability.
7. Enhances drug supply chain transparency.



The Solution

- Blockchain: Highlight the immutability, decentralization, and transparency of blockchain technology.
- Our Approach: Creating a system where each drug can be traced from its origin (manufacturer) to its destination (consumer).
- Transparency & Decentralization: Ensuring every transaction is traceable and cannot be altered once recorded.

Executive Summary

Our goal is to create an application on the blockchain where pharmaceutical companies can register drugs and verify authenticity for each batch of drugs

We want the public to be able to know their medicine is real and be able to trace it from manufacturer to pharmacy to create ease of mind.

Every manufactured medication batch receives a unique blockchain token, encapsulating its entire lifecycle data

SecureDose is meant to bring transparency, traceability, and accountability to the pharmaceutical supply

Approach

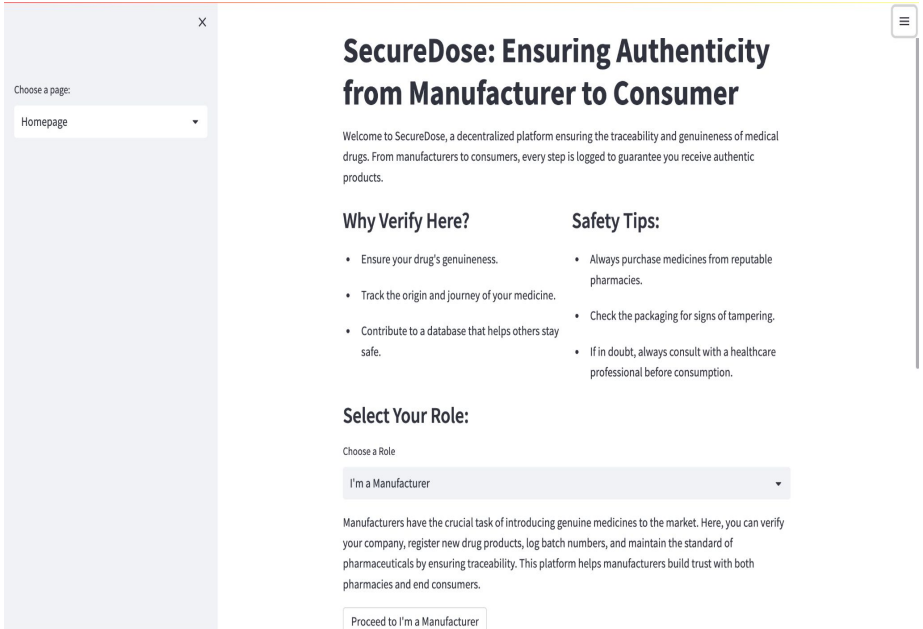
Sepolia Faucet was implemented to test our app and contracts because it acts as a real life blockchain would rather than just in a local environment

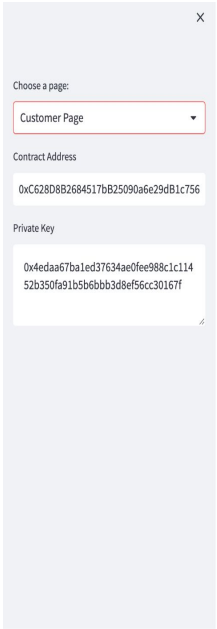
Remix was used to develop and deploy our smart contract

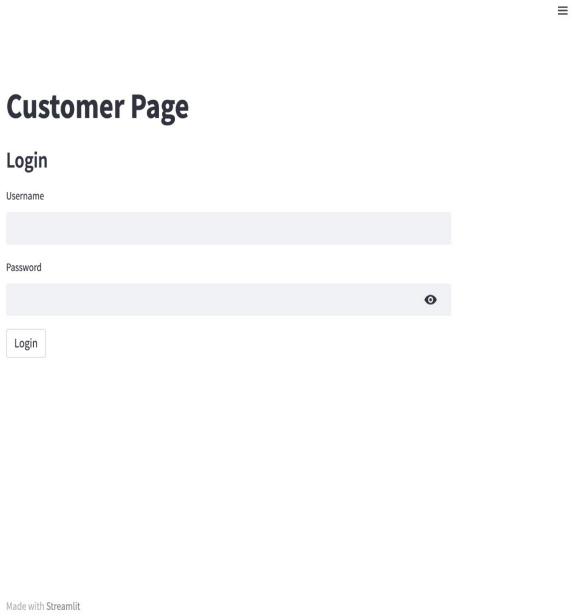
Streamlit was utilized as an application to interact with our contract

Split into two teams Miguel and Chris for smart contract development
Aaron and Amir handled the streamlit application

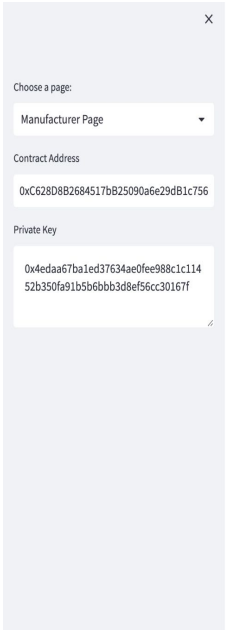
Visuals (homepage & customer page)

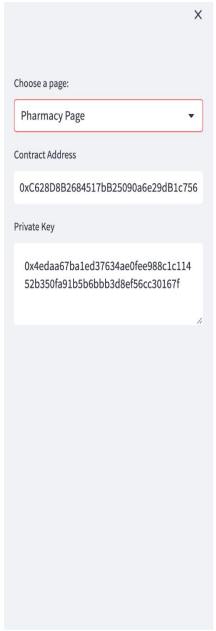


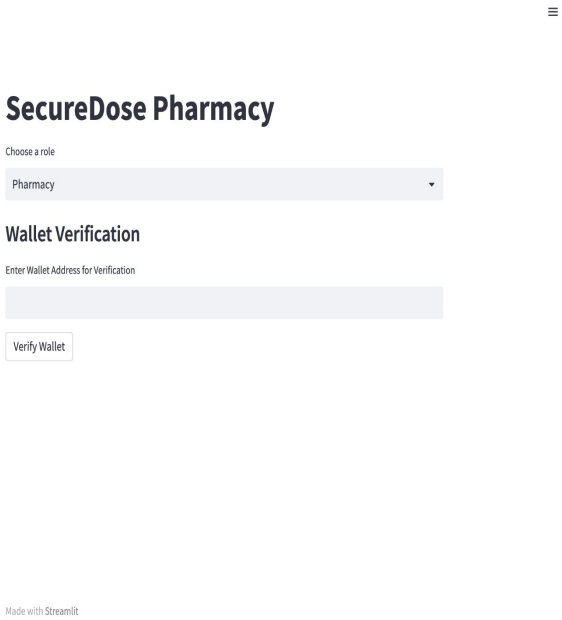




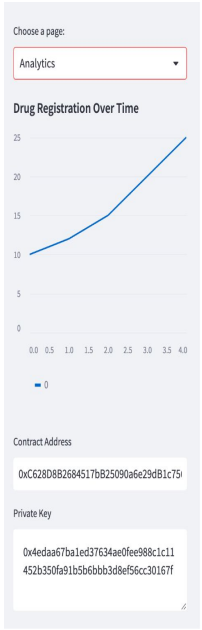
Visuals (Manufacturer/pharmacy)

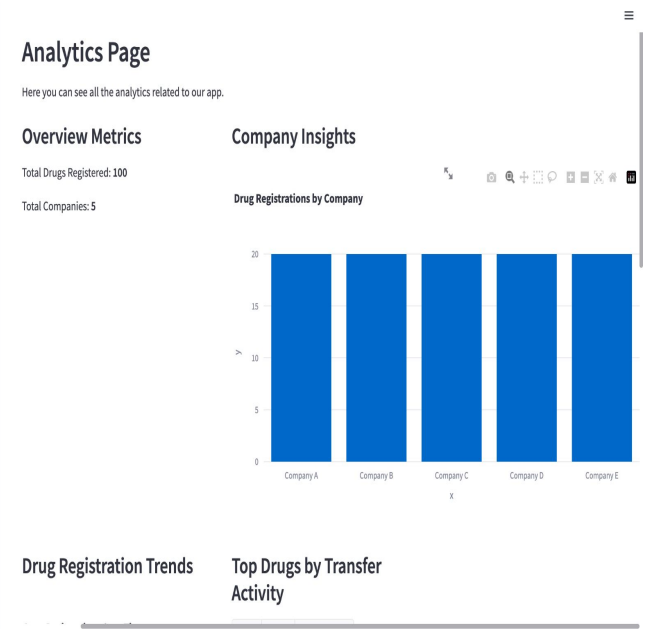


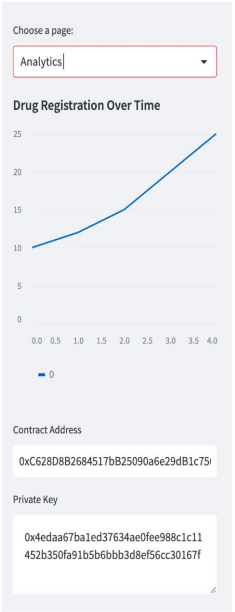


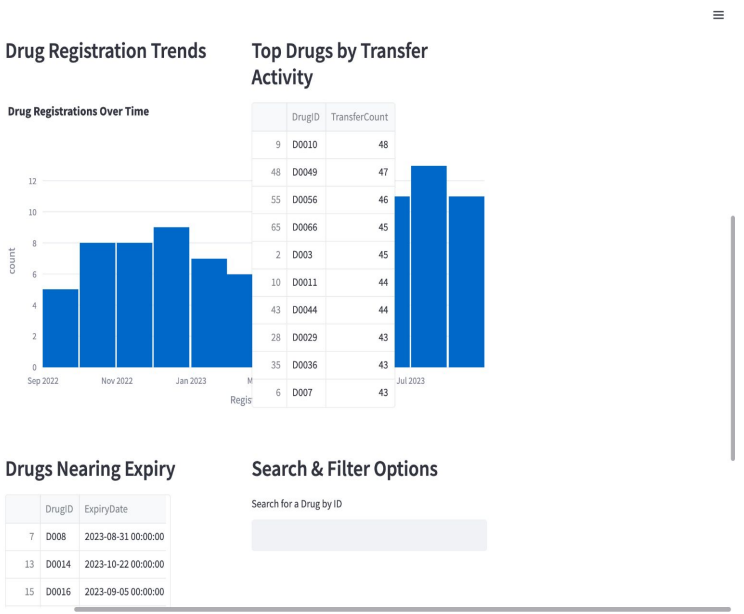


Visuals (analytics)









Core Functionalities:

- **Company Verification**: Ensures only genuine manufacturers can register drugs.
- **Drug Registration**: Recording essential details, timestamped for authenticity.
- **Drug Transfer**: Monitoring drug ownership changes to trace its journey.
- **Drug Queries**: Providing valuable insights by fetching drug details.
- **Drug Recall:** Allows instant notification of unsafe/recalled drugs

Tools Used & Justification:

Streamlit: Rapid prototyping and user-friendly design for non-tech users.

Web3: The gateway between Ethereum and our Python-based application.

Ethereum: Offers smart contracts, a robust ecosystem, and is widely adopted.

Infura: Provides scalable and reliable access to the Ethereum network.

Use Cases:

Consumer Confidence: A consumer can check the authenticity of the drug they purchased.

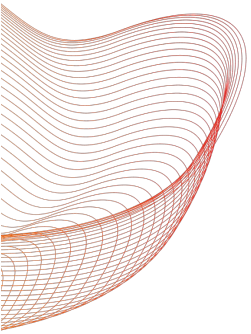
Regulatory Compliance: Ensuring manufacturers comply with standards.

Supply Chain: Track the movement and ownership changes of drugs, helping in recalls or investigations.

Pharmacy Assurance: Pharmacies can ensure they're stocking genuine products.

Purpose of the Token in Our System

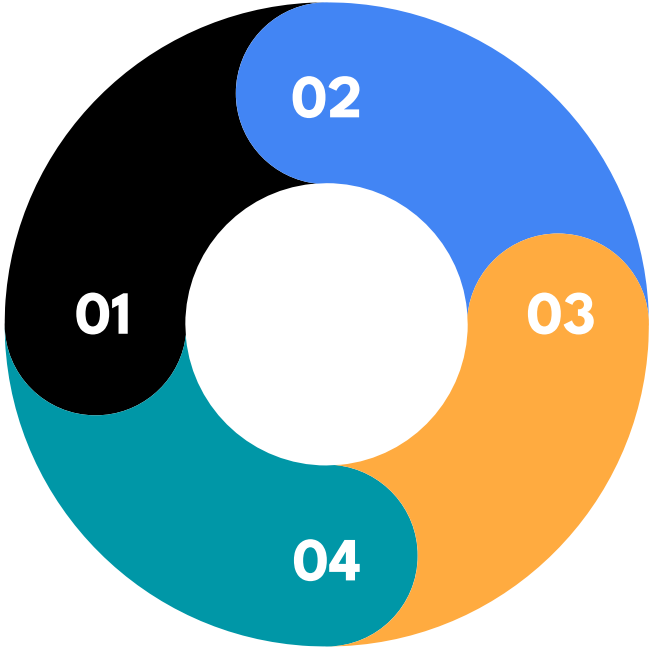
- Digital Representation: Each drug registered becomes a unique token, making it identifiable and traceable on the blockchain.
- Ownership: The token's ownership represents the current holder of the drug, ensuring clear drug provenance.
- Transfer: When a drug changes hands, the associated token is transferred on the blockchain, reflecting the physical movement of the drug.



Why use tokenization?

Tokenization in our system provides a secure and transparent way to track drugs on the blockchain.

By adopting ERC standards, we ensure compatibility, uniqueness, and flexibility in our tokenized drug system.



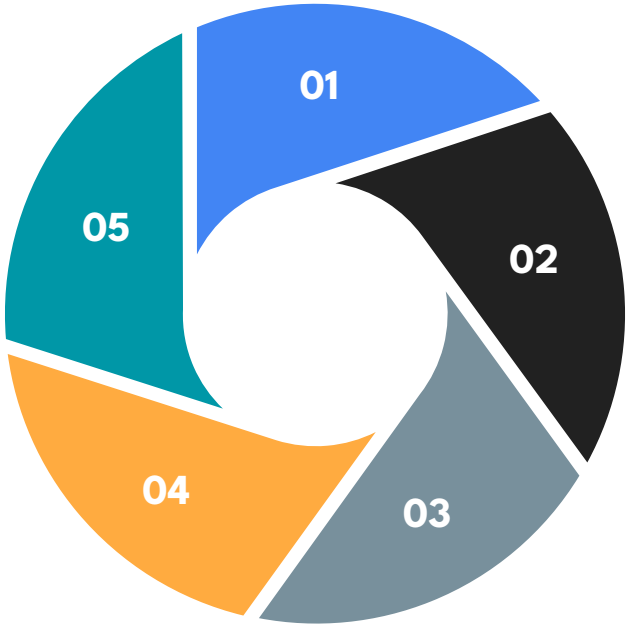
The advantages of using tokens include immutable records, global standards, and reduction in counterfeiting.

Together, these features contribute to building a trustworthy and efficient drug authentication platform.

Our Smart Contract: Structured to Enhance Authenticity

Transfer Functionality: Maintains a clear record of every drug's movement, ensuring traceability.

Data Retrieval: Enables stakeholders to quickly fetch drug details or verify company authenticity.



Company Verification: Only verified companies can register drugs, ensuring data credibility.

Drug Registration: Detailed drug information, including components, manufacture, and expiry dates, are stored.

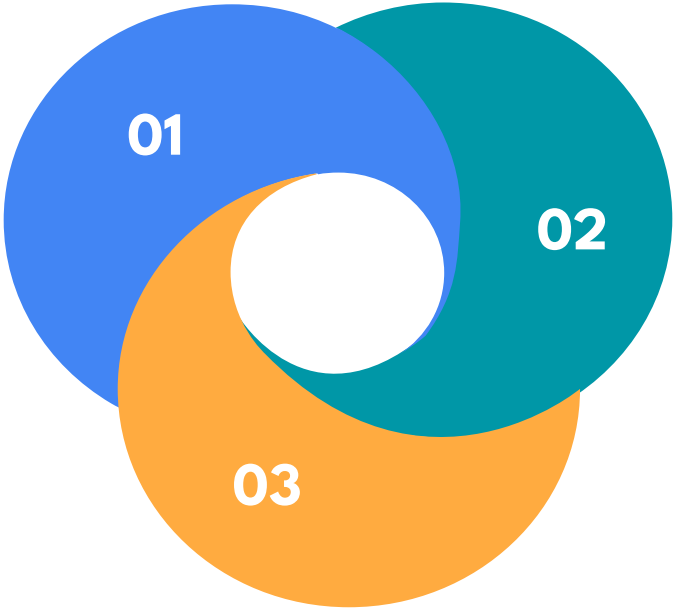
Decentralized Search: Uses drug properties to search for relevant drugs, a feature not easily achievable in traditional databases.

Real-time Verification

- The ability to instantaneously verify drug authenticity is crucial in fast paced pharmaceutical distribution networks.
- Reduces chances of counterfeit drugs entering the supply chain.

The Future of Blockchain in Pharma

Real-time tracking of drug shipments.



Predictive Analysis with AI: Predict potential counterfeit hotspots or supply chain disruptions.

Interconnection with Health Systems: Providing patients with a holistic view of their medications.

Challenges & Future Enhancements

- Challenges: Gas fees, data storage limitations on blockchain, realtime updates.
- Enhancements: Integrate with off-chain storage for large data, use layer-2 solutions for scalability, expand to other blockchains for cross-chain operability.
- Add in a qr code feature for patients to be able to scan their medicines

Cost Estimation

- **Private Blockchain:** $50,000 - $65,000 USD
- **Labor costs:** $30,000-$40,000 USD
- **Bottom Line:** $95,00 - $105,000 Initial investment

Conclusion

01 Call to Action: Encouraging stakeholders to adopt or support such systems for a safer healthcare ecosystem.

02 Recap: The importance of drug authenticity and the potential of blockchain in addressing it. As well as curbing the false pharmaceutical pandemic before it gets any worse.

Drug Authenticity Management

Choose a Function

verifyCompany

Verify a Company

Company Address to Verify

Company Name

Verify Company

Thank you for your time and attention 🙂