SafeShipping: Secure Smart Contracts for Global Shipping

1. Project Title

SafeShipping: Transparent, Tamper-Proof Logistics via Smart Contracts and IoT

2. Summary (Abstract)

SafeShipping is a blockchain-based logistics platform using smart contracts, decentralized oracles, and IoT integrations to automate, secure, and verify global shipping workflows. The system enables tokenized bills of lading, transparent shipment tracking, and real-time contract enforcement between carriers, customs, and recipients-reducing fraud, delays, and legal disputes in international trade.

3. Problem Statement

Global shipping is plagued by:

- Fraudulent or duplicated documents (e.g., bills of lading)
- Opaque handling and transit records
- Payment disputes due to unverified delivery conditions
- Lack of automation between trustless, multi-party agreements

Legacy systems lack the transparency, traceability, and trustless enforcement mechanisms required in a modern global logistics landscape.

4. Proposed Solution

SafeShipping offers a smart-contract framework for:

- Tokenized shipping documents (NFT bills of lading)
- IoT-triggered smart contracts for condition-based events (e.g., temperature, location)
- Multi-party escrow and milestone-based payments

- Tamper-proof shipping logs on-chain

- Chainlink oracles for verifiable delivery and port clearances

Initial deployment will focus on containerized goods shipped via seaports-high-value, high-risk transactions that benefit most from trustless infrastructure.

5. Technical Architecture

- Blockchain Layer: EVM-compatible (Arbitrum, Polygon)

- Smart Contracts: Solidity (ERC-721, Escrow, MultiSig, Dispute Resolution)

- Oracle Integration: Chainlink for external data verification

- IoT Devices: GPS, seal sensors, temp loggers - bridge via middleware to smart contracts

- Front-End: Web3 dashboard (React + wagmi + ethers.js)

6. Milestones & Timeline

Milestone | Description | Duration

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M1 | Design smart contracts, security audit | 1 month

M2 | Integrate Chainlink + simulate test shipments | 1 month

M3 | Develop IoT middleware interface | 1 month

M4 | Launch MVP on testnet with tokenized documents | 1 month

M5 | Deploy on mainnet + onboard logistics partners | 1-2 months

7. Use of Funds

- Engineering: Smart contract dev, IoT integration

- Security Audits: External smart contract verification

- Hardware: Prototype IoT shipping trackers

- Legal/Compliance: Navigating e-doc legality in international trade

- Operations: Partner engagement with ports/logistics providers

8. Team

(Insert brief bios: blockchain dev, IoT specialist, logistics consultant, legal advisor)

9. Impact & Metrics

- % reduction in delivery disputes

- # of successful shipments tracked on-chain

- Time-to-clear customs (automated doc verification)

- Pilot partners (logistics companies, customs agents)

10. Why Blockchain?

- Immutability ensures trust across borders

- Programmability automates conditional flows (e.g., cargo release only if customs cleared)

- Tokenization enables digital-first document management and transfer of ownership