

SteelLink : AI & Blockchain Enabled B2B Vendor Platform

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Abstract - SteelLink is a smart and secure B2B platform designed for the steel industry. It integrates Artificial Intelligence (AI) and Blockchain to enhance transparency, efficiency, and trust in vendor-buyer relationships. Traditional steel procurement suffers from issues like fake vendors, delayed deliveries, and poor traceability. SteelLink tackles these challenges by introducing blockchain-based vendor verification and AI-driven fraud detection. Vendors and buyers can register, verify, and trade materials in real time with complete data integrity. The platform also provides an urgent material exchange feature to minimize wastage. Deployed on cloud infrastructure, it ensures scalability, reliability, and security. SteelLink thus represents a modern digital approach to transforming the steel supply chain ecosystem.

Key Words: AI, Blockchain, B2B Platform, Steel Industry, Vendor Verification, Fraud Detection.

1.INTRODUCTION

In the steel industry, small and medium-scale businesses often face challenges related to vendor trust, procurement delays, and fraud. SteelLink addresses these issues by offering a smart digital platform that connects vendors and buyers in a transparent and secure environment. The project focuses on optimizing the B2B steel supply chain using AI and Blockchain technologies.

The system enables vendor registration, blockchain-based verification, and real-time material exchange. AI algorithms are applied to detect duplicate vendors, identify fraudulent activity, and analyze trends. By leveraging these technologies, SteelLink provides a reliable and

efficient solution for modernizing steel procurement and trading processes

2.LITERATURE SURVEY

Several research studies and industrial implementations highlight the need for automation and trust in B2B systems:

1. **AI in Steel Industry:** Pellegrini et al. (2019) demonstrated AI's impact in optimizing steel production and logistics through predictive analytics.

2. **Blockchain for Supply Chain Transparency:** IEEE and ACM publications emphasize blockchain's role in ensuring tamper-proof records and decentralized verification.

3. **AI-driven Fraud Detection:** Research in e-commerce and finance reveals that ML models can effectively detect anomalies in transactional data, reducing fraud risks.

Existing solutions like Alibaba or TradeIndia provide general B2B listings but lack domain-specific trust mechanisms for industries like steel. SteelLink fills this gap by combining AI + Blockchain + Cloud to create an end-to-end verified platform.

3.OVERVIEW

Aim: To design and develop a smart AI and Blockchain-enabled B2B platform ensuring real-time verified material exchange for the steel industry.

Objectives:

1. Analyze current challenges in steel procurement and vendor management.
2. Develop blockchain-based smart contracts for vendor verification.
3. Implement AI models for fraud detection in documents and transactions.
4. Provide a material exchange module for urgent requirements.
5. Deploy the platform on cloud for scalability and secure access.

Scope:

1. Includes: Vendor onboarding, Blockchain verification, AI fraud detection, material listing, cloud deployment.
2. Excludes: Manufacturing process optimization and financial service integrations.

4.METHODOLOGY

The SteelLink system is built using a modular approach:

1. Requirement Analysis:
Study of B2B workflows in steel industry and identification of pain points (trust, delay, fraud).
2. System Design:
Definition of six main modules — Administration, Vendors, Buyers, Material Exchange, Blockchain Verification, and AI Fraud Detection.
3. Technology Stack:

Frontend: React.js, TailwindCSS

Backend: Node.js, Express.js

Database: PostgreSQL

AI Models: Python (fraud detection)

Blockchain: Eththerum/Polygon

Hosting: Firebase , Vercel

4. Implementation:

Smart contracts are coded to ensure vendor authenticity. AI modules flag suspicious activities using pattern recognition and anomaly detection.

5. Testing and Evaluation:

System tested for accuracy, response time, scalability, and trust metrics.

5.DESIGN AND ARCHITECTURE

SteelLink follows a three-tier architecture:

i. Presentation Layer:

User Interface for vendors, buyers, and administrators (web & mobile).

ii. Application Layer:

AI Engine: Performs fraud detection and vendor scoring.

Blockchain Module: Executes smart contracts and maintains verified records.

iii. Data Layer:

Stores user profiles, materials, transactions, and audit logs. Uses SQL/NoSQL hybrid design for performance.

Data Flow:

1. Vendor registers → Blockchain verification → Listing approval.
2. Buyer searches material → Transaction initiated → AI fraud check.
3. Notification and transaction record stored on Blockchain.

Integration Layer:

APIs for payment, logistics, and external services ensure extensibility.

6. APPLICATION

1. Steel Trading and Procurement

The primary application of SteelLink lies in the B2B steel trading ecosystem.

Traditional procurement processes involve manual vendor verification, quotation comparisons, and negotiations — all of which consume time and are prone to fraud.

With SteelLink:

- i. Buyers can browse verified vendor listings and directly place orders for materials.
- ii. Vendors can showcase available stock, update prices in real time, and reach genuine buyers.
- iii. Blockchain ensures that all trade transactions are recorded transparently, eliminating disputes and improving traceability.

This improves overall efficiency and builds long-term trust between buyers and sellers.

2. Vendor Verification and Certification Systems

One of SteelLink's core strengths is blockchain-based vendor verification.

In industries where vendor authenticity is critical — such as steel, construction, or manufacturing — fake documentation and duplicate registrations are common.

SteelLink solves this problem through:

- i. Smart contracts that validate each vendor's registration data before approval.
- ii. Immutable blockchain records that prevent tampering or multiple fake accounts.
- iii. AI models that analyze uploaded documents and detect forgery or duplication.

This mechanism can be extended to any organization or government body that needs a tamper-proof digital verification system for suppliers or service providers.

3. Material Exchange and Waste Reduction

In the steel sector, leftover or surplus materials from one vendor can often meet the urgent needs of another.

SteelLink introduces a Material Exchange Module where verified vendors can:

- i. List excess or unused materials for sale.
- ii. Find nearby buyers who require the same materials immediately.
- iii. Conduct secure, blockchain-backed exchanges with verified payment and delivery records.

This reduces material wastage, supports sustainability, and ensures resource optimization — aligning with circular economy principles.

4. Fraud Detection and Risk Management

Fraudulent activities, fake invoices, and duplicate vendor profiles are major issues in online B2B ecosystems.

The AI fraud detection module in SteelLink addresses this by:

- i. Scanning all uploaded vendor documents using machine learning models to detect inconsistencies.
- ii. Monitoring transaction patterns for suspicious behavior or anomalies.
- iii. Automatically flagging high-risk transactions for admin review.

This ensures safer transactions, builds trust, and protects the ecosystem from malicious users — making the platform self-learning and adaptive over time.

5. Industrial Supply Chain Management

Beyond steel, SteelLink's architecture can be adapted to other manufacturing or logistics industries that face similar challenges of traceability and authenticity.

By using smart contracts and AI-powered decision systems, companies can:

- i. Track materials through every stage of the supply chain.
- ii. Maintain digital logs of procurement, movement, and ownership.

iii. Share verified data among partners without disclosing sensitive details.

This helps in reducing operational costs, improving transparency, and enhancing audit readiness for compliance standards such as ISO or ESG.

6. Government and Infrastructure Procurement

Government tenders and large infrastructure projects often suffer from corruption or lack of visibility in vendor selection.

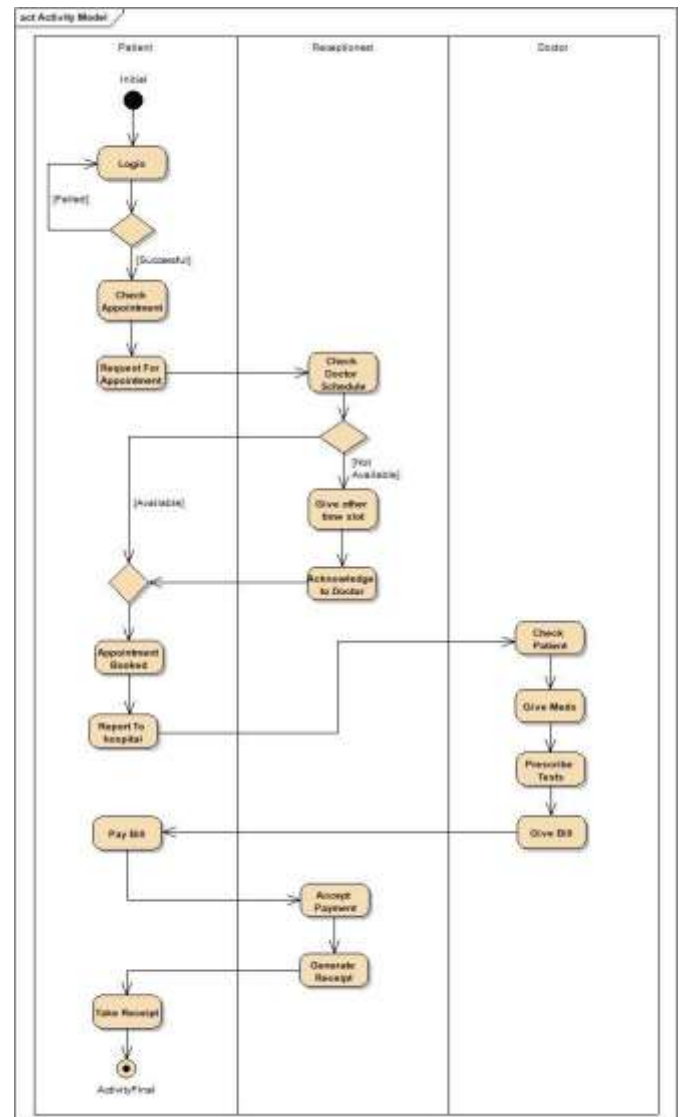
SteelLink can act as a transparent digital procurement portal, ensuring that:

i. Only verified vendors with valid certifications can participate.

ii. Each transaction and tender document is recorded on a public blockchain ledger.

iii. sAI-based analysis ensures fair competition and detects anomalies in bids or pricing patterns.

Such use cases promote accountability, fairness, and anti-corruption in public procurement systems.



3. CONCLUSIONS

SteelLink provides a secure, AI and Blockchain-enabled solution for the steel industry. It minimizes fraud, ensures vendor authenticity, and speeds up the procurement process. With transparent transactions and tamper-proof data, it builds trust between buyers and sellers. In the future, SteelLink can be expanded with advanced analytics, mobile applications, and integration with payment gateways to enhance its functionality and reach

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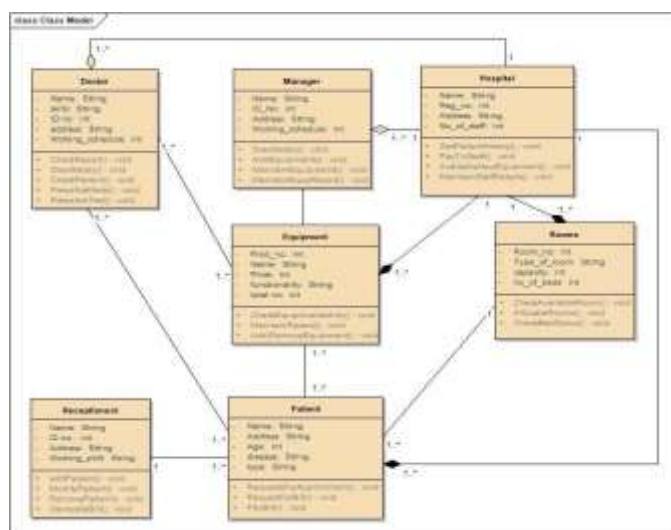


Fig 1. UML Diagram

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