

BLOCKCHAIN BASED LAND MANAGEMENT SYSTEM

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Introduction

- The proposed system is a blockchain-based document verification platform developed to assist Sub-Registrars in securely managing and validating land and legal documents.
- It integrates a Django-based web application with blockchain technology to ensure immutability, transparency, and tamper-proof record keeping.
- The system enables users to upload, verify, and track documents through unique hash generation and decentralized storage.
- By replacing traditional manual verification with blockchain-backed validation, it reduces the chances of forgery, data manipulation, and record loss.
- Through decentralized verification and secure digital records, the system enhances trust, efficiency, and accountability in land registration workflows.

Problem Statement

- The current land registration process involves manual verification of ownership and documents, which is prone to delays, errors, and fraud.
- Lack of a transparent and tamper-proof system makes it difficult to ensure the authenticity of land records.
- The absence of a unified digital platform for maintaining property data causes inefficiency and data redundancy.
- There is a need for a secure and decentralized solution to store, update, and verify land ownership records without relying on intermediaries.
- The project aims to develop a blockchain-based system that ensures immutability, transparency, and security of land registration data.

Existing System

Traditional Land Management:

- Existing land registration systems rely heavily on manual document verification and paper-based workflows, leading to delays and inefficiencies.
- Records are stored across multiple government departments such as registration, revenue, and survey offices, resulting in fragmented and inconsistent data.
- Lack of transparency and traceability in traditional processes increases the chances of fraud, forgery, and disputes over property ownership.
- Current digital initiatives focus mainly on record digitization and fail to ensure data immutability or tamper-proof verification.

Literature Survey

- **Exploring the Potential of Blockchain in Land Information Management (2021) Authors:** S. O. Olaleye, A. S. Adegoke, S. E. Agbato
 - Proposed hybrid public–private blockchain models for transparent and secure land administration.
 - Addressed challenges like corruption risk, privacy-by-design, and governance readiness.

Technologies: Hybrid Blockchain, Governance Models.

- + Focus on stakeholder alignment and security.
- - Limited real-world pilot validation.

- **Using Blockchain and Digital Land Registries to Enhance Land Management and Tenure (2021) Authors:** J. Mahlangu, G. Taunyane, B. Moosa

- Proposed integration of blockchain with digital identifiers for transparent land transactions.
- Emphasized interoperability and legal parity for blockchain-based registries.

Technologies: Digital Identity, Blockchain Interoperability.

- + Strengthens tenure security and record traceability.
- - Legal acceptance and standardization remain barriers.

- **Blockchain in Land Registry for Transforming Land Administration (2020) Authors:** V. Shukla, A. R. Raipurkar, M. B. Chandak, V. Barai

- Compared legacy registration systems with blockchain-enabled smart contract workflows.
- Demonstrated enhanced transparency, auditability, and record immutability.

Technologies: Smart Contracts, Blockchain Audit Trail.

- + Clear mapping of old vs. new system flow.
- - Scalability challenges in multi-party coordination.

- **A Secure Land Record Management System Using Blockchain (2021) Authors:** M. S. Shahariar, P. Banik, M. A. Habib

- Implemented a blockchain framework using text-to-integer encoding and asymmetric-key cryptography.
- Focused on secure owner authentication and contract-controlled document updates.

Technologies: Cryptography, Smart Contracts.

- + High data integrity and security assurance.
- - Complex implementation for non-technical users.

- **Digital Land Registry System Using Blockchain (2020) Authors:**
R. Ghanpathi, A. Srivastava, R. Bhosikar

- Designed Ethereum-based registry automating deed verification and title transfer.
- Discussed atomic property exchange and transaction cost optimization.

Technologies: Ethereum Blockchain, Smart Contracts.

- + Automates verification and ownership transfer.
- - Dependent on gas costs and public-chain limitations.

- **Blockchain-Based Land Record System (2021) Authors:** K. Vayadande, R. Shaikh, S. Rothe, S. Patil, T. Baware, S. Naik
 - Integrated IPFS for decentralized document storage with blockchain-based record hashing.
 - Provided map-based visualization for ownership tracking.

Technologies: IPFS, Blockchain Hashing.

- + Reduces storage overhead via off-chain architecture.
- - Relies on stable IPFS gateway availability.

- **Land Registry in the Blockchain (Sweden Pilot, 2017) Authors:** Lantmäteriet, Telia Company, ChromaWay, Kairos Future

- Conducted a national pilot integrating banks, land offices, and agents into blockchain workflows.
- Reported reduced processing time and enhanced traceability.

Technologies: Private Blockchain, Multi-party Integration.

- + Real-world validation of blockchain feasibility.
- - High cost and complex stakeholder coordination.

- **Blockchain Technology in Land Registration: A Systematic Literature Review (2020) Authors:** H. Twinomurinzi
 - Reviewed blockchain-based land registration frameworks in developing contexts.
 - Highlighted inclusion, governance, and institutional readiness challenges.

Technologies: Literature Review, Blockchain Frameworks.

- + Comprehensive coverage of global use cases.
- - Lacks implementation-level analysis.

- **Blockchain-Based Framework for Secure and Reliable Land Registry System (2022) Authors:** M. Shuaib, S. M. Daud, S. Alam, W. Z. Khan
 - Proposed permissioned blockchain architecture with rule-based validation.
 - Focused on decentralized updates and multi-office synchronization.

Technologies: Permissioned Blockchain, Validation Rules.

- + Ensures data security across government nodes.
- - Requires strong coordination and network reliability.

- **Current Status, Requirements, and Challenges of Blockchain Application in Land Registry (2023) Authors:** M. Shuaib, S. Alam, R. Ahmed

- Analyzed global pilot projects in Sweden, Georgia, and UAE.
- Identified legal, technical, and user-experience gaps for real-world adoption.

Technologies: Comparative Analysis, Policy Review.

- + Provides roadmap for standardization and governance.
- - Focused more on policy than technical design.

Literature Survey Summary I

No.	Paper Title	Method / Approach	Strengths	Limitations
1	Exploring the Potential of Blockchain in Land Information Management	Hybrid public-private blockchain models	Transparency, stakeholder inclusion	Conceptual; lacks pilot implementation
2	Using Blockchain and Digital Land Registries to Enhance Land Management and Tenure	Blockchain with digital identifiers	Data interoperability, legal traceability	Legal and standardization issues
3	Blockchain in Land Registry for Transforming Land Administration	Smart contracts for land transfer	Auditability, tamper-proof records	Multi-agency scalability issues
4	A Secure Land Record Management System Using Blockchain	Cryptography with smart contracts	Secure ownership validation	Complex for non-technical users
5	Digital Land Registry System Using Blockchain	Ethereum-based title and fund exchange	Automated verification, transparency	Gas cost and public-chain limits

Literature Survey Summary II

6	Blockchain-Based Land Record System	IPFS with on-chain hashes	Reduced storage, ownership mapping	Dependent on IPFS stability
7	Land Registry in the Blockchain (Sweden Pilot)	Private blockchain pilot with banks and offices	Real-world feasibility, faster process	High setup cost, coordination effort
8	Blockchain Technology in Land Registration: A Systematic Review	Review of global blockchain registries	Broad coverage, governance insights	Lacks implementation analysis
9	Blockchain-Based Framework for Secure and Reliable Land Registry System	Permissioned blockchain, rule validation	Secure, multi-node reliability	Network sync requirements
10	Current Status, Requirements, and Challenges of Blockchain in Land Registry	Comparative study of global pilots	Identifies adoption gaps	Focused on policy, less technical detail

Proposed System

Automation and Transparency:

- The proposed system automates land registration and document verification using blockchain technology.
- It ensures transparency, immutability, and security by recording transactions on a decentralized ledger.
- Reduces manual verification and paperwork through smart-contract-based workflows and digital approvals.

System Integration:

- Developed using Django for backend management, authentication, and user interaction.
- Integrates blockchain modules for document hashing, transaction validation, and ownership transfer.
- Provides a role-based web interface for admin, registrar, and citizen users with secure access control.

Enhanced Record Management:

- Enables secure upload and verification of land documents using cryptographic hashing.
- Maintains decentralized ownership records that can be traced and verified anytime.
- Prevents forgery and duplication through immutable blockchain entries.

Key Features:

- Blockchain-based land record storage and verification.
- Smart contract automation for registration and approval processes.
- Role-based access for Admin, Registrar, and Citizen users.
- Tamper-proof data integrity with on-chain document hashes.

General Requirements

Hardware Requirements:

- **Processor:** Intel Core i5 (10th Gen) / AMD Ryzen 5 or higher
- **RAM:** Minimum 8 GB (Recommended: 16 GB)
- **Storage:** 512 GB SSD or higher
- **GPU:** Optional — for model training (e.g., NVIDIA GTX 1660 or equivalent)
- **Network:** Stable internet connection for data sync and dashboard access

Software Requirements:

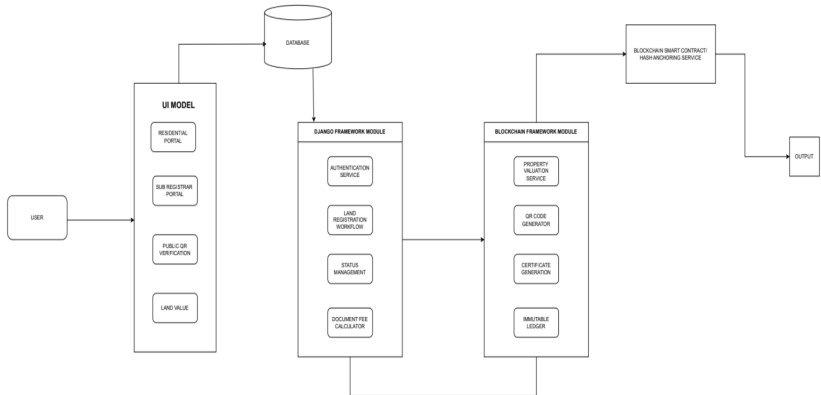
- **Operating System:** Windows 10 / Linux (Ubuntu 22.04)
- **Framework:** Django 5.0
- **Database:** PostgreSQL / SQLite
- **Browser:** Google Chrome / Edge (for web access)

Tools and Languages

- **Programming Language:** Python
- **Web Framework:** Django (Backend)
- **Front-End Technologies:** HTML, JavaScript, Tailwind CSS
- **Database:** SQLite (Development), PostgreSQL (Production)
- **Blockchain:** Permissioned EVM-compatible network with Smart Contracts
- **Blockchain Testing:** Ganache (Local Ethereum environment for smart contract deployment and testing)
- **Storage:** IPFS / Object Storage (MinIO or AWS S3) for document management
- **Version Control:** Git and GitHub

System Design

• System Architecture



Resident Use Case Diagram

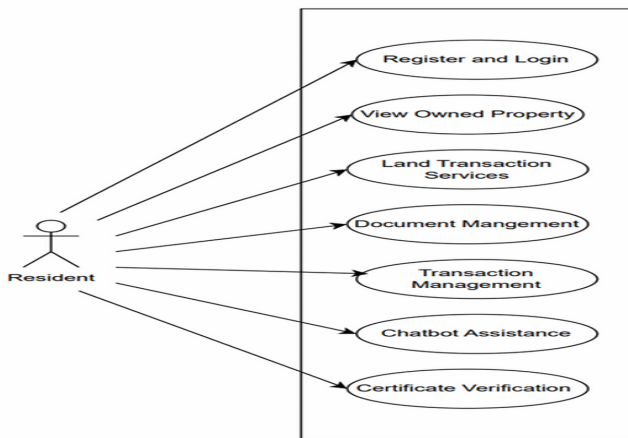


Figure: Resident Use Case Diagram

Registrar Use Case Diagram

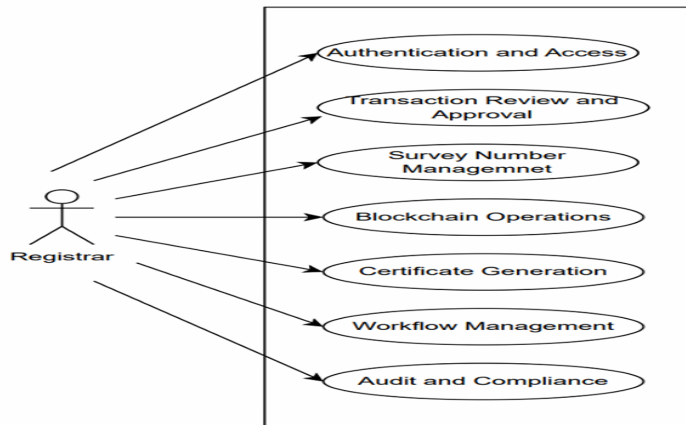


Figure: Registrar Use Case Diagram

Admin Use Case Diagram

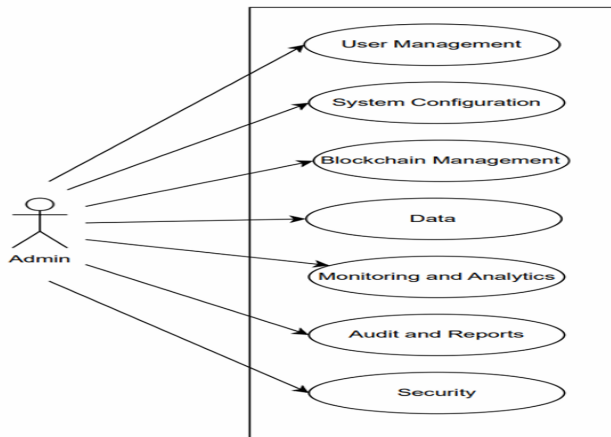
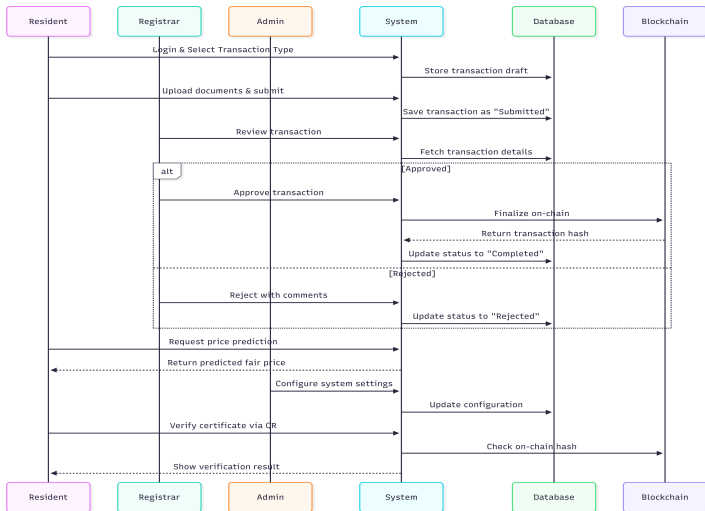


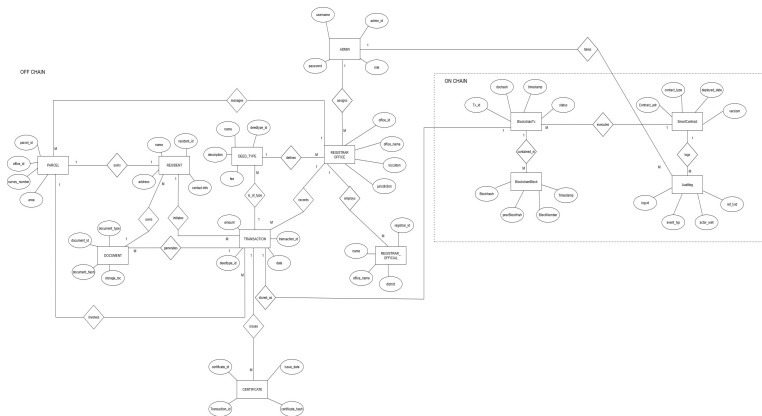
Figure: Admin Use Case Diagram

Sequence Diagram

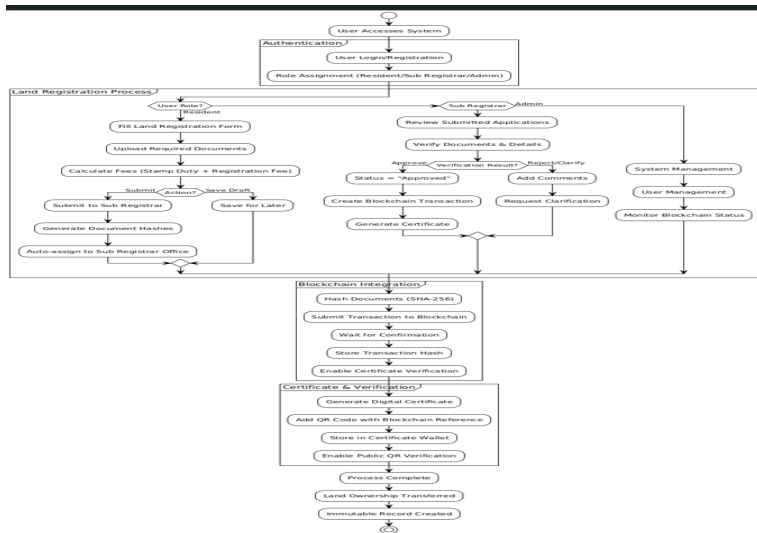
Sequence Diagram



ER Diagram



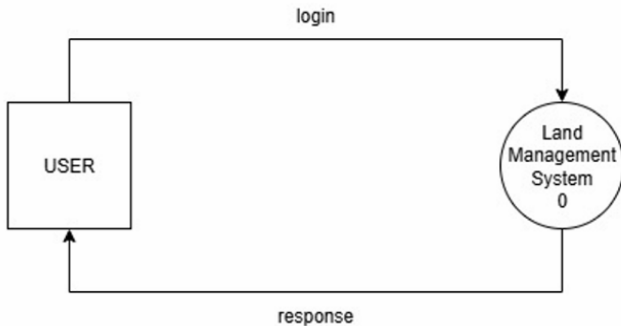
Activity Diagram



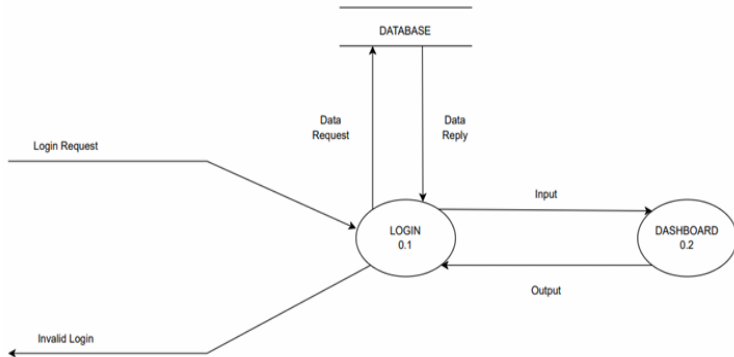
Data Flow Diagram

- Data Flow Diagram

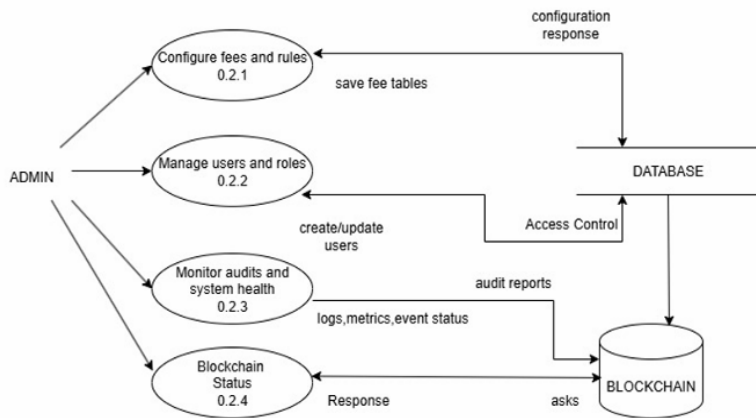
Level 0



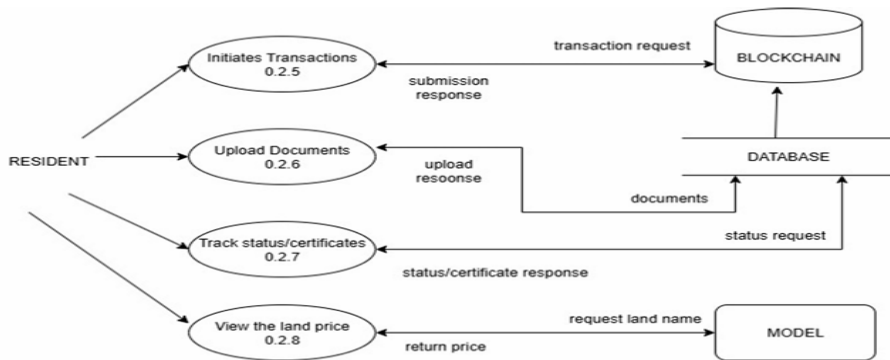
Level 1



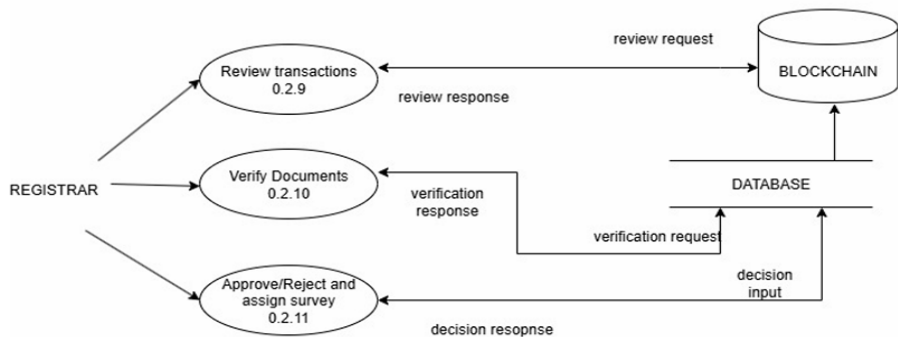
Level 2 (Admin)



Level 2 (Resident)



Level 2 (Registrar)



Implementation

● Web Platform

- Django-based system with roles: **Resident, Registrar, Admin**.
- Residents submit land transactions; registrars review and approve.

● Blockchain Layer

- Smart contract deployed on Ganache (Ethereum test network).
- MetaMask used to sign and confirm approvals.

● Certificate Generation

- Approved transactions automatically generate PDF certificates.
- QR code embedded for online authenticity verification.

● Valuation Model

- Tracks land value percentage variations across locations.
- Helps ensure fair and consistent registration decisions.

Results

• Login Window



Kerala BLMS
Blockchain Land Management

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Login to Kerala BLMS

Email Address

you@example.com

Password

Login

Don't have an account? [Register here](#)

Customer Dashboard

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Welcome back, Jhon!

Kerala Blockchain Land Management System



Dashboard Overview



Pending

3



Under Review

2



Approved

8



Notifications

5

Submit New Transaction

Start new deed transaction - Sale, Will, Inheritance, Mortgage, Gift, or Power of Attorney

Select deed type • Upload documents • Submit for review



Transaction Wallet

View all transactions, track status, fees, and blockchain confirmations

History • Status • Receipts • Hash verification



Verify Certificate

Upload certificate ID to verify authenticity via blockchain

Upload • Verify hash • Instant report

Submit Transaction



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Blockchain Land Management

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Submit New Land Transaction

1. Choose Deed Type

Select deed type ▼

2. Enter Property & Party Details

Property Survey Number

Location (click on map)



Click on the map to select the location. Coordinates will be saved.

Property Valuation (INR)

Party Name (Buyer/Seller or Giver/Receiver)

Party Contact Number

Party ID Proof Number

Select Office

District Registrar Office - alappuzha ▼

Choose the office to submit your transaction to.

3. Upload Supporting Documents (PDF, JPG, PNG, multiple allowed)

Choose Files No file chosen

Reset

Submit Application

Property Valuation



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Property Valuation

[Back to Dashboard](#)

SELECT DISTRICT *

Choose Your District



SELECT LOCALITY *

Select District First



 CALCULATE VALUATION

• Registrar Login

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Registrar Login

Username

Password

Log In

Registrar Dashboard

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Registrar Dashboard

Welcome back,
Office-Kochi, emskolan

Dashboard Overview



PENDING APPLICATIONS

Applications awaiting review and action.



APPROVED APPLICATIONS

Verified and queued for blockchain anchoring.



REJECTED APPLICATIONS

Rejected with documented reasons.



NOTIFICATIONS

Newly submitted transactions to review.

Review Submitted Applications

Dead Type

From Date

To Date

Customer Name

All Dead Types

dd-mm-yyyy

dd-mm-yyyy

Search by customer name...

Apply Filter

Reset

APPLICATION ID	CUSTOMER	DEAD TYPE	SUBMISSION DATE	STATUS	ACTIONS
#12	Jhon	W1	Jan 05, 2025	Pending	Review
#11	Juanan Nelson	W2-Denied	Jan 05, 2025	Approved	Review
#10	Jhon	W3-Denied	Jan 05, 2025	Approved	Review
#9	Jhon	W4-Denied / Suspended	Jan 05, 2025	Approved	Review
#8	Jhon	W5-Denied	Jan 05, 2025	Approved	Review

Security & Audit

Registrar Approval

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Application #12

Pending

CUSTOMER NAME

Jhon

PARTY NAME

jako

DEED TYPE

Will

PARTY CONTACT

47749449

SURVEY NUMBER

1234/6379

PARTY ID

847747474

PROPERTY VALUATION

₹ 67484858.00

SUB-REGISTRAR OFFICE

Kochi
ernakulam

SUBMISSION DATE

Jan 05, 2026 - 16:26

Uploaded Documents

Document

transactions/61F_Kochi-signature.png

[View](#)[Download](#)[← Back to Dashboard](#)[✓ Approve & Anchor](#)[✗ Reject](#)

Metamask Transaction

127.0.0.1:8000/application/12/

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Application #12

CUSTOMER NAME
Jhon

DEED TYPE
Will

SURVEY NUMBER
1234/6379

PROPERTY VALUATION
₹ 87484858.00

SUBMISSION DATE
Jan 05, 2026 - 16:26

PARTY NAME
jako

PARTY CONTACT
47749449

PARTY ID
847747474

SUB-REGISTRAR OFFICE
Kochi
emakulam

Uploaded Documents

Document
transactions/R/F/Kocca-signature.png

View Download

← Back to Dashboard

✓ Approve & Anchor

✗ Reject

Transfer request

0.01 ETH

From
Imported ...
Imported accounts

To
OxCF613...63B...

Network
G Ganache Local

Request from
HTTP 127.0.0.1:8000

Network fee
0 ETH

Cancel

Confirm

Transaction Hash ID

The screenshot displays the Kerala BLMS (Blockchain Land Management) application interface. A browser window shows the URL `127.0.0.1:8000/application/12/`. The application header includes the logo, name, and navigation links. A modal overlay displays the transaction hash and its status. The main content area shows details for Application #12, including customer and party information, deed type, survey number, property valuation, and submission date. Below this, there is a section for uploaded documents.

Kerala BLMS
Blockchain Land Management

127.0.0.1:8000/application/12/

127.0.0.1:8000 says
Approved & anchored (Ganache)!
0x95c57b1d0114b9d7bbabe1c75068e93148aed19b32ac9c61f8a119fb989f75

Application #12 Pending

CUSTOMER NAME Jhon	PARTY NAME jako
DEED TYPE WIL	PARTY CONTACT 47749449
SURVEY NUMBER 1234/6379	PARTY ID 847747474
PROPERTY VALUATION ₹ 87484858.00	SUB-REGISTRAR OFFICE Kochi emakulam
SUBMISSION DATE Jan 05, 2026 - 16:26	

Uploaded Documents

Document
transactions\RF_Kocci-signature.png

View Download

Certificate Download

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View and download your verified blockchain certificates

4 Certificates

CERTIFICATE ID	TYPE	DATE VERIFIED	ACTIONS
#12	Will	Jan 05, 2026	Download
#10	Gift Deed	Jan 05, 2026	Download
#9	Inheritance / Succession	Jan 05, 2026	Download
#8	Gift Deed	Jan 05, 2026	Download



Professional blockchain-based land management services for Kerala. Secure, transparent, and efficient property registration solutions.

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Ownership Transfer
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Contact

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info@keralablms.com

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Conclusion

- The proposed football analytics system establishes a foundation for AI-driven decision-making in team management and performance evaluation.
- The current phase successfully integrates data collection, basic match prediction, and player analysis modules using Django and machine learning techniques.
- Future work will focus on enhancing model accuracy, improving lineup recommendation logic, and developing advanced visualization dashboards for coaches and analysts.
- Once fully implemented, the system aims to assist teams in strategic planning, player selection, and performance optimization through data-driven insights.


Conclusion

- The proposed Blockchain-Based Land Management System provides a secure and transparent framework for property registration, document handling, and mutation tracking.
- The system successfully integrates blockchain technology with a Django web application to ensure tamper-evident document provenance, registrar workflow automation, and QR-verifiable certificates.
- This approach reduces manual intervention, minimizes fraudulent activities, and improves public trust in land transactions through immutable audit trails.
- Future enhancements will include conclusive titling, GIS-based cadastre integration, risk analytics, and eKYC/eSign features for end-to-end digital transformation in land governance.

References

- ① S. O. Olaleye, A. S. Adegoke, S. E. Agbato, “Exploring the Potential of Blockchain in Land Information Management,” stakeholder-oriented study proposing hybrid public–private models with privacy-by-design and governance alignment.
- ② J. Mahlangu, G. Taunyane, B. Moosa, “Using Blockchain and Digital Land Registries to Enhance Land Management and Tenure,” University of Johannesburg; emphasizes secure identifiers, interoperability, and procedural parity.
- ③ V. Shukla, A. R. Raipurkar, M. B. Chandak, V. Barai, “Blockchain in Land Registry for Transforming Land Administration,” comparative study highlighting end-to-end traceability and auditability.
- ④ M. S. Shahariar, P. Banik, M. A. Habib, “A Secure Land Record Management System Using Blockchain,” proposes asymmetric-key verification and text-to-integer encoding for secure ownership validation.
- ⑤ R. Ghanpathi, A. Srivastava, R. Bhosikar, “Digital Land Registry”

References (Continued)

- ⑥ K. Vayadande, R. Shaikh, S. Rothe, S. Patil, T. Baware, S. Naik, “Blockchain-Based Land Record System,” proposes IPFS-backed off-chain document storage and map-based ownership visualization.
- ⑦ Lantmäteriet, Telia Company, ChromaWay, Kairos Future, “Land Registry in the Blockchain (Sweden Pilot),” demonstrates full lifecycle simulation with institutional integration.
- ⑧ H. Twinomurinzi, “Blockchain Technology in Lands Registration: A Systematic Literature Review,” surveys architectures and governance models for developing contexts.
- ⑨ M. Shuaib, S. M. Daud, S. Alam, W. Z. Khan, “Blockchain-Based Framework for Secure and Reliable Land Registry System,” outlines permissioned rule-based validation and decentralized updates.
- ⑩ M. Shuaib, S. Alam, R. Ahmed, “Current Status, Requirements, and Challenges of Blockchain Application in Land Registry,” reviews global pilots (Sweden, Georgia, UAE) and policy roadmaps.
- ⑪ Government of Kerala, “Ente Bhoomi: Integrated Land Information 

Thank You!

Your attention is greatly appreciated.

Questions and Feedback are Welcome