

BLOCKCHAIN BASED LAND MANAGEMENT SYSTEM

Guided By: Mrs Shabana H

Group 4

ABHIRAM N	CEC22CS009
HRISHIKESH G KAMMATH	CEC22CS066
JESLIN GABRIEL A J	CEC22CS071
JOSEPH ALAN	CEC22CS072

**DEPARTMENT OF COMPUTER ENGINEERING
COLLEGE OF ENGINEERING CHERTHALA**

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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. Shahriar, 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:

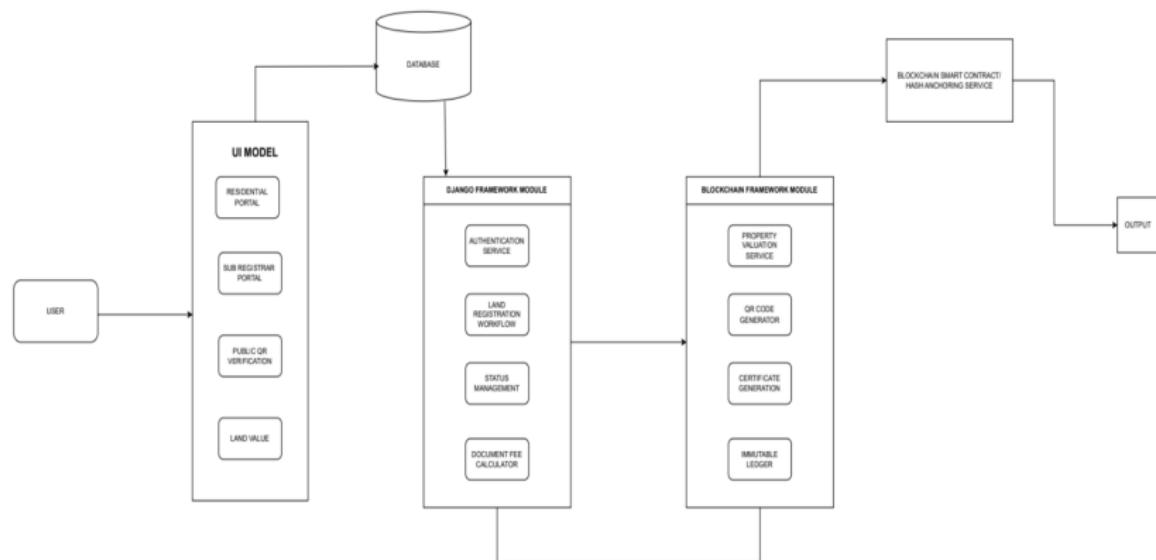
- **Operating System:** Windows 10 / Linux (Ubuntu 22.04)
- **Framework:** Django 5.0
- **Database:** PostgreSQL / SQLite
- **Browser:** Google Chrome / Edge (for web access)

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

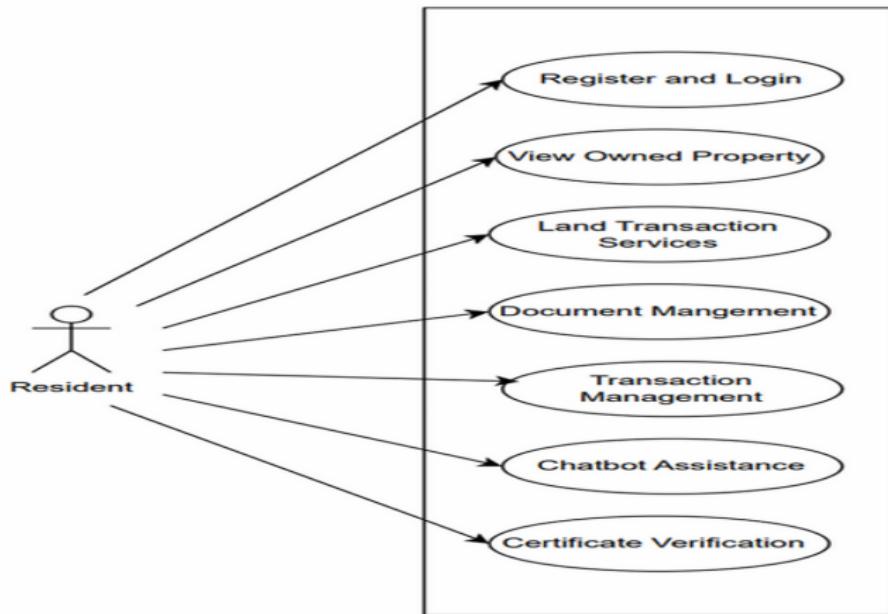


Figure: Resident Use Case Diagram

Registrar Use Case Diagram

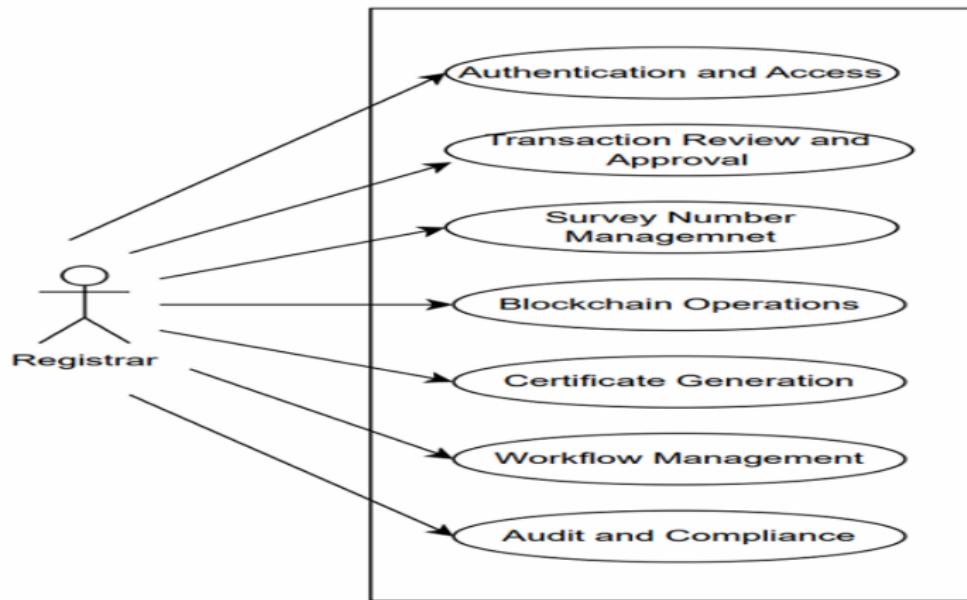


Figure: Registrar Use Case Diagram

Admin Use Case Diagram

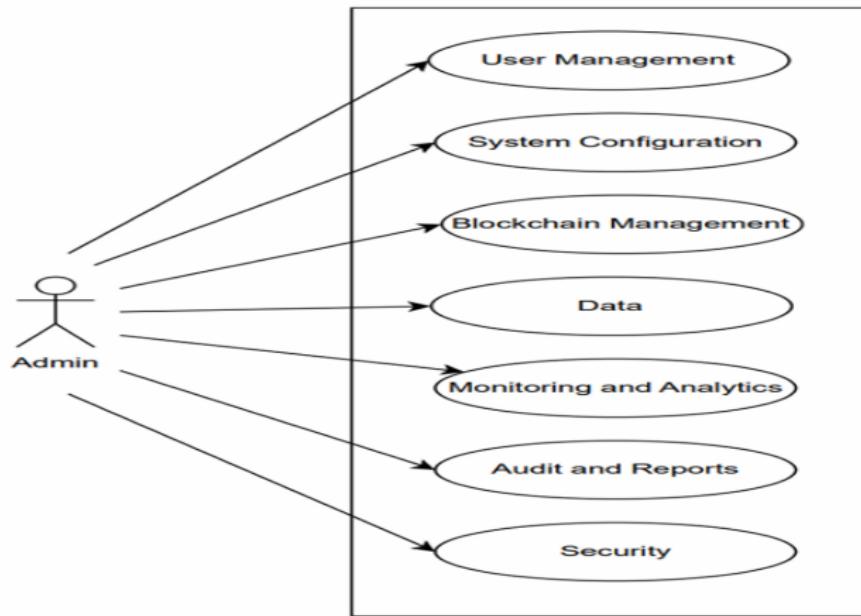
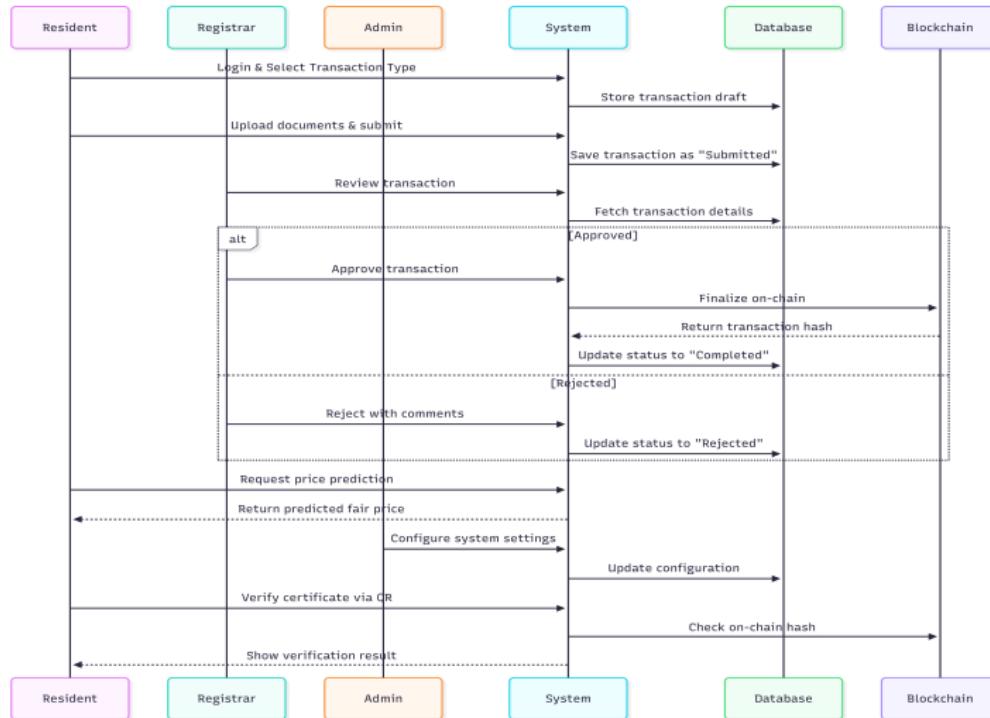


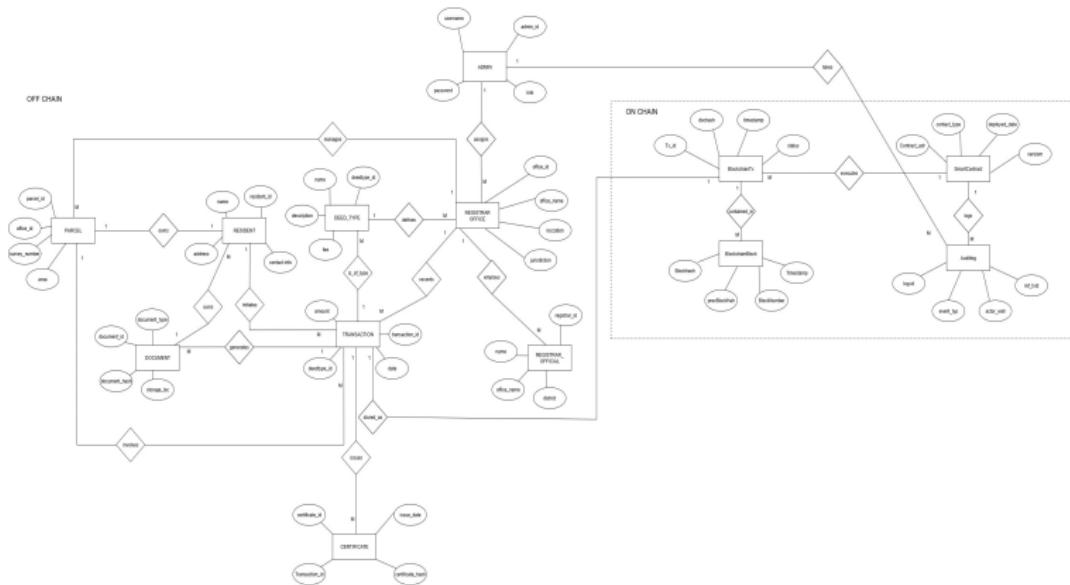
Figure: Admin Use Case Diagram

Sequence Diagram

- Sequence Diagram



ER Diagram



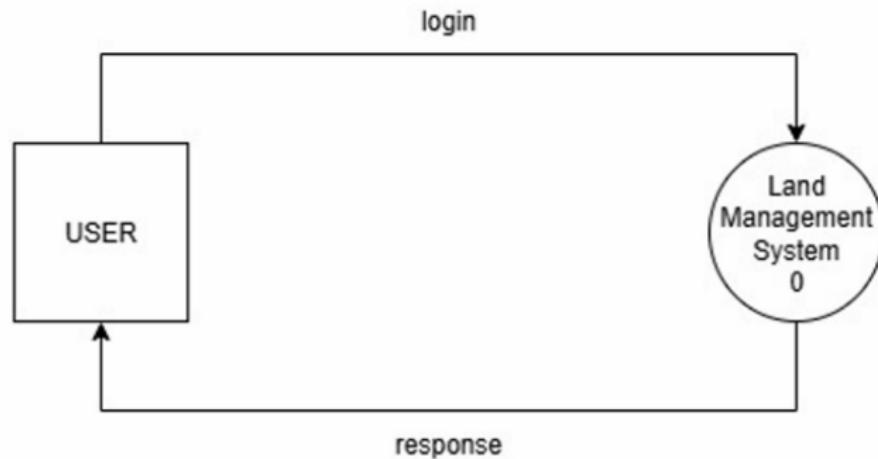
Activity Diagram



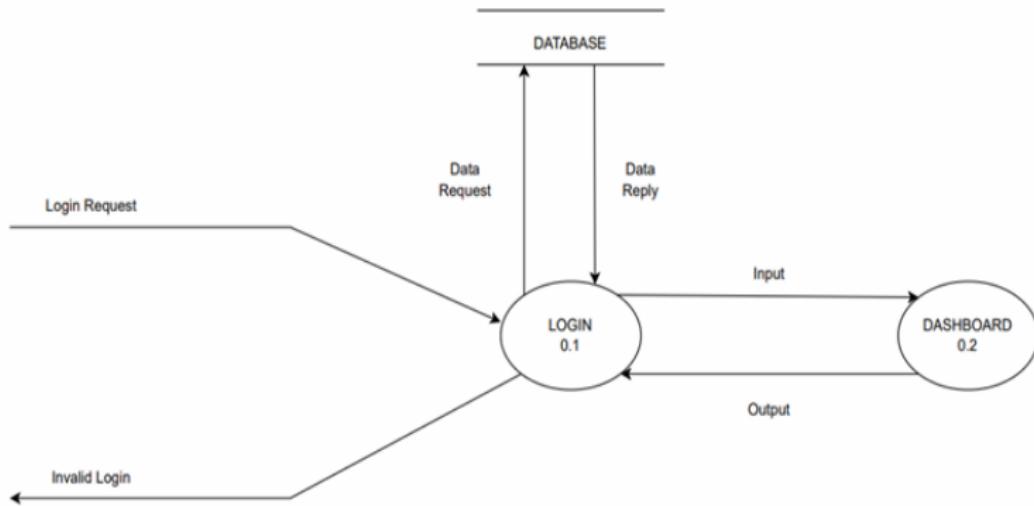
Data Flow Diagram

- Data Flow Diagram

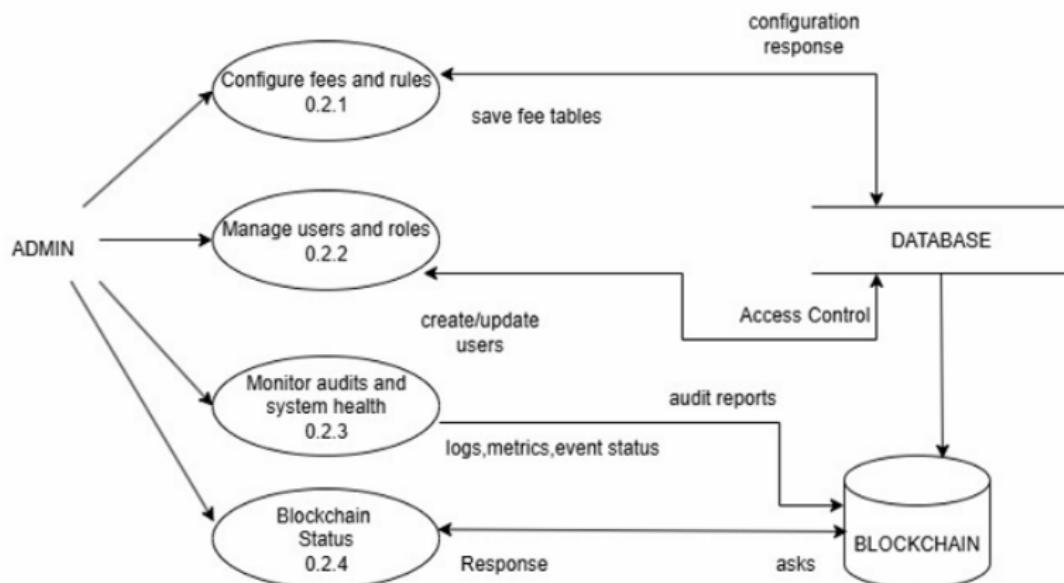
Level 0



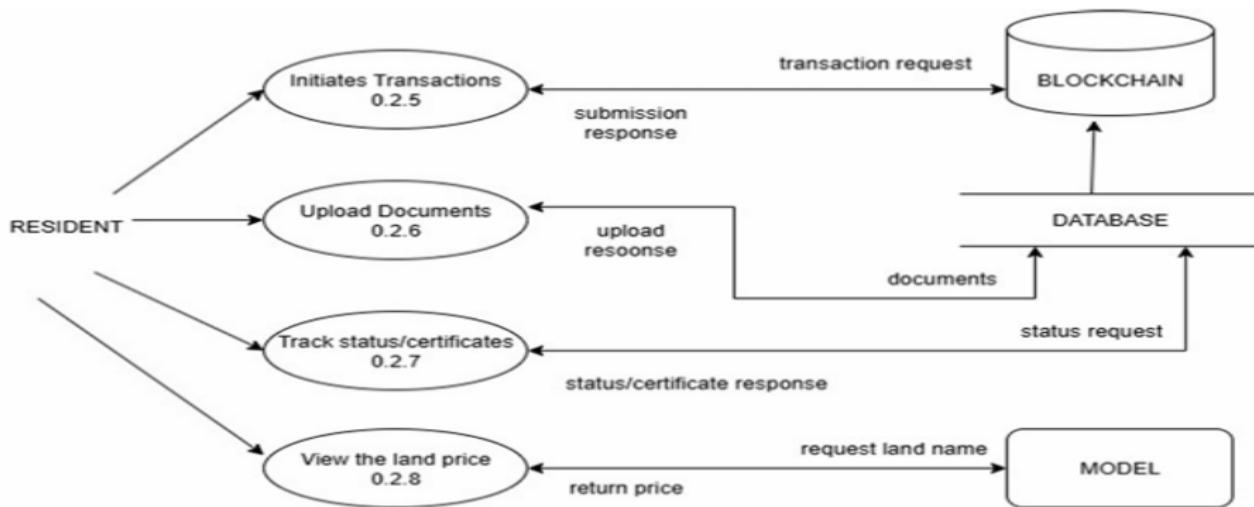
Level 1



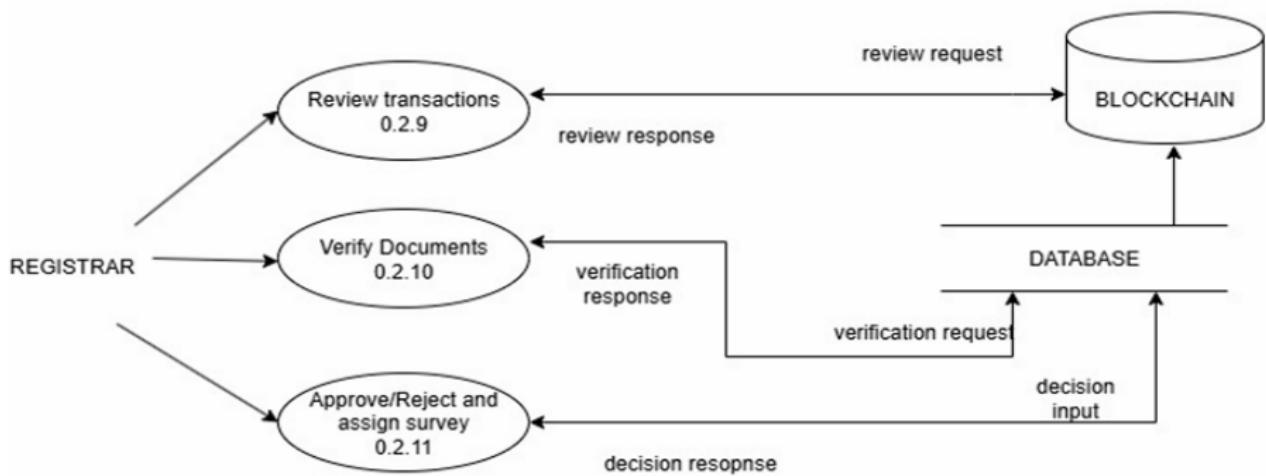
Level 2 (Admin)



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

The screenshot shows a dark-themed login interface for the Kerala BLMS system. At the top left is the logo 'Kerala BLMS Blockchain Land Management'. The top right features a navigation bar with links for Home, Services, About, Contact, and a prominent 'Access Portal' button. The main area is titled 'Login to Kerala BLMS'. It contains two input fields: 'Email Address' with the placeholder 'you@example.com' and 'Password' with several dots indicating the password. Below these is a large 'Login' button. At the bottom, there is a link 'Don't have an account? Register here'.

Customer Dashboard



Kerala BLMS
Blockchain Land Management

Home Services About Contact

Access Portal



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

Kerala BLMS
Blockchain Land Management

Home Services About Contact Access Portal

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, JPEG, PNG; multiple allowed)

Choose Files No file chosen

Reset Submit Application

● Property Valuation

[Home](#) [Services](#) [About](#) [Contact](#)[Access Portal](#)

Property Valuation

[Back to Dashboard](#)**SELECT DISTRICT ***

Choose Your District

SELECT LOCALITY *

Select District First

CALCULATE VALUATION



• Registrar Login



Home Services About Contact Access Portal

Registrar Login

Username

Password

Log In

• Registrar Dashboard


[Home](#) [Services](#) [About](#) [Contact](#)
[Access Portal](#)

Registrar Dashboard

Welcome back,
Office-Kochi, emanation

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

Deed Type	From Date		To Date		
All Deed Types	dd-mm-yyyy		dd-mm-yyyy		<input type="text"/> Search by customer name...
<input checked="" type="checkbox"/> Apply filters	<input type="button" value="Reset"/>				
APPLICATION ID	CUSTOMER	DEED TYPE	SUBMISSION DATE	STATUS	ACTIONS
#P2	Jhon	Old	Jan 05, 2026	Pending	<input type="button" value="Review"/>
#P1	Jonan Nelson	Old Deed	Jan 05, 2026	Approved	<input type="button" value="Review"/>
#P0	Jhon	Old Deed	Jan 05, 2026	Approved	<input type="button" value="Review"/>
#P9	Jhon	繼承 / Succession	Jan 05, 2026	Approved	<input type="button" value="Review"/>
#P8	Jhon	Old Deed	Jan 05, 2026	Approved	<input type="button" value="Review"/>

Security & Audit

• Registrar Approval

The screenshot shows a dark-themed web application for land management. At the top left is the logo "Kerala BLMS Blockchain Land Management". At the top right are links for "Home", "Services", "About", "Contact", and a prominent "Access Portal" button.

The main content area displays an application form for "Application #12". The form fields include:

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

A status indicator at the top right of the form says "Pending".

Below the form is a section titled "Uploaded Documents" which lists a single file:

- Document: transactions/R/F.Kochi-signature.png

With "View" and "Download" buttons.

At the bottom of the page are three buttons: "Back to Dashboard", "Approve & Anchor" (green), and "Reject" (red).

• Metamask Transaction

The image shows a dual-screen setup. On the left, a web browser window displays the Kerala BLMS Blockchain Land Management system. The page title is "Application #12". The form fields contain the following data:

- CUSTOMER NAME: Jhon
- PARTY NAME: jako
- DEED TYPE: Will
- 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

Below the form, there is a section titled "Uploaded Documents" showing a file named "transactions/B/F.Koca-signature.png".

At the bottom of the page are two buttons: "Back to Dashboard" and "Approve & Anchor" (green) or "Reject" (red).

On the right side of the image, a separate window titled "Transfer request" from the MetaMask wallet is open. It shows a transaction being sent to the address 0xCF613...63B.. The amount is 0.01 ETH. The "From" field shows "Imported accounts" and the "To" field shows the recipient address. The "Network" is set to Ganache Local. The "Request from" field shows HTTP 127.0.0.1:8000. The "Network fee" is 0 ETH. At the bottom are "Cancel" and "Confirm" buttons.

• Transaction Hash ID

The screenshot shows a web browser window for the Kerala BLMS (Blockchain Land Management) system. The URL is 127.0.0.1:8000/application/12/. A modal dialog box is displayed in the center, titled "127.0.0.1:8000 says". It contains the message "Approved & anchored (Ganache):" followed by a long hex string: 0x95c57b1d0114b9d7bbabet1c75068e93148aed19b32ac9c61ff8a119fb989ff75. Below the message is an "OK" button. The main application interface shows details for Application #12, including Customer Name (Jhon), Party Name (jako), Deed Type (WB), Survey Number (1234/6379), Property Valuation (₹ 87484858.00), Submission Date (Jan 05, 2026 - 16:26), and Sub-Registrar Office (Kochi emakulam). At the bottom, there is a section for "Uploaded Documents" with a file named "transactionWB/Kochi-signature.png".

● Certificate Download



Kerala BLMS

Blockchain Land Management

[Home](#)[Services](#)[About](#)[Contact](#)[Access Portal](#)

4 Certificates

View and download your verified blockchain 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



Kerala BLMS

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

Blockchain Secured 24/7 Support

Services

Property Registration

Document Verification

Ownership Transfer

Legal Compliance

Contact

Kochi, Kerala, India

+91 484 XXXXXX

info@keralablms.com

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. Shahriar, 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