Electra

Blockchain-Powered Voting System to Enhance Election Transparency in Nigeria

Personal Mission & Alignment

Mission: To use technology to solve inefficiencies in Africa, transforming challenges into scalable solutions that improve lives.

- **The Challenge**: Electoral inefficiencies undermining democracy in Nigeria
- **Technology Solution**: Blockchain-powered voting system ("Electra")

PROBLEM - ELECTORAL CRISIS IN NIGERIA

Nigeria's Democratic Challenge

- 29% voter turnout in 2023 elections - lowest since 1999
- History of electoral malpractices: ballot stuffing, result manipulation, voter suppression
- Technology failures in 2023:
  - BVAS system malfunctions preventing voter accreditation
  - IReV platform delays and server issues
  - Public trust severely damaged

CURRENT SYSTEM LIMITATIONS

BVAS & IReV System Failures

Technical Issues:

- Device malfunctions during fingerprint/face recognition
- Network connectivity problems
- Server configuration errors

Trust Issues:

- Discrepancies between polling unit results and IReV uploads
- Allegations of result tampering
- Lack of real-time verification

CURRENT SYSTEM LIMITATIONS

BVAS & IReV System Failures

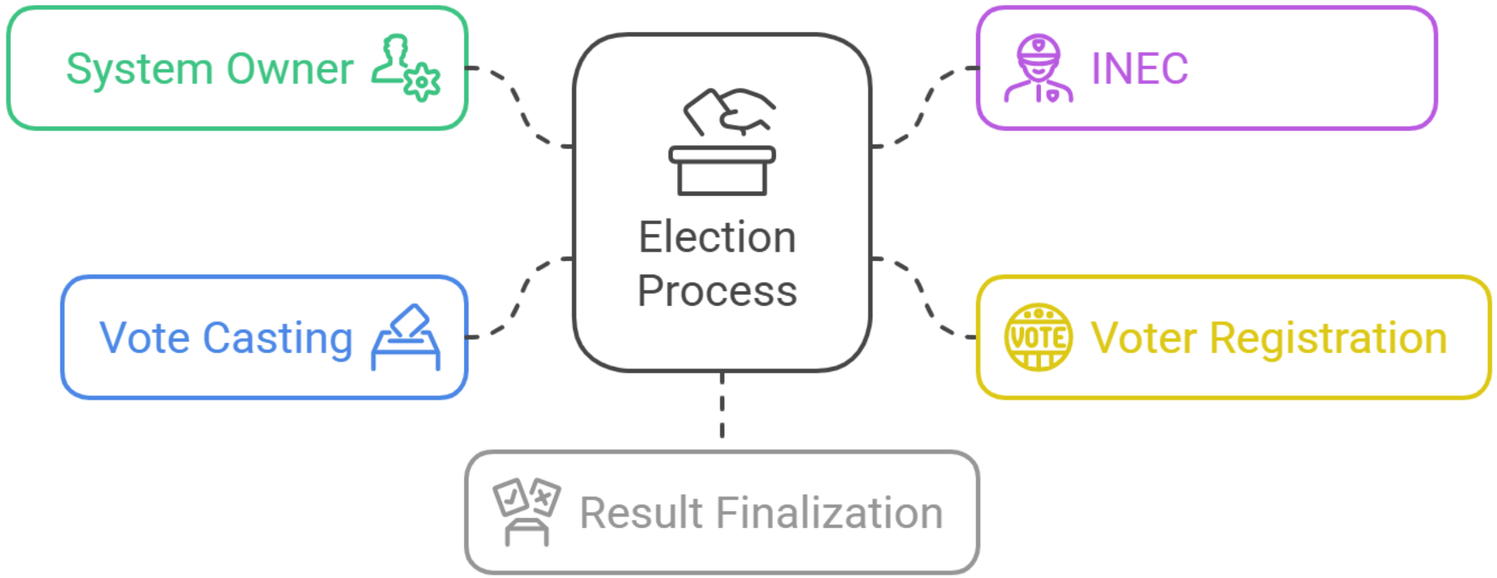
Core Features:

- Role-Based Access Control: Voters, Observers, INEC
- Immutable Vote Records
- Real-time Transparency
- Self-Registration: Voters can register themselves during open periods

Technology Implementation:

- Solidity 0.8.19 smart contract
- Comprehensive access control system
- Emergency safety mechanisms

SYSTEM ARCHITECTURE



Comparison with Current System

Feature	BVAS/IReV (2023)	Electra Blockchain
Voter Verification	Biometric failures	Cryptographic validation
Result Upload	Delayed, server issues	Real-time blockchain recording
Transparency	Limited, delayed	Public, instant verification
Tampering Resistance	Vulnerable to manipulation	Immutable blockchain records
Public Auditability	Restricted access	Open blockchain verification

DEPLOYMENT PROCESS

- Used Truffle + Ganache + MetaMask
- Deployment steps:
  - Compile smart contract
  - Migrate to Ethereum Testnet (Sepolia)
  - Interact using Web3/Remix frontend
- Verification through blockchain explorer

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📋 Deployment Summary:
======================
Contract: Electra
Address: 0x465EA85230A786719a8ADEEa17Aa0d34d5CD99Bf
Network: sepolia_alchemy
Gas used: ~ 0.005396708 Gwei
Deployer: 0xc67a6076f1A339826f875e43efD9Ac8FD3e81739
   > Saving migration to chain.
   > Saving artifacts
   -------------------------------------
   > Total cost:           0.1693492 ETH

Summary
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> Total deployments:   2
> Final cost:          0.1771117 ETH
```

```
godsfavour@GODSFAVOUR:~/ALU/electra$ truffle run verify E
lectra --network sepolia_alchemy
[dotenv@17.2.0] injecting env (26) from .env (tip: 🔐 pre
vent building .env in docker: https://dotenvx.com/prebuil
d)
Verifying contracts on etherscan
   Verifying Electra
   Pass - Verified: https://sepolia.etherscan.io/address/
0x465EA85230A786719a8ADEEa17Aa0d34d5CD99Bf#code
   Successfully verified 1 contract(s).
Verifying contracts on sourcify
   Verifying Electra
   Pass - Verified: https://sourcify.dev/#/lookup/0x465EA
85230A786719a8ADEEa17Aa0d34d5CD99Bf
   Successfully verified 1 contract(s).
```

CONCLUSION

In summary, this blockchain-powered voting system is designed to address the core issues undermining Nigeria’s elections—fraud, lack of transparency, and public distrust. By leveraging decentralization, immutability, and smart contracts, the solution ensures secure vote recording, real-time verification, and tamper-proof results, ultimately restoring trust and strengthening democratic integrity.

THANK YOU