Solution Challenge
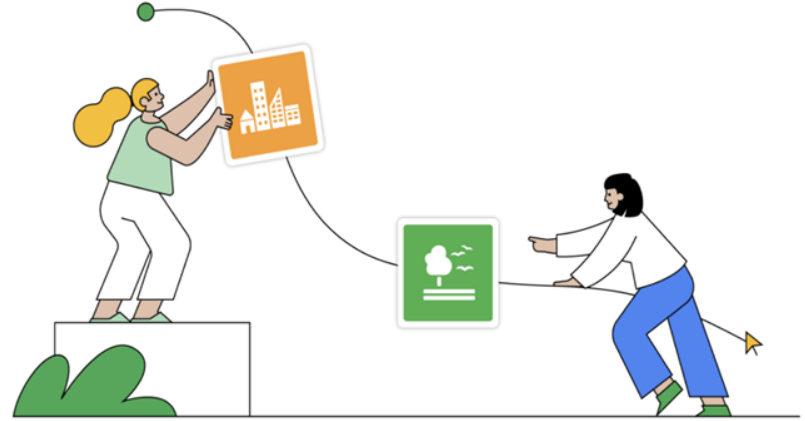
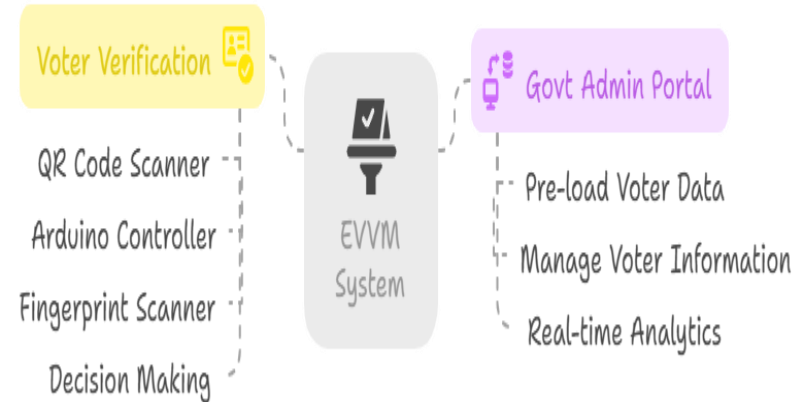**Team Details**

    a. Team name: Spartans
    b. Team leader name: Prajwal M Biradar
    c. Problem Statement: Revolutionizing Voting with Faster and Secure Automated Verification

We propose an Electronic Voter Verification Model (EVVM) to replace manual voter verification in Indian elections using QR code and fingerprint authentication.

➢ Pre-uploaded Data: Govt uploads voter & candidate data (Aadhaar, Voter ID, fingerprint, symbols) before elections.

➢ QR Code Slip: Voters receive an electoral slip with a QR code containing their Voter ID.

➢ Verification Flow:
- QR code is scanned at the booth.
- Fingerprint is authenticated via sensor.
- If matched → Ballot unit is activated.
- Voter marked as "Voted" (no re-voting).

➢ Live Analytics: Real-time vote count sent to Google Data Studio every minute.

➢ If anything, goes wrong the officer has authority give manual authentication

Electronic Voter Verification Model

Voter Verification
QR Code Scanner
Arduino Controller
Fingerprint Scanner
Decision Making

EVVM System

Govt Admin Portal
Pre-load Voter Data
Manage Voter Information
Real-time Analytics

Opportunities

What Makes It Different?

✓ Most current systems rely on manual voter verification by officers.
✓ Existing electronic systems lack biometric checks and real-time tracking.
✓ Our model uses QR + fingerprint verification + live analytics for end-to-end automation.
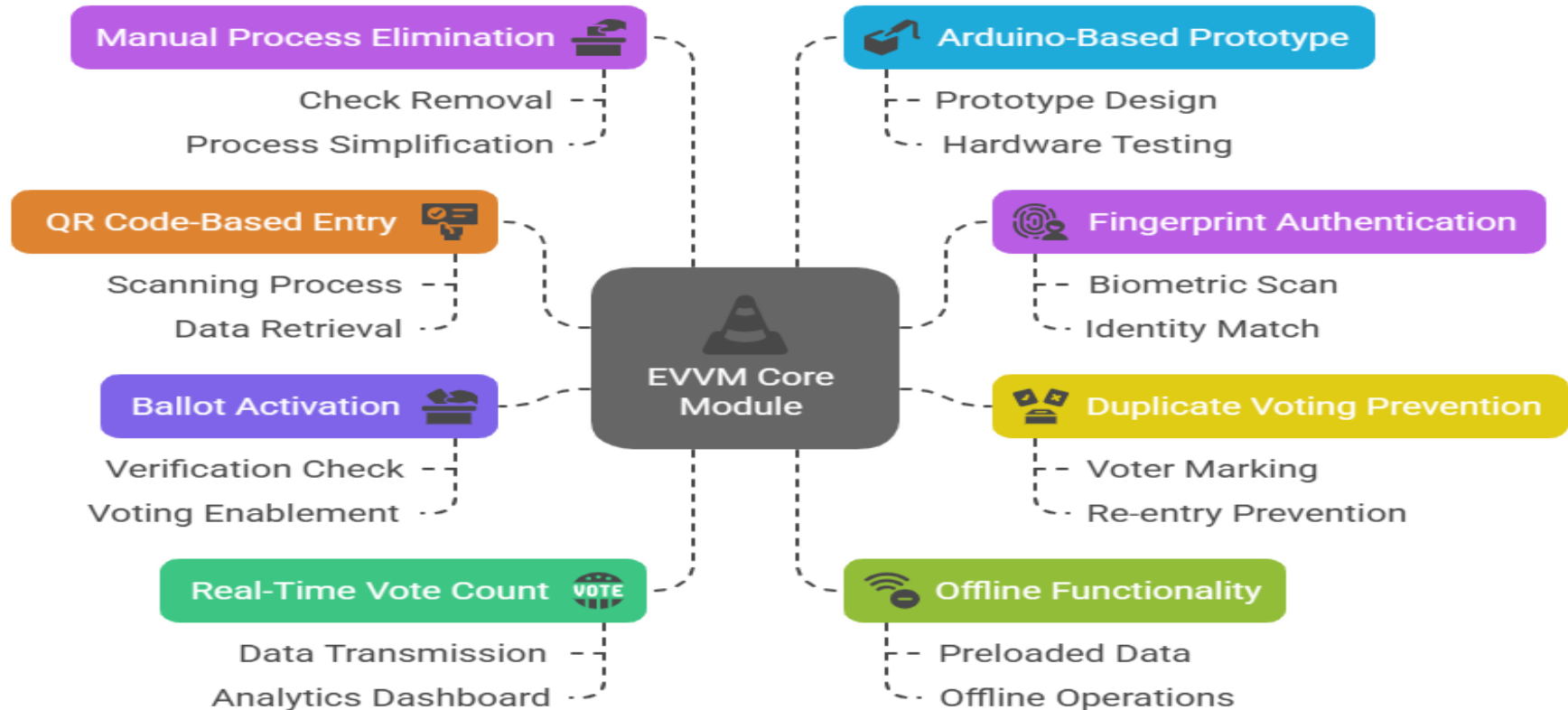✓ Works offline with preloaded secure data—no network dependency during voting.

How It Solves the Problem?

✓ Eliminates manual errors & fake voting
✓ Ensures only authenticated citizens can vote
✓ Increases the speed of voting process by eliminating manual method
✓ Provides real-time data for transparency & monitoring

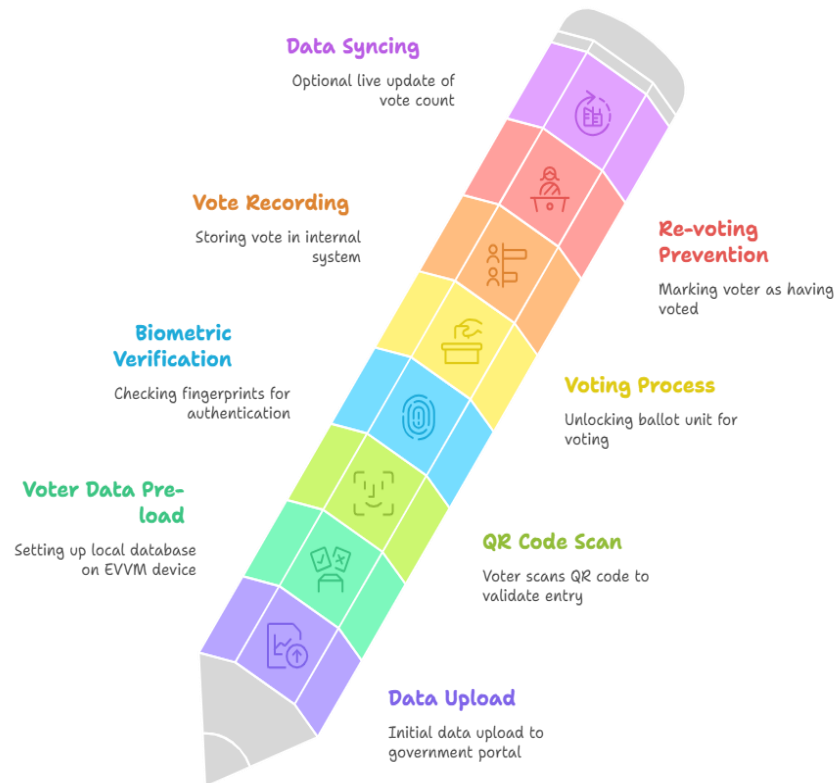**USP – Why EVVM Stands Out**

✓ Biometric + QR-based double-layered verification
✓ Real-time vote count tracking via Google Data Studio
✓ Offline-ready architecture with full local data control
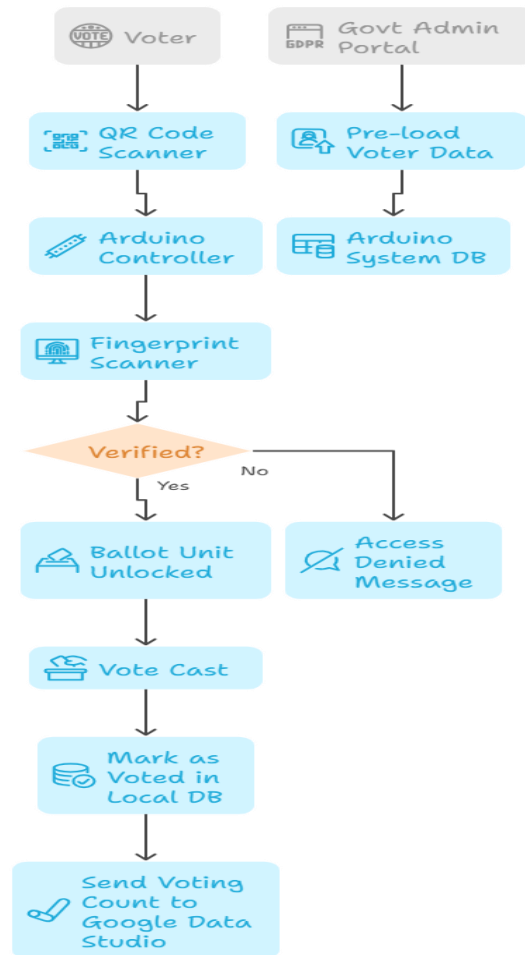✓ Fully working Arduino-based prototype
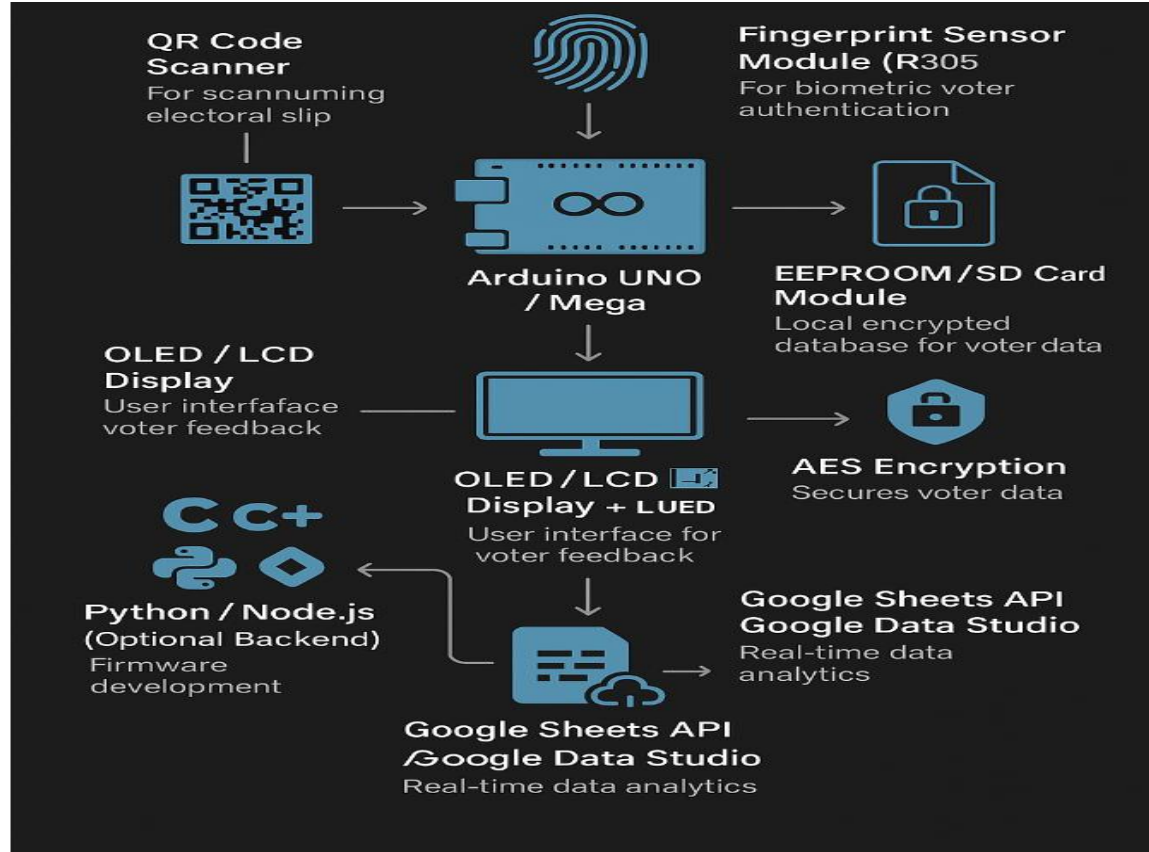
Electronic Voter Verification Model (EVVM) System Features

Solution Challenge

EVVM Process Overview

Data Syncing
Optional live update of vote count

Vote Recording
Storing vote in internal system

Re-voting Prevention
Marking voter as having voted

Biometric Verification
Checking fingerprints for authentication

Voting Process
Unlocking ballot unit for voting

Voter Data Pre-load
Setting up local database on EVVM device

QR Code Scan
Voter scans QR code to validate entry

Data Upload
Initial data upload to government portal

EVVM Process Flowchart

Voter → QR Code Scanner → Arduino Controller → Fingerprint Scanner → Verified?

Govt Admin Portal → Pre-load Voter Data → Arduino System DB

Verified? — Yes → Ballot Unit Unlocked → Vote Cast → Mark as Voted in Local DB → Send Voting Count to Google Data Studio

Verified? — No → Access Denied Message

Made with Napkin

Architecture diagram :

Core Technologies for EVVM

Arduino UNO / Mega
Central microcontroller for hardware control.

Fingerprint Sensor
Biometric authentication for voter verification.

QR Code Scanner
Scans QR codes on electoral slips.

EEPROM / SD Card
Local storage for encrypted voter data.

Google Sheets API
Collects and visualizes real-time voter data.

C / C++
Programming languages for Arduino firmware.

Python / Node.js
Backend for data syncing and monitoring.

AES Encryption
Secures voter data during storage and transmission.

OLED / LCD Display
Voter feedback interface for messages and status.

Estimated implementation cost :

Component	Estimated Cost (INR)
Arduino Mega / Uno	₹600 – ₹900
Fingerprint Sensor Module (R305)	₹1,500 – ₹2,000
QR Code Scanner Module	₹700 – ₹1,200
OLED / LCD Display	₹200 – ₹400
Buzzer, LEDs, Push Buttons	₹100
SD Card Module or EEPROM	₹150 – ₹300
Wires, Connectors, PCB (Misc Hardware)	₹200 – ₹300
Power Supply / Battery Backup	₹300 – ₹500
Enclosure Box (for rugged use)	₹300 – ₹600
Software Tools (Arduino IDE, Python etc)	Free (Open Source)
Google Data Studio Integration	Free Tier (for Prototype)
Total Estimated Cost (per unit)	**₹4,000 – ₹6,300**

➢ In each booth, 3–4 officers are appointed at ₹1000 per day. Our system replaces   2–3 of them, saving ₹2000 daily per booth. In just 3 years, the savings equal the device cost (~₹6000), making the next 7 years a cost-free advantage.(if we assume min 10 years the device works properly)

Snapshots of the MVP
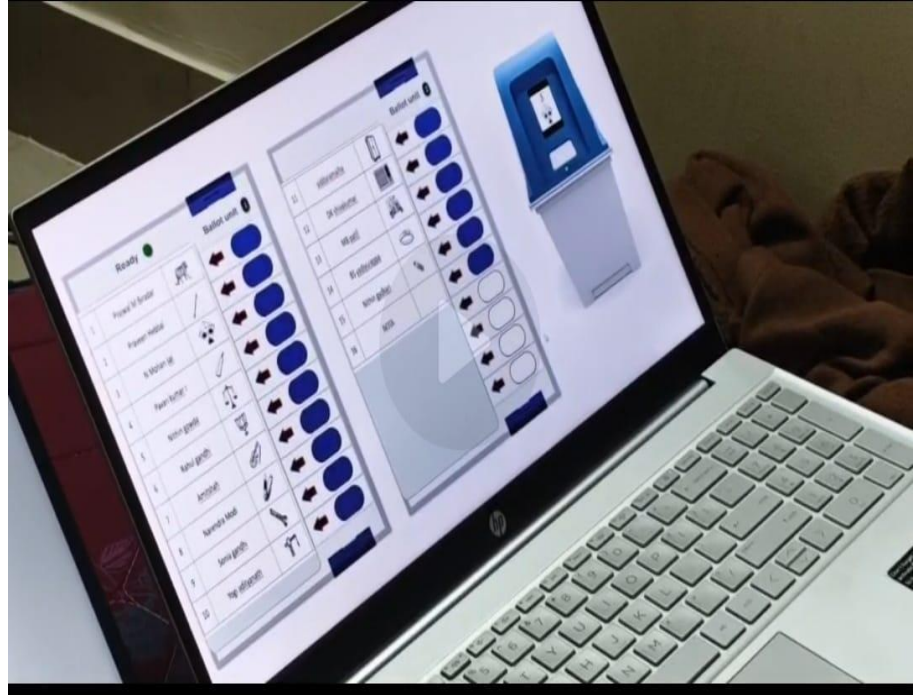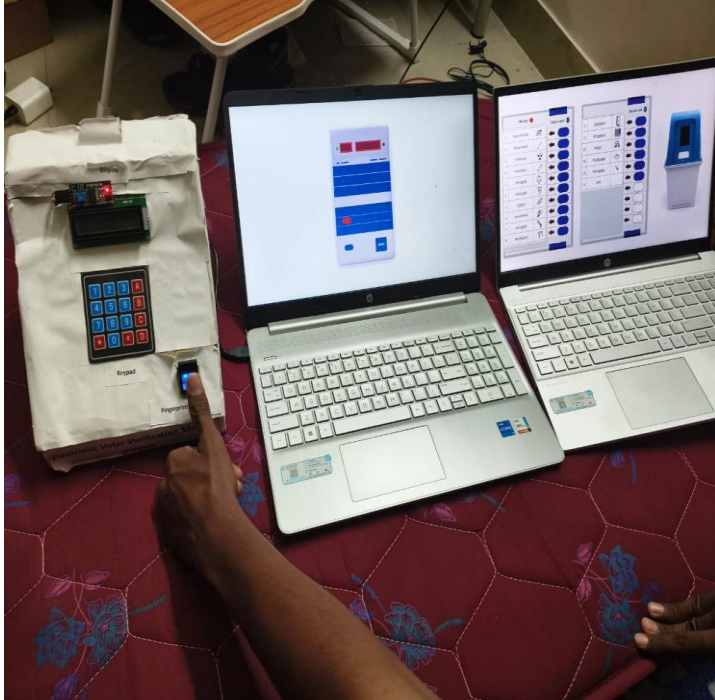
Future Development :

- ❖ **Biometric Encryption & Tamper-Proof Logs** to enhance data security and prevent manipulation.

- ❖ **Centralized Cloud Sync** post-voting to update voter status and results securely in real time.

- ❖ **Offline to Online Transition Mode**: Works offline during polling and syncs automatically when internet is available.

- ❖ **Mobile App for Officers** to monitor booth stats, voter turnout, and system health live.

- ❖ **Integration with Blockchain** for transparent vote audit trails in future upgrades.

- ❖ **AI-based Anomaly Detection** to flag suspicious voting patterns or duplicate attempts.

- ❖ **Scalable Hardware Design** allowing updates or modules to be added (e.g., face recognition, camera, GPS).

Provide links to your:

1. GitHub Public Repository: https://github.com/ningaraj44/spartans_EVVM.git

2. Demo Video Link (3 Minutes): https://drive.google.com/drive/folders/1_G5NPJXMU2nwlO1aNxhQ9g3ooKCyc5y3?usp=drive_link

1. MVP Link: https://drive.google.com/drive/folders/15FsHU3rw-PF2QtF-3m-yy6lSROfFCBSO?usp=drive_link