

# Police Complaint DApp – How It Works

## 1. Overview

The **Police Complaint DApp** is a decentralized application that allows citizens to file complaints **securely**, **immutably**, and **transparently** using blockchain technology. The system also enables police/admins to track, verify, and resolve complaints. All proofs (images, documents, videos) are stored on **IPFS**, ensuring tamper-proof evidence.

## 2. Key Features

- ✔ **Decentralized Complaint Storage**: Complaints are stored on **Ethereum blockchain** (Sepolia testnet) ensuring immutability.
- ✔ **IPFS Proof Upload**: Users can upload files as evidence which are stored on **IPFS**.
- ✔ **User Wallet Authentication**: Users connect via **MetaMask** wallet to submit complaints.
- ✔ **Admin Dashboard**: Police or admin can fetch all complaints, view details, and mark them as resolved.
- ✔ **Analytics Integration**: Backend stores complaints in **MongoDB** to perform analytics like total complaints, unresolved complaints, and complaints per user.

## 3. System Architecture

**Components:**

- ✔ **Frontend (React)**: Allows users to file complaints and view status. Connects with MetaMask for blockchain interactions. Uploads proof files to IPFS or via backend server.
- ✔ **Backend (Node.js + Express)**: Receives complaints and stores them in MongoDB. Handles IPFS file uploads securely. Provides APIs for admin analytics and complaint resolution.
- ✔ **Smart Contract (Solidity)**: `ComplaintSystem.sol` stores complaint data on Ethereum blockchain. Emits events on filing and resolving complaints. Only admin wallet can resolve complaints.
- ✔ **IPFS Storage**: Stores media proof files, generating a permanent hash linked in the complaint.

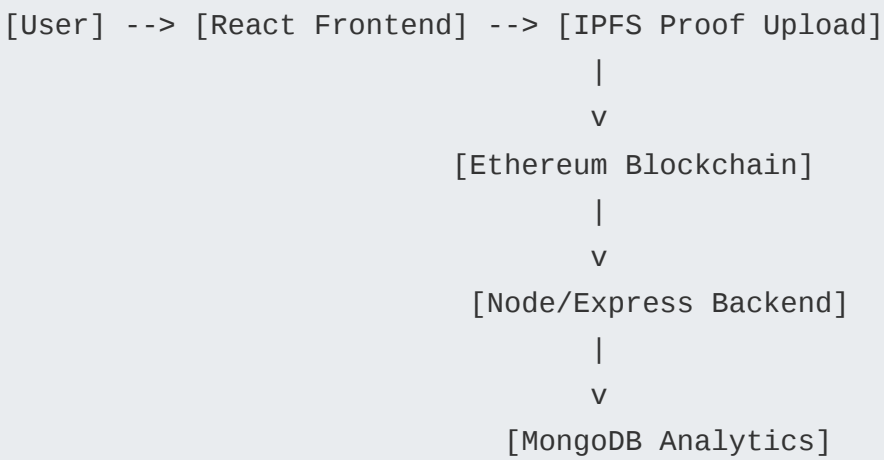
## 4. Complaint Filing Flow

- 1 User connects wallet using **MetaMask**.
- 2 User enters a description of the complaint.
- 3 User optionally uploads proof (image/video/document).
- 4 Proof is uploaded to **IPFS** → returns a unique **IPFS hash**.
- 5 User submits complaint → smart contract stores: User address, Description, **IPFS hash**, Timestamp, Resolved status (default: false).
- 6 Backend stores complaint metadata in **MongoDB** for analytics.

## 5. Admin/Police Flow

- 1 Admin logs into dashboard using secure credentials or wallet.
- 2 Admin fetches all complaints via backend API or directly via smart contract.
- 3 Admin views complaint details and proof files.
- 4 Admin resolves complaints → updates **blockchain** and backend database.
- 5 Admin can run analytics: Total complaints, Unresolved complaints, Complaints per user.

## 6. Data Flow Diagram



## 7. Technical Stack

COMPONENT	TECHNOLOGY/TOOL
Frontend	React, ethers.js
Backend	Node.js, Express
Database	MongoDB
Blockchain	Ethereum Sepolia
Smart Contract	Solidity, Hardhat
File Storage	IPFS (Pinata/Infura)
Wallet Integration	MetaMask
Deployment	Hardhat, Infura

## 8. Security & Transparency

- ✔ **Immutable Records**: Blockchain ensures complaints cannot be tampered with.
- ✔ **Tamper-proof Evidence**: **IPFS** ensures uploaded proof files are permanent.
- ✔ **Admin Control**: Only authorized police wallet can resolve complaints.
- ✔ **Analytics**: Backend database allows real-time reporting while preserving blockchain data integrity.

## 9. Hackathon Demo Flow

- 1 Open the DApp → connect wallet.
- 2 Enter complaint description → attach proof file.
- 3 Click “File Complaint” → shows blockchain transaction confirmation.
- 4 Admin dashboard → view all complaints → mark resolved.
- 5 Analytics → show total complaints, unresolved count, complaints per user.

## 10. Advantages

- ✔ Transparency in filing complaints.
- ✔ Secure and decentralized storage.
- ✔ Quick verification for police.
- ✔ Permanent tamper-proof evidence storage.
- ✔ Ready for analytics and reporting.