**Common User Inputs Required (Collected from Customer Form)**

| **Input Field** | **Purpose** | **Notes** |
| --- | --- | --- |
| **Survey Number** | Core identifier for property | Needed for almost all portals |
| **Owner Name** | Ownership verification | Useful for name-based search and matching |
| **Village Name** | Precise location | Required for land records |
| **District, Taluk, Hobli** | Administrative mapping | Required for Bhoomi, Mutation |
| **Google Pin / Coordinates** | Location accuracy | GIS and zoning portals |
| **State** | Routing to correct portal | Drives the backend routing |
| **Property Type (Urban/Rural)** | Determines document types | Helps in portal form selections |
| **Consent (checkbox)** | Legal compliance | Needed to access Aadhaar or UIDAI APIs |
| **Aadhar Number (Optional)** | Owner validation | If authorized by customer consent |

**Portal-wise Inputs Mapping**

| **Portal / API** | **Document** | **Inputs Required** |
| --- | --- | --- |
| **KAVERI (Karnataka)** | Encumbrance Certificate (EC) | District, SRO, Survey No or Document No |
| **Bhoomi RTC (Karnataka)** | RTC (Record of Rights, Tenancy, Crops) | District, Taluk, Hobli, Village, Survey No |
| **Bhoomi Mutation (Karnataka)** | Mutation Status | District, Taluk, Hobli, Village, Survey No or Application ID |
| **Dishank (Karnataka)** | Survey Sketch / GIS Maps | Village, Survey No, Google Pin |
| **BBMP (Bangalore)** | Tax Receipt | Property ID, Owner Name, Ward |
| **BDA CDP Map (Bangalore)** | Zoning Information | Survey No or direct map interaction |
| **Dharani (Telangana)** | EC, RTC, Mutation | District, Mandal, Village, Survey No |
| **IGRS (AP, Telangana)** | Encumbrance Certificate | Document No, Registration Details |
| **TNREGINET (Tamil Nadu)** | EC, Mutation, Patta/Chitta | District, Sub-Registrar, Document/Schedule No |
| **UIDAI API (Optional)** | Aadhar Validation | Aadhar Number (with consent) |
| **eCourts / NJDG** | Legal Case Check | Owner Name, Case Title, Survey No (if mapped) |

# **What are all the ways we have to fetch documents and verify them?**

We essentially have 4 possible ways to fetch documents from government portals:

| **Method** | **Description** | **Use Case** |
| --- | --- | --- |
| **1️.Public APIs (Official Government APIs)** | Some states have official APIs for property records | UIDAI for Aadhaar KYC (with consent), few revenue APIs |
| **2️.Browser Automation (Selenium / Puppeteer)** | Automating human interaction: fill forms, click buttons, download PDFs | Most portals (Bhoomi, KAVERI, TNREGINET, Dharani, etc.) |
| **3️.Headless API Gateway Providers (Private Aggregators)** | Companies already offering APIs aggregating multiple government sources | Eg: Signzy, Karza, Perfios, Hyperverge |
| **4️.Government Partnership (Official Legal Integrations)** | Partnering officially with state governments to integrate as authorized data consumer | Long process, but full legal access |

# **Portal-by-Portal Integration Approaches**

### Karnataka (Bhoomi, KAVERI, Dishank, BBMP, BDA)

| **Portal** | **Best Approach** | **Notes** |
| --- | --- | --- |
| **Bhoomi RTC / Mutation** | Selenium Automation (Form-fill automation) | High stability, captchas manageable |
| **KAVERI EC** | Selenium Automation (with CAPTCHA solver) | Captcha can be bypassed via OCR or external captcha solving services |
| **Dishank (Survey Map)** | GIS App Automation via Appium | Dishank is primarily mobile-based, no public APIs |
| **BBMP Tax** | Direct scraping (no captcha) | High feasibility |
| **BDA CDP** | Screenshot Automation (map overlay capture) | No official APIs |

### Telangana (Dharani, IGRS)

| **Portal** | **Best Approach** | **Notes** |
| --- | --- | --- |
| **Dharani RTC / Mutation** | Selenium Automation | Stable interface |
| **IGRS EC** | Selenium Automation | Document no based searches |

### Tamil Nadu (TNREGINET)

| **Portal** | **Best Approach** | **Notes** |
| --- | --- | --- |
| **TNREGINET EC / Patta** | Selenium Automation (State Captcha Solvers may be needed) | Captcha challenge |
| **Patta/Chitta** | Similar scraping approach | Works with credentials sometimes |

### UIDAI (Aadhar Validation)

| **Portal** | **Best Approach** | **Notes** |
| --- | --- | --- |
| **UIDAI APIs** | Direct API Integration (Official UIDAI KYC API with consent) | Needs KUA license, legal agreements |

### Legal Case (eCourts / NJDG)

| **Portal** | **Best Approach** | **Notes** |
| --- | --- | --- |
| **eCourts** | Browser Automation with Search by Party Name | Captcha challenge, but searchable |

# **Backend Technologies**

| **Component** | **Tool Options** |
| --- | --- |
| Browser Automation | Selenium, Puppeteer (headless Chrome) |
| CAPTCHA Solvers | 2Captcha, AntiCaptcha, custom OCR |
| App Automation (Mobile) | Appium |
| NLP & OCR | Google Vision, Tesseract OCR, OpenAI models |
| Secure Credential Management | AWS Secrets Manager, Azure Vault |
| Backend Server | Node.js, Python FastAPI, Django |
| Storage | AWS S3, GCP Storage, Azure Blob |
| Databases | PostgreSQL, MongoDB (for document meta storage) |

# **How we can integrate? (Integration Models)**

### Option 1 — ****Direct Automation Build In-House (Cheapest, Complex)****

* Build all scrapers, captcha solvers, backend yourself.
* Full control but very high technical work.
* You can start step-by-step state-by-state.

### Option 2 — ****Hybrid Integration (Recommended for NAL India Start)****

* Build basic automation in-house.
* Use 3rd-party API aggregators for difficult portals (ex: Dishank, UIDAI, eCourts)
* Faster time to market.

### Option 3 — ****Partner with Government (Long-term Vision)****

* Apply for authorized partnerships.
* Some states allow official API access for PropTech companies.
* Requires regulatory clearances.

# **Step-by-step Roadmap**

**Phase 1 (MVP):**

* Build Customer Input Module
* Build Routing Engine
* Start with Karnataka (Bhoomi, KAVERI, BBMP, BDA)
* Use Selenium Automation with Captcha handling

**Phase 2:**

* Add Telangana and TN portals.
* Expand Captcha solver logic.

**Phase 3:**

* Integrate eCourts, UIDAI via 3rd-party aggregator or official partnership.

**Phase 4:**

* Build full AI-powered legal validation, document parsing, trust report generation.