

## # OpenSmartFill Pro — Architecture & KPIs

## Core Problem Native autofill systems only handle fixed field types (name, address, credit card). They fail on custom, institutional, or context-specific fields (e.g., “ASU ID”, “Project Code”, “Employee Number”).

## Solution A semantic, privacy-first autofill extension for Safari that learns custom fields, adapts to context, and synchronizes securely across devices.

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### ## Technical Overview

### Frontend - Safari Web Extension (Manifest v3) with: - Content Script: DOM scan, label extraction, confidence chips, field fill - Background Worker: hotkeys, sync, model preload - React Options UI: profiles, vault, backup/restore - On-device ML with Transformers.js (MiniLM model, WASM) - IndexedDB (Dexie) for vectors, settings, fields - AES-GCM encryption (Web Crypto) with PBKDF2 passphrase key - Local cosine similarity scoring for label↔field matching

### Backend - Firebase (Free Tier): - Auth: anonymous sign-in - Firestore: encrypted field vault + telemetry (non-PII) - Cloud Functions (optional): aggregate correction rate, domain stats - Firestore Rules: per-user scope, rate limits, no server-side decryption

### Pipeline 1. Extract label (label/aria/placeholder/text node) 2. Normalize → Embed (MiniLM → vector) 3. Retrieve candidate fields from profile 4. Compute cosine similarity + rule boosts 5. Decision thresholds: -  $\geq 0.85$ : auto-fill -  $0.72-0.85$ : suggest chip 6. Learn from accept/reject edits 7. E2E encrypt & sync vault to Firestore

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### ## KPIs (Key Performance Indicators)

Metric	Target	Description
<b>Top-1 Field Recognition Accuracy</b>	$\geq 90\%$	Correct mapping between label and saved field
<b>p95 Fill-All Latency</b>	$\leq 120$ ms	Time to fill 30 fields on a page
<b>Cold Model Load Time</b>	$\leq 500$ ms	First-load MiniLM model initialization
<b>Encrypted Sync Success Rate</b>	$\geq 99\%$	Successful encrypted upload/download transactions
<b>Correction Rate (1 - Accuracy Drift)</b>	$\leq 8\%$	User corrections over total fills
<b>Storage Footprint</b>	$\leq 50$ MB	Quantized MiniLM + local Dexie DB
<b>Auto-Fill Acceptance Rate</b>	$\geq 85\%$	Users accepting autofill suggestions
<b>Confidence Precision@0.85</b>	$\geq 0.9$	Precision for fields filled automatically
<b>User Keystroke Reduction</b>	$\geq 70\%$	Reduction compared to manual entry
<b>Offline Operation Coverage</b>	100%	All core autofill logic runs offline

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## Security Model - End-to-End AES-GCM encryption, passphrase-derived key (PBKDF2) - No plaintext PII leaves device - Cloud functions handle only encrypted or hashed data - Safe Mode: blocks autofill on HTTP/unverified domains

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## Key Differentiators - Understands non-standard institutional fields (IDs, handles, codes) - Learns from corrections (local embeddings update) - Profile-aware autofill (Academic, Work, Travel) - Transparent confidence + explanation chips - Offline-first architecture with encrypted Firebase sync

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## Summary **OpenSmartFill Pro** offers context-aware, privacy-first autofill through on-device semantic models and secure sync. It delivers measurable gains in accuracy, latency, and user

efficiency, while maintaining strict user data control.