Sovereignty Shield

Academic Integrity Defense System

IT103 Web Programming | Computer Science

The Problem

AI Detection Crisis

- **30-40%** false positive rate in AI detectors
- **90%+** universities now require AI disclosure
- **72%** of students report anxiety about AI detection
- **500%** increase in academic disputes since ChatGPT

Students Have No Defense

- Accused of AI-generated work with no way to prove innocence
- Current AI detectors are fundamentally unreliable
- Honor statements are unverifiable
- Google Docs version history can be manipulated

Our Solution

Forensic Proof of Authorship

Sovereignty Shield = A "flight recorder" for writing

Core Concept

- Capture every keystroke, every edit, every save
- Create tamper-resistant forensic evidence
- Shift from "prove you didn't cheat" to "here is proof I wrote this"

Key Technologies

- Keystroke Telemetry (typing patterns)
- Cryptographic Hash Chains (SHA-256)
- PDF Attestation Certificates
- Real-time Draft Snapshots

Team Setup & Roles

Development Approach

Option A: Solo Full-Stack Developer

Area	Technologies

Frontend	React 19, TypeScript, Vite
Backend	Supabase, PostgreSQL
AI	Gemini 2.5 Flash, Claude 3.5

Option B: Pair Development

Role	Responsibilities
Frontend Dev	React components, UI/UX, state management
Backend Dev	Supabase schema, Edge Functions, RLS policies

AI Integration

4 Key AI Use Cases

1. Content Generation Assistance

- Google Gemini 2.5 Flash + Claude 3.5 Sonnet
- 3 specialized modes: Essay, CS, Paraphrase

2. Risk Analysis

- Burstiness Analyzer (sentence variance)
- Perplexity Estimator (word unpredictability)
- LOW/MEDIUM/HIGH risk scoring

3. Surgical Editing

- AI identifies only high-risk sentences
- Minimal intervention, preserves human patterns

4. Web Search Integration

- MCTS algorithm for source selection
- Automatic citation generation

SDG Alignment

SDG 4: Quality Education

- Ensures fair academic assessment
- Protects students from false accusations
- Promotes transparent integrity systems
- Supports educational equity

SDG 16: Peace, Justice, Strong Institutions

- Provides tamper-resistant evidence for disputes
- Strengthens institutional trust

- Creates auditable verification systems

Statistics & Market Need

Industry Data

Statistic	Impact
90%+ universities	Require AI disclosure
30-40%	False positive rate in detectors
72% students	Report AI detection anxiety
$200M+	EdTech integrity market

The Core Problem

- Students accused without evidence
- No tools to prove authorship
- Institutional pressure increasing
- Legal disputes on the rise

Target Users

Primary: University Students (18-25)

Persona	Pain Point
The Accused Student	Falsely flagged, needs proof
The Paranoid Writer	Wants protection before submission
The International Student	Writing style unfairly flagged

Secondary: Educators

Persona	Need
Fair Professor	Verifiable evidence to review
Integrity Officer	Forensic audit trail for appeals

Tertiary: Legal Professionals

- Defense in academic misconduct cases
- Need admissible forensic evidence

Key Features

Core Feature Set

Feature	Description
Zen Mode Editor	Distraction-free writing interface
Draft Snapshots	Automatic forensic versioning
Keystroke Telemetry	Captures typing patterns
Chain of Custody	Cryptographic hash linking
PDF Certificates	Verifiable attestation documents
Audit Trail Viewer	Visual forensic verification
Risk Metrics	Burstiness & Perplexity analysis

User Personas

Maria - The Accused CS Student

- **Age:** 21 | **Program:** BS Computer Science
- **Situation:** Paper flagged as "97% AI-generated"
- **Truth:** She wrote it herself over 2 weeks
- **Goal:** Download forensic certificate proving authorship
- **Success:** Professor reviews audit trail, clears accusation

James - The Paranoid Graduate Student

- **Age:** 26 | **Program:** MS Data Science
- **Situation:** Writing thesis, anxious about Turnitin
- **Goal:** Write with sovereignty protection enabled
- **Success:** Has attestation certificate ready before submission

Strategic Goals

Vision

> *Make proof-of-authorship the standard for academic submissions worldwide.*

Roadmap

Timeframe	Goal
6 months	Deploy MVP, 1,000 beta users

1 year	Partner with 5 universities
3 years	Standard verification for Canvas, Blackboard, Moodle

Impact Metrics

- Reduce false accusations by 80%
- Decrease integrity disputes by 60%
- Save 10,000+ hours of appeals processing
- Prevent 500+ wrongful penalties annually

Release Criteria

Test Cases

ID	Test	Pass Criteria
TC-01	Create draft	New row in drafts table
TC-02	Type in editor	Telemetry data captured
TC-03	Auto-save	Snapshot within 3 seconds
TC-04	Hash chain	Integrity verified
TC-05	PDF certificate	File in Storage bucket
TC-06	RLS enforcement	User isolation works

Performance Targets

- Page Load: < 2 seconds
- API Response: < 500ms
- Mobile Responsive: 375px width
- Accessibility: WCAG 2.1 AA

Tech Stack

Frontend

- React 19
- TypeScript 5
- Vite 6
- Lucide Icons

Backend

- Supabase
- PostgreSQL
- Edge Functions (Deno)

- Supabase Storage

AI Layer

- Google Gemini 2.5 Flash
- Anthropic Claude 3.5 Sonnet
- Serper.dev (Web Search)

Conclusion

CS Theme Alignment ✓

Requirement	Status
Novel Solution	✓ Proof-of-authorship
AI Integration	✓ Gemini + Claude
Data Analytics	✓ Keystroke telemetry
Cyber Security	✓ Hash chains, RLS
Database	✓ PostgreSQL + 18 migrations

Project Readiness

- All 5 IT103 sections covered
- Full-stack implementation complete
- SDG 4 & SDG 16 aligned
- Ready for presentation

Thank You

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Protecting honest students in the AI era.

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