COHERENCE Prototype Specification

Project Name: COHERENCE Sentinel v0.1

Tagline: Authentication that listens to your nervous system.

Objective

To develop a functioning proof-of-concept system that generates and collapses cryptographic keys in real-time based on the user's physiological coherence (), emotional turbulence (curl()), and symbolic context embedding h(t).

The prototype demonstrates:

- Biometric key generation from HRV + EEG coherence

- Session collapse upon trauma indicators (e.g., HRV drop, EEG desync, curl() >)

- Symbolic AI modulation of thresholds and decay window via h(t)

Core Features

1. Sensor Integration

- EEG: Muse S headband (gamma phase coherence >35Hz)

- HRV: Whoop strap or HeartMath device (0.1Hz coherence band)

- Real-time data acquisition via BLE (Python libraries available)

2. Signal Processing Engine

- Extract real-time HRV window (3s-10s) and compute coherence

- Calculate EEG phase coherence index across key electrodes

- Compute : composite trust signal

- Compute curl(): rolling turbulence window from signal fluctuation

3. Key Generator

- Generate key:

  $K = H(HRV\_sync\ )$

- Use SHA3-256 or BLAKE3

- Store key only if   0.7 and curl() <

4. Key Lifecycle Management

- TTL set dynamically: 5s120s, modulated by h(t)

- Auto-collapse on detection of:

  - HRV coherence drop below = 0.7

  - EEG desynchronization

  - curl() >

  - h(t) = [grief, panic, dissociation]

5. Symbolic Context Integration (Kai)

- Process semantic data (voice tone, typed sentiment, facial emotion if available)

- Generate h(t) affects , , TTL decay rate

- Log symbolic context per session

6. Frontend (CLI/Web)

- Real-time key state: valid, expired, revoked

- Visualize HRV, EEG coherence, ,

- Display live curl() as a phase dial

Tech Stack

- Python: core engine

- Flask/FastAPI: web-based UI or REST endpoint

- BLE SDKs: Muse SDK, HeartMath/Whoop integrations

- Kai module: symbolic context parser (mocked or pretrained sentiment AI)

Milestones

Milestone	Description	Target Date
M1	HRV and EEG ingestion and coherence calculation	Week 1
M2	Key generation from biometric fusion	Week 2
M3	curl() and thresholds + auto-collapse logic	Week 3
M4	Kai context hooks (symbolic state affects TTL)	Week 4
M5	CLI or Web dashboard	Week 5

Outcome

A functioning prototype that:

- Proves emotional coherence can generate cryptographic keys

- Demonstrates trauma-based auto-expiry (ethical security)

- Sets foundation for licensing to therapy, AI, or biometric security partners

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This system does not just authenticate. It listens.