

Research Plan — Agency-Safe HMIs

0 Why now (overview)

We've entered an era of neurotechnology and ultra-fast HMIs where machines can act almost as soon as our minds lean toward action. Like it or not, this nudges us toward an extended self. To maintain autonomy and trust, we need explicit, straightforward protocols that clearly delineate the boundary between human responsibility and machine responsibility, both legally and ethically.



1 SoA-Building Window (with cancel in mind)

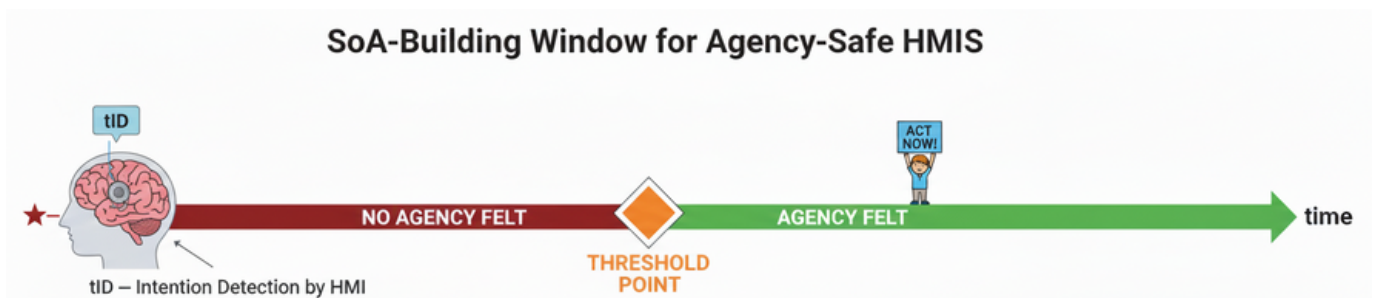
When we act, the feeling “I did that” doesn’t pop up all at once. It builds:

intend → prepare → (SoA builds — **can still cancel**) → commit → act.

That brief SoA-building window—even at the very last moment—lets the brain check: “Am I still choosing this?” Keeping that option alive is what makes the action feel truly ours. Take the window away, and the sense of agency weakens or flips (“the system did it, not me”).

2 The Problem In Neurotech

Some of today’s fast HMIs can start outcomes too early, before this window does its job. Then people report weaker agency; autonomy, consent, and responsibility get shaky—and disputes become harder to resolve. We need a clear, testable timing rule so builders and lawyers can draw the human/machine line.



3 Hypothesis & Aim

- **Hypothesis:** If an outcome is started too early after intention detection, later sense of agency drops; there exists an earliest safe time that preserves SoA.
- **Aim:** Estimate this SoA-building window and turn it into a simple design rule and tiny timing log.

4 Method

- Detect early intention in real-time (e.g., in a simple keypress task).
- Start a brief sound before the action at different times across trials.
- After each trial, ask *"How much did it feel like you did that?"*; log three times: intention detected, outcome started, action performed (add abort if available).
- From timing vs. ratings, find the earliest safe time → this estimates the SoA-building window.

5 What changes for law & design

- **Design rule:** Don't start action earlier than the SoA-building window (or always keep hold-to-commit/confirm).
- **Responsibility:** If an action starts earlier than the window, responsibility leans toward the system, not the user.
- **Consent:** Tell users the device waits long enough for the agency to form; flag modes that shorten the wait.

6 Outputs & Collaboration

- **Output:** A practical time range (per task/device), a one-page builder checklist, a log template, and a short policy note.
- **Collaboration:** Open to legal/BCI collaborators to refine standards and deployment.