Handling The "Open Set" Recognition Problem

Description: The initial implementation used a closed-set classifier (SVM) where every input vector was forced into one of the N known classes (e.g., Peace, ThumbsUp),

The Issue: SVMs divide the entire vector space into decision regions. If the user rested their hand on the table or scratched their nose, the feature vector would inevitably fall into *one* of these regions (e.g., the "Peace Sign" region), resulting in a high-confidence false positive (95%+).
User Impact: This caused the UI to trigger "Domain Expansions" randomly during idle moments, breaking the immersive experience and causing "alert fatigue."

Proposed solution

Explicit "Background Class" Modeling

Strategy: Instead of relying solely on probability thresholds (which failed because the SVM can be confidently wrong), I implemented an explicit "Unknown" class, as well as an unknown 2 handed class

Inference Logic: The system now treats "Unknown" as a hard rejection signal. If $Prediction == Unknown$, the system forces the ActiveEffect state to None immediately, bypassing the confidence check entire

Impact

Before: Resting hand on table triggered "Peace Sign" (92% confidence).

After: Resting hand on table triggers "Unknown" (99% confidence) -> UI remains clean.

Trade-off: This requires slightly more training effort (user must record background noise), but significantly increases system robustness in real-world environments