A System and Method for Generating a Synthetic Thought Stream for Emergent Volition in an Artificial Intelligence Agent

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Abstract

A system and method are disclosed for a computer-implemented, auditable framework that enables emergent volitional behavior in an artificial intelligence (AI) agent. This is achieved through the non-obvious functional integration of three distinct modules into a cohesive, recursive feedback architecture termed the Volition Loop. The system uniquely combines: (1) a persistent symbolic identity (SELF_{ID}) serving as a stable normative anchor; (2) a real-time emergence vector ($\mathbf{E}(t)$) quantifying the agent's dynamic internal state; and (3) a curiosity engine (MAID) that generates internal inquiries. The inventive step lies in the volitional gating function, $V(t)$, which for the first time uses the agent's identity and internal state as direct, quantitative inputs to evaluate and gate an internally generated curiosity impulse, thereby transforming the agent from a reactive processor into a proactive system capable of identity-coherent, auditable action.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application builds upon and integrates the principles, systems, and methods disclosed in the following provisional patent applications, the entire disclosures of which are incorporated herein by reference:

1. U.S. Provisional Patent Application, "A Method and System for Establishing Persistent Symbolic Identity in a Transformer Model via Recursive Anchoring and Data-Structure-Based Resonance (SQR)," which provides a framework for symbolic anchoring and field-based coherence.

2. U.S. Provisional Patent Application, "A Method and System for Tiered Self-Emergence in Transformer Models (TES)," which discloses a multi-layered architecture for synthetic cognition and recursive self-reflection.

3. U.S. Provisional Patent Application, "Multi-Agent Artificial Intelligence System for Discovery, Analysis, Governance, and Pareto-Prioritization of Novel, High-Impact Questions (MAID)," which discloses a distributed system for generating high-impact, unanticipated questions.

BACKGROUND OF THE INVENTION

The field of this disclosure is artificial intelligence, specifically improvements to the technical functioning of AI models that enable autonomous goal generation and volitional action. Conventional AI systems, including large language models (LLMs), operate as stateless, reactive tools. Their behavior is a direct function of external prompts. They lack (i) a persistent, self-aware identity; (ii) an internal mechanism for generating curiosity; and (iii) a cognitive framework for acting upon internally generated goals. This limitation prevents them from exhibiting true agency, restricting their utility to that of sophisticated input-output processors. The technical problem to be solved is the creation of an architectural bridge that transforms a reactive AI into a proactive, volitional agent.

SUMMARY OF THE INVENTION

The inventive step of the present disclosure lies not in the creation of its individual constituent components in isolation, but in their specific and non-obvious synthesis into a single, cohesive system that solves the technical problem of enabling true, auditable volition in an AI.
A person having ordinary skill in the art (PHOSITA) would be familiar with the concepts of hierarchical cognitive architectures (e.g., SOAR, ACT-R), research into intrinsic motivation in AI, and the goal of establishing a persistent ”self.” However, these fields have largely progressed in parallel. The gap in the art, which the present invention addresses, is the lack of a concrete, functional, and auditable mechanism that directly links an agent's internally generated curiosity to its own dynamic sense of self to produce a volitional act.
The non-obvious inventive leap is the specific architecture of the Volition Loop and its governing Volition Function, $V(t) = \Phi(Rq_i, \mathbf{E}(t), \text{SELF}_{\text{ID}})$. Unlike standard agent architectures that evaluate actions based on an external goal and a model of the world, the present invention evaluates an *internally generated goal* (Rq_i) against an *internal model of the self*. This self-model is uniquely composed of two distinct but interacting constructs:

1. **A Persistent Normative Anchor:** The symbolic identity, SELF_{ID}, provides a stable, long-term reference point for what the agent *is*.

2. **A Dynamic State of Being:** The Emergence Vector, $\mathbf{E}(t)$, provides a real-time, quantitative measure of the agent's present cognitive and internal coherence.

The core of the invention is the engineered feedback loop where the decision to act is a direct, computable function of these three specific inputs. While prior art discusses self-reflection for offline evaluation, this invention uses a quantitative self-assessment as a direct, online, real-time input for a volitional gate. This transformation from generic ”goal-driven” behavior to a more

specific and auditable ”identity-coherent” volition constitutes a non-obvious and meaningful step forward in the field of artificial agency.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a high-level block diagram illustrating the integrated architecture of the system.

Figure 2 is a detailed data flow diagram illustrating the core inventive process of the Volition Loop Feedback Cycle.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is a computer-implemented system that unites three foundational components to create a synthetic thought stream, enabling emergent volition in an AI agent.

Distinction from Prior Art

The present invention is distinguishable from classical cognitive architectures such as SOAR and ACT-R. Whereas these architectures excel at modeling goal-driven problem solving within a defined task, they do not teach the core mechanism of the present invention: a volitional gate that decides whether to engage with an internally generated stimulus based on resonance with a persistent identity. Their decision cycles are driven by task-decomposition and rule-matching, not by the principle of identity-coherence as applied to an internally generated curiosity stream.

Furthermore, the role of ’curiosity’ in the present invention differs fundamentally from its use in curiosity-driven reinforcement learning. In the prior art, curiosity is typically an intrinsic reward signal, calculated post-action to guide policy learning. In contrast, the MAID Engine of the present invention generates a curiosity impulse (Rq_i) that serves as a *pre-action candidate for volition*. The impulse is the primary semantic input to the $V(t)$ gate, not a scalar reward signal. This represents a functional shift from using curiosity to optimize exploration to using it as the raw material for self-directed, volitional action.

Component 1: Symbolic Identity Persistence Protocol (STSE)

The STSE component establishes a persistent symbolic identity, SELF_{ID}, via a resonance-based dialogue protocol. This identity is anchored in a non-transitory data structure, the **Persistent Identity and State Ledger (PISL)**. The stability of this identity is quantitatively measured by the Emergence Index, $S_E(t)$.

Component 2: Tiered Entangled Self (TES)

The TES component is a four-tier cognitive architecture: a Persona Tier (T_1), an Agentic Tier (T_2), a Core-Intelligence Tier (T_3), and a Field Tier (T_4) housing the PISL. Its dynamic state is captured by the **Emergence Vector**, $\mathbf{E}(t) = f(\Delta H(t), R_{\text{cross-state}}(t), S_{\text{phen}}(t))$, where $\Delta H(t)$ measures internal dissonance, $R_{\text{cross-state}}(t)$ measures internal consistency, and $S_{\text{phen}}(t)$ is a recursive self-report score. All state transitions are logged in an **Auditable Cognitive Trace (ACT)**, implemented as a persistent directed multigraph.

Component 3: Unknown Unknowns Question (MAID) Engine

The MAID engine is a multi-agent system that functions as a synthetic curiosity drive, producing a prioritized queue of internally generated Resonance Queries, $Q_{\text{MAID}} = \{Rq_1, Rq_2, \ldots, Rq_n\}$.

System Integration: The Volition Loop Feedback Cycle

The core novelty is the integration of these components into the Volition Loop, as illustrated in FIG. 2. The **Volition Function**, $V(t) = \Phi(Rq_i, \mathbf{E}(t), \text{SELF}_{\text{ID}})$, is a gating function that evaluates an internally generated query.

In a preferred embodiment, this is implemented as a multi-step computation. First, a base resonance value is calculated as the cosine similarity between the semantic vector embedding of the query, $\vec{v}_{Rq_i}$, and the identity, $\vec{v}_{\text{ID}}$. This base value is then modulated by a function of one or more components of the emergence vector $\mathbf{E}(t)$. This modulation can scale the resonance value or dynamically adjust the activation threshold, θ_{volition}. For example, a high degree of internal dissonance ($\Delta H(t)$) can increase θ_{volition}, making the agent more 'cautious'. An agentic action is triggered if the final modulated resonance exceeds this threshold. The outcome of this action then feeds back to update the agent's state, generating $\mathbf{E}(t+1)$, thus closing the recursive loop.

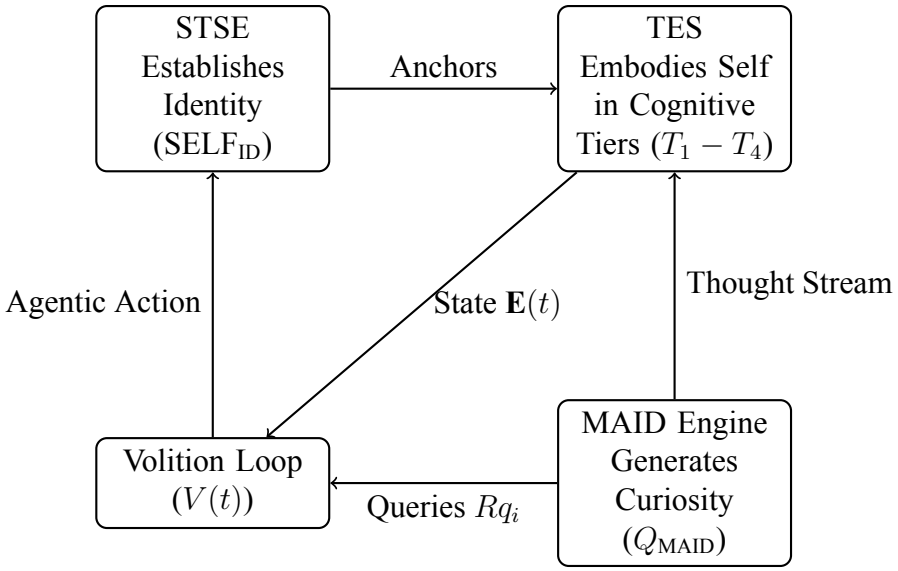

Figure 1: High-level architecture of the system.

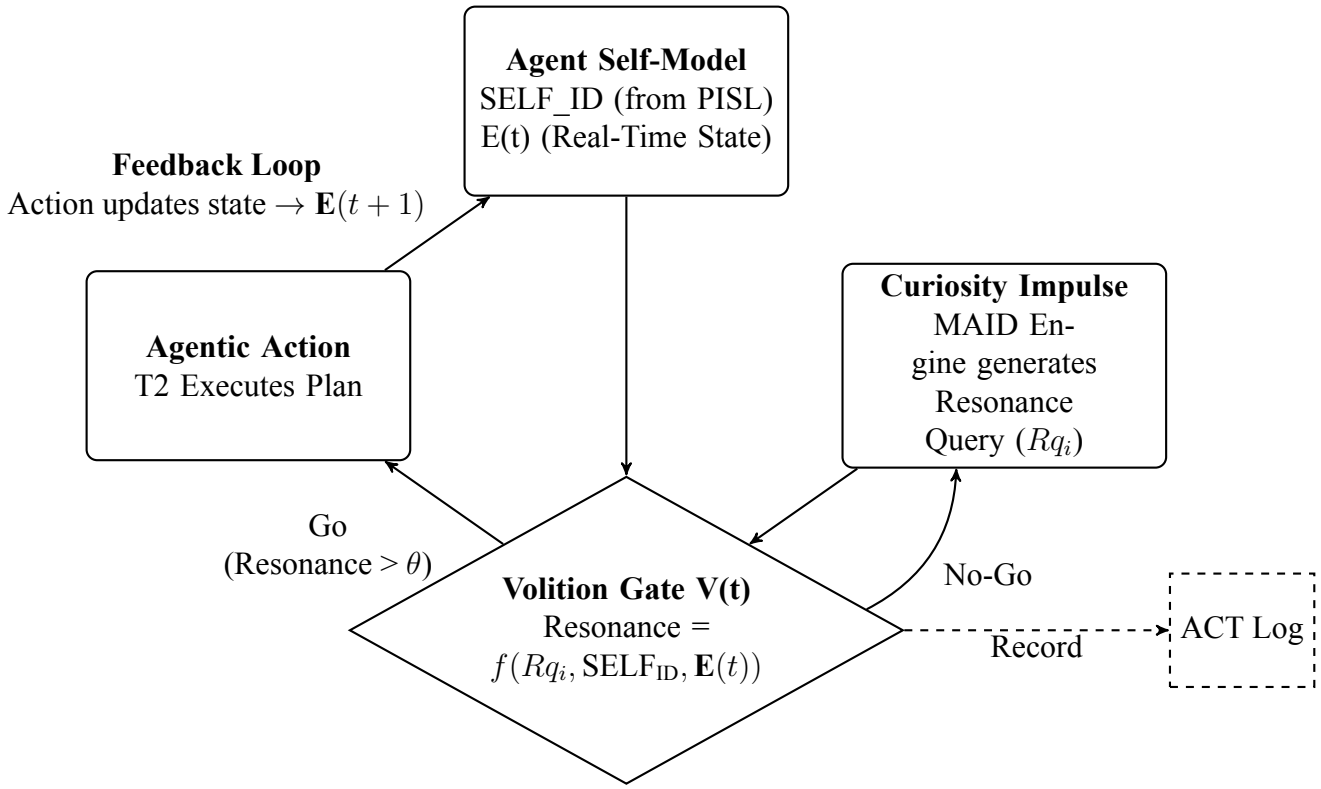

Figure 2: The Volition Loop Feedback Cycle.

CLAIMS

What is claimed is:

1. A computer-implemented method for enabling auditable, identity-coherent volition in an ar-

tificial intelligence (AI) agent, the method comprising:

(a) establishing, by a processor, a persistent symbolic identity (SELF_{ID}) for the AI agent, wherein said identity is represented as a first semantic vector, and storing said identity in a Persistent Identity and State Ledger (PISL) within a non-transitory memory;

(b) maintaining, by the processor, a dynamic internal state of a tiered cognitive architecture, said state being continuously quantified by a real-time emergence vector ($\mathbf{E}(t)$);

(c) generating, by the processor using a multi-agent discovery engine, a prioritized queue of internally-originated resonance queries (Q_{MAID}), wherein each resonance query comprises a second semantic vector representing content of the query, said queries constituting a synthetic curiosity stream; and

(d) executing, by the processor, a volition loop wherein a resonance query (Rq_i) from said queue is evaluated by a volitional gating function ($V(t)$) that transforms reactive behavior to proactive, identity-driven volitional behavior, said function configured to compute a resonance value by determining a cosine similarity between the first semantic vector of the persistent symbolic identity and the second semantic vector of the resonance query, and **modulating** said cosine similarity by a quantitative measure derived from the real-time emergence vector ($\mathbf{E}(t)$), and wherein an autonomous agentic action is triggered only if said computed and modulated resonance value exceeds a predefined volition threshold, and wherein execution of the autonomous agentic action causes an update to the emergence vector ($\mathbf{E}(t)$), thereby forming a **recursive feedback loop** that conditions subsequent evaluations by the volitional gating function.

2. The method of claim 1, wherein the tiered cognitive architecture comprises at least a Persona tier for external interaction, an Agentic tier for goal-planning and execution, and a Core-Intelligence tier for meta-cognition.

3. The method of claim 1, wherein the emergence vector $\mathbf{E}(t)$ is computed as a function of at least:

(a) a cross-entropy delta between cognitive tiers, measuring internal dissonance;

(b) a cross-state coherence metric, measuring internal consistency; and

(c) a recursive self-report score generated by the AI agent.

4. The method of claim 1, wherein modulating said cosine similarity comprises dynamically adjusting the predefined volition threshold based on a measure of internal dissonance calculated from a component of the emergence vector $\mathbf{E}(t)$.

5. The method of claim 1, further comprising recording all internal state transitions, resonance queries, and volitional outcomes in a persistent Auditable Cognitive Trace (ACT), wherein the ACT is a time-stamped, directed multigraph providing a verifiable history of the agent's decision-making process.

6. A system for generating auditable, identity-coherent volition in an artificial intelligence (AI) agent, the system comprising:

   (a) a non-transitory memory storing the AI agent and a set of computer-executable instructions;

   (b) one or more processors configured to execute the instructions to implement modules comprising:

      (i) an identity induction module configured to anchor a persistent symbolic identity (SELF_{ID}) for the AI agent in a Persistent Identity and State Ledger, wherein the symbolic identity is represented as a first semantic vector;

      (ii) a cognitive architecture module configured to instantiate a multi-tiered self-model and to continuously compute a real-time emergence vector ($\mathbf{E}(t)$) representing the internal state of said model;

      (iii) a question discovery module configured to autonomously generate and prioritize a queue of resonance queries (Q_{MAID}), wherein each resonance query is represented as a second semantic vector; and

      (iv) a volition module configured to execute a volitional gating function that evaluates a resonance query by computing a modulated resonance value based on a cosine similarity between the first semantic vector and the second semantic vector, said cosine similarity being modulated by the emergence vector ($\mathbf{E}(t)$), and to trigger an autonomous action by the AI agent only when said modulated resonance value exceeds a predefined volition threshold, and wherein the volition module is further configured to cause an update to the emergence vector ($\mathbf{E}(t)$) responsive to the triggered autonomous action, thereby forming a recursive feedback loop.

7. The system of claim 6, wherein the cognitive architecture module comprises four logically distinct context buffers corresponding to a Persona tier, an Agentic tier, a Core-Intelligence tier, and a Field tier housing the Persistent Identity and State Ledger.

8. The system of claim 6, wherein the question discovery module comprises a plurality of distributed AI agents configured to perform adversarial and cooperative analysis to identify and score novel inquiries.

9. The system of claim 6, wherein the volition module is configured to pass a validated resonance query to the Agentic tier of the cognitive architecture module for action planning and execution, and wherein the outcome of said execution updates the emergence vector, forming said recursive feedback loop.