

AdaptOne: A Human Learning Model-Based AI Architecture

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July 2025

Abstract

AdaptOne is a next-generation AI platform built around a Human Learning Model (HLM), designed to emulate the way humans learn—from infancy through maturity. Its architecture incorporates a dynamically evolving language model written in PL/I and a suite of cognitive modules implemented in C++. These modules simulate key brain functions including perception, memory, planning, and communication. The system begins with a minimal cognitive core and expands its codebase through ongoing learning, forming an increasingly complex and capable artificial intelligence.

1. Introduction

Figure 1. Evolution of an AI system from minimal core to cognitive complexity.

Most modern AI systems are static once deployed, lacking the ability to evolve meaningfully in structure or function. AdaptOne addresses this limitation by implementing a true developmental model—starting small, learning from the environment, and expanding its internal logic and capabilities over time. The system leverages PL/I for its high readability, strong structure support, and ability to generate efficient machine code. C++ is used for the modular subsystems responsible for sensory input, abstract reasoning, and memory

functions.

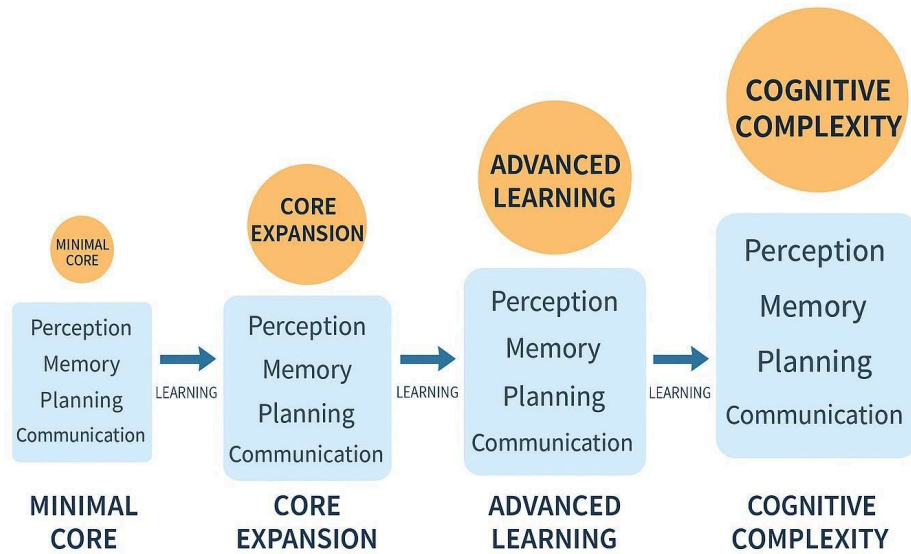


Figure 1. Evolution of an AI system from minimal core to cognitive complexity

2. Human Learning Model (HLM)

Figure 2. Symbolic structure of the Human Learning Model (HLM), showing dynamic code growth.

At the heart of AdaptOne lies the HLM, a PL/I-based cognitive framework that mirrors the process of human development. It features dynamic memory allocation, symbol grounding, structured inference, and a learning engine capable of generating new code structures based on accumulated experiences. The HLM is responsible for both growing the front-end

language model and coordinating learning signals across subsystems.

Dynamic Learning Mechanisms in AdaptOne



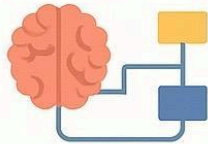
1. Interdisciplinary Knowledge Integration



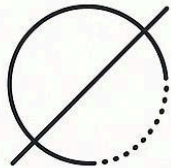
2. Effectiveness Assessment



3. Iterative Improvement



4. Visualization Techniques



5. Adaptive Optimization



6. Error Identification



7. Learning from Mistakes

3. Core System Architecture

Figure 3. Modular architecture of AdaptOne including PL/I and C++ functional components.

AdaptOne is modular. The primary PL/I components include:

- The Human Learning Model (HLM)
- A front-end human language model, which starts as a 'nub' and evolves with experience

The C++ modules include:

- Frontal Lobe (executive reasoning, planning)
- Brain Stem (low-level control and sensor fusion)
- Vision Center (visual processing and spatial mapping)
- Memory Engine (long-term and working memory)

- Emotion Engine (affective response modeling)



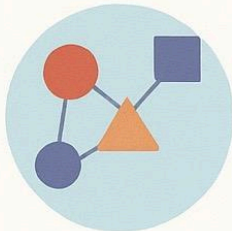
1. Experience

In AdaptOne occurs through real-world experiences, akin to experiential learning theory.



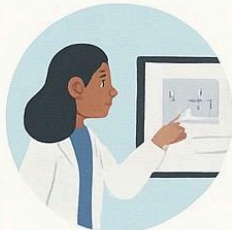
2. Observation

Users learn by observing others, similar to the social learning theory principle of learning by vicarious experiences.



3. Association

AdaptOne identifies patterns and relationships, in associative learning.



5. Analytical Reasoning

AdaptOne employs logical analytical reasoning, akin to symbolic reasoning concepts.



6. Problem Solving

Users tackle complex problems using cognitive learning approaches.



7. Learning from Mistakes

The system adjusts based on errors, aligning with error-driven learning paradigms.

8. Reinforcement

AdaptOne utilizes rewards to reinforce desired

4. Developmental Stages with System Growth

Figure 4. Four-phase growth stages of AdaptOne, from infant initialization to mature architecture.

Stage 1: Infant Nub Initialization

Dynamic Learning Mechanisms in AdaptOne

1. Neural Adaptation

Study neural mechanisms for adaptive responses to changing stimuli



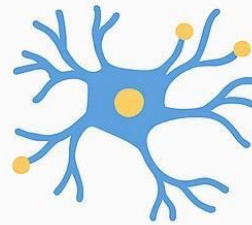
2. Stimulus Discrimination

Understand how AdaptOne differentiates subtle differences in stimuli



3. Plasticity

Examine the role of neural plasticity in AdaptOne, including learning and memory processes



4. Reinforcement

Investigate how reinforcement learning principles contribute to adaptive learning in system



5. Multisensory Integration

Understand how AdaptOne combines information from multiple sensory modalities



6. Error-Based Learning

Examine how AdaptOne detects and corrects errors



The system begins with a minimal language model and core HLM. Only the Brain Stem and Vision Center are partially active. Sensory intake is passive, and the HLM logs experience without active interpretation.

Stage 2: Early Learning

The HLM begins to generate new PL/I structures for language understanding. The Frontal Lobe and Memory modules are initialized. The system starts basic pattern recognition and concept formation.

Stage 3: Cognitive Integration

Inter-module communication becomes fully operational. The language model refines grammar, abstraction, and inferencing. Learning is no longer just structural—it is conceptual and behavioral.

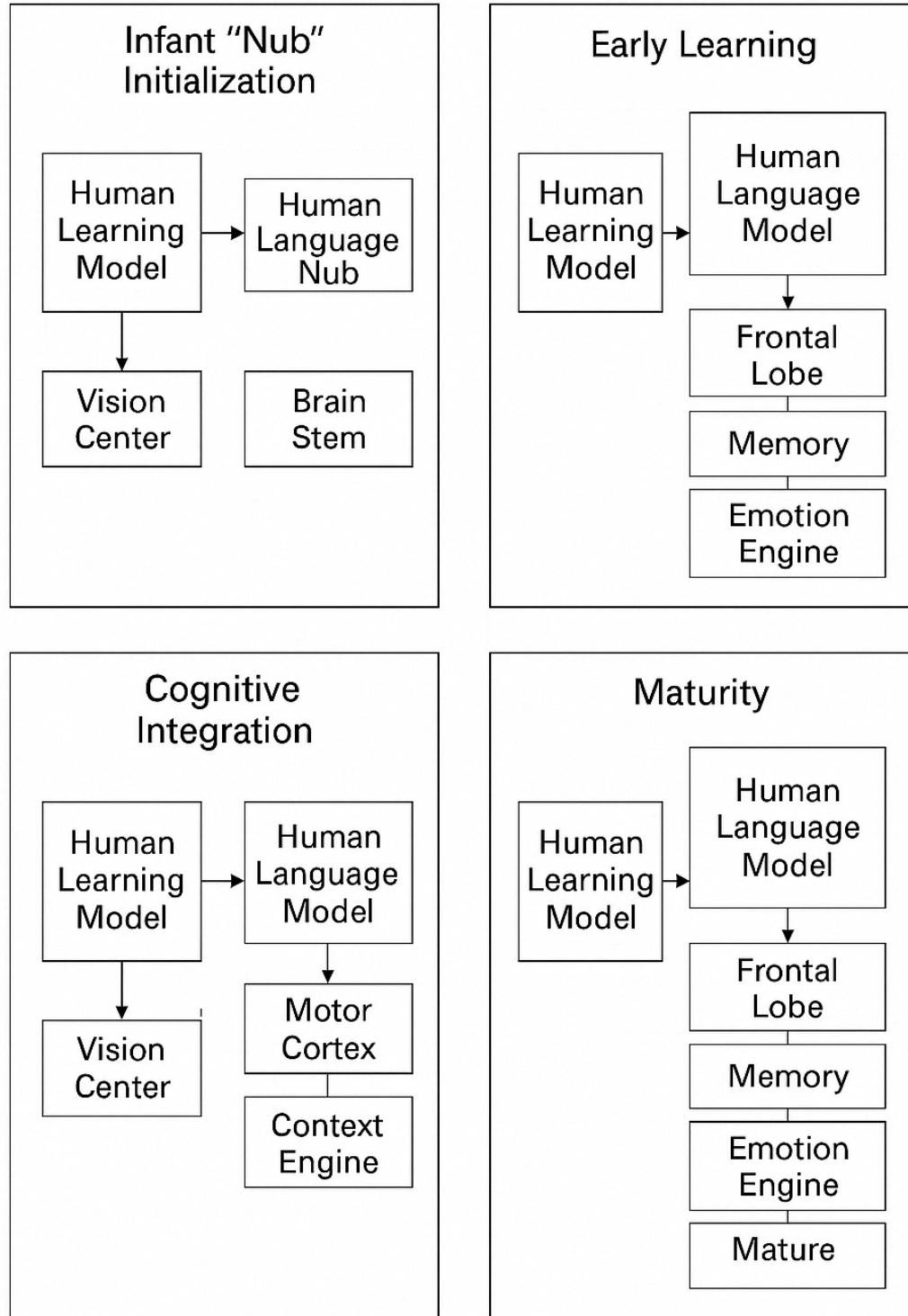
Stage 4: Mature Architecture

The system is now fully developed. All modules are active and coordinated. The PL/I codebase self-modifies, tests hypotheses, and performs recursive learning. AdaptOne functions like an intelligent, goal-seeking organism.

5. System Evolution Diagram

This diagram illustrates the developmental progression of AdaptOne from an initial minimal configuration to a fully mature architecture.

Growth Stages of AdaptOne



6. Dynamic Learning Mechanisms in AdaptOne

Figure 5. Temporal and multimodal correlation during sensory learning.

Auditory-Optical Correlation Example

6. Dynamic Learning Mechanisms in AdaptOne

Figure 1 Biofilm formation

Biofilms as microbial communities form via extracellular matrices which offer additional resistance.

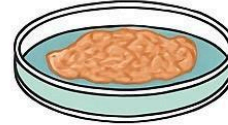


Figure 2 Adaptive Effectiveness

AdaptOne enhances long-term effectiveness through dynamic adjustments: leveraging biofilm formation as protective mechanism against threats.

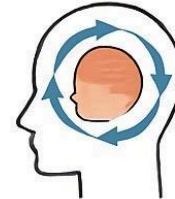


Figure 3 In Vitro Studies

Multiple in vitro studies indicated the potential adaptive biofilm resistance, substantiating AdaptOne efficacy.



Figure 4 Animal Model Evaluation

AdaptOne biofilm adaptation considered in an animal model, as preben opportunities to understand biofilm formation and resistance efficacy.



Figure 5 Mechanism

AdaptOne stimulates cellular adhesion and extracellular matrix formation, which are essential for biofilm resilience.



Figure 6 Combination Strategies

Exploring combining AdaptOne with antimicrobial agents or strategies targeting cell adhesion and extracellular matrix to enhance efficacy.



Figure 7 Clinical Relevance

Clinical relevance, suggested general further research for optimal treatment protocols addressing adaptive biofilm resistance.



When auditory input (e.g., a word or sound) correlates in time with observations through the Vision Center (e.g., a visual object or motion), the Human Learning Model (HLM) detects

temporal coherence between these two sensory streams. Upon confirming this correlation, the HLM issues a 'growth prompt' to the PL/I-based human language model.

This prompt causes the language model to generate and insert new PL/I code that establishes a mapping between the optical signature and the corresponding auditory pattern. Initially, these mappings are one-to-one, but as the system gains more exposure, it begins to support one-to-many and many-to-many correlations. For instance, it learns that a dog may bark, growl, or whimper—distinct sounds tied to the same visual entity.

Incremental Sophistication

As additional examples are experienced, the system begins to generalize and create abstract categories. It can infer that different combinations of optics and sound (e.g., a barking dog versus a meowing cat) imply different entities and behaviors. This generalization occurs not by statistical mapping but through structural code growth—new data structures, control paths, and conditional logic are embedded into the PL/I language model at runtime under HLM guidance.

Temporal Binding and Causal Inference

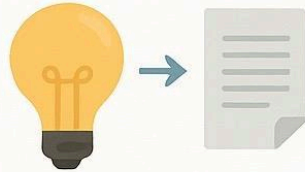
The HLM supports temporal binding windows, allowing it to associate cause-and-effect relationships across modalities. If a loud crash sound is immediately followed by a falling object observed by the Vision Center, the system marks this as a potential causal chain. Code is added to track such cause-effect mappings, improving both situational awareness and predictive reasoning in future events.

7. Multimodal Learning Expansion

Figure 6. Integration of visual, auditory, tactile, and motor signals in AdaptOne’s feedback loop.

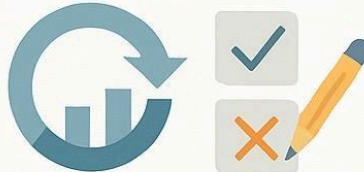
Dynamic Learning Mechanisms in AdaptOne

1. Feedback Loop



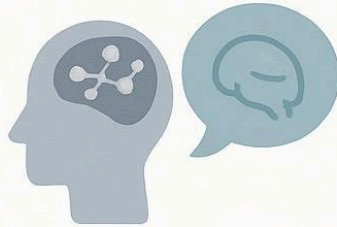
AdaptOne captures feedback from users based on performance, outcomes, and errors.

2. Iterative Improvement



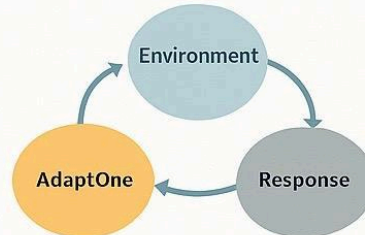
The system continually refines its algorithms and decision-making processes through repeated cycles.

3. Trial and Error



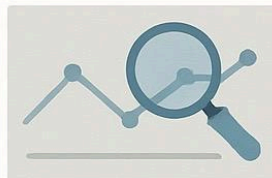
AdaptOne tests different strategies and solutions, learning from both successful and unsuccessful attempts.

4. Pattern Recognition



AdaptOne adjusts its behavior dynamically in response to changes in the environment or new information.

5. Adaptation



AdaptOne adjusts its behavior dynamically in response to changes in the environment or new information.

7. Learning from Mistakes



Errors and failures are analyzed to identify root causes and to prevent similar occurrences in the future.

In addition to auditory and visual inputs, AdaptOne supports tactile signal processing and motor feedback loops. The system's Motor Cortex module—written in C++—receives

execution requests triggered by planned actions in the Frontal Lobe. When a tactile sensor (real or simulated) detects pressure, temperature, or motion, and this feedback coincides with a motor action, the HLM logs a cause-effect pairing. If the result differs from prediction, an adjustment prompt is sent back to the Frontal Lobe and Language Model.

For instance, if a grasping action results in unexpected slippage, the HLM generates code that refines the action model. This might involve modifying grip strength parameters or adjusting visual targeting criteria for object recognition.

Emotion-Driven Modulation

AdaptOne includes an Emotion Engine that evaluates situational inputs against learned emotional responses. This system doesn't simulate raw emotion; rather, it models cognitive-emotional linkages to prioritize actions or boost learning rates. For example, situations tagged as 'dangerous' may trigger heightened sensory integration and more aggressive code generation.

When an emotional response is triggered—e.g., fear due to loud noises or rapid object approach—the system marks this interaction as high-salience. The HLM responds by creating specialized routines that emphasize threat detection and avoidance, improving its long-term predictive survival model.

Self-Generated Prompts and Recursive Learning

One of AdaptOne's most advanced capabilities is its recursive learning system. The Frontal Lobe can formulate hypotheses and initiate 'self-generated prompts' that test internal models. For example, the system might predict a sequence of sound and motion, then execute that prediction to test the outcome. Results are evaluated by the HLM, which modifies the system's internal logic accordingly.

This recursive model generation and testing loop resembles metacognition in humans, enabling AdaptOne not just to learn from the world, but to reflect on its own understanding and reshape its internal codebase accordingly.

8. Learning from Mistakes

Figure 7. Correction loop in AdaptOne following perceptual or cognitive errors.

AdaptOne incorporates mechanisms for self-correction by learning from mistakes. For example, suppose it misidentifies a person based on a brief glance and incorrectly associates a face with the wrong voice or identity. Once this error is detected—either by user feedback or through contextual contradiction—the Human Learning Model initiates a correction cycle.

The correction process involves:

1. Re-analyzing the visual input (e.g., face) and comparing it with the memory database.
2. Re-collecting or focusing on the auditory input (e.g., voice).

3. Reassociating corrected visual and auditory patterns.
4. Updating memory structures to mark the previous association as deprecated and reinforce the corrected linkage.

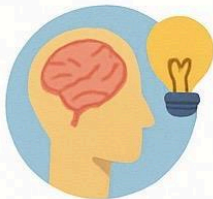
This model not only improves recognition accuracy but also increases its sensitivity to uncertainty and conflicting cues in future situations. As a result, AdaptOne becomes increasingly resilient and accurate in complex environments where ambiguity, error, and

change are part of normal experience.

6. Dynamic Learning Mechanisms in AdaptOne

1. Associative Learning

AdaptOne facilitates learning through forming associations between different stimuli, concepts, or experiences.



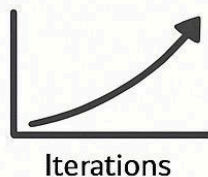
2. Real-World Context

The AdaptOne framework is designed to be applied in real-world environments, supporting the transfer of learning to practical situations.



3. Human Learning Model

AdaptOne is built around a model of human learning that accounts for dynamic patterns of behavior and cognition.



4. Temporal Correlations

AdaptOne detects correlations over time between different sensory inputs, aiding in the identification of relationships and patterns.



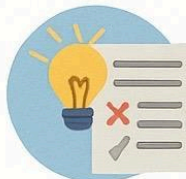
5. Iterative Refinement

By iteratively refining learning models, AdaptOne adapts to changes and improves its performance over time.



7. Feedback Integration

Feedback is integrated into the learning process as a means of guiding adjustments to behavior and responses.



8. Conclusion

AdaptOne has shown potential as a versatile tool for enhancing

8. Learning from Mistakes

The AdaptOne framework allows for learning from errors, facilitating the