OBINexus Vision & Specification Document

Project Title: Ontological Bayesian Intelligence Infrastructure (OBIAI) for Smart Homes
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Duration: 2 Years (PhD)
Funding Goal: £12,500

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1. Vision Statement

To design and deploy **Hybrid Directed Instruction Systems (HDIS)** that are active, self-aware systems preventing information corruption, embodied in a smart home prototype where AI units act ethically, efficiently, and in compliance with **OBINexus Human Advocacy Compliance Cycles (HACC)**. The foundation is **OBIAI** — an ontological, Bayesian-driven intelligence infrastructure that ensures unbiased, safe, and efficient AI.

2. Problem Statement

Potential Gaps
- Existing AI in smart homes is passive, biased, and inefficient.
- Current RAM and storage systems cannot actively manage corruption, stale credentials, or evolving program states.
- Energy demands of AI-enabled homes are often disproportionate to the efficiency of tasks (e.g., lighting, HVAC).

Why it’s a Problem
- Lack of resilience against data corruption undermines trust in AI.
- Biased AI undermines fairness, privacy, and compliance.
- High-energy footprints conflict with sustainability and safety standards.

Proposed Solutions
- Develop **DiRAM (Directed Instruction RAM)**: an active memory model that applies directed evolution to cache programs, actively evicting aged data (cookies, storage credentials).
- Integrate DiRAM into OBIAI for smart home deployment.
- Ensure all AI units are designed under **Bayesian mitigation principles** (unbiased inference).
- Apply **HACC cycles**: human advocacy checks at each development milestone.

3. Technical Blueprint

3.1 HDIS: DiRAM Architecture — Truth Table (binary bounds)

X	Y	XOR|CNOT	OUTPUT
0	0	00	00
0	1	01	01
1	0	10	10
1	1	11	11

3.2 AI Energy Constraints

- Human brain ≈ 60 joules/day.
- Safety requirement: DiRAM modules capped to ≤**40 joules** daily for standard household tasks (lights, fans, appliances).
- Each AI unit must demonstrate **energy proportionality** — enough to act, never to degrade the system.

3.3 HDIS Blueprint Schema Binding Package

HDIS Blueprint Schema Binding Package
- The **Schema Binding Package** defines how HDIS modules (e.g., DiRAM) are connected to ontological layers of OBIAI.
- Ensures that each hardware component is bound to a software schema for self-description, interoperability, and QA validation.
- Package includes:
• Instruction Schema Map (binding truth table logic to ontology terms).
• Resource Schema (energy allocation bindings, capped at safety constraints).
• Compliance Schema (HACC checkpoints embedded as callable modules).
- Functions as the bridge between physical circuits and logical ontological models, making the system explainable and auditable.

3.4 Polyglot Binding for Language Coherence

Polyglot Binding for Language Coherence
- To ensure **polyglot coherence**, OBIAI integrates a **polyglot binding system** that allows AI units to operate across multiple human and machine languages seamlessly.
- **Bisected Language-to-Language System:**
• Semantic Layer: ensures meaning preservation across translations.
• Instruction Layer: binds system commands and schemas directly to executable code.
- Benefits:
• Guarantees interoperability in multilingual smart home contexts.
• Enables AI units to mediate between human users and hardware/software processes without bias.
• Reinforces OBINexus' principle of universal accessibility and fairness.

4. Roadmap & Milestones

Phase 1: Foundations (Months 1–6)
- Define requirements backlog (X/Y axis QA gating).
- Design DiRAM circuit schematic.
- Develop simulation pipeline (software model).
- Conduct first QA matrix evaluation (true/false positives, negatives).

Phase 2: Prototype Integration (Months 7–12)

- Fabricate DiRAM hardware prototype.
- Integrate with OBIAI ontology layer.
- Implement Bayesian mitigation cycle.
- HACC audit checkpoint (compliance verification).

Phase 3: Smart Home Pilot (Months 13–18)
- Deploy prototype in controlled smart home lab.
- Integrate AI assistant (chatbot, walker-bot, hover-bot).
- Test energy usage vs safety benchmarks.
- QA Matrix evaluation v2 (scaled pipeline).

Phase 4: Commercialisation Readiness (Months 19–24)
- Refine DiRAM modules for manufacturability.
- Update OBINexus.org marketplace with product specification.
- Submit IP / patent filings.
- Seeded investment round presentation.
- Final QA Matrix review and HACC compliance certification.

5. Quality Assurance Matrix (QA Gating) — Sample

equirement	Test	Expected	Result	Action
nergy cap ≤40J	Run 24h power test	≤40J	TBD	If fail -> optimize slee
viction_policy	Inject stale cookie	Evicted within 5s	TBD	If fail -> adjust evictio
as mitigation	Run fairness suite	Pass thresholds	TBD	If fail -> retrain with p

6. OBINexus Policy Alignment

- Human Advocacy Compliance Cycles (HACC): every milestone includes a human-in-the-loop audit.
- SorryNotSorry Right to Act: AI systems must log and justify every autonomous action.
- Unbiased AI Principle: Bayesian mitigation applied to all inference pipelines.
- Ontological Foundations: OBIAI units must maintain internal self-knowledge representation (ontology schema) to remain transparent and explainable.
- Polyglot Accessibility: communication binding ensures language neutrality, fairness, and accessibility across diverse populations.

7. Investment & Deployment Strategy

- Initial funding: [£116k–125k, see budget doc].
- Milestone-seeded investments: unlock tranche at each successful QA gate.
- Early demonstrator (DiRAM module) sold via OBINexus.org to early adopters and research partners.
- Long-term: license OBIAI + DiRAM as the heart (OBI) and connection (Nexus) of next-gen smart home systems.

Appendix: Diagrams & Blueprints (placeholders)

- Interactive SVG Blueprint (placeholder): An SVG-based DAG showing polyglot bindings, package nodes (Go, Python, Cython, C), FFI links, and authentication layers. Color-coded states (OK, Warning, Critical) and clickable package descriptions. - LED State Feedback Map (placeholder): Color mapping table for AI internal states (e.g., Green=Normal, Amber=Degraded, Red=Critical, Blue=Maintenance). - Sensor Layout (placeholder): Example room plan showing temperature sensors, AIU enclosure (glass-sealed), and actuator points.