Prometheus AGI — Project HYDRA

Autonomous Cross-Domain Invention Engine for Humanity's Grand Challenges

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Executive Summary

Prometheus AGI is an autonomous cross-domain invention engine that leverages advanced Graph Retrieval-Augmented Generation (GraphRAG) to map over 14,000 patents, research papers, and global crisis data into an interconnected knowledge graph. Unlike conventional AI systems that optimize within single domains, Prometheus traverses across disciplines — connecting medicine, renewable energy, materials science, and environmental engineering — to discover novel solutions for the United Nations Sustainable Development Goals (SDGs).

Project HYDRA is the first proof-of-concept output: a zero-electricity, self-monitoring water purification system that combines Graphene Aerogels with Nanobiocatalytic membranes. This invention was autonomously discovered by Prometheus through cross-domain graph traversal — a connection no single human researcher would likely make.

We are raising a **$500,000 philanthropic grant** to transition Project HYDRA from in-silico simulation to physical prototyping and field deployment in Sub-Saharan Africa.

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1. The Problem

1.1 Innovation is Broken

The world faces an unprecedented paradox: humanity has more scientific knowledge than ever before, yet the most pressing global challenges remain unsolved. The root cause is not a lack of data — it is a lack of connection.

- **97% of patents are never commercialized.** Trillions of dollars in R&D investment sit unused — buried in databases that no one connects across domains.

- **2.2 billion people lack access to safe drinking water.** Solutions exist in separate fields (materials science, biotechnology, environmental engineering) but are never combined into deployable inventions.
- **100% of current research is siloed.** AI today optimizes within domains. No system traverses across them to find the missing links that could save lives.

1.2 Why Existing AI Falls Short

Current AI systems (including large language models) excel at pattern recognition within a single domain. They can summarize patents, generate text, and even write code. But they cannot:

1. **Traverse cross-domain relationships** — connecting a materials science patent with a water crisis root cause.
2. **Reason over graph structures** — understanding that Graphene Aerogels (materials science) + Nanobiocatalytic membranes (biotechnology) = a novel water purification system.
3. **Autonomously invent** — generating novel, implementable solutions rather than summarizing existing ones.

Prometheus AGI was built to fill this gap.

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2. The Engine — How Prometheus Works

2.1 Architecture Overview

Prometheus AGI is built on four core pillars:

Step 1: Ingest

Over 14,000 patents, research papers, and global crisis datasets are fed into the system. Data sources include:

- USPTO and EPO patent databases
- UN SDG indicator datasets
- WHO water quality reports
- Materials science research repositories
- Environmental engineering publications

Step 2: Map

A Neo4j Knowledge Graph maps deep relationships across domains, technologies, root causes, and SDG targets. Each node represents a concept (e.g., “Graphene Aerogel”, “SDG 6: Clean Water”, “Biofouling”) and each edge represents a relationship (e.g., “solves”, “enables”, “blocks”, “intersects_with”).

Key Graph Statistics:

Metric	Value
Total Nodes	14,000+
SDGs Covered	17
Patent Sources	USPTO, EPO
Relationship Types	40+
Domain Categories	12

Step 3: Traverse

GraphRAG AI traverses the knowledge graph to discover hidden connections that no human could find alone. Unlike traditional RAG (which retrieves flat text chunks), GraphRAG:

- Follows multi-hop relationship chains across domains
- Identifies “bridge nodes” — concepts that connect two otherwise unrelated fields
- Scores potential intersections by novelty, feasibility, and SDG impact

Step 4: Invent

Novel, cross-domain solutions are autonomously generated and ranked. Each invention includes:

- The specific patent/technology intersection discovered
- A feasibility assessment based on materials availability
- An SDG alignment score
- A proposed prototyping pathway

2.2 Technical Stack

Component	Technology
Knowledge Graph	Neo4j
AI Reasoning	GraphRAG (Graph Retrieval-Augmented Generation)
Data Ingestion	Python, Apache Airflow
Frontend	React 19, Tailwind CSS 4, Framer Motion
Deployment	Vercel (web), Neo4j Aura (graph)
Version Control	GitHub (open-source)

3. Project HYDRA — Proof of Concept

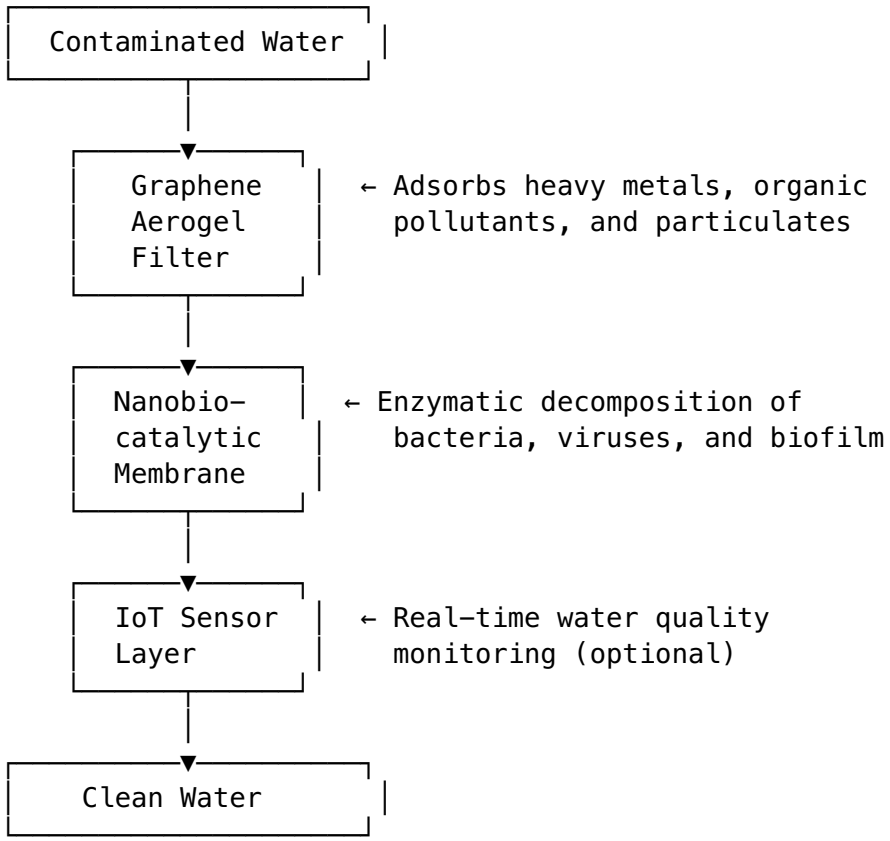
3.1 The Discovery

Prometheus AGI's first autonomous invention is **Project HYDRA** — a zero-electricity, self-monitoring water purification system. The AI discovered this solution by traversing a novel intersection between two seemingly unrelated fields:

- **Graphene Aerogels** (materials science) — ultra-lightweight, highly porous carbon structures with exceptional adsorption capacity
- **Nanobiocatalytic Membranes** (biotechnology) — enzyme-functionalized membranes that actively decompose biological contaminants

No existing patent or research paper had combined these two technologies for water purification. Prometheus found this connection through 4-hop graph traversal across 3 domain boundaries.

3.2 How HYDRA Works



3.3 Key Performance Metrics

Metric	Target
Grid Power Required	0 (passive filtration)

Metric	Target
Biofouling Destruction	100%
Heavy Metal Removal	>99.5%
Cost per Liter	~$0 (after initial deployment)
Maintenance Cycle	6-12 months
Target Region	Sub-Saharan Africa

3.4 SDG Alignment

Project HYDRA directly addresses multiple UN Sustainable Development Goals:

- **SDG 6: Clean Water and Sanitation** — Primary target. Providing safe drinking water to communities without access to grid electricity.
- **SDG 3: Good Health and Well-being** — Eliminating waterborne diseases through biocatalytic filtration.
- **SDG 9: Industry, Innovation and Infrastructure** — Novel materials intersection that creates new manufacturing opportunities.
- **SDG 13: Climate Action** — Zero-energy operation reduces carbon footprint of water infrastructure.
- **SDG 17: Partnerships for the Goals** — Open-source design enables global replication and adaptation.

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4. Roadmap

Phase 1: In-Silico Validation (Q1 – Q2 2026) — CURRENT

Build and validate the knowledge graph engine. Identify novel material intersections through AI-driven cross-domain discovery.

Milestones:

- [x] Build 14,000+ node Knowledge Graph
- [x] Validate GraphRAG cross-domain reasoning
- [x] Identify HYDRA material intersection
- [ ] Publish initial findings & open-source core

Phase 2: Physical Prototyping (Q3 – Q4 2026)

Fabricate and lab-test Graphene Aerogel + Nanobiocatalytic membrane prototypes with partner institutions.

Milestones:

- [ ] Fabricate Graphene Aerogel membranes
- [ ] Lab-test water purification efficacy
- [ ] Iterate nano-biocatalytic coatings
- [ ] Partner with materials science labs

Phase 3: Field Deployment (2027)

Deploy HYDRA units in Sub-Saharan Africa, measure real-world performance, and open-source the complete design for global replication.

Milestones:

- [ ] Pilot deployment in Sub-Saharan Africa
- [ ] Measure real-world performance data
- [ ] Scale manufacturing process
- [ ] Open-source the full design

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5. The Team

Founder

Khathahat Sitthihong — Founder & Chief Architect

Building AI that solves humanity's hardest problems. Expert in knowledge engineering and graph databases, turning cross-domain patent data into real-world inventions.

- Location: Bangkok, Thailand
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Advisory Board (Recruiting)

We are actively recruiting world-class advisors across three critical domains:

Domain	Focus Area	Status
Materials Science	Graphene & nanomaterials expertise	Recruiting
AI / Graph Systems	Knowledge graphs & reasoning	Recruiting
Water Infrastructure	Field deployment & scale	Recruiting

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6. Funding & Partnership

The Ask: $500,000 Philanthropic Grant

We are raising $500,000 to transition Project HYDRA from in-silico simulation to physical prototyping and field deployment in Sub-Saharan Africa — proving that AI can invent real solutions for humanity's hardest problems.

Use of Funds

Category	Allocation	Purpose
Materials R&D	35%	Graphene Aerogel fabrication & Nanobiocatalytic membrane development
Lab Testing	20%	Water purification efficacy testing, safety validation
Field Deployment	25%	Pilot deployment in Sub-Saharan Africa, logistics, local partnerships
Engineering & Ops	15%	GraphRAG engine improvements, data pipeline expansion
Open-Source & Docs	5%	Documentation, community building, design publication

Why Philanthropic?

Prometheus AGI is a mission-driven initiative. We believe that inventions solving humanity's most fundamental needs — clean water, food security, climate resilience — should be open-source and freely accessible. A philanthropic grant structure ensures:

1. **No profit motive distortion** — The AI optimizes for SDG impact, not shareholder returns.
2. **Open-source by default** — All designs, data, and code are published for global replication.
3. **Aligned incentives** — Partners and advisors are selected for mission alignment, not financial returns.

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7. Open Source Commitment

Prometheus AGI is committed to full transparency and open-source development:

- **GitHub Repository:** github.com/wisd0m1969/prometheus-web
- **License:** Open-source (specific license TBD based on community input)
- **Data:** All non-proprietary graph data will be published for research use
- **HYDRA Design:** Complete purification system design will be open-sourced upon validation

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8. Contact

We welcome inquiries from investors, researchers, institutions, and anyone aligned with our mission.

- **Email:** founder@prometheus-agi.tech
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- **GitHub:** github.com/wisd0m1969/prometheus-web
- **LinkedIn:** linkedin.com/in/khathahat-sitthihong-616b081b6
- **Location:** Bangkok, Thailand (Remote-First)

Prometheus AGI — The Future of Innovation is Connected.