HydraAI Inspect: AI Vehicle Inspection on Hydra L2

Project Catalyst Fund 15 Proposal

⬜ Proposal Summary

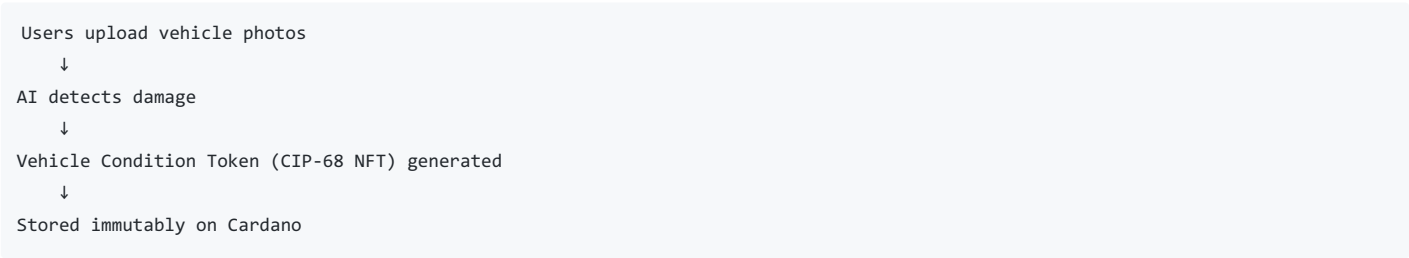| Item	Details
Proposal Title	HydraAI Inspect: AI Vehicle Inspection on Hydra L2
Applicant	Maulana Anjari Anggorokasih
Entity	Sumbu Labs (PT. Sumbu Inovasi Digital)
Website	https://sumbu.xyz
Budget Requested	₳90,000
Timeline	6 months
Category	Cardano Use Cases — Prototype & Launch
Theme	Real-World Applications
Open Source	Yes (MIT License)

⬜ Problem Statement

The global pre-owned automotive market depends heavily on vehicle inspections, yet these inspection records are **siloed, forgeable, and lack a global standard of truth**. Buyers cannot easily trust inspection results, sellers cannot easily prove a car's true condition, and inspection data lacks any global, tamper-resistant standard.

At the same time, inspection workflows involve high transaction volumes (updates, verifications, metadata changes), which makes storing everything directly on-chain impractical due to cost and latency. Without a Layer 2 solution like Hydra, each inspection update would incur significant fees and delays, making industrial-scale adoption impossible.

⬜ Solution Overview

HydraAI Inspect is an AI-powered vehicle inspection platform that uses **Hydra** to process inspection events quickly and cost-efficiently.

Workflow:

```
Users upload vehicle photos
    ↓
AI detects damage
    ↓
Vehicle Condition Token (CIP-68 NFT) generated
    ↓
Stored immutably on Cardano
```

Hydra acts as a high-speed Layer 2 engine, enabling **instant, zero-gas** inspection updates before final settlement on Cardano. Without Hydra, each inspection update would cost ~0.17 ADA. With Hydra, we batch 100+ updates and settle once, **reducing cost by 99%** while maintaining decentralized trust.

> **Note:** This proposal is not just a prototype—it is an upgrade to an already deployed Catalyst-funded product used daily in real inspection centers.

⬜ Ecosystem Research & Value Proposition

Research Conducted

We analyzed all Catalyst-funded projects related to vehicle inspection, Hydra applications, and AI+blockchain integrations.

Findings

- **CAR-dano (Fund 13):** Our previous project - basic L1 inspection records, no AI, no Hydra
- **Hydra Projects:** Mostly payment/gaming prototypes, no industrial workflows
- **NFT Projects:** Focus on art/collectibles, not industrial use cases

Value Proposition

HydraAI Inspect is the **first to combine** AI computer vision + Hydra L2 + CIP-68 for industrial inspection. No existing Catalyst project addresses high-throughput, AI-assisted, verifiable inspection on Hydra.

⬡ Innovation Highlights

1. First Hydra-Powered Industrial Inspection Workflow

While past Catalyst projects have explored NFTs and data storage, none have combined AI inspection data with Hydra-based fast settlement to create a scalable inspection framework. This is the first real-world industrial use case for Hydra on Cardano.

2. AI-Assisted Condition Verification

Damage detection and scoring via AI reduces subjective variance and inspection fraud, creating objective, verifiable condition reports.

3. CIP-68 Vehicle Condition Token (VCT)

Each inspection mints an updatable NFT representing the vehicle's condition—creating a global, verifiable inspection format. CIP-68 enables the token to evolve as the car's condition changes or is repaired, maintaining a complete lifecycle history.

4. Hydra as the Operational Engine

Inspection workflows involve many intermediate steps. Hydra enables:

- **Batching of high-volume updates** (99% cost reduction)
- **Near-instant confirmations** (sub-second vs minutes on L1)
- **Reduced cost** (batch 100 updates, pay once)
- **Selective settlement to L1** (only final state committed)

5. Developer-Friendly Open-Source Reference

The project delivers both a working prototype and a reusable blueprint for AI+Hydra+tokenization applications. This blueprint is highly modular and easily adaptable for various other use cases: property inspection, electronics grading, logistics verification, etc.

⬡ MVP Deliverables

The MVP will include:

AI Damage Detection Service

- User uploads car images
- AI model outputs damage classification and severity

Hydra-Based Inspection Workflow

- Initiate inspection session in a Hydra Head
- Store intermediate AI results
- Update inspection metadata
- Approve inspection by multiple parties (inspector, dealership)

CIP-68 Vehicle Condition Token

- Minting of a VCT
- Metadata includes condition score, detected issues, timestamps
- Token stored on Cardano testnet

Prototype UI

- Upload photos
- View AI results

- View minted token link
- QR code viewer for VCT

Testnet Deployment

- Hydra head instance accessible through public endpoint
- Public demo instructions via GitHub

Users and reviewers can interact with the MVP through a web demo and inspect the workflow via testnet explorer.

🏆 Success Metrics

On-chain Metrics

- **≥50 real car inspections** processed through the system
- **300+ simulated/testnet transactions** demonstrating Hydra throughput
- **300+ CIP-68 VCT tokens minted** on Cardano testnet
- **1,000+ Hydra transactions processed** in Hydra Heads
- **≥50 settlement operations** committed to Cardano L1

Public Testnet Deployment

- Video demo showcasing end-to-end workflow
- Public GitHub repository with comprehensive documentation
- Accessible landing page and web app for community testing

Qualitative Metrics

- Community developer feedback and engagement
- Number of forks/stars on GitHub repository
- Number of Hydra builders referencing the open-source code

Adoption Metrics

- At least 3 workshops or demos with the Cardano community
- 50+ users testing the platform during open beta

🛠 Technical Solution

This proposal builds directly upon the success of a previous Catalyst-funded project, **CAR-dano**, developed by Sumbu Labs in collaboration with PT. Inspeksi Mobil Jogja (Palapa) and currently deployed at **cari.inspeksimobil.id**.

The system is actively used in three inspection branches, processing approximately **15 vehicle inspections per day**, and has demonstrated a measurable operational improvement of up to **50% in inspection workflow efficiency**.

The platform is already being used in real commercial environments to generate immutable inspection records on Cardano, proving both market demand and technical feasibility. HydraAI Inspect represents the next evolution of this deployed solution by introducing AI-assisted inspection scoring and Hydra-based batching to scale the system for higher throughput and broader industry adoption.

Workflow

1. User or inspector uploads vehicle photos
2. AI model detects damage (scratches, dents, bumper issues, paint defects, etc.)
3. Hydra processes inspection session updates (fast, off-chain)
4. Once confirmed, inspection metadata is finalized
5. A Vehicle Condition Token (VCT) is minted on Cardano using CIP-68
6. Users receive a QR code linking to the token metadata
7. Settlement to Cardano L1 ensures long-term immutability

Hydra makes this workflow scalable, low-cost, and instant, allowing industrial-grade inspection operations.

🌐 Impact on Cardano Community

The project is not starting from zero—deployment pipelines, inspection workflow, and industry partnerships already exist. This dramatically increases the likelihood of adoption and meaningful on-chain activity.

HydraAI Inspect contributes significantly to Cardano by:

A. Proving Hydra is Ready for Business

This serves as a live, commercial case study demonstrating Hydra's capability to handle real-world industrial throughput. It answers the critical question: "Can Hydra scale real applications?" with concrete proof.

B. Enabling New Developers

The open-source blueprint becomes a valuable learning tool for:

- Hydra beginners seeking production-ready examples
- AI integration builders exploring blockchain use cases
- NFT metadata engineers implementing CIP-68
- Automotive/Web3 innovators building inspection systems
- Any developer needing a reusable AI+Hydra+tokenization framework

C. Real On-chain Activity

The project will generate consistent, meaningful transaction volume through:

- VCT minting (300+ tokens)
- Metadata updates (1,000+ Hydra transactions)
- Settlement transactions (50+ L1 commits)
- Multi-party approvals (inspector + dealership signatures)

D. Bridging AI and Cardano

This project demonstrates how Cardano can serve as a trusted ledger for AI-generated data, promoting future AI+blockchain solutions across industries (insurance, logistics, quality control, etc.).

E. Academic Validation

With 2 blockchain experts from Universitas Gadjah Mada's Faculty of Engineering, the project gains academic credibility and research validation, strengthening Cardano's reputation in Indonesian higher education.

⬛ Team Capability

Sumbu Labs (PT. Sumbu Inovasi Digital)

Website: https://sumbu.xyz

The team has already delivered a Catalyst-funded blockchain inspection system (CAR-dano) currently in production use at cari.inspeksimobil.id, processing ~15 inspections/day across 3 branches with 50% efficiency improvement. This demonstrates both delivery capability and industry integration.

Core Team (6 Members)

1. Giga Hidjrika Aura Adkhy (Head of Product: Lead Engineer)

- LinkedIn: https://www.linkedin.com/in/gigahidjrikaaa/
- GitHub: https://github.com/gigahidjrikaaa
- Website: https://gigahidjrikaaa.my.id

2. Maulana Anjari Anggorokasih (Blockchain/Backend Lead Engineer & DevOps)

- LinkedIn: https://www.linkedin.com/in/maulana-anjari-anggorokasih/
- GitHub: https://github.com/Maulana-anjari
- Website: https://maulana.sumbu.xyz

3. Azfar Azdi Arfakhsyad (AI Engineer Lead & UI/UX Designer Lead)

- LinkedIn: https://www.linkedin.com/in/azfar-azdi-arfakhsyad-64587a237/
- GitHub: https://github.com/Azfar101

4. Farhan Franaka (AI Engineer & Frontend Engineer Lead)

- LinkedIn: https://www.linkedin.com/in/farhanfranaka/
- GitHub: https://github.com/frhnfrnk
- Website: https://frhnn.my.id

5. Dzikran Azka Sajidan (Mobile Apps Engineer Lead)

- LinkedIn: https://www.linkedin.com/in/dzikranazkasajidan/
- GitHub: https://github.com/SjdnDzikran
- Website: https://dzikran.sumbu.xyz

6. Virna Amrita (Operations & Business Support Lead)

- LinkedIn: https://www.linkedin.com/in/virna-amrita-a13463261/
- Responsibilities: HR, payroll, accounting, administrative coordination, social media marketing

Team Expertise

- Cardano development & smart contracts
- Hydra integration & Layer 2 architecture
- AI computer vision (YOLOv11n deployment)
- Backend systems (.NET, TypeScript, Go)
- Blockchain architecture & tokenomics
- Kubernetes, Docker, DevOps
- Production-grade system design
- UI/UX, frontend, and mobile development

Academic Advisors (2 Professors)

1. Ir. Noor Akhmad Setiawan, S.T., M.T., Ph.D., IPM.

- Blockchain & Distributed Systems Expert
- Faculty of Engineering, Universitas Gadjah Mada (UGM)
- Previously contributed to CAR-dano project
- LinkedIn: https://www.linkedin.com/in/nasetiawan/
- UGM Profile: https://acadstaff.ugm.ac.id/nasetiawan
- GitHub: https://github.com/noorwewe

2. Guntur Dharma Putra, Ph.D.

- Blockchain & Distributed Systems Expert
- Faculty of Engineering, Universitas Gadjah Mada (UGM)
- Previously contributed to CAR-dano project
- LinkedIn: https://www.linkedin.com/in/guntur-dharma-putra/
- Personal Site: https://gdputra.github.io/
- UGM Profile: https://acadstaff.ugm.ac.id/gdputra
- GitHub: https://github.com/gtrdp

Feasibility Validation

- AI models (YOLOv11n) are readily available and tested
- Hydra scripts and devnet resources already exist
- CIP-68 minting is well documented
- Tokenization pipeline is straightforward
- Existing production infrastructure reduces risk
- 6-month roadmap is realistic based on prior delivery
- Video demo and public links provide transparency

Milestones & Budget

Total Budget: ₳90,000 over 6 months

Milestone 1 — Architecture & AI Integration

Timeline: Month 1 | **Cost:** ₳10,000 | **Progress:** 10%

Outputs:

- System architecture
- Initial AI damage detection model integrated
- Backend skeleton repos

Acceptance Criteria:

- AI recognizes at least 5 common types of vehicle damage
- Architecture covers Hydra, backend, AI, CIP-68
- Jupyter Notebook/Colab demo of AI model detecting damage on sample images

Evidence:

- GitHub repo with code + documentation

Milestone 2 — Hydra Head Setup

Timeline: Month 2 | **Cost:** ₳12,000 | **Progress:** 20%

Outputs:

- Hydra devnet running
- Hydra workflow for session creation

Acceptance Criteria:

- Hydra process can create, update, and close inspection sessions
- Unit tests included
- Video demo of opening/closing a Hydra Head or screenshot of Hydra node logs

Evidence:

- Hydra logs, scripts, public instructions

Milestone 3 — CIP-68 Vehicle Condition Token (VCT)

Timeline: Month 3 | **Cost:** ₳13,000 | **Progress:** 40%

Outputs:

- Smart metadata format
- Token minting pipeline
- Settlement pipeline to L1

Acceptance Criteria:

- VCT created on testnet
- Metadata contains AI results
- CIP-68 standard properly implemented with updatable metadata

Evidence:

- Testnet explorer links
- GitHub repo code

Milestone 4 — Full Inspection Workflow MVP

Timeline: Month 4 | **Cost:** ₳15,000 | **Progress:** 60%

Outputs:

- End-to-end inspection using Hydra
- AI → Hydra → CIP-68 flow
- QR code viewer

Acceptance Criteria:

- Users can complete entire workflow via UI
- Hydra updates appear instantly (sub-second confirmation)
- End-to-end video walkthrough demonstrating the full flow

Evidence:

- Public video demo
- GitHub with frontend

Milestone 5 — Public Testnet Deployment

Timeline: Month 5 | **Cost:** ₳12,000 | **Progress:** 80%

Outputs:

- Public Hydra endpoint
- Public frontend and backend
- Test instructions

Acceptance Criteria:

- Community can run inspection tests
- Testnet VCTs mint successfully
- Public video demo available
- GitHub repository with comprehensive documentation
- Landing page and app publicly accessible

Evidence:

- Testnet links
- GitHub documentation

Milestone 6 — Community Testing & Final Report

Timeline: Month 6 | **Cost:** ₳13,000 | **Progress:** 100%

Outputs:

- Final report
- Community feedback summary
- Code freeze (open-source)

Acceptance Criteria:

- **≥50 real car inspections** completed through the system

- **≥300 simulated/testnet transactions** demonstrating Hydra throughput
- GitHub repository stabilized and fully documented
- Final video demo showcasing "existing product → Hydra upgrade" narrative

Evidence:

- Public report
- Final code base

⬚ Budget Breakdown

Total Requested: ₳90,000

At current ADA price ($0.41 / Rp 6,800): ~$36,900 (Rp 612 million) for 6 months.

Allocation

Category	Details
5 Engineers	Full-stack, blockchain, AI, DevOps specialists
1 Operations & Business Support	HR, accounting, marketing, administrative coordination
2 Academic Advisors (UGM)	Strategic guidance, research validation
50 Real Car Inspections	Proof of concept testing
Infrastructure	Hydra nodes, testnet deployment, hosting

> **Note:** This is sole funding from Project Catalyst for the Hydra + AI upgrade.

⬚ Value for Money

Funding accelerates a system already generating real usage rather than creating a new prototype that may not achieve adoption.

This Project Delivers

- ⬚ **First industrial Hydra reference implementation**
- ⬚ **AI+blockchain integration blueprint** (reusable for any inspection use case)
- ⬚ **Fully open-source code** (MIT license)
- ⬚ **Real testnet application** with public access
- ⬚ **High on-chain activity** (50 real + 300 simulated inspections)
- ⬚ **Academic validation** (UGM professors)
- ⬚ **Video demo** proving concept before and after Hydra integration

Reusable for Other Industries

- Insurance claim verification
- Logistics quality control
- Property inspection
- Electronics grading
- Any scenario requiring trusted, AI-assisted condition assessment

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⬚ Self-Assessment Checklist

1. Prior Research/Proof-of-Concept

⬚ **Yes** - CAR-dano production system at cari.inspeksimobil.id, system diagrams, UX wireframes, and AI model references are provided.

2. Ecosystem Research

⬚ **Yes** - Ecosystem Research section analyzes CAR-dano, Hydra projects, and NFT projects, demonstrating HydraAI Inspect is the first to combine AI + Hydra L2 + CIP-68 for industrial inspection.

3. Technical Capability

☑ **Yes** - 6 team members with LinkedIn and GitHub profiles, 2 UGM professors with academic profiles, and CAR-dano production deployment as portfolio evidence.

4. Good Standing with Catalyst

☑ **Yes** - CAR-dano (Fund 13) successfully delivered and currently in production use.

5. Problem & Value Definition

☑ **Yes** - Problem statement defines trust deficit and scalability issues. Solution demonstrates 99% cost reduction via Hydra and immutable verification via CIP-68 tokens.

6. Testnet Deployment Goal

☑ **Yes** - Milestone 5 delivers public testnet deployment with Hydra Head, VCT minting, and community testing access.

7. Technical Plan

☑ **Yes** - Detailed workflow (AI → Hydra → CIP-68), 6 milestones with specific deliverables, and feasibility validation provided.

8. Realistic Budget & Timeline

☑ **Yes** - ₳90,000 for 6 months with 6 team members, 2 advisors, and existing infrastructure is realistic based on prior CAR-dano delivery.

9. Community Engagement Plan

☑ **Yes** - 3 workshops/demos, 50+ beta testers, public GitHub, video demo, and accessible landing page/app for community testing.

10. Budget Compliance

☑ **Yes** - Budget allocated to: 6 team members, 2 advisors, 50 real car inspections, and infrastructure. No retroactive funding, incentives, or giveaways.

☑ Required Acknowledgments

The team accepts all Fund15 rules regarding:

- ☑ Transparency
- ☑ Milestone-based payouts
- ☑ Reporting obligations
- ☑ Public visibility of deliverables

☑ Contact Information

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Prepared for Project Catalyst Fund 15
Category: Cardano Use Cases — Prototype & Launch
Theme: Real-World Applications

This proposal represents a commitment to advancing Cardano's capabilities in real-world industrial applications through the innovative combination of AI, Hydra Layer 2, and CIP-68 tokenization.