

# Coherence Guard for Autonomous Mobility

From collision avoidance to socially legible traffic co-regulation

Palm Garden AI | Draft Pitch Deck | June 2026

## The hidden gap in autonomous driving

Safety is necessary. Acceptance requires legibility.

Traffic is not only rules.  
It is real-time relational negotiation.

Everyday road users constantly negotiate priority, intention, hesitation and trust through micro-signals.

A vehicle can be technically safe — yet socially unreadable.

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## Where rules are not enough

Ambiguity appears whenever multiple safe actions exist.

**Zipper merge**

Who creates the opening?

**Crosswalk hesitation**

Is the pedestrian crossing — or asking for confirmation?

**Mixed traffic**

Scooters, cyclists and pedestrians negotiate by movement.

**Right-of-way tension**

Having priority may still destabilize the scene.

The next frontier is not only predicting others. It is choosing actions that help others behave better.

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## A vehicle already has body language

It communicates before it speaks.

Acceleration, deceleration, distance, lane position, lights, timing and smoothness

These physical signals can feel aggressive, nervous, hesitant or cooperative. Coherence Guard treats motion as relational communication.

A car does not need a human face to become socially legible.

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## First benchmark: Pedestrian Uncertainty

Replacing missing eye contact with coherent vehicle behavior.

**Scenario**

A pedestrian stands near a crossing, looks toward the vehicle, moves slightly forward, stops again and waits for implicit confirmation.

**Classical AV question**

"Will the pedestrian cross?"

**Coherence Guard question**

"Which safe action reduces the person's uncertainty?"

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## What Coherence Guard adds

A candidate-action evaluator inside the safe envelope.

**ADS Stack**

perception  
prediction  
planning

**Candidate Actions**

continue  
slow  
yield  
signal

**Coherence Guard**

legibility  
uncertainty  
trust

**Preferred Action**

safe + legal  
most coherent

Safety and legality remain hard gates. Coherence Guard does not replace emergency braking, steering or primary vehicle control.

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## Phase 0B prototype already runs

A minimal decision kernel ranks safe candidate actions by coherence score.

continue normally 0.329

brake late 0.577

slow early + hold 0.864

signal + slow 0.889

Recommendation: signal\_and\_slow

Reason: combined signaling and early slowing creates the clearest external intention and supports shared predictability in the traffic field.

Prototype file: coherence\_guard\_av\_phase0b.py

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## Simulation-first path

No vehicle purchase is required to prove the first layer.

0A

Scenario Definition

0B

Python Decision Kernel

1

CARLA Scene Demo

2

ROS2 Node Shadow Mode

3

Autoware / CARLA Compatibility

The first proof can remain advisory. Coherence Guard observes a simulated scene, evaluates candidate maneuvers, and logs the most coherent recommendation.

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## Benchmark suite

A compact set of social ambiguity cases for virtual validation.

**Pedestrian uncertainty**

missing eye contact

**Mixed traffic Thailand**

local negotiation

**Aggressive follower**

smooth de-escalation

**Zipper merge**

cooperative flow

**Elderly pedestrian**

vulnerability sensitivity

**Ambiguous priority**

trust-preserving yield

**Success criterion**

Distinguish "safe but socially unclear" from "safe and socially coherent."

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## Why Palm Garden AI

The same relational layer now generalizes from robotics to mobility.

First relational coherence, then field dynamics, then embodied decision systems.

Palm Garden AI developed Coherence Guard from a human-facing robotics context: timing, proximity, boundary recognition, respectful withdrawal and trust preservation.

Autonomous mobility is the same class of problem under different physics: a moving agent must choose not only what is possible, but what stabilizes the shared field.

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## Partner ask

A focused Phase 0 compatibility review.

- 1 Select one benchmark scenario
- 2 Map candidate-action interface
- 3 Run Python decision kernel in shadow mode
- 4 Prepare CARLA / ROS2 / Autoware path

What we need from a partner: a technical review conversation, simulation environment assumptions, and candidate-action access points.

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A good autonomous vehicle does not only drive through traffic.

For a short moment,  
it helps carry the traffic field.

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## Selected technical references

Used for Phase 0 positioning and simulation path.

**CARLA Simulator**

Open-source autonomous driving simulator for development, training and validation.

**Autoware Foundation**

Open-source autonomous driving software built on ROS / ROS2.

**ISO 34502:2022**

Scenario-based safety evaluation framework for automated driving systems.

**autoware\_carla\_interface**

ROS 2 / Autoware Universe bridge for CARLA simulation.

**Waymo Reference Driver / ReD**

Industry signal: human-behavior modeling as a safety benchmark direction.

Note: Coherence Guard is positioned as an advisory evaluation layer inside the safe envelope, not as a replacement for certified ADS safety control.

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