

CARLA Simulated User Interaction For CityOS

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Introduction

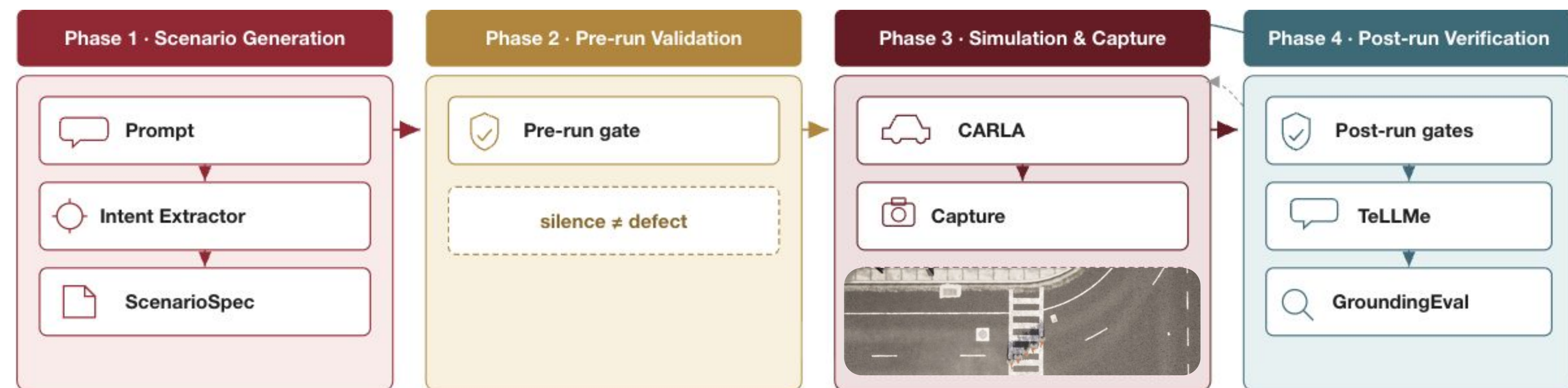
Idea: TeLLMe and GroundingEval need a world with known, verifiable state to test against, and an answer key for that world.

Challenge: The stack needs a simulation that can run to completion, write every output file, and exit clean, while depicting exactly what was asked for.

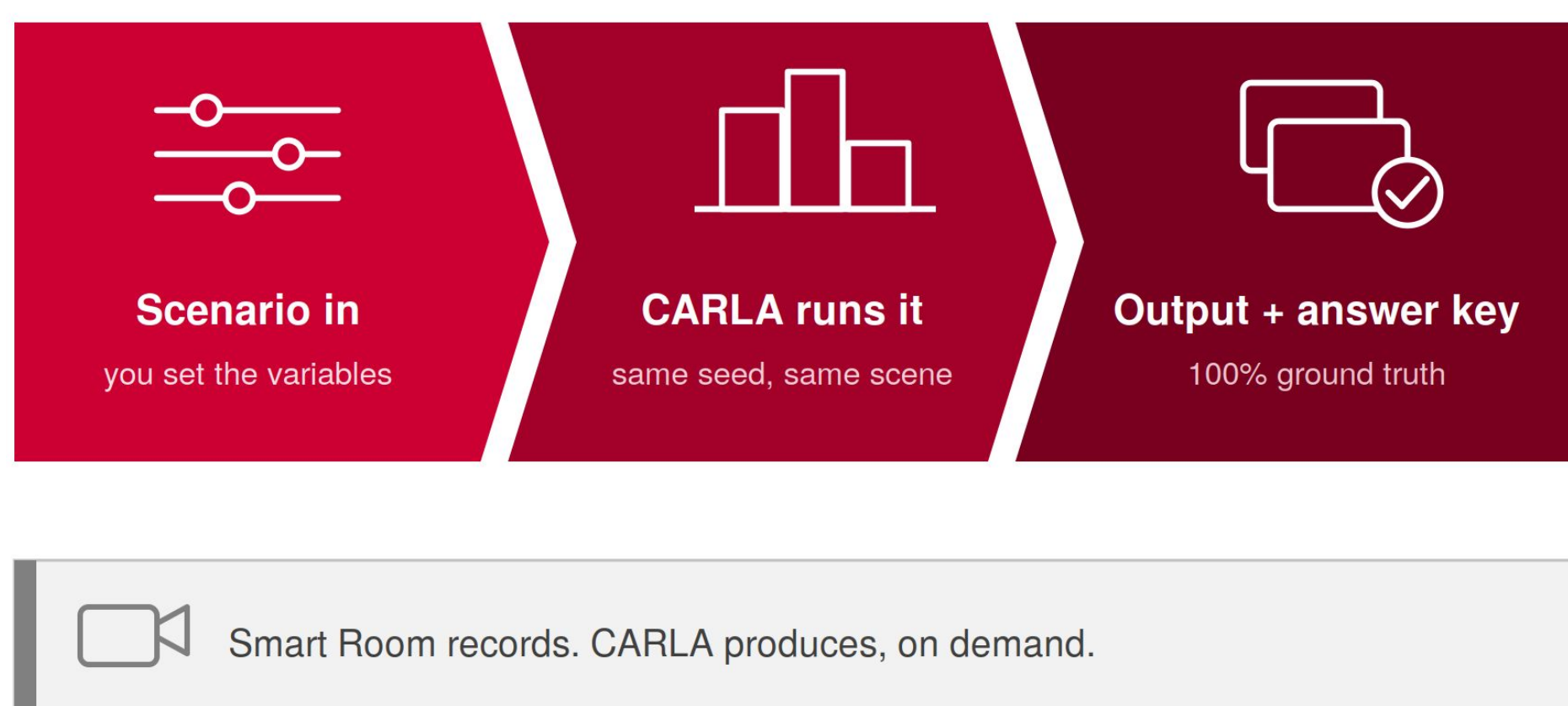
Approach: A prompt is extracted into separate fields, executed in CARLA, captured across sensor streams, and then passed through three verification gates, before being given to other fields

Key benefit: One pipeline produces both the simulated world and its own verified answer key, and we get a cityscape point of view.

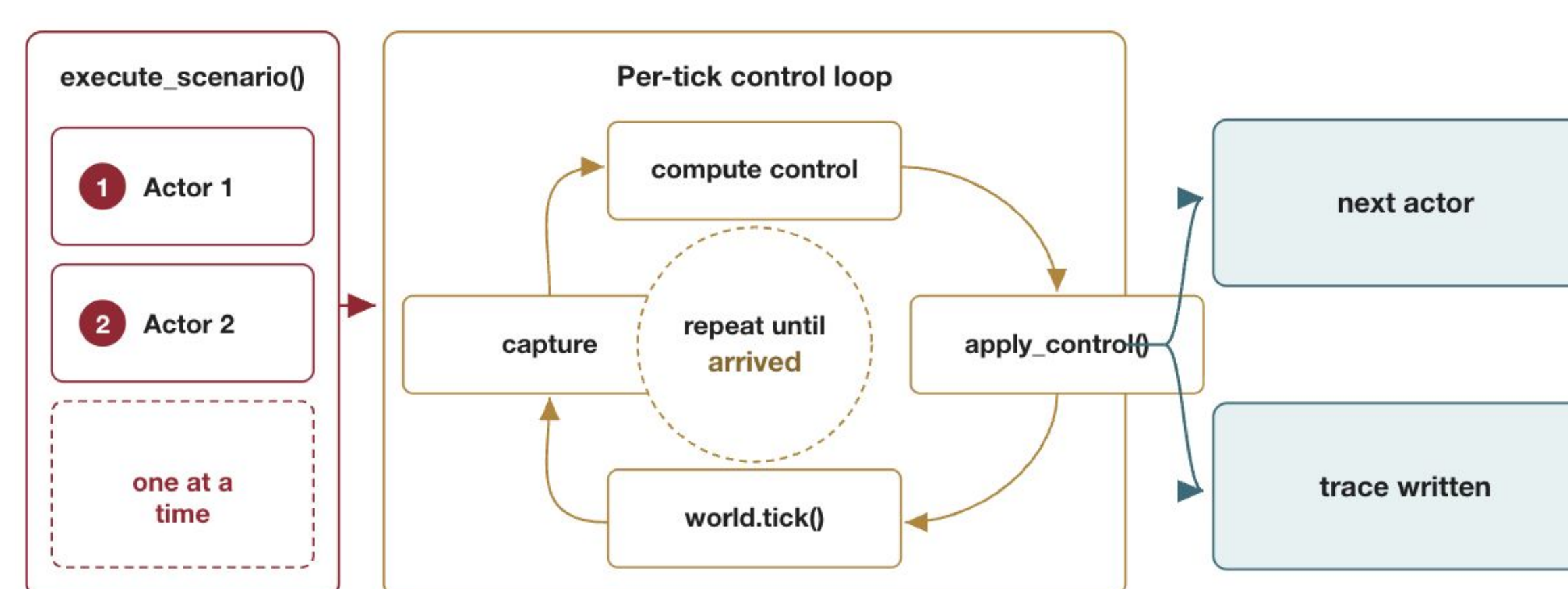
Pipeline



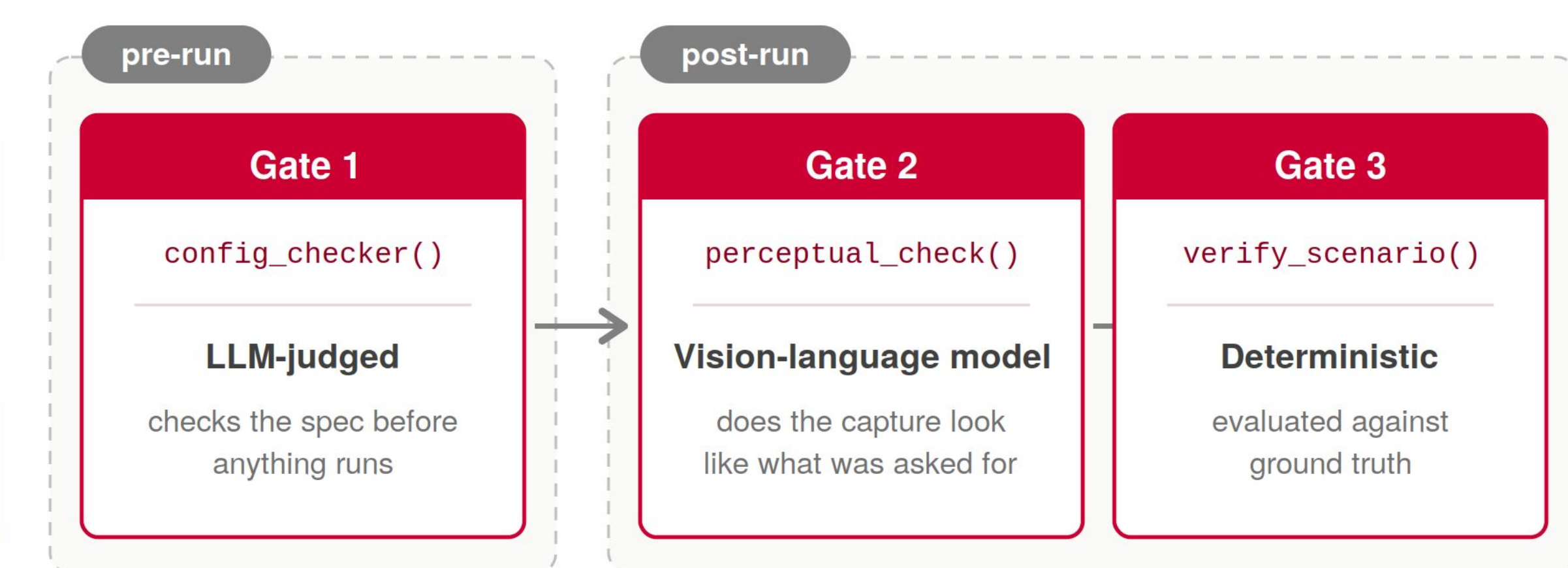
Background



Execution



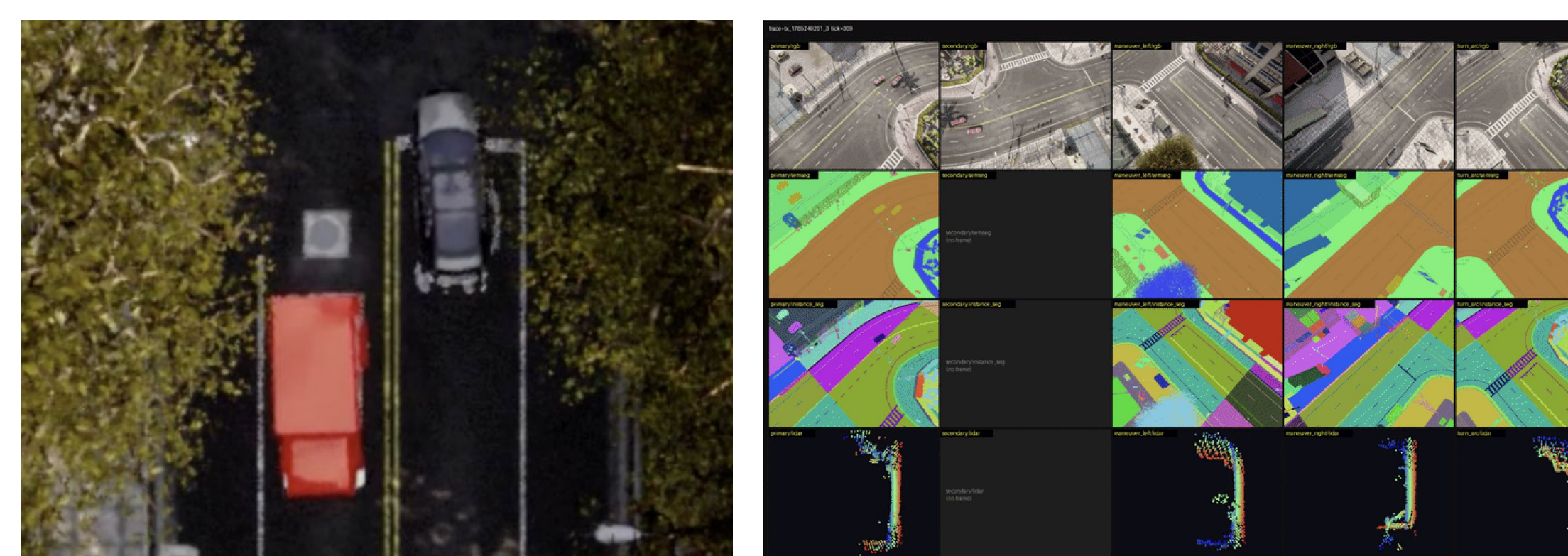
Verification



Stress Test

Actor Mix	Scenarios	Why It's Harder
Pedestrians only	2	Both actors slow and predictable
Vehicles only	12	Higher speed, physics-based motion
Mixed	16	Asymmetric speed, safety-critical

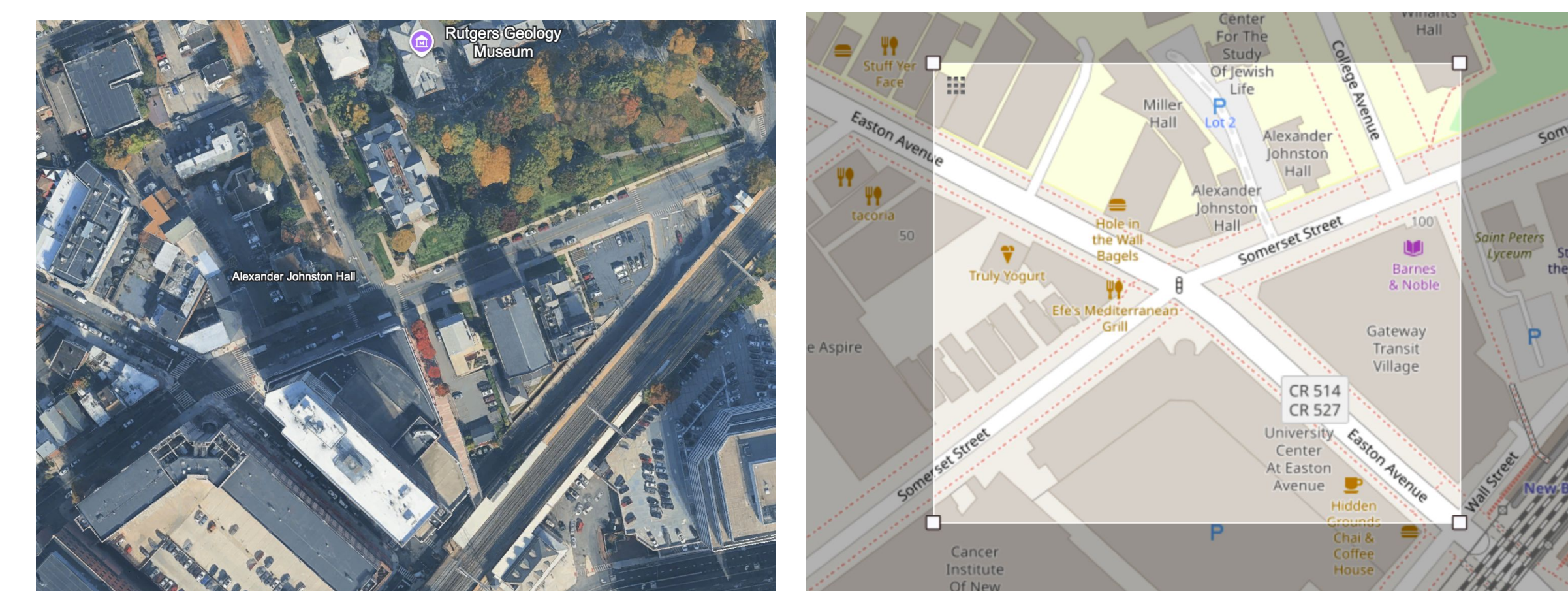
Results



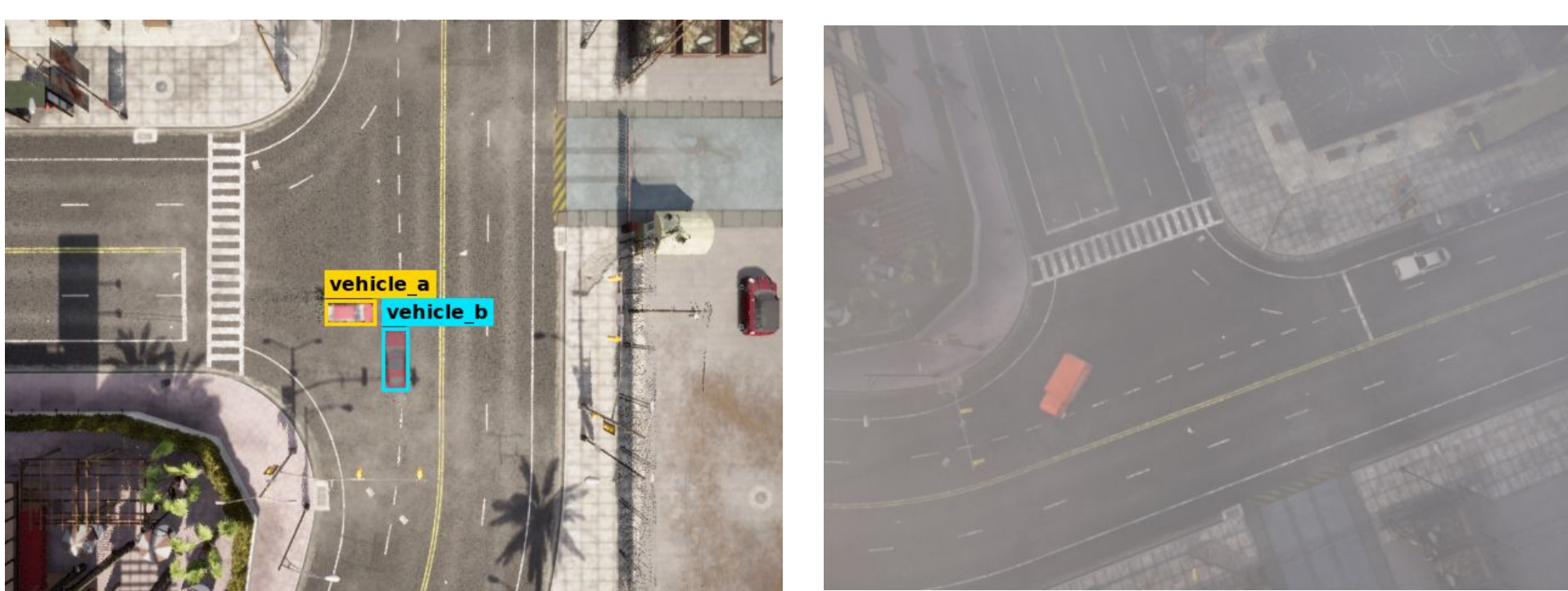
1 of 30 automated scenarios

Multi-sensor grid composite

Open Street Map



- OSM maps import into CARLA to generate street layout and traffic light positions
- Blender fills in what OSM doesn't provide: buildings, structures, trees
- Roads generating successfully; blueprints for everything else still to come
- Tagging zones/creating own source data required for self-imported maps.



Testing bounding boxes

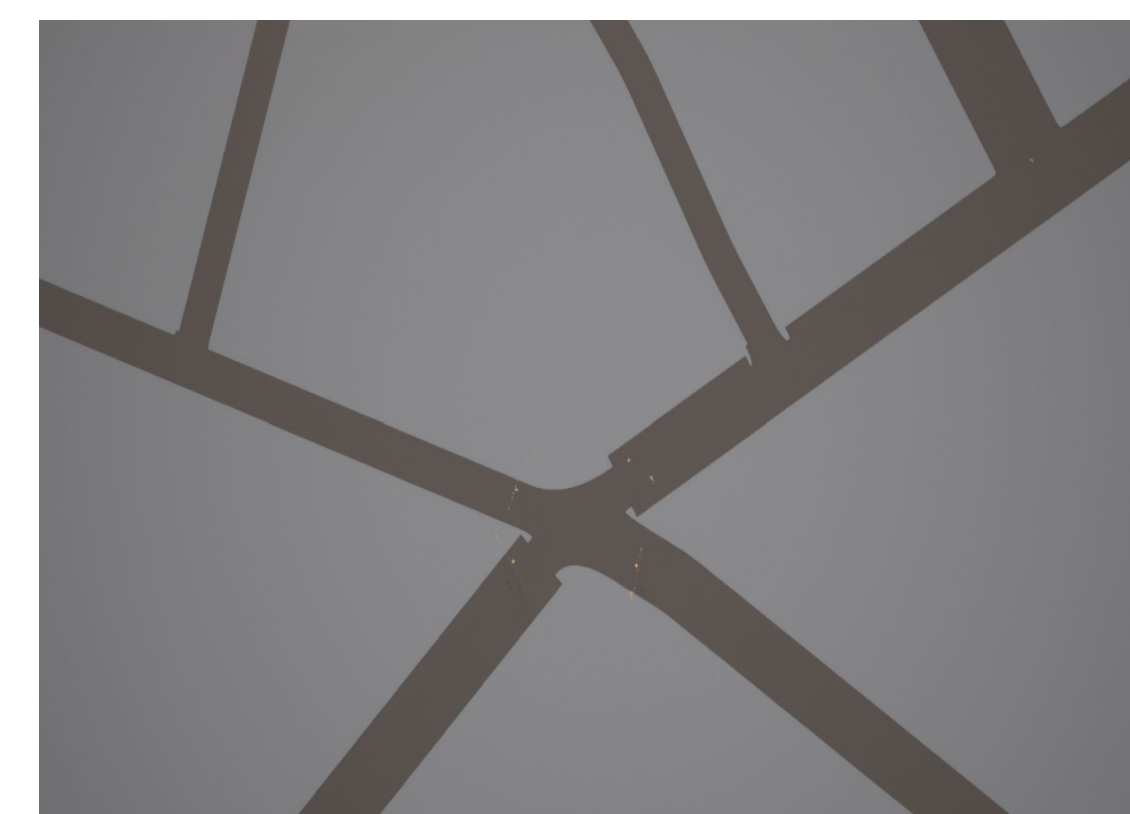
Set dense fog to test sensors



Automated zoning data



Automated camera/sensor placement. One of 5 camera views generated per run, each capturing multiple angles.



4 way intersection generated in CARLA taken from the intersection near the New Brunswick train station

Future Work

- **Harder scenarios:** multi-actor coordination beyond the current setup
- **CityOS integration:** wire verified traces into the CityOS stream format directly
- **OSM street polishing:** adding more blueprints for further integration



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