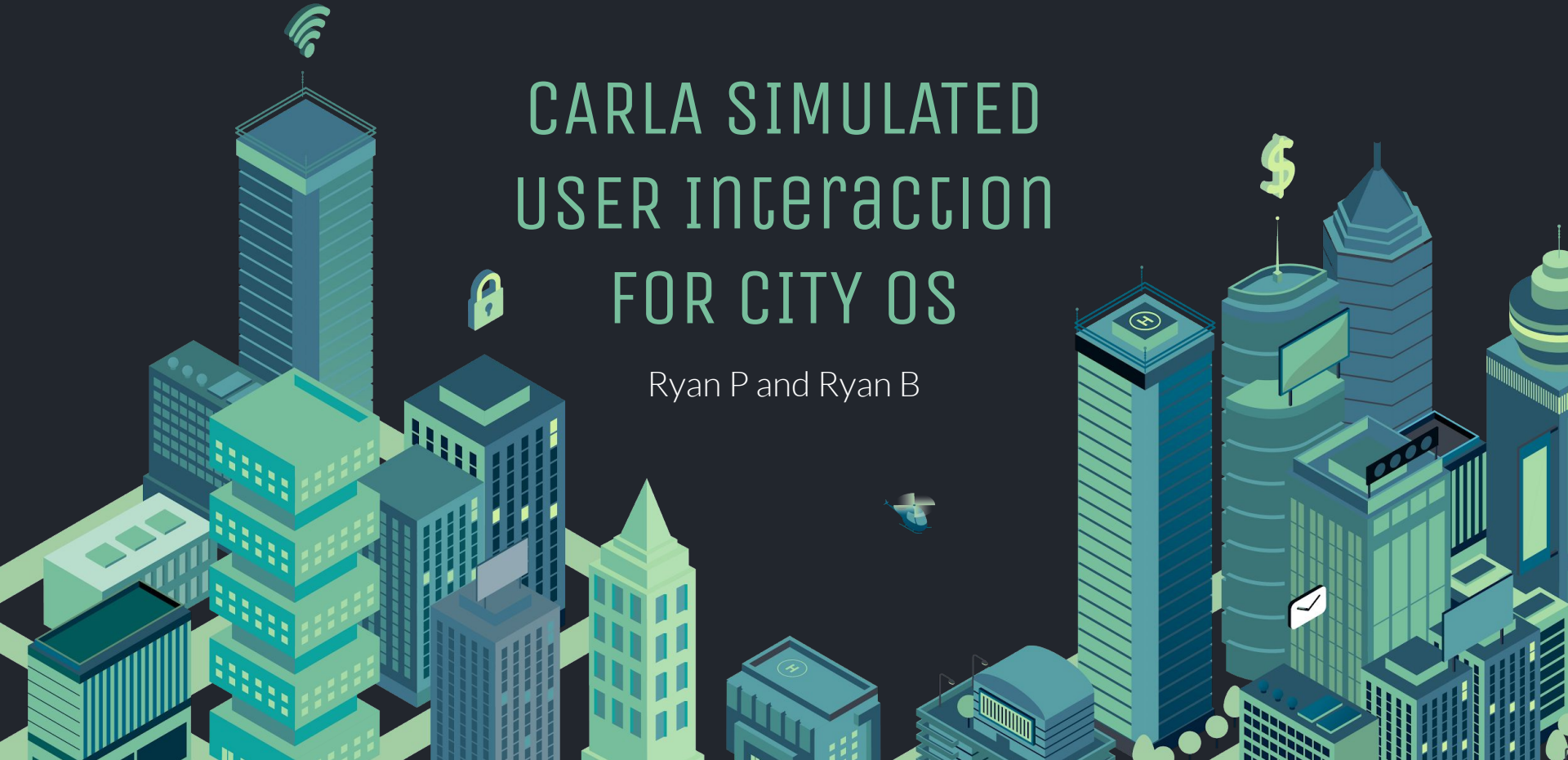
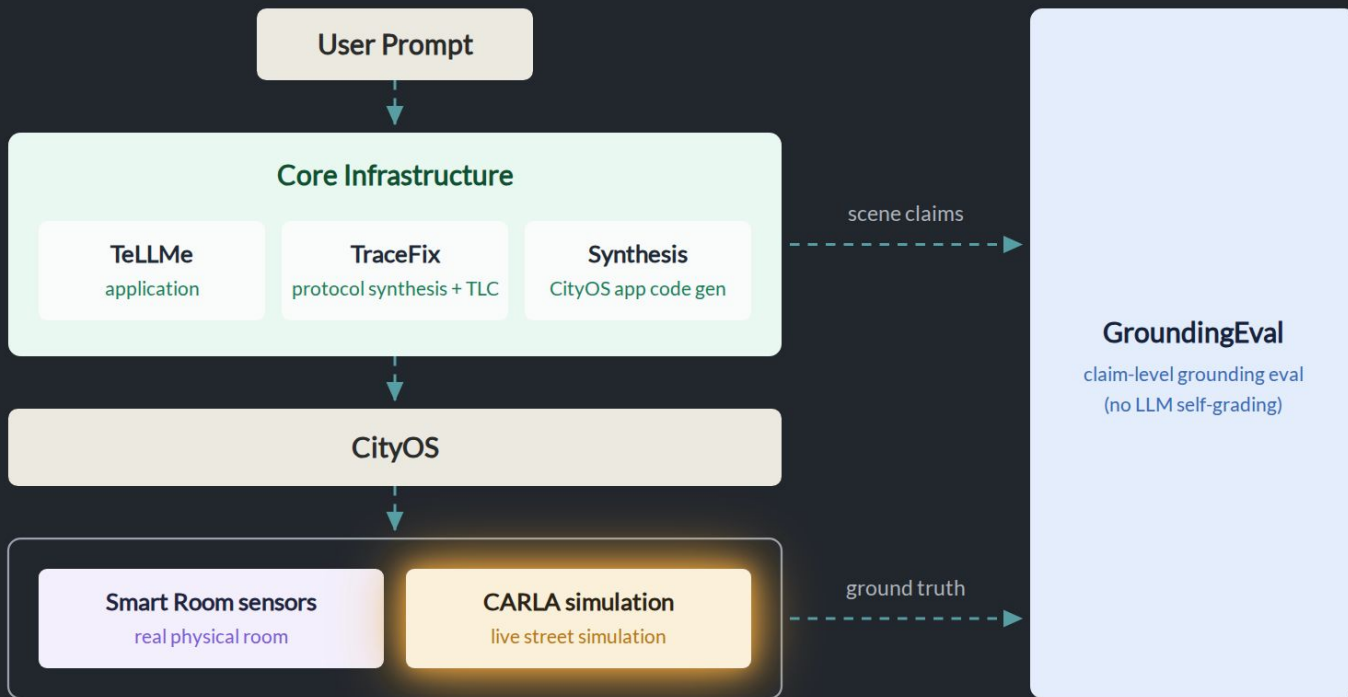


CARLA SIMULATED USER INTERACTION FOR CITY OS

Ryan P and Ryan B



Where this fits



CARLA vs SMART ROOM

Smart Room

CARLA

ROLE

Records what happened

Specifies, then produces

CONDITIONS

Variable

Controlled

REPEATABILITY

Non-deterministic

Deterministic

DOMAIN

Indoor room

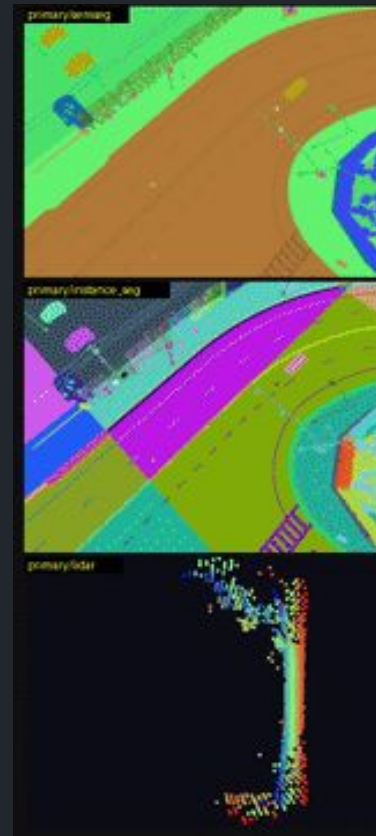
Streetscape

GROUND TRUTH

Human-labeled

Simulator state

Same output format; the same GroundingEval checkers run on both.



Input + Output

Pedestrian walks across the crosswalk with a water bottle and leaves it



Scenario Config
Structured for simulation

```
[
{
  "scenario_id": "s_low_001",
  "schema_version": "0.1.0",
  "generation_batch": "batch_low_2026-07-30",
  "location_id": "loc_road_1",
  "design_target": {
    "target_complexity_tier": "low",
    "supports_families": [
      "A_occupancy",
      "C_counting"
    ],
    "isolating_factor": null
  }
},
]
```



Visual

**Sensor
streams**

**Verified
evidence**

5

camera angles

one junction, frame-synced across all views



11

sensor streams

captured every run



DEPLOYMENT-REALISTIC

what real hardware could see;
goes to TraceFix

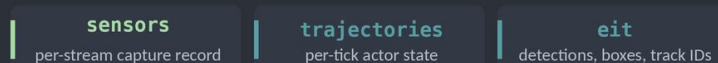
SIMULATOR-PRIVILEGED

sensors that won't be applied in real
settings

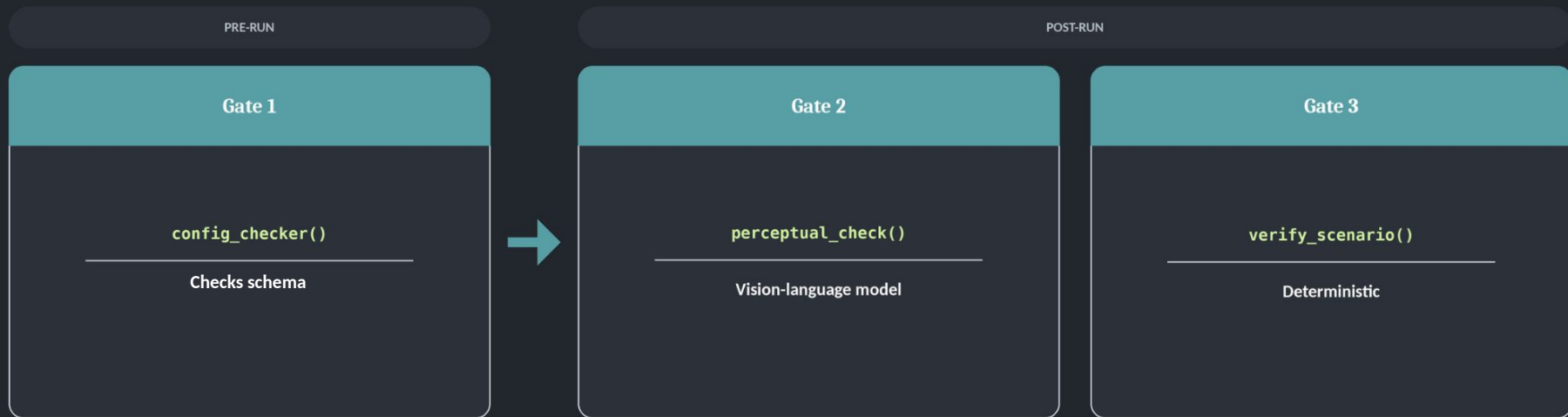
3

JSON artifacts

written every run



Verification: The multi-layered process



Stress Tests:



30 runs

Actor Pairing

VARIED
pedestrian / car / other vehicle, opposing directions



3 tiers

Weather Severity

VARIED
clear → rain → storm, sensor exposure adjusted



1 scenario

Camera Placement

VARIED
camera position and yaw swept per run

One variable per sweep; everything else pinned

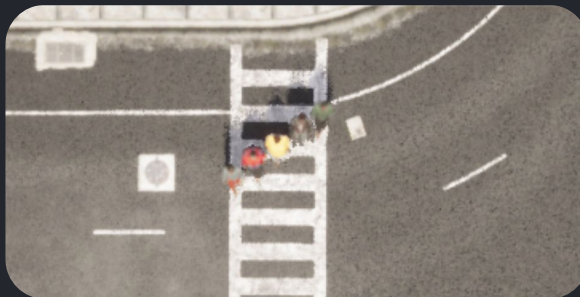
Town10HD · junction 468 · fixed seed · delta_seconds = 0.1 · synchronous mode



junction 468

Sensor Rig Geometry

VARIED
LiDAR / radar / semseg positions around the junction



5 presets

Traffic Density

VARIED
empty → light → medium → heavy → rush

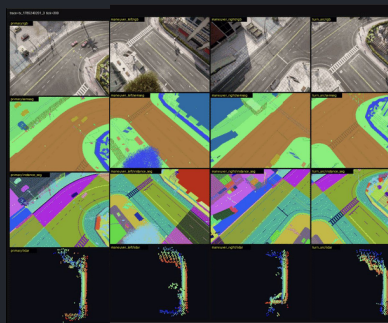
What got built



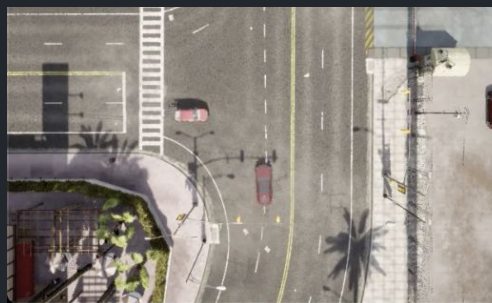
30 scenarios



Automated zoning data



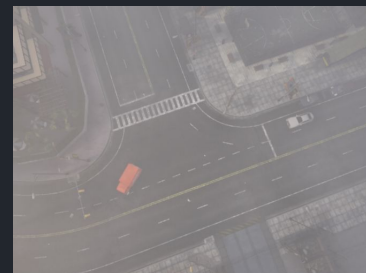
Multi-sensor grid composite



Automated camera/sensor placement.

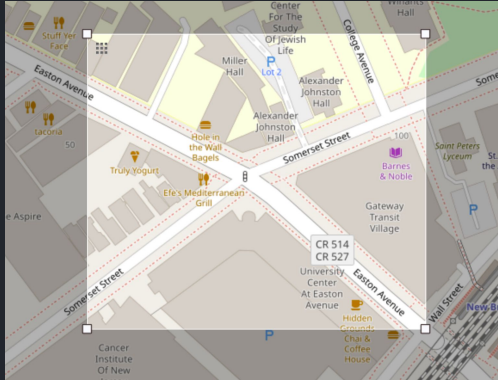


Bounding Boxes with YOLO

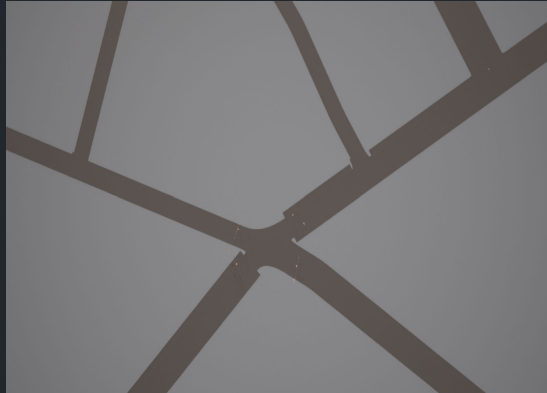


Sensors adjusted for weather

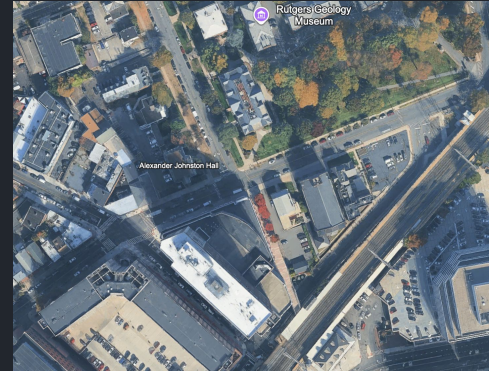
Open Street Map



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



OSM import WITHOUT Blender. It has the roads and the traffic lights.



Prototype OSM import with Blender. Would be in the simulation with 100% zoning data for scenario runs.

Future Work

CityOS Integration

Harder Scenarios

Integrate OSM

Increase Runtime Efficiency



Ryan Baik



Ryan Purakal



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