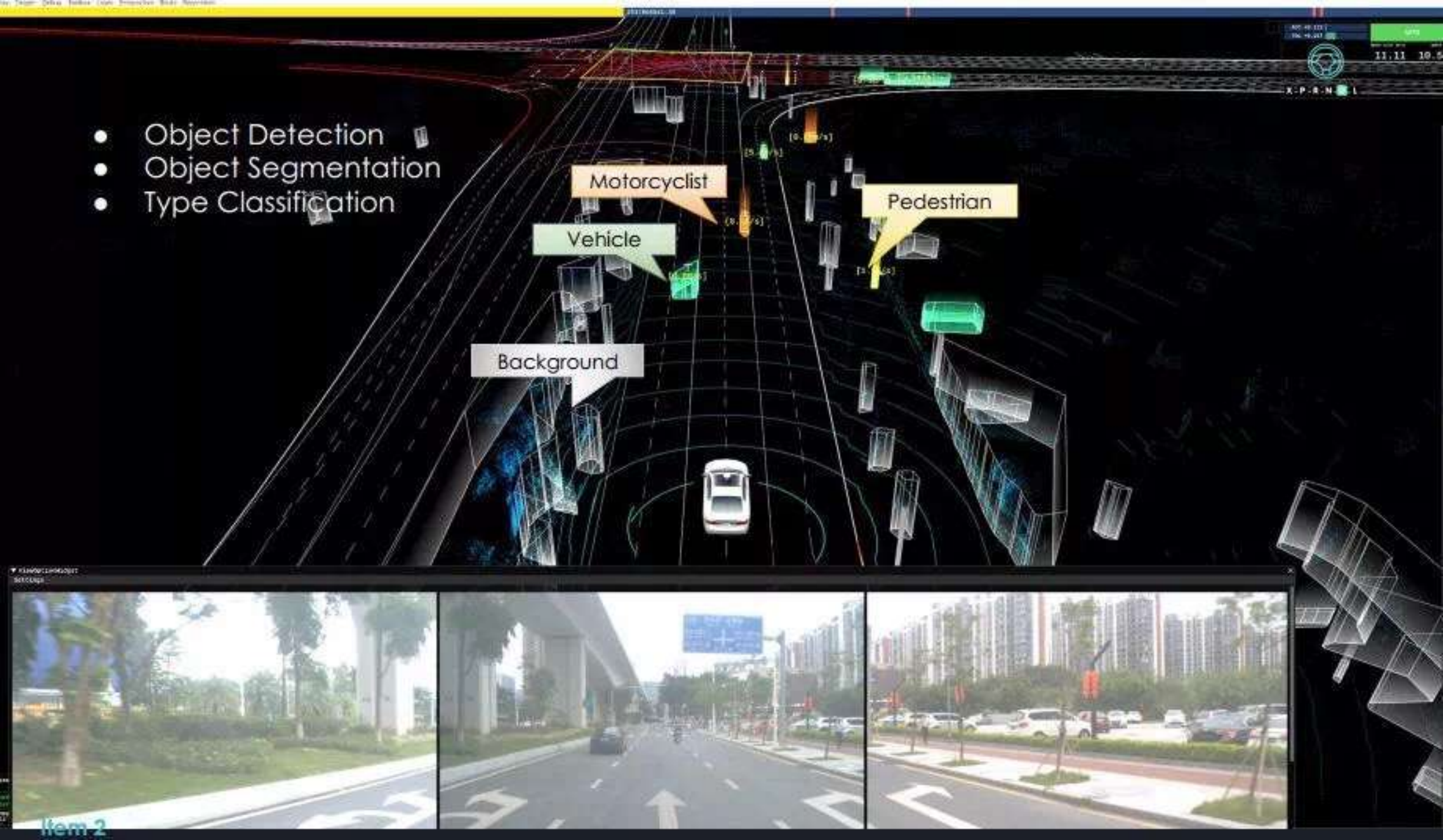
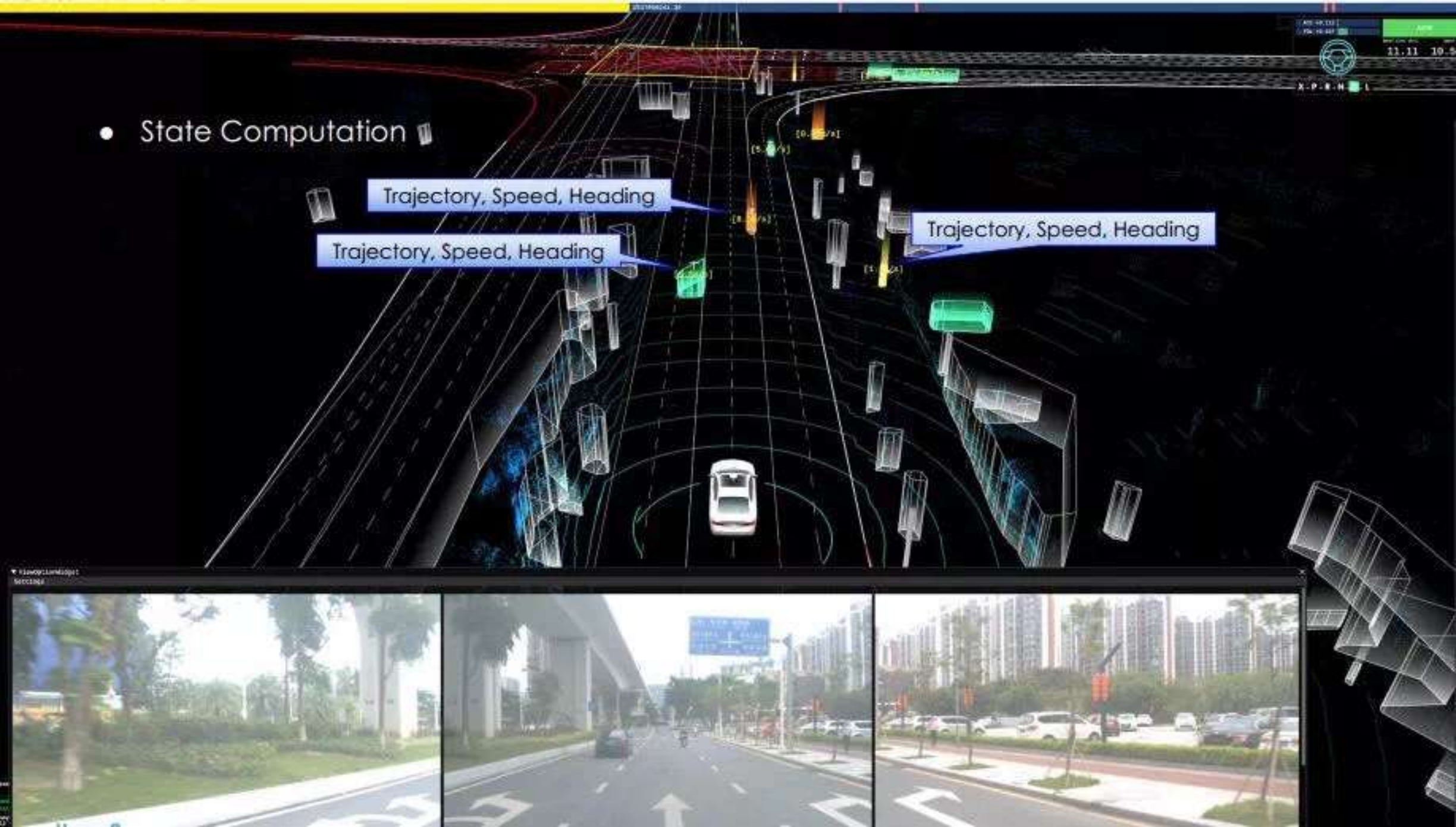

Object Detection
Object Segmentation
Type Classification
Motorcyclist
Vehicle
Pedestrian
Background
Item 2


State Computation
Trajectory, Speed, Heading
Trajectory, Speed, Heading
Trajectory, Speed, Heading

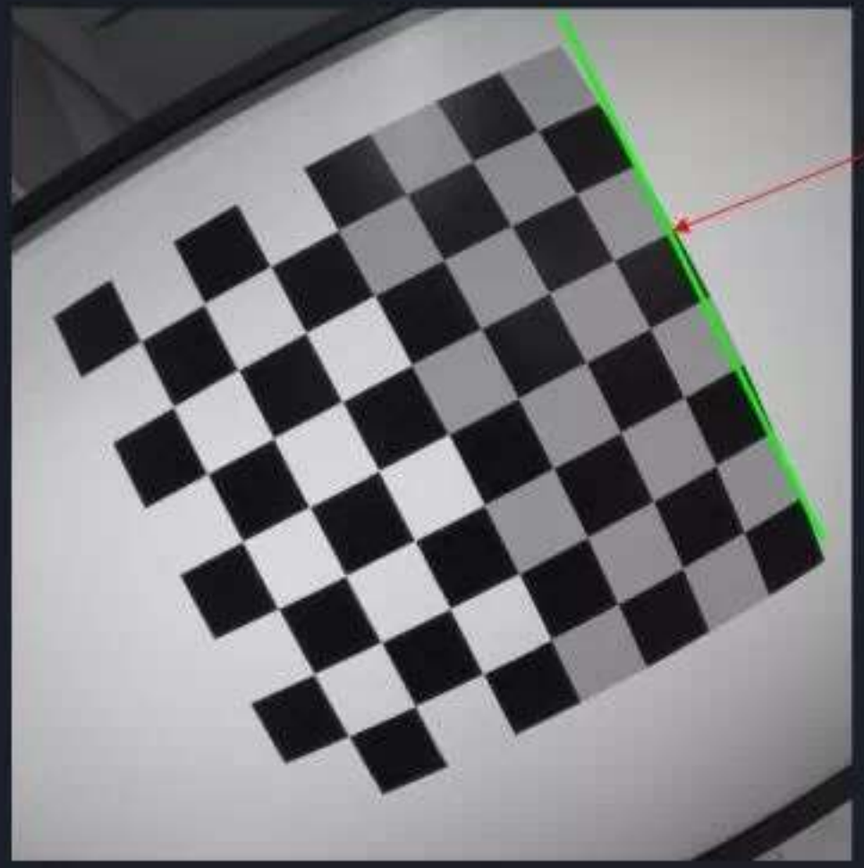
Next generation system enables greater variety of scenarios

Importance of Sensor Calibration Precision

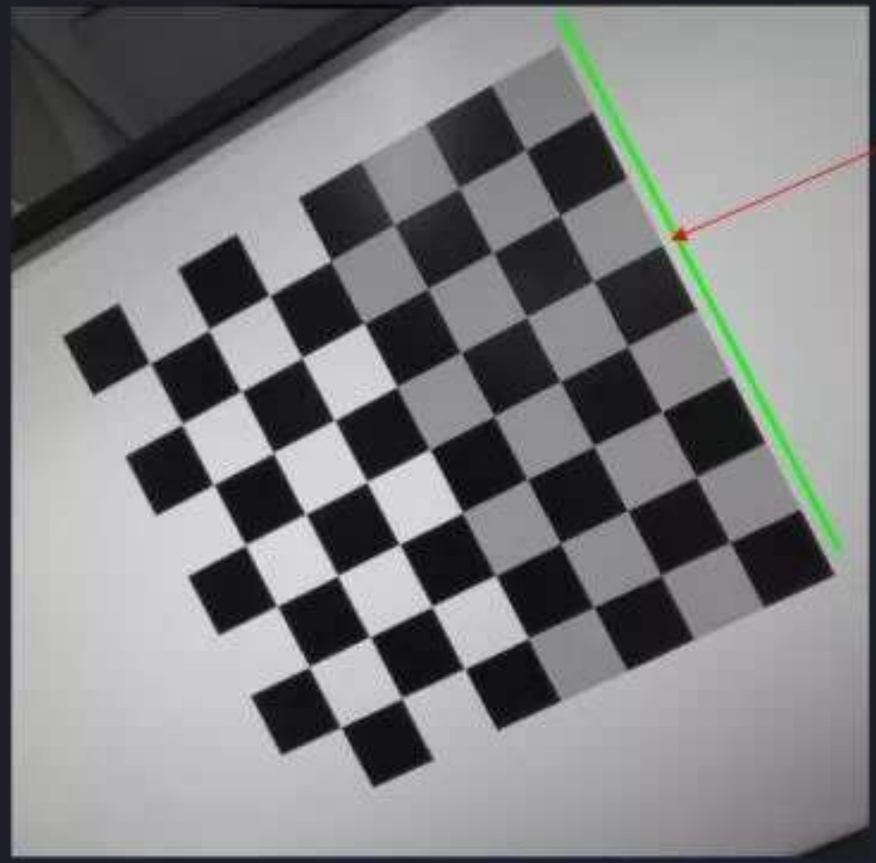
- Combine inputs to support sensor fusion
- One integrated output from perception

Camera Intrinsic Calibration

- Camera intrinsic calibration is to correct the distorted image pixels caused by camera internal characteristics, e.g. focal length, skew, distortion, image center and etc.
- With Pony.ai tools, only 2 ~ 3 minutes calibration effort is required for each camera sensor.



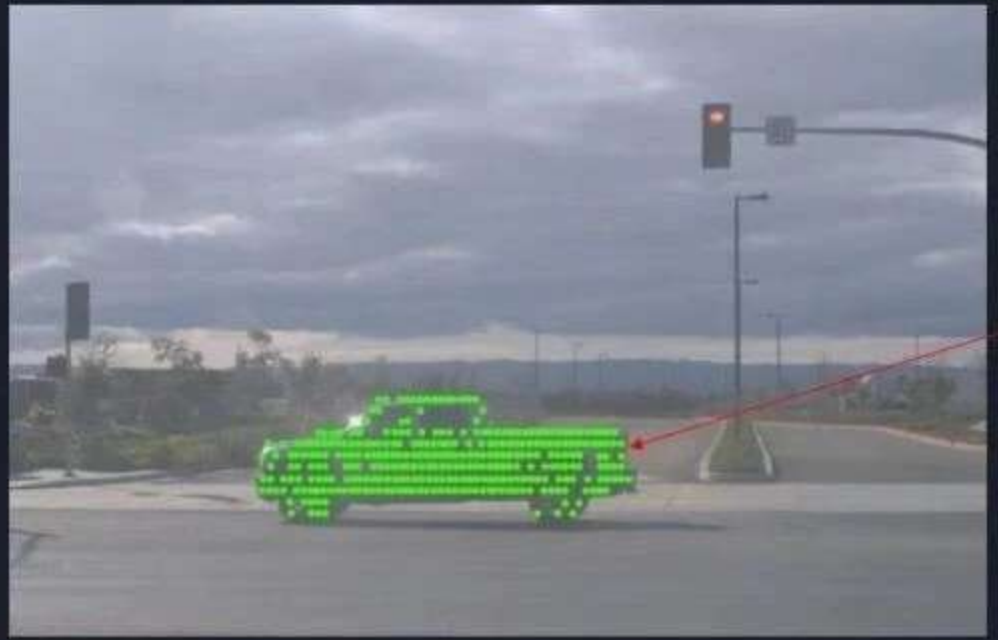
(Before Intrinsic Calibration)



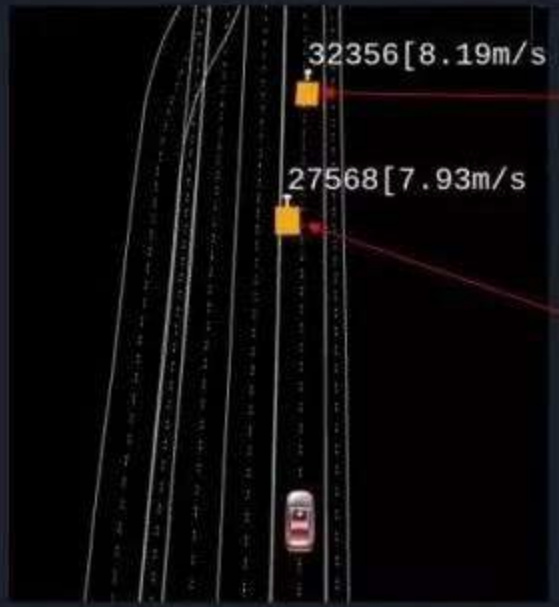
(After Intrinsic Calibration)

Perfect "thin" wall after projecting all lidar points to the world gps space.

Manual driving under the figure eight shape trajectory (digit "8").



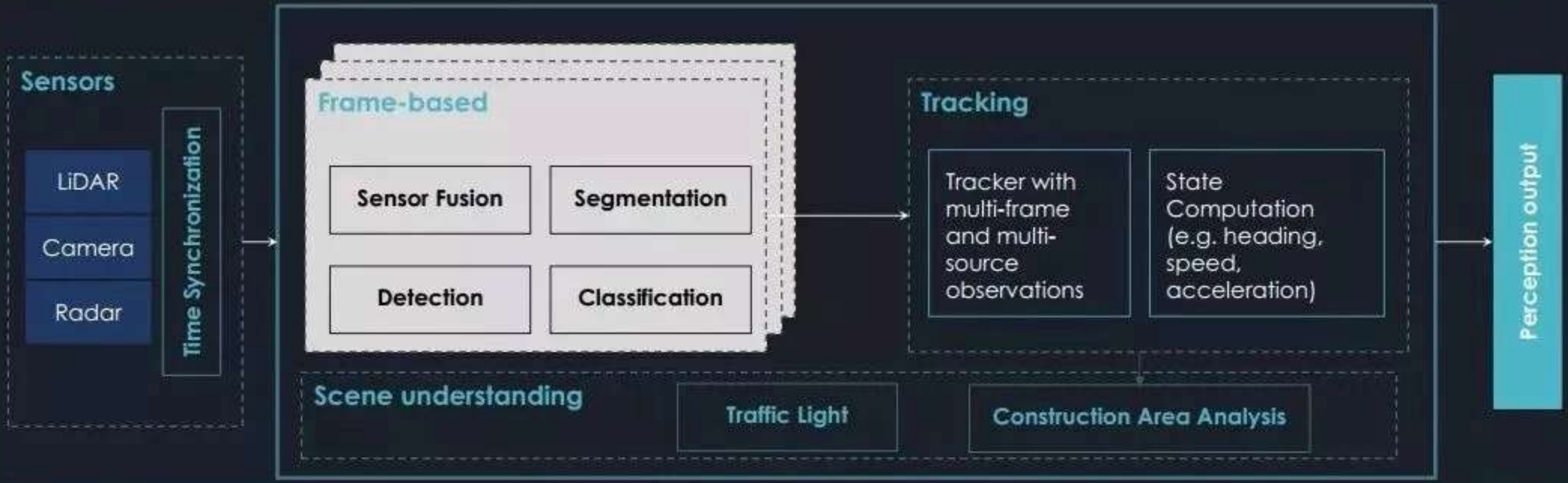
Good calibration example: the lidar obstacle shape and camera obstacle shape are matched perfectly for a 50+ mph running truck.



Blue truck is **driving in the middle of the lane** at the speed 8.19 m/sec.

Black SUV is **driving across lane** at the speed 7.93 m/sec.

Perception Onboard



Perception Technical Challenges: Precision vs. Recall

- Busy Intersection

Perception Technical Challenges: Precision vs. Recall

- Busy Intersection

Perception Technical Challenges: Long Tail

- Sprinklers

Perception Technical Challenges: Long Tail

- Small Obstacles Detection

Perception Technical Challenges: Long Tail

- Traffic Light - always new scenarios

Perception Technical Challenges: Long Tail

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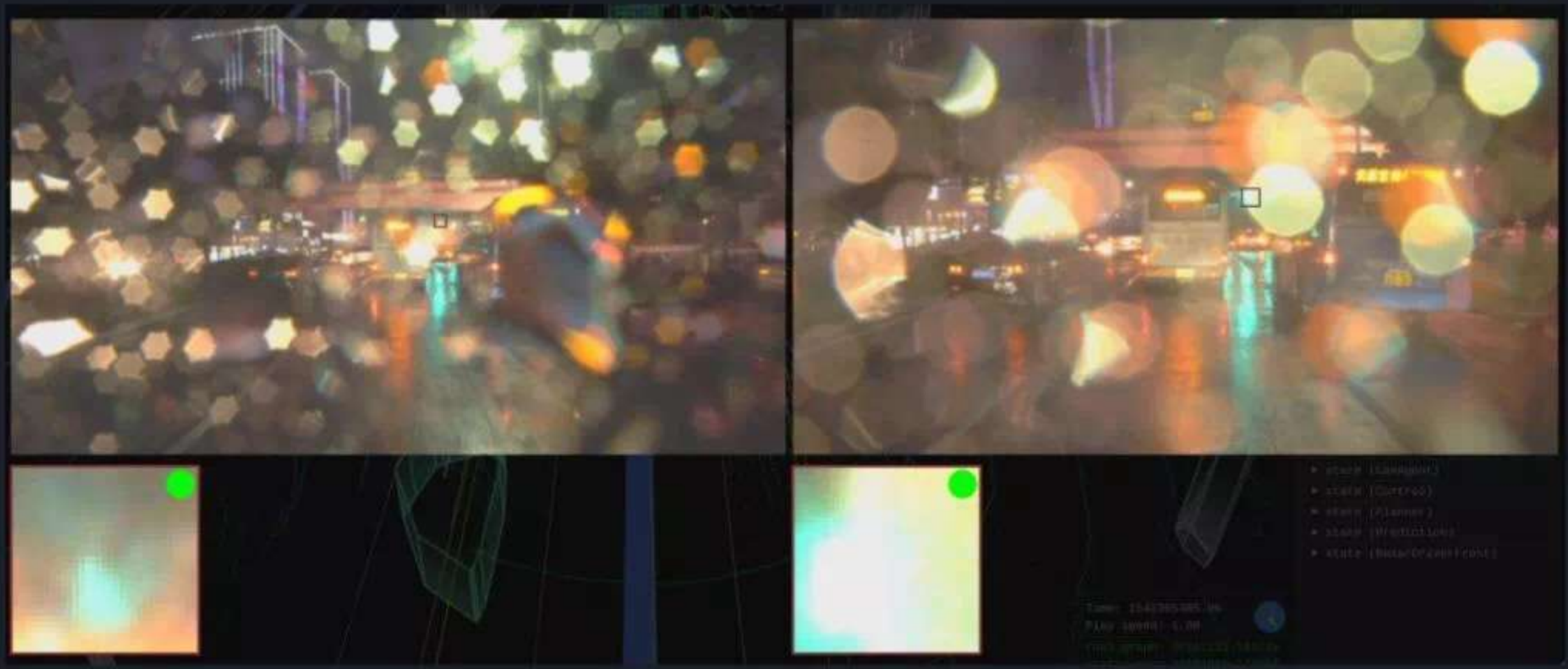
- Traffic Light - always new scenarios



Perception Technical Challenges: Long Tail

- Traffic Light - always new scenarios