

GOALI CPS: Maneuver and Data Optimization for High Confidence Testing of Future Automotive Cyber-physical Systems



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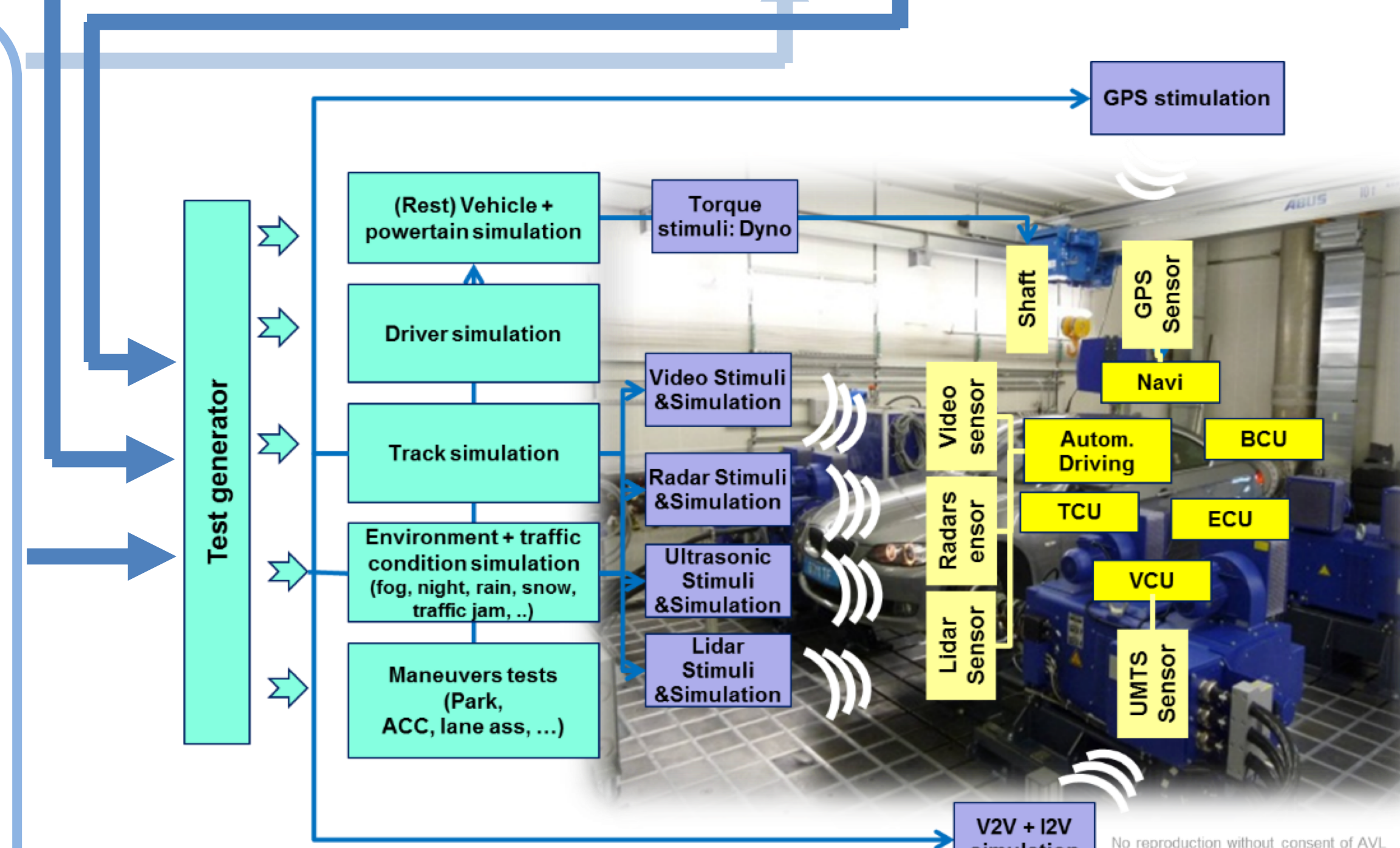
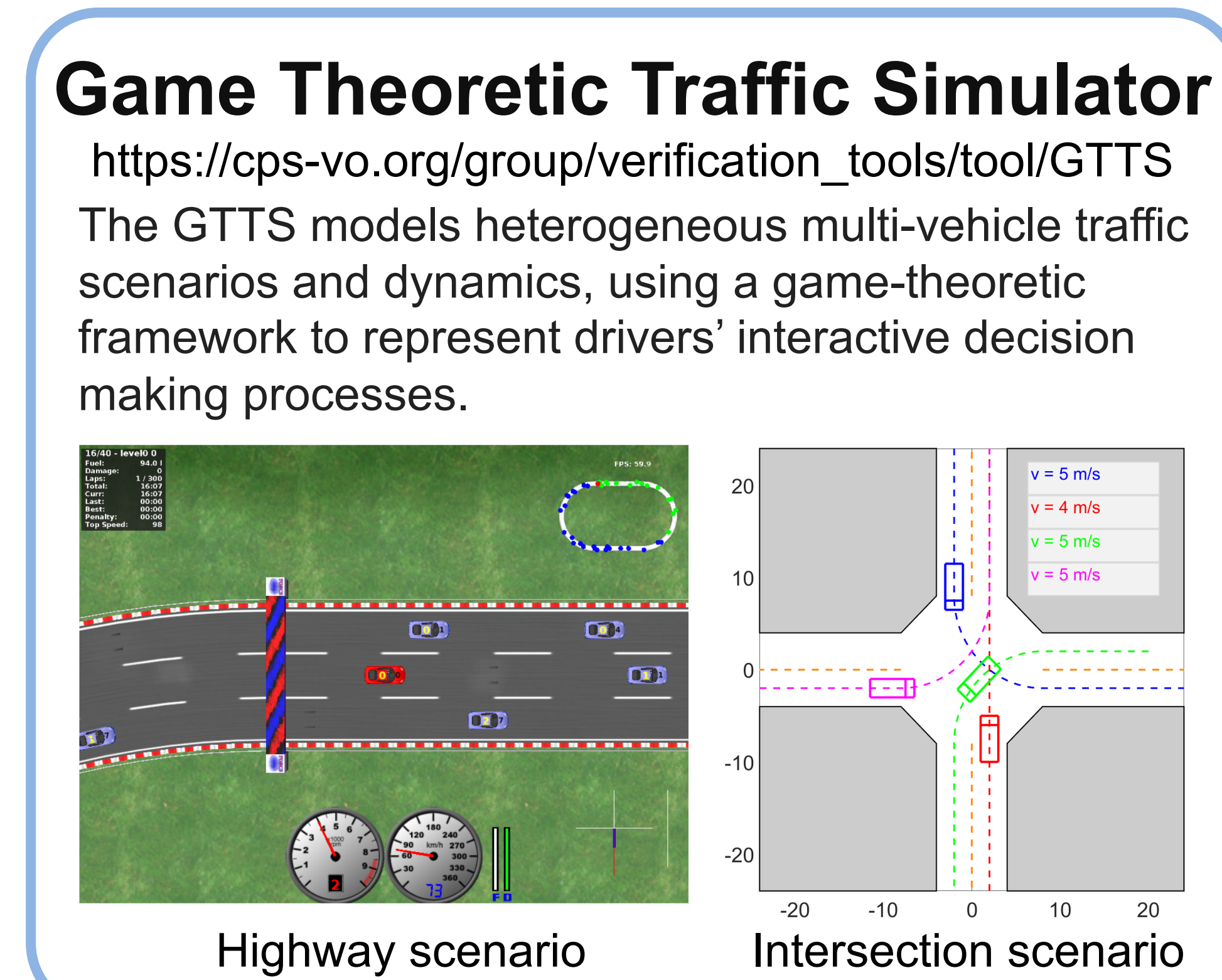
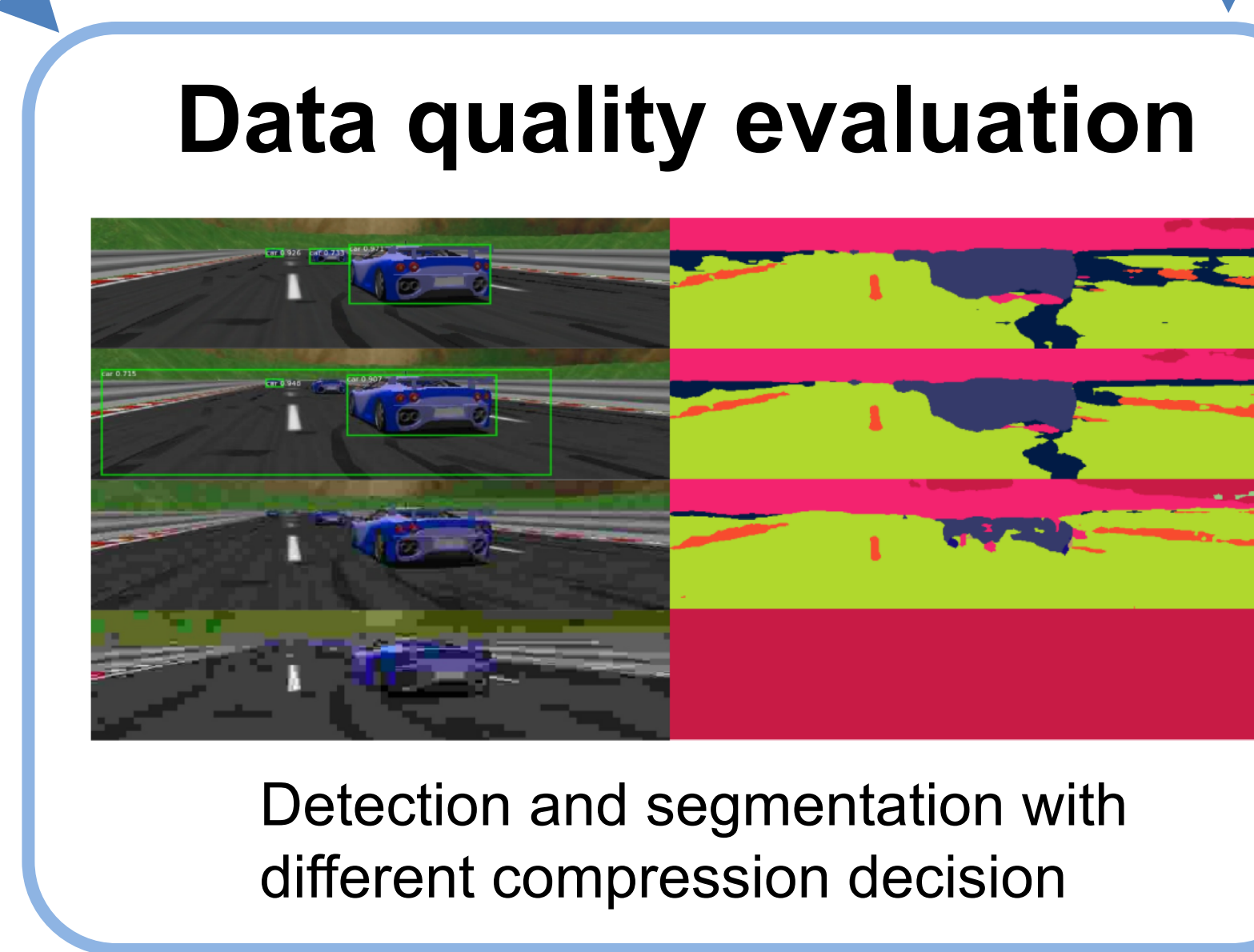
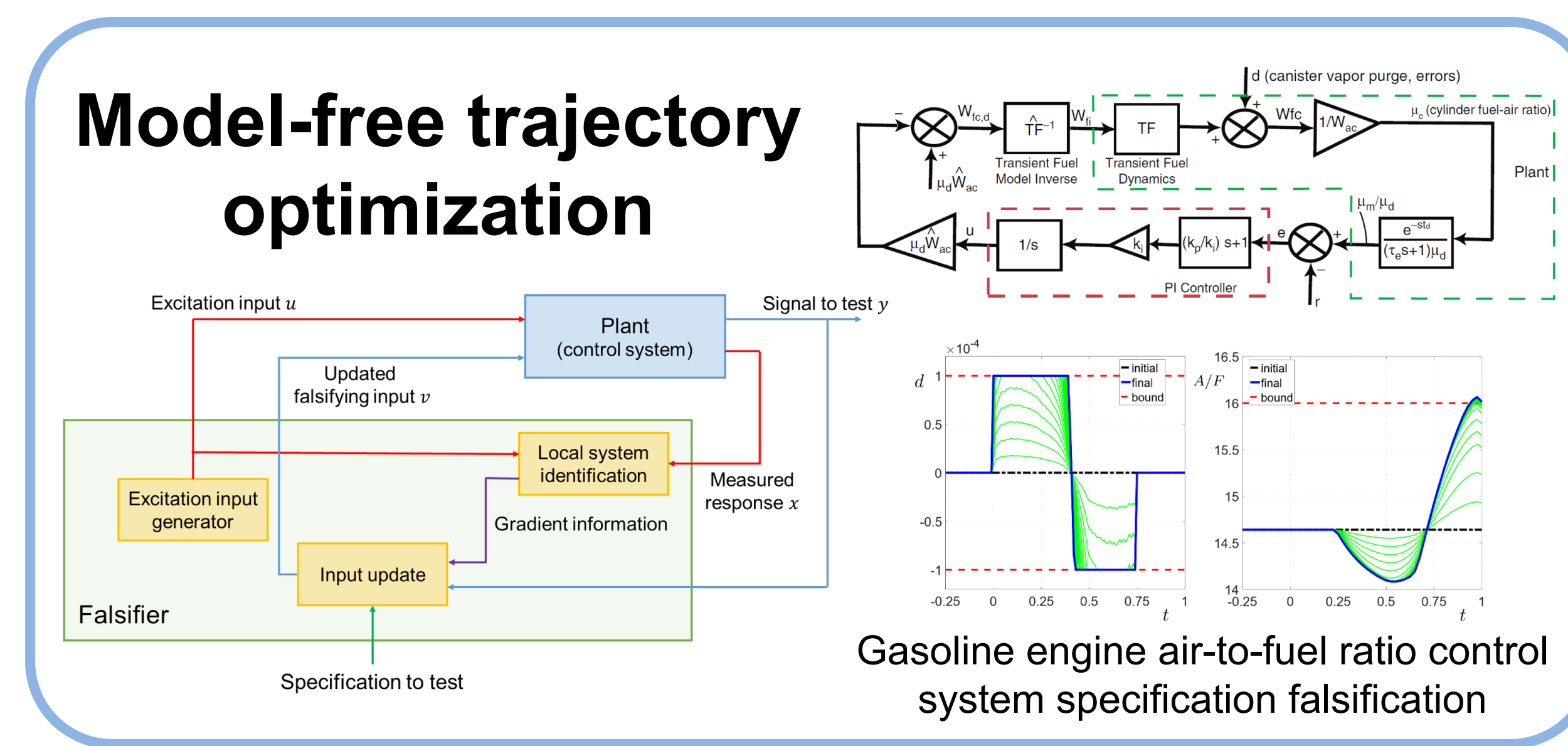
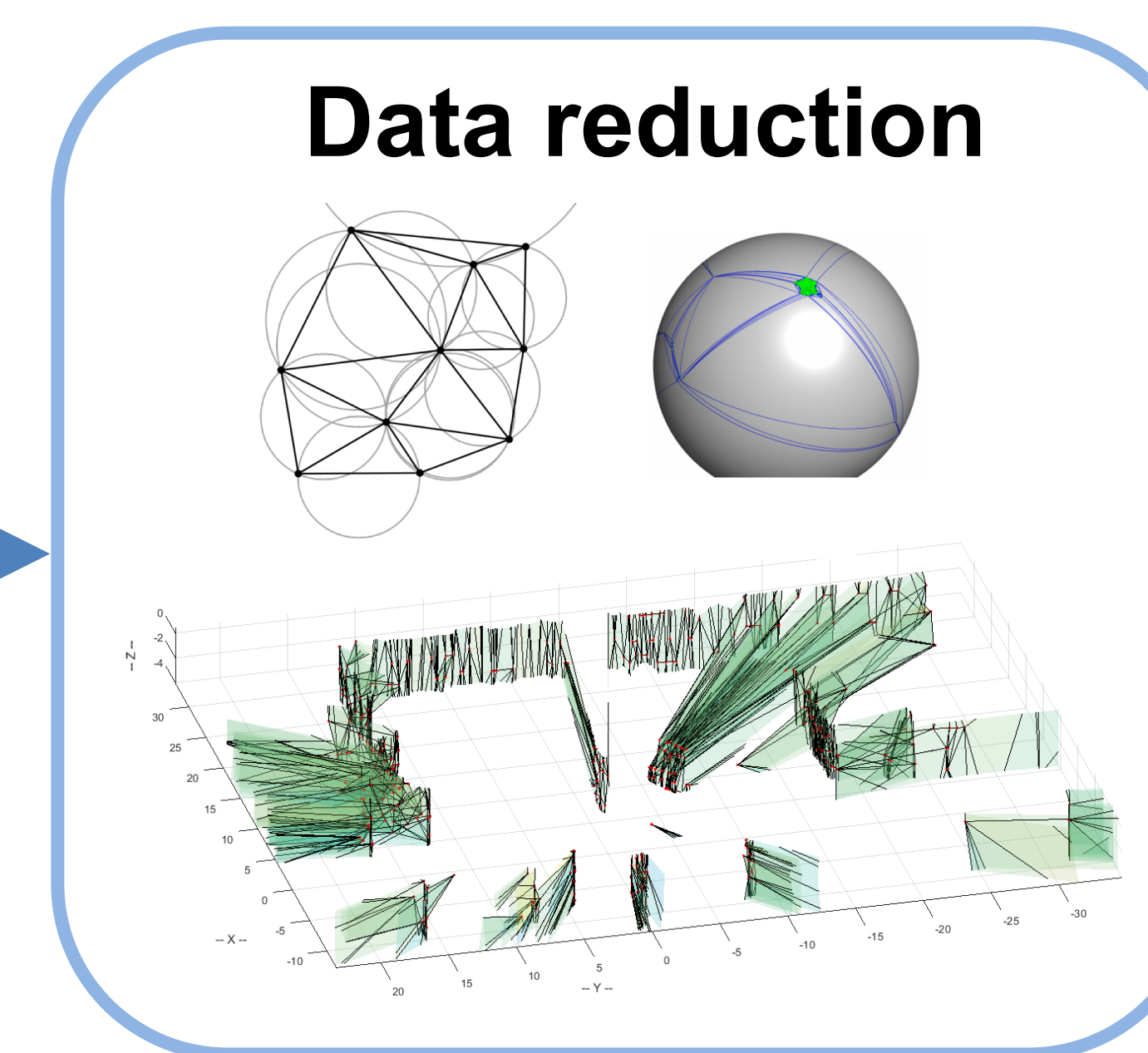
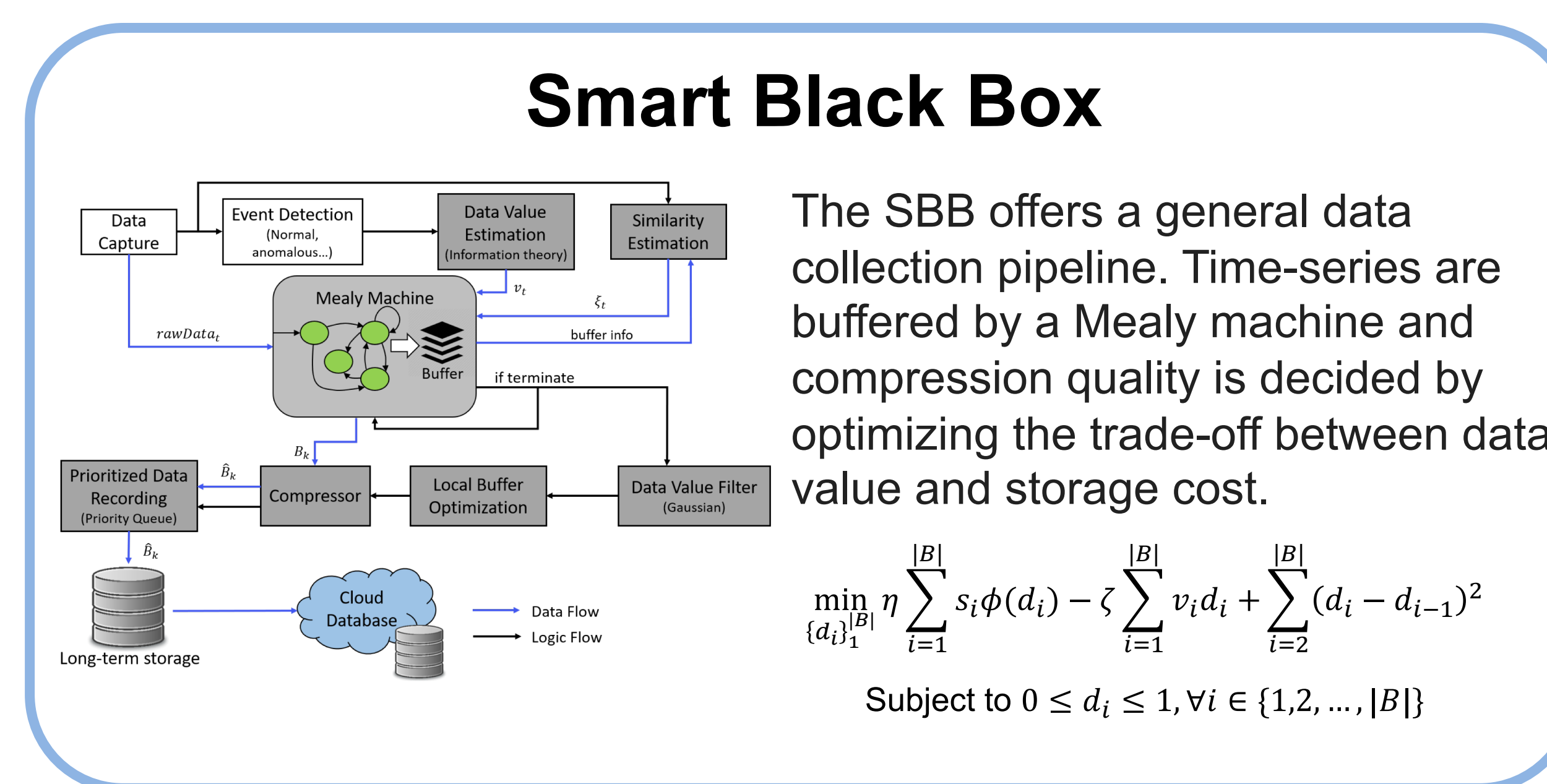
<https://sites.google.com/umich.edu/testing-of-automotive-cps/>

Challenge:

This research addresses challenges in high confidence testing of automotive systems due to on-going and anticipated introduction of advanced, connected, and autonomous vehicle technologies.

Solution:

- The development of a tool chain for high confidence testing, verification, and validation of advanced, connected, and autonomous vehicles is pursued based on the research into maneuver and data optimization to determine test trajectories and scenarios for vehicle testing.
- Game theoretic modeling of heterogeneous and interactive traffic for advanced vehicle decision and control system verification, validation, and calibration through informing in-traffic relevant trajectories, identifying corner cases, and discovering faults.
- Model-free trajectory optimization for falsification of automotive control system time domain specifications.
- Smart Black Box to identify and record high-priority data for diagnostics and validation.



Scientific impact:

- Research advances CPS vehicle lifecycle management with focus on test generation and verification & validation.
- Research advances game theory, optimal control theory, information theory and data mining for applications in autonomous/automated vehicle setting.
- Data acquisition and sampling strategies can be applied broadly to connected vehicle & devices.

Broader impact:

- Research supports the automotive industry in introduction of advanced vehicle technology into mass production.
- Autonomous vehicles can have a significant societal impact, e.g., enabling transportation for people who are not able to drive, and can positively improve road safety, traffic efficiency, reduce energy consumption and environmental impact.
- Interdisciplinary advances are integrated into courses and tutorials.

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