Mosaic

An Extensible Framework for Composing Rule-Based and Learned Motion Planners



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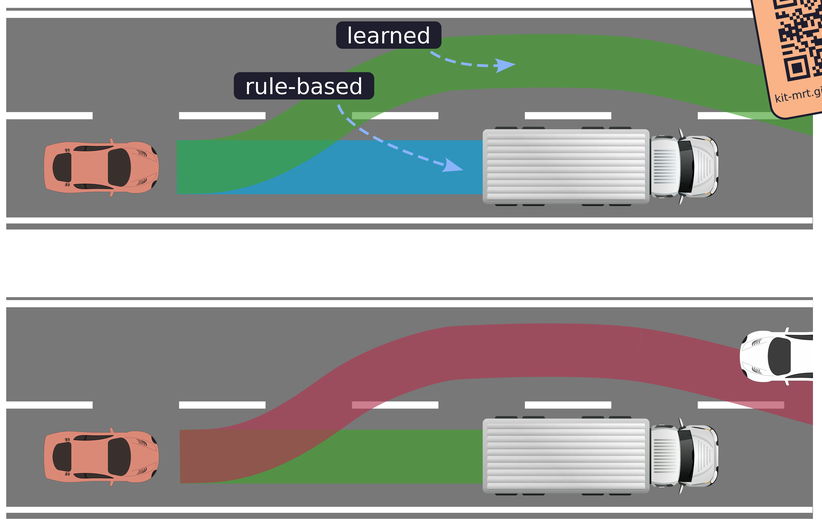
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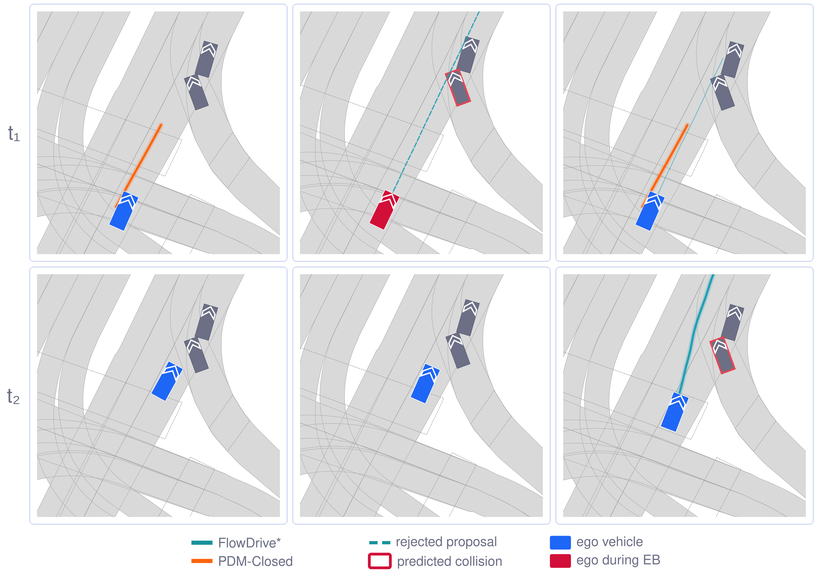
Compose & Verify



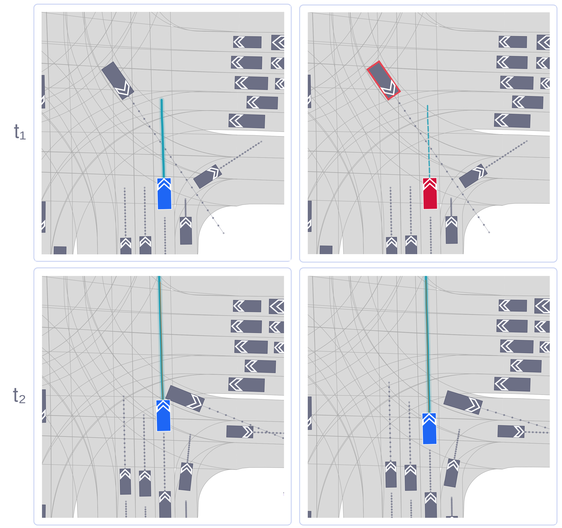
kit-mrt.github.io/mosaic

selected · proposed · rejected

Composition: The Performance Ceiling

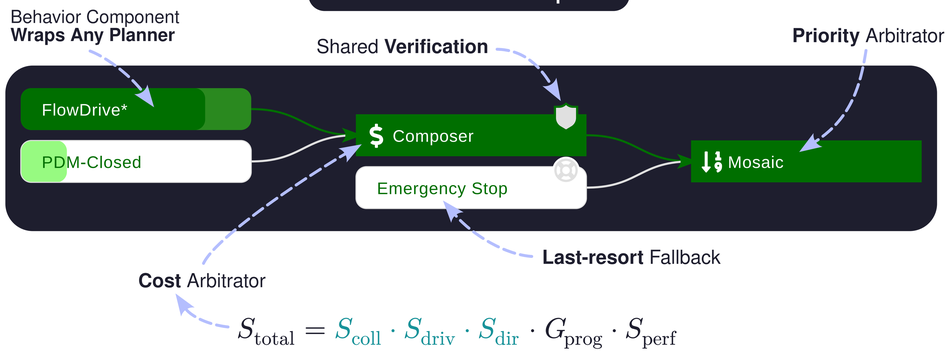


Verification: The Safety Floor



Scenario visualizations derived from the nuPlan dataset, © Motional.

Arbitration Graph



$$S_{\text{total}} = S_{\text{coll}} \cdot S_{\text{driv}} \cdot S_{\text{dir}} \cdot G_{\text{prog}} \cdot S_{\text{perf}}$$

Results

Type	Planner	nuPlan Val14 CLS-NR ↑	nuPlan Val14 CLS-R ↑	interPlan ↑
Expert	Log-replay	93.53	80.32	14.76
Learning-based	FlowDrive	91.21	85.37	36.96
	GIGAFLOW†	–	93.8	–
Rule-based	PDM-Closed	92.84	92.12	41.23
Hybrid	Diffusion Planner w/ ref.	94.26	92.90	–
	FlowDrive*	94.81	92.96	44.05
Ours	**Mosaic**	**95.56**	**94.18**	**54.10**

† closed-source

nuPlan Benchmark Highscore

Two Independent Mechanisms

