

Holistic Grid Fusion Based Stop Line Estimation

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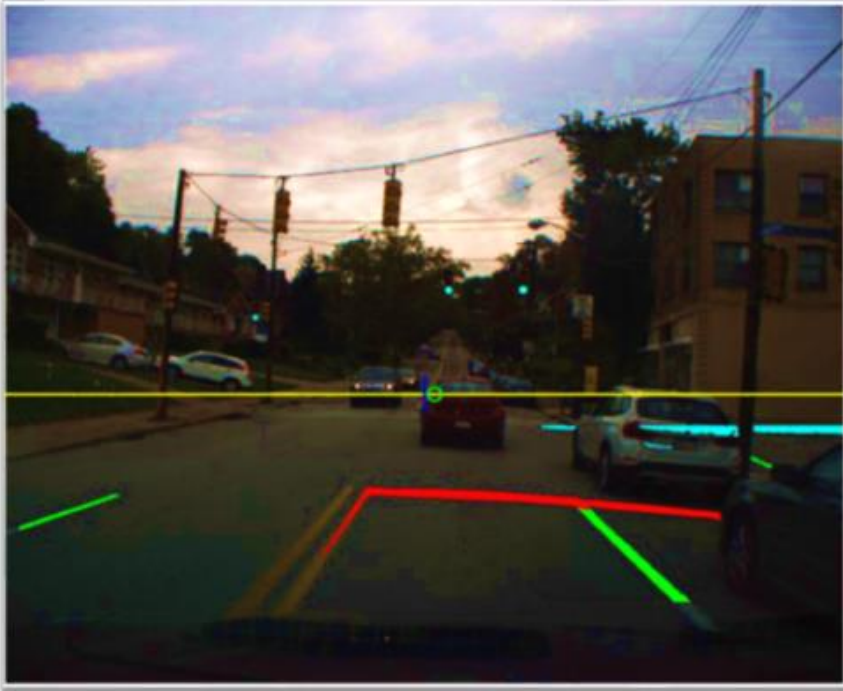
Navigating Intersection



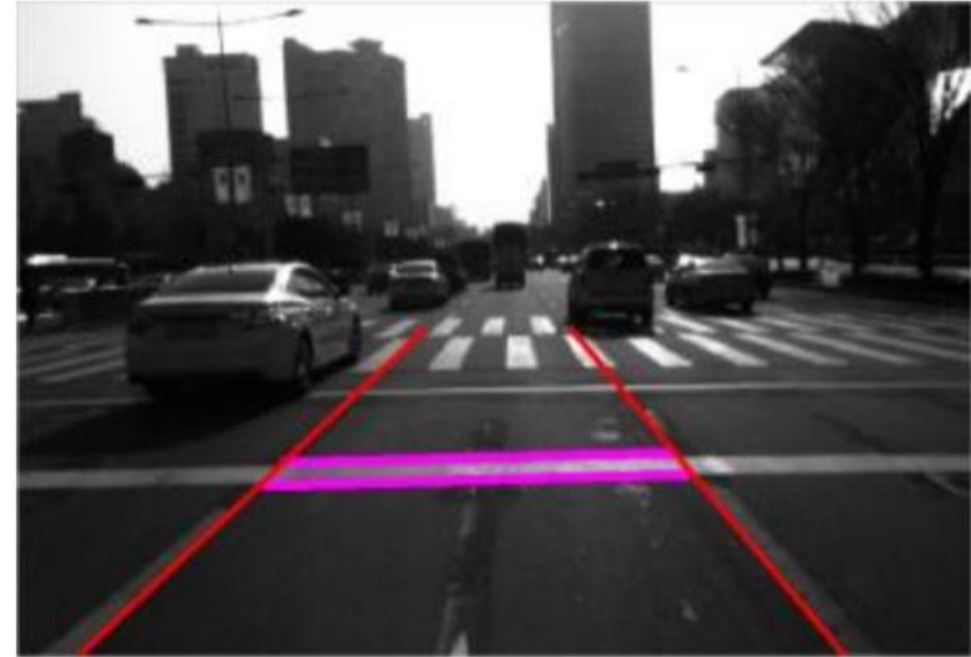
Stop Line Detection



Existing Approaches



*A Vision System for Detection
And Tracking of Stop-lines [1]*

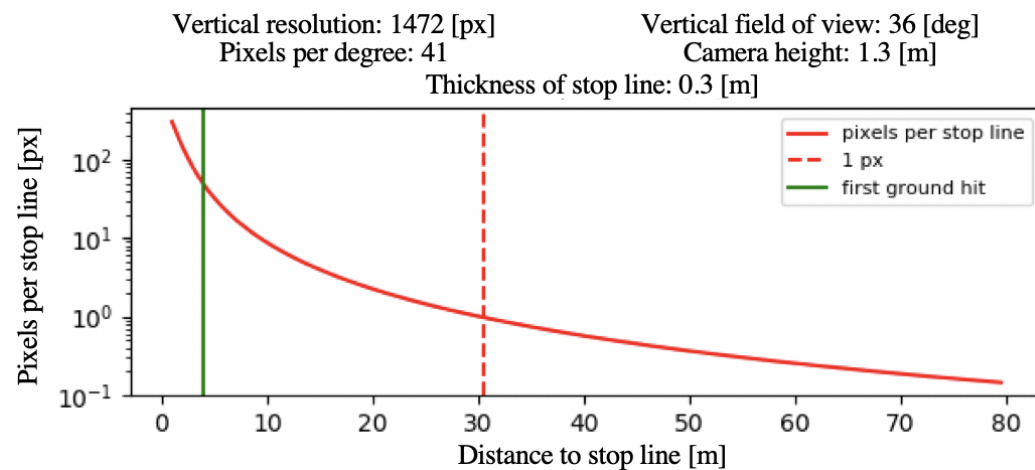
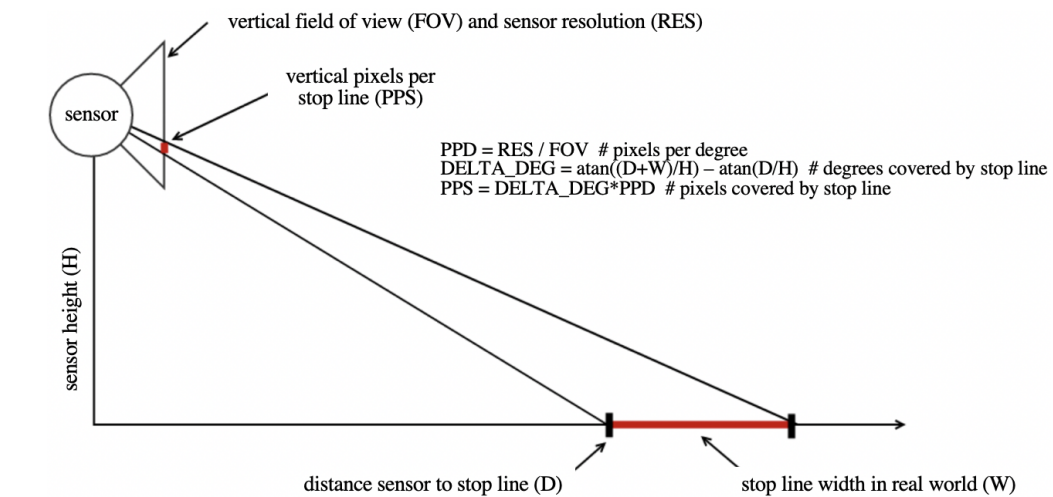


*Fast Symbolic Road Marking and Stop-Line
Detection for Vehicle Localization [2]*

[1] “A Vision System for Detection And Tracking of Stop-lines”, Young-Woo Seo, 17th International IEEE Conference on Intelligent Transportation Systems

[2] “Fast Symbolic Road Marking and Stop-Line Detection for Vehicle Localization”, Jae Kyu Suhr, Ho Gi Jung, 2015 IEEE Intelligent Vehicles Symposium

Perspective Issues



Where is the stop line?

Other Issues

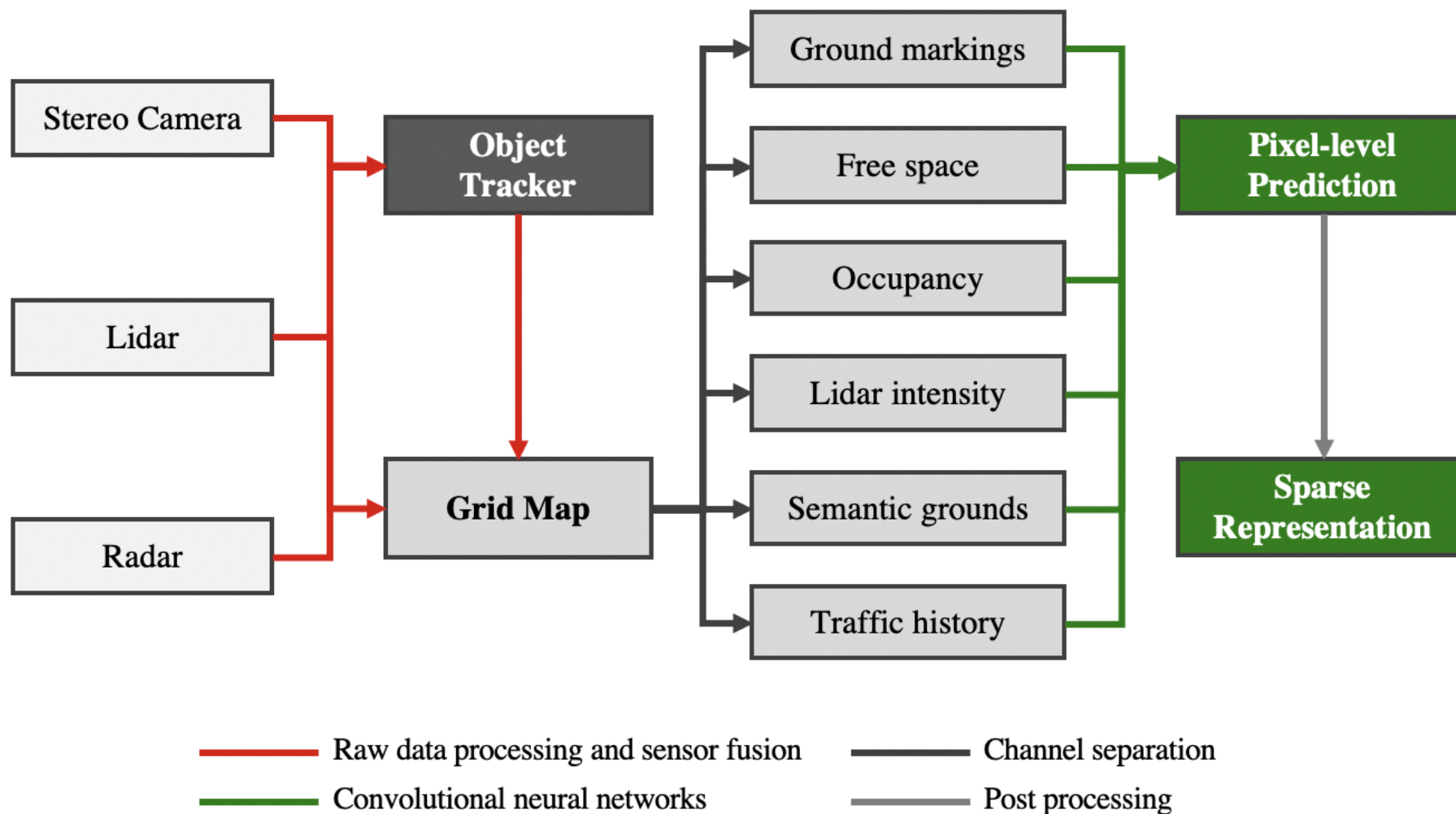


Occlusion

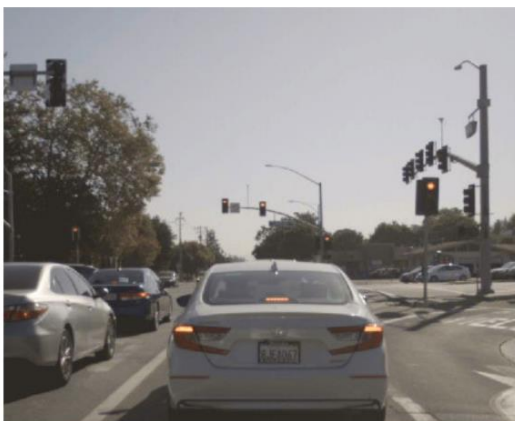


Confusion with lane markings while turning

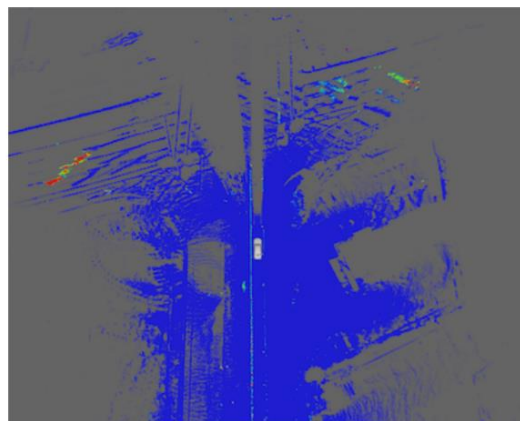
Proposed Solution



Multi-Channel Fused Grid Maps



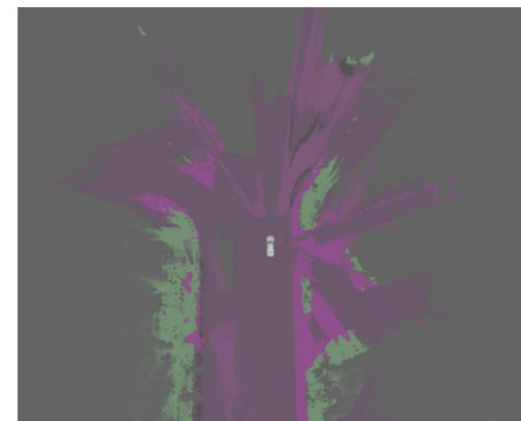
(a) Camera snapshot



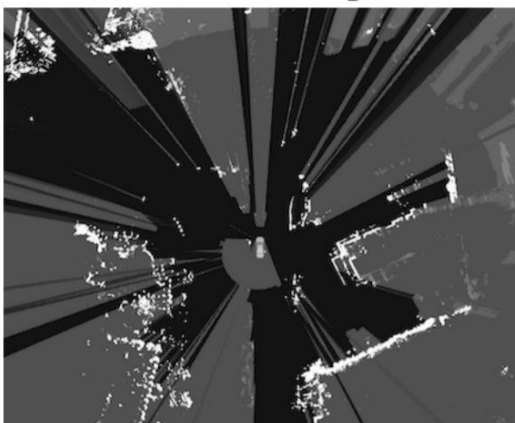
(b) Lidar intensity



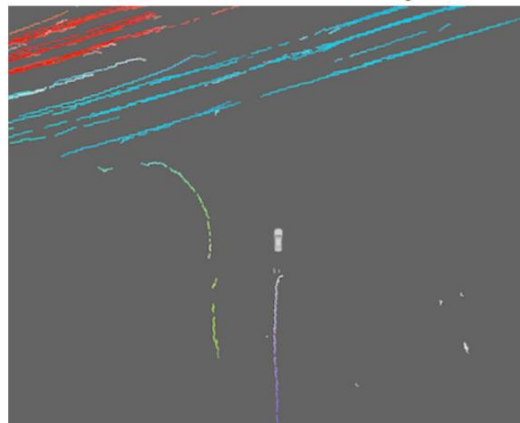
(c) Ground markings



(d) Semantics ground



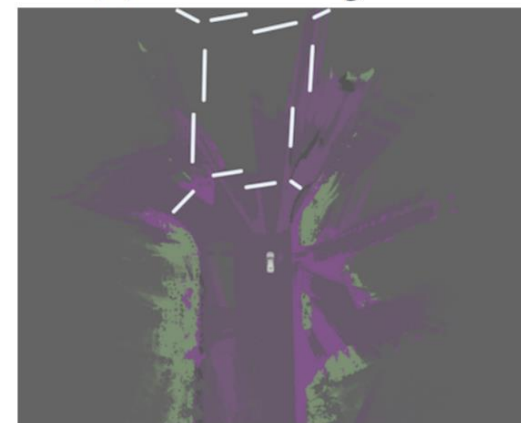
(e) Occupancy



(f) Traffic history

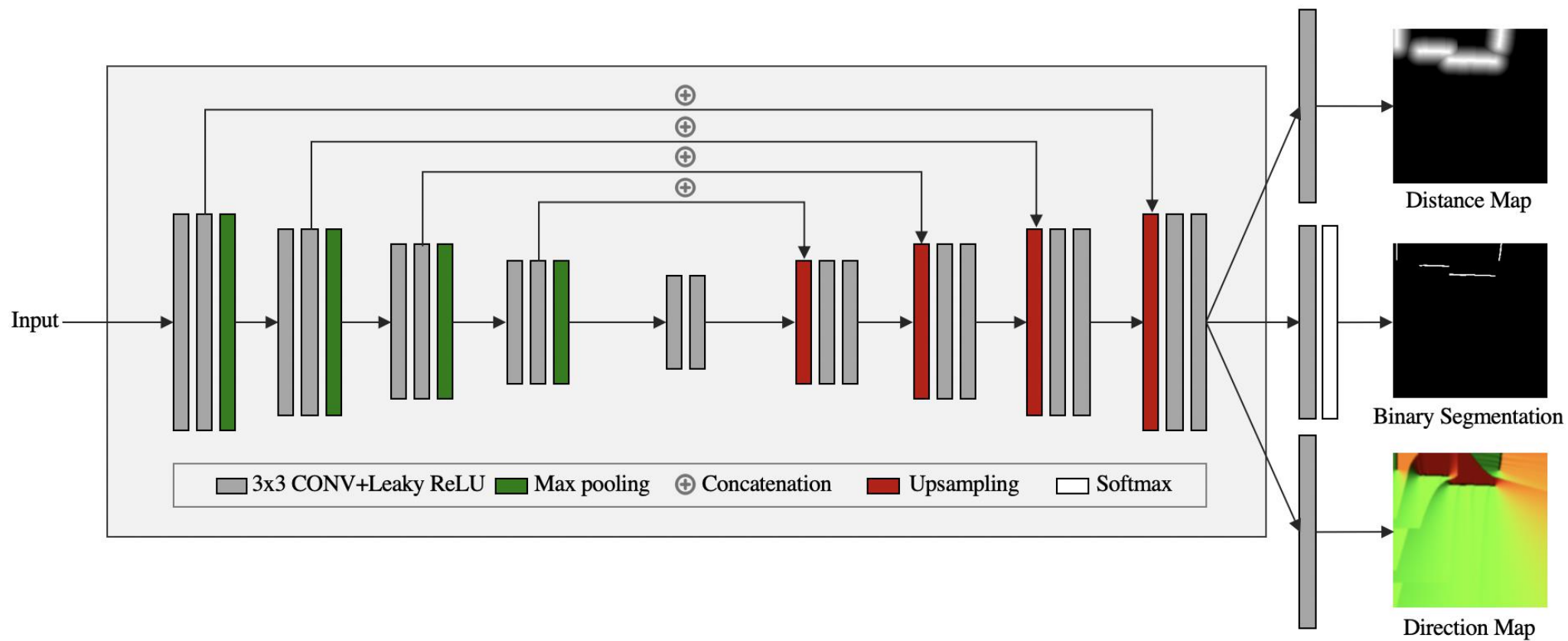


(g) Elevation map

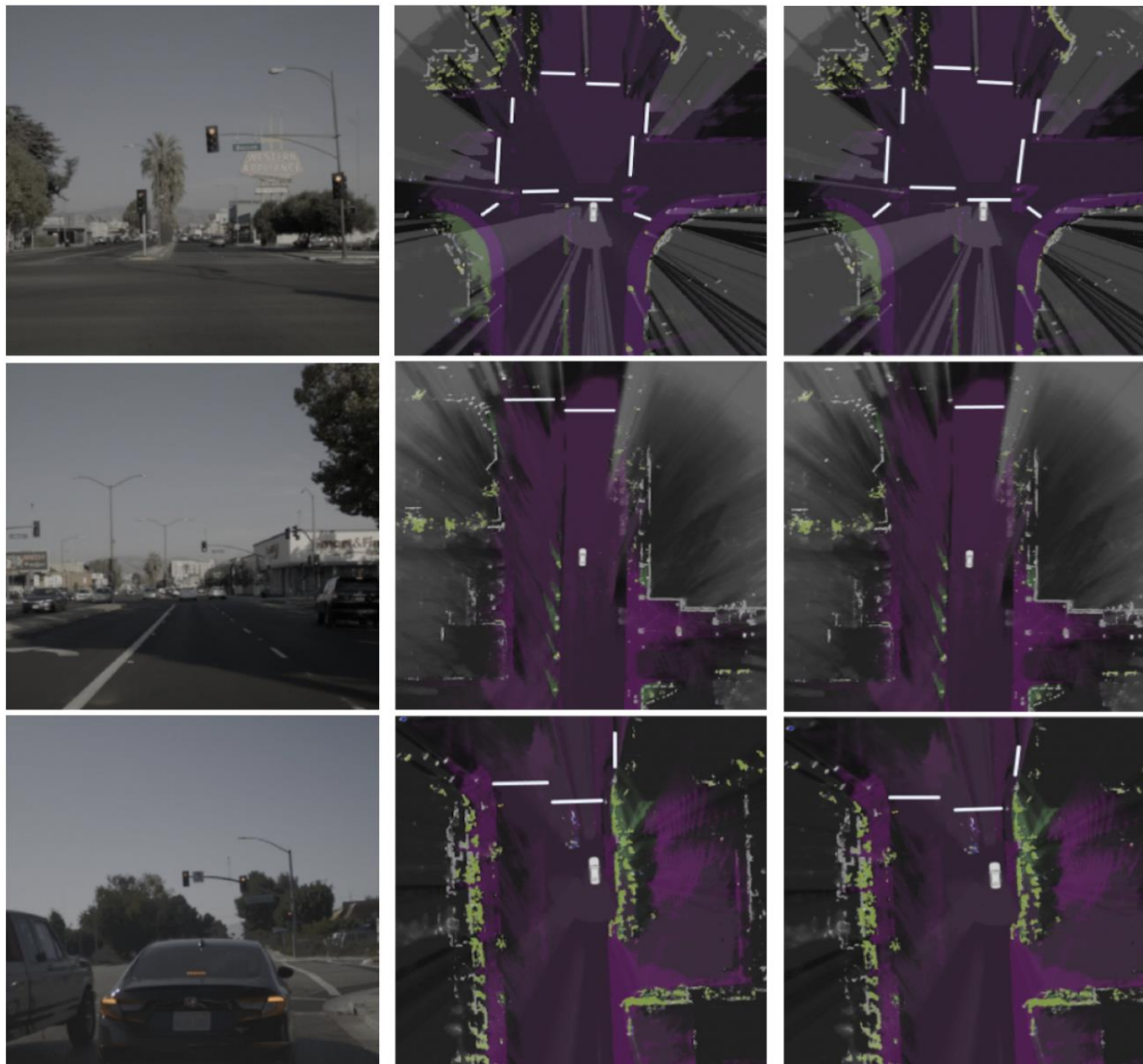


(h) Stop line ground truth

Model Architecture



Qualitative Results



(a) Stereo camera

(b) Ground truth

(c) Predictions

Quantitative Results

Distance	10m				20m				30m				40m				50m			
	Pr.	Rec.	F1	MAE	Pr.	Rec.	F1	MAE	Pr.	Rec.	F1	MAE	Pr.	Rec.	F1	MAE	Pr.	Rec.	F1	MAE
S	85.5	74.9	80.0	0.32	83.7	67.3	74.7	0.48	82.7	63.8	72.0	0.48	74.5	57.8	65.2	0.54	67.3	51.4	58.3	0.72
S+E	93.4	75.9	83.8	0.29	80.9	71.5	76.0	0.34	81.0	70.7	75.5	0.56	71.8	63.7	67.4	0.57	67.5	51.6	58.6	0.66
S+D	93.7	77.4	84.8	0.36	81.3	73.5	77.2	0.30	82.0	71.3	76.3	0.48	67.7	58.8	63.0	0.52	62.7	45.9	53.8	0.62
S+E+D	94.1	79.4	86.1	0.26	83.8	77.4	80.6	0.28	80.1	72.1	76.0	0.47	74.7	66.0	70.1	0.48	62.8	56.2	60.3	0.54

Ablation Study

Distance	10m				20m				30m				40m				50m			
	Pr.	Rec.	F1	MAE	Pr.	Rec.	F1	MAE	Pr.	Rec.	F1	MAE	Pr.	Rec.	F1	MAE	Pr.	Rec.	F1	MAE
GM-only	82.3	69.0	75.1	0.54	78.5	65.8	71.6	0.42	75.5	46.8	57.8	0.76	55.6	29.8	38.9	0.99	27.1	22.1	24.3	1.34
LI-only	85.1	65.1	73.9	0.32	83.1	64.2	72.0	0.35	86.1	64.0	71.3	0.49	74.5	57.8	65.1	0.50	62.5	39.5	48.4	0.45

Thank You!