NLOST: Non-Line-of-Sight Imaging with Transformer

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Project URL: https://github.com/Depth2World/NLOST

中国科学技术大学
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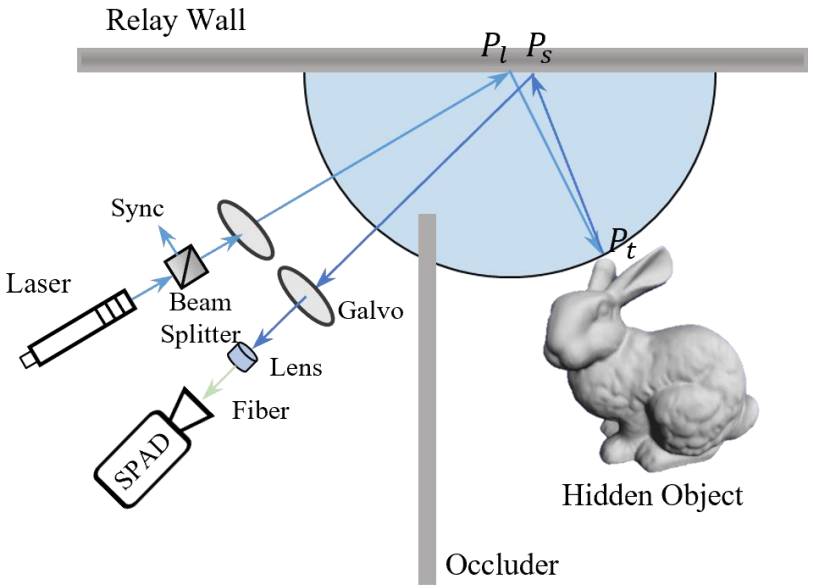
NEL-BITA
National Engineering Laboratory for Brain-Inspired Intelligence Technology and Application
VIDAR
Visual Information Discovery And Recovery

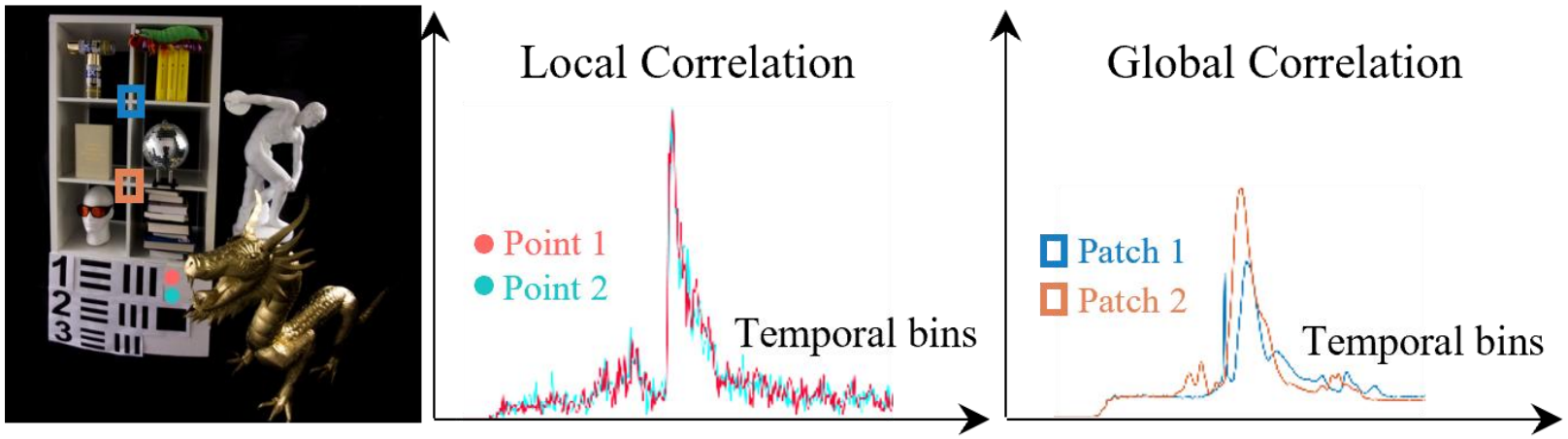
Introduction

Non-Line-of-Sight Imaging



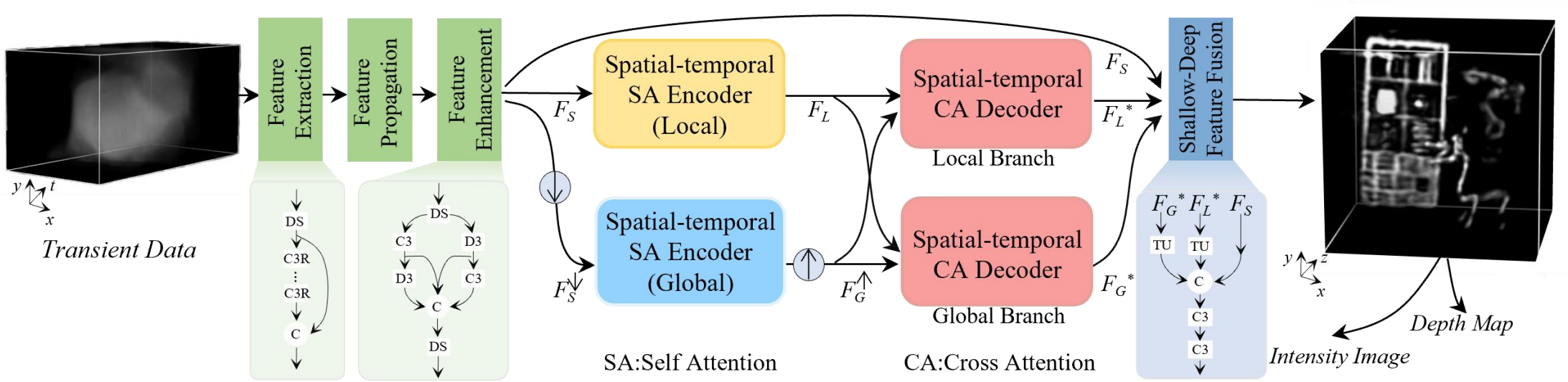
- NLOS imaging targets recovering the hidden scene beyond the direct line of the cameras' sight, where a diffuse relay surface scatters the light from the scene with dramatic loss.
- The light propagates from the relay wall to the hidden object, then reflects back to the relay wall and is finally captured with a time-resolved single-photon avalanche diode (SPAD) detector.
- The hidden volume could be reconstructed by modeling the three bounces of the traveling light, achieving “seeing around corners”.

Introduction



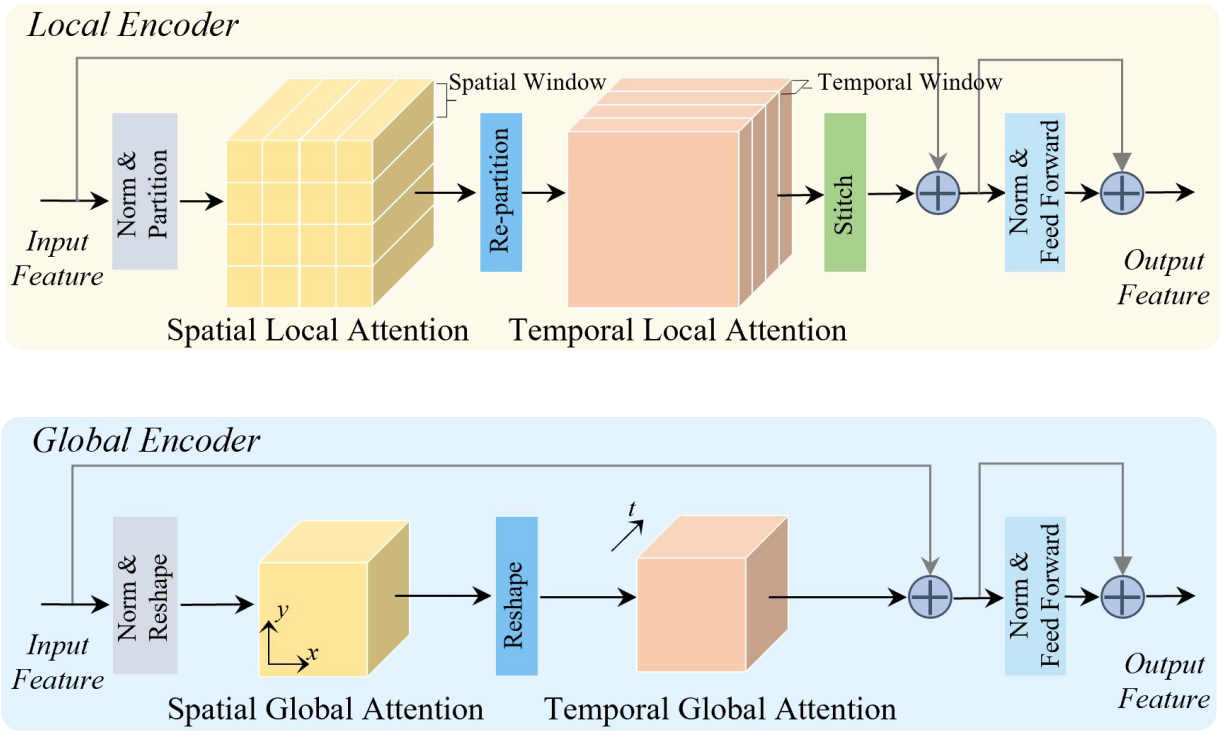
- Local Correlation: A certain location usually has similar intensity and depth values to its neighborhoods.
- Global Correlation: Distant patches with similar geometry may have similar intensity and depth values

Proposed Method

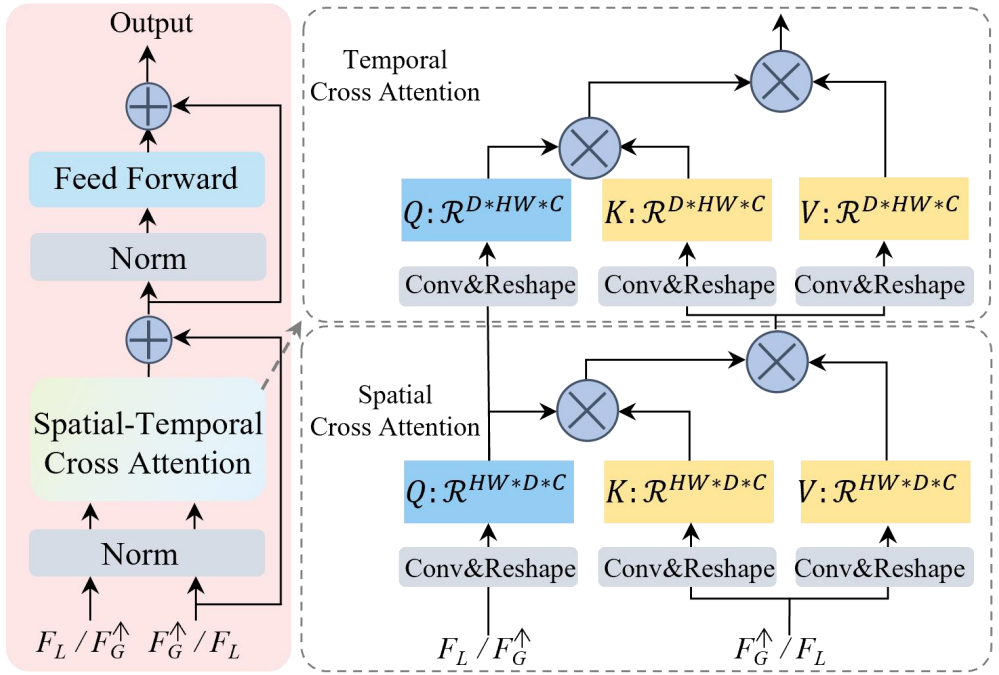


Proposed Method

Spatial-Temporal Self Attention Encoder

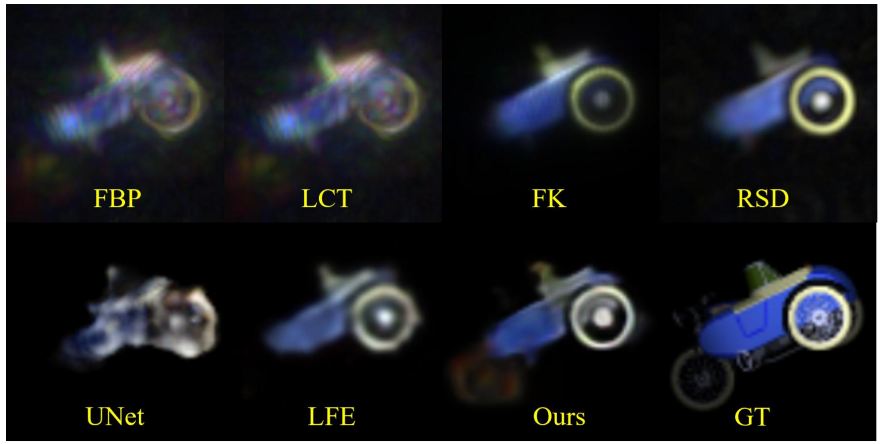


Spatial-Temporal Cross Attention Encoder

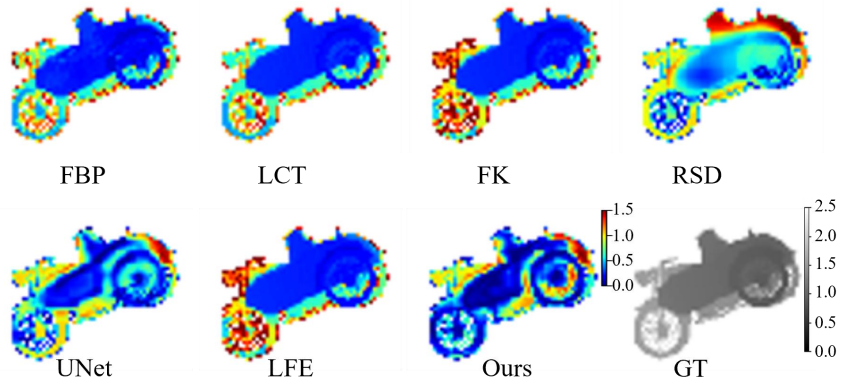


Results on the synthetic test set.

Intensity Image

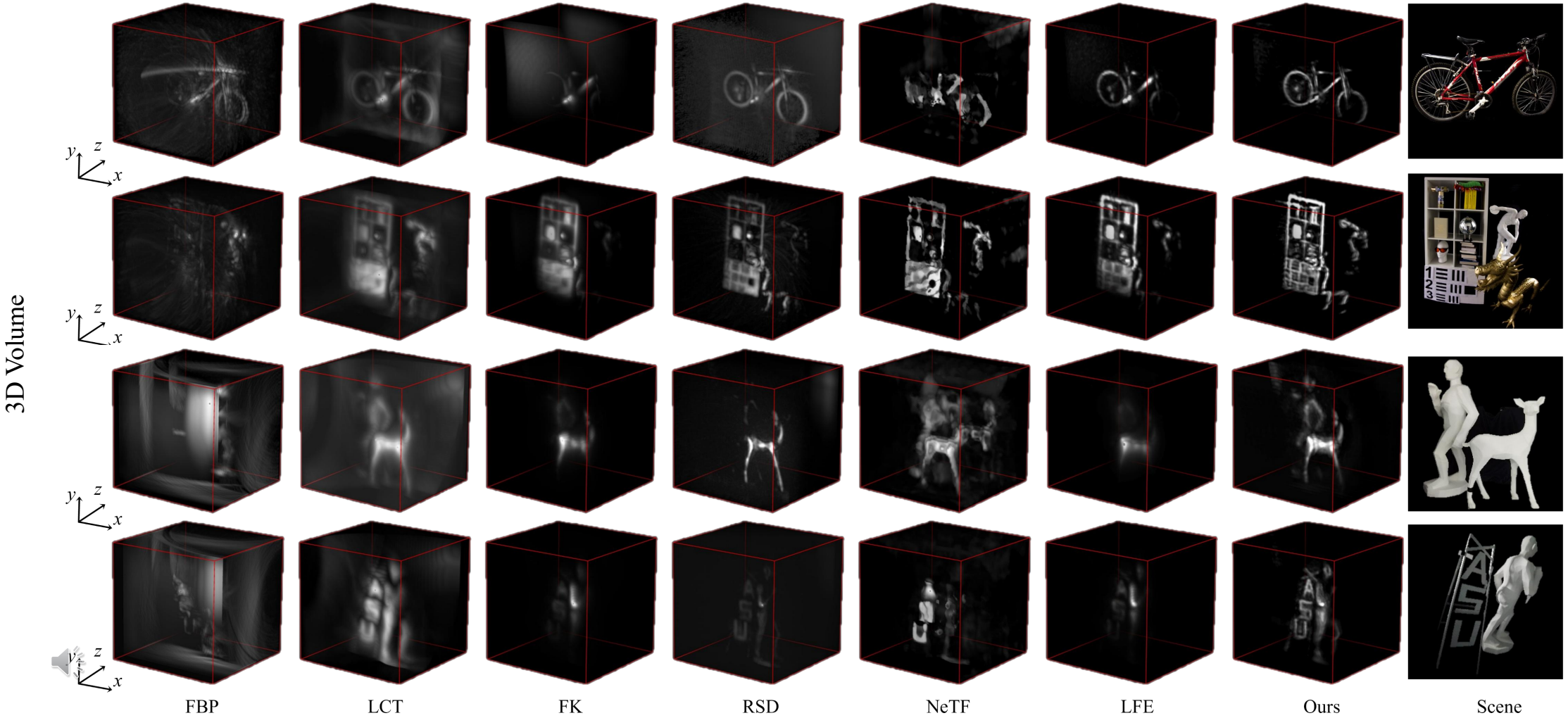


Depth Map



Data	Methods	Intensity		Depth	
		PSNR↑	SSIM↑	RMSE↓	MAD↓
Seen	FBP [41]	19.96	0.1846	0.7053	0.6694
	LCT [29]	19.78	0.4477	0.6694	0.6321
	RSD [24]	22.17	0.4257	0.7156	0.6846
	FK [21]	23.11	0.7996	0.5558	0.5332
	UNet [10]	24.38	0.7792	0.0820	0.0317
	LFE [9]	26.90	0.8661	0.0769	0.0455
	Ours	**28.17**	**0.9018**	**0.0666**	**0.0221**
Unseen	FBP [41]	17.81	0.2114	0.6986	0.6479
	LCT [29]	18.54	0.4962	0.6604	0.6152
	RSD [24]	19.58	0.4151	0.7335	0.6938
	FK [21]	19.92	0.7729	0.5896	0.5526
	UNet [10]	17.87	0.6932	0.1326	0.0555
	LFE [9]	23.40	0.8100	0.1220	0.0561
	Ours	**23.99**	**0.8286**	**0.1107**	**0.0444**

Results on the real-world data.



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