

Seam360GS: Seamless 360° Gaussian Splatting from Real-World Omnidirectional Images

Supplementary Material

A. Baseline Comparisons with Dual-Fisheye and MVG

We further evaluate our method using raw dual-fisheye inputs. Tab. 1 and Fig. 1 show that applying our seamless calibration algorithm to fisheye images yields a meaningful improvement (PSNR +0.34dB, LPIPS -0.0023), comparable to results obtained with ERP inputs. This demonstrates that our pipeline is readily applicable to alternative image formats. We also implemented a distortion-aware MVG pipeline for comparison. However, we observed significantly worse 360° rendering performance than with the ERP-based rasterizer. This aligns with previous findings from works such as OmniGS and OP43DGS, which consistently show that ERP-based rasterization outperforms MVG approaches in novel-view synthesis, even without explicit distortion correction. By adopting ERP inputs, our method builds on a strong baseline while avoiding the complexity of distortion-correction preprocessing.

Table 1. Quantitative comparison on raw fisheye inputs.

Scene	Vanilla			Ours		
	PSNR↑	LPIPS↓	#Points	PSNR↑	LPIPS↓	#Points
Barbershop	29.9564	0.0553	507k	30.2923	0.0530	479k

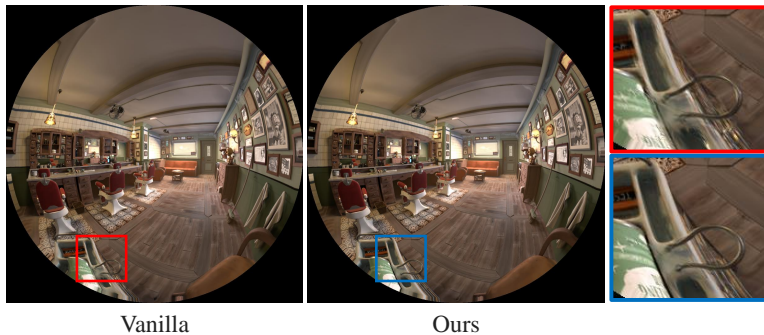


Figure 1. Qualitative comparison on raw fisheye inputs: vanilla fisheye model (Vanilla) vs. our seamless fisheye model (Ours).

B. Modeling of Angular Distortion Grid

To evaluate the impact of the embedding grid resolution, we conducted experiments with resolutions of 16×32 , 32×64 , 64×128 , and 128×256 . The results showed nearly identical performance across all resolutions, with differences in PSNR remaining below 0.2 dB, which demonstrates the robustness of our method to the embedding resolution. We attribute this stability to the smooth variation of angular distortion across the sphere, allowing the embedding to generalize well even at relatively low resolutions. Interestingly, we observe that ΔR learned from different scenes of the same camera are nearly identical, supporting cross-scene transferability. However, due to significant inter-device calibration differences, cross-device transfer remains challenging.

C. Additional Quantitative and Qualitative Evaluation

In the supplementary material, we provide comprehensive experimental results covering quantitative evaluations, qualitative assessments, and seamless rendering performance. Quantitative results detail our method’s superior performance in metrics such as PSNR, SSIM, and LPIPS, while also highlighting its efficiency with fewer Gaussians. Qualitative evaluations showcase the method’s ability to capture fine details and maintain visual fidelity across challenging scenes. Additionally, seamless rendering results demonstrate the effectiveness of our calibration in eliminating stitching artifacts and producing artifact-free, high-fidelity outputs even when the ground truth suffers from noticeable errors.

Scene	Method	EgoNeRF [?]	OP43DGS [?]	ODGS [?]	OmniGS [?]	Ours
<i>bricks</i>	PSNR↑	22.708	21.270	21.608	24.514	26.182
	SSIM↑	0.722	0.705	0.744	0.840	0.882
	LPIPS↓	0.246	0.268	0.190	0.112	0.079
	#Points	-	202K	2075K	914K	900K
<i>bridge</i>	PSNR↑	22.973	22.528	21.901	23.650	24.316
	SSIM↑	0.715	0.740	0.712	0.795	0.818
	LPIPS↓	0.258	0.217	0.243	0.133	0.107
	#Points	-	721K	1311K	758K	840K
<i>bridge_under</i>	PSNR↑	24.213	22.754	23.599	26.696	27.096
	SSIM↑	0.764	0.738	0.777	0.877	0.895
	LPIPS↓	0.232	0.292	0.200	0.086	0.072
	#Points	-	222K	1876K	815K	878K
<i>cat_tower</i>	PSNR↑	23.715	23.592	22.735	24.775	25.571
	SSIM↑	0.684	0.717	0.696	0.775	0.795
	LPIPS↓	0.299	0.269	0.242	0.155	0.144
	#Points	-	486K	1177K	548K	529K
<i>center</i>	PSNR↑	28.065	27.616	23.167	29.381	30.749
	SSIM↑	0.850	0.858	0.776	0.893	0.912
	LPIPS↓	0.189	0.181	0.321	0.094	0.074
	#Points	-	293K	234K	353K	356K
<i>farm</i>	PSNR↑	21.938	21.214	20.865	22.210	23.067
	SSIM↑	0.651	0.663	0.659	0.732	0.773
	LPIPS↓	0.299	0.286	0.238	0.157	0.130
	#Points	-	478K	2110K	957K	900K
<i>flower</i>	PSNR↑	21.520	19.634	18.752	22.389	23.089
	SSIM↑	0.620	0.568	0.591	0.728	0.754
	LPIPS↓	0.341	0.548	0.334	0.187	0.166
	#Points	-	55K	1458K	664K	637K
<i>gallery_chair</i>	PSNR↑	27.053	27.320	25.761	28.685	28.971
	SSIM↑	0.834	0.858	0.828	0.892	0.905
	LPIPS↓	0.227	0.199	0.217	0.107	0.088
	#Points	-	325K	628K	329K	330K
<i>gallery_pillar</i>	PSNR↑	26.764	27.121	22.493	28.712	29.855
	SSIM↑	0.822	0.850	0.805	0.885	0.904
	LPIPS↓	0.180	0.155	0.191	0.092	0.073
	#Points	-	401K	764K	374K	419K
<i>garden</i>	PSNR↑	26.483	24.779	22.576	27.170	27.815
	SSIM↑	0.715	0.728	0.717	0.798	0.817
	LPIPS↓	0.276	0.276	0.234	0.145	0.133
	#Points	-	293K	1042K	499K	537K
<i>poster</i>	PSNR↑	25.598	23.738	24.662	28.518	29.851
	SSIM↑	0.832	0.808	0.825	0.902	0.915
	LPIPS↓	0.200	0.241	0.212	0.105	0.092
	#Points	-	138K	1362K	593K	505K

Table 2. Per-scene quantitative evaluation results on EgoNeRF-Ricoh360 dataset.

Scene	Method	EgoNeRF [?]	OP43DGS [?]	ODGS [?]	OmniGS [?]	SC-OmniGS [?]	Ours
<i>Bar</i>	PSNR↑	19.689	20.947	19.812	22.536	22.556	23.155
	SSIM↑	0.619	0.715	0.666	0.783	0.783	0.804
	LPIPS↓	0.424	0.268	0.277	0.160	0.200	0.157
	#Points	-	215K	1244K	1104K	-	592K
<i>Base</i>	PSNR↑	21.606	23.367	22.152	24.924	25.504	26.496
	SSIM↑	0.608	0.745	0.679	0.806	0.816	0.856
	LPIPS↓	0.434	0.206	0.230	0.099	0.133	0.089
	#Points	-	326K	1428K	1236K	-	806K
<i>Cafe</i>	PSNR↑	22.323	23.432	22.457	25.307	24.838	26.139
	SSIM↑	0.702	0.793	0.738	0.838	0.813	0.859
	LPIPS↓	0.342	0.190	0.208	0.101	0.161	0.099
	#Points	-	339K	1389K	1032K	-	518K
<i>Canteen</i>	PSNR↑	20.960	21.313	20.194	22.458	22.159	22.863
	SSIM↑	0.653	0.707	0.658	0.743	0.734	0.762
	LPIPS↓	0.439	0.294	0.304	0.196	0.263	0.204
	#Points	-	164K	854K	686K	-	322K
<i>Center</i>	PSNR↑	23.041	24.144	22.768	25.121	25.802	25.824
	SSIM↑	0.721	0.774	0.725	0.804	0.813	0.822
	LPIPS↓	0.404	0.265	0.291	0.170	0.203	0.176
	#Points	-	182K	855K	785K	-	372K
<i>Corridor</i>	PSNR↑	26.644	24.097	23.606	25.037	-	25.733
	SSIM↑	0.788	0.790	0.740	0.812	-	0.826
	LPIPS↓	0.255	0.243	0.287	0.162	-	0.166
	#Points	-	111K	388K	380K	-	202K
<i>Innovation</i>	PSNR↑	23.643	24.358	22.492	25.902	26.390	27.174
	SSIM↑	0.681	0.754	0.712	0.808	0.819	0.852
	LPIPS↓	0.364	0.234	0.232	0.120	0.148	0.120
	#Points	-	296K	1248K	1305K	-	784K
<i>Lab</i>	PSNR↑	24.932	26.223	24.845	28.742	28.875	30.171
	SSIM↑	0.791	0.859	0.820	0.897	0.898	0.917
	LPIPS↓	0.263	0.127	0.168	0.063	0.087	0.060
	#Points	-	372K	1045K	703K	-	329K
<i>Library</i>	PSNR↑	23.381	25.393	23.818	25.946	26.250	27.236
	SSIM↑	0.657	0.726	0.678	0.756	0.746	0.785
	LPIPS↓	0.403	0.244	0.300	0.203	0.243	0.191
	#Points	-	216K	824K	600K	-	283K
<i>Office</i>	PSNR↑	23.986	23.622	21.796	24.862	-	26.212
	SSIM↑	0.714	0.739	0.681	0.787	-	0.804
	LPIPS↓	0.348	0.269	0.344	0.175	-	0.180
	#Points	-	138K	434K	526K	-	265K

Table 3. Per-scene Quantitative evaluation results on the 360Roam dataset.

Scene	Method	EgoNeRF [?]	OP43DGS [?]	ODGS [?]	OmniGS [?]	Ours
<i>barbershop</i>	PSNR↑	28.150	29.703	28.844	33.283	36.022
	SSIM↑	0.873	0.913	0.884	0.950	0.963
	LPIPS↓	0.121	0.078	0.103	0.044	0.039
	#Points	-	401K	1002K	316K	242K
<i>classroom</i>	PSNR↑	28.788	31.016	30.655	34.547	36.362
	SSIM↑	0.883	0.926	0.915	0.958	0.966
	LPIPS↓	0.102	0.092	0.088	0.039	0.036
	#Points	-	376K	979K	294K	264K
<i>restroom</i>	PSNR↑	28.788	26.116	29.729	32.998	35.122
	SSIM↑	0.772	0.820	0.818	0.896	0.922
	LPIPS↓	0.256	0.177	0.169	0.082	0.076
	#Points	-	378K	840K	402K	333K
<i>lone_monk</i>	PSNR↑	16.160	24.466	26.105	28.858	32.439
	SSIM↑	0.455	0.837	0.846	0.906	0.939
	LPIPS↓	0.450	0.118	0.104	0.049	0.039
	#Points	-	487K	1189K	483K	394K

Table 4. Per-scene Quantitative evaluation results on the synthetic dataset.

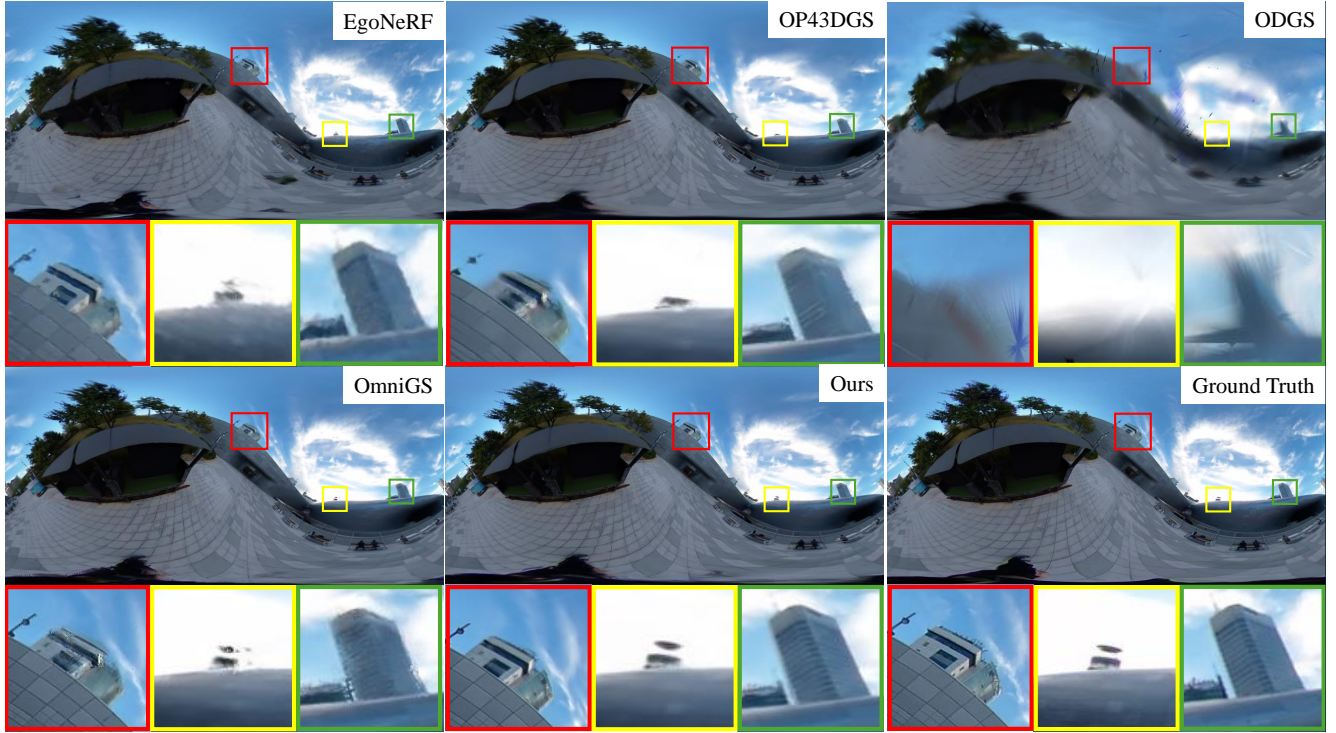


Figure 2. Qualitative comparisons of novel-view synthesis on *center* scene in the EgoNeRF-Ricoh360 dataset.

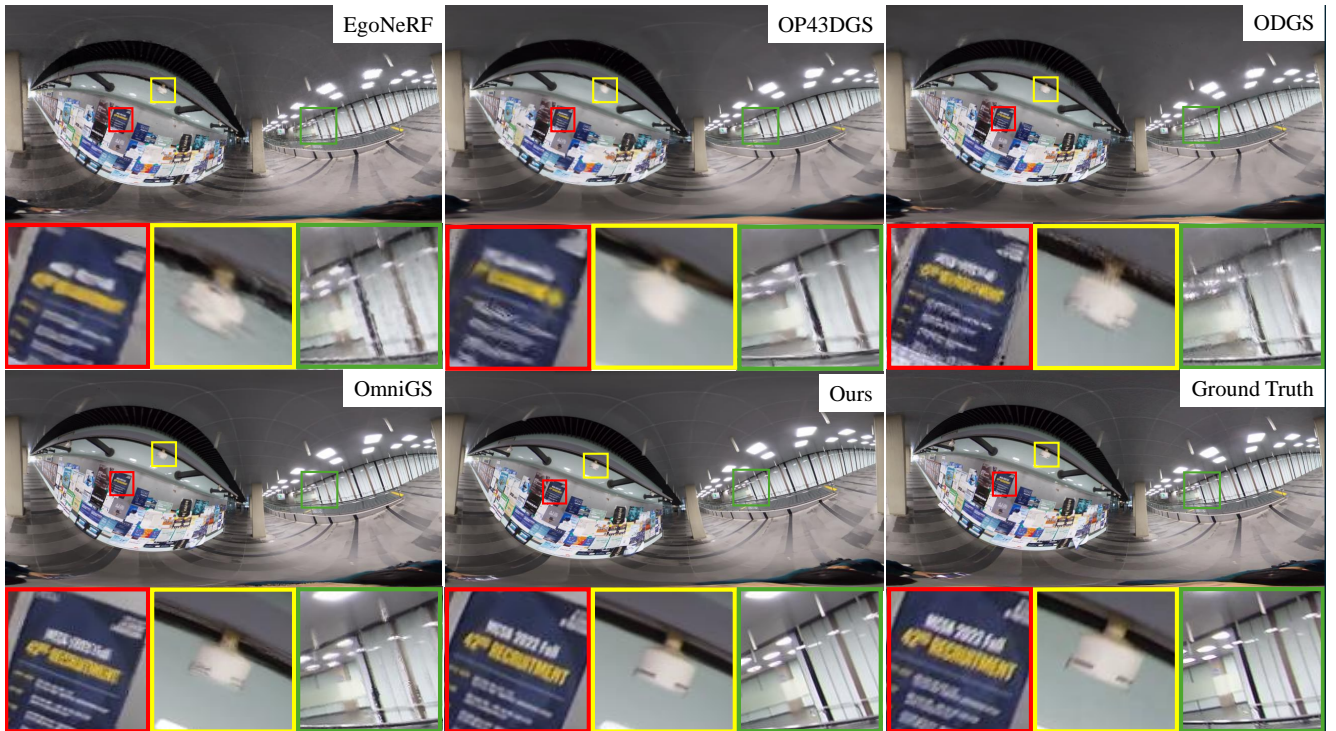


Figure 3. Qualitative comparisons of novel-view synthesis on *poster* scene in the EgoNeRF-Ricoh360 dataset.

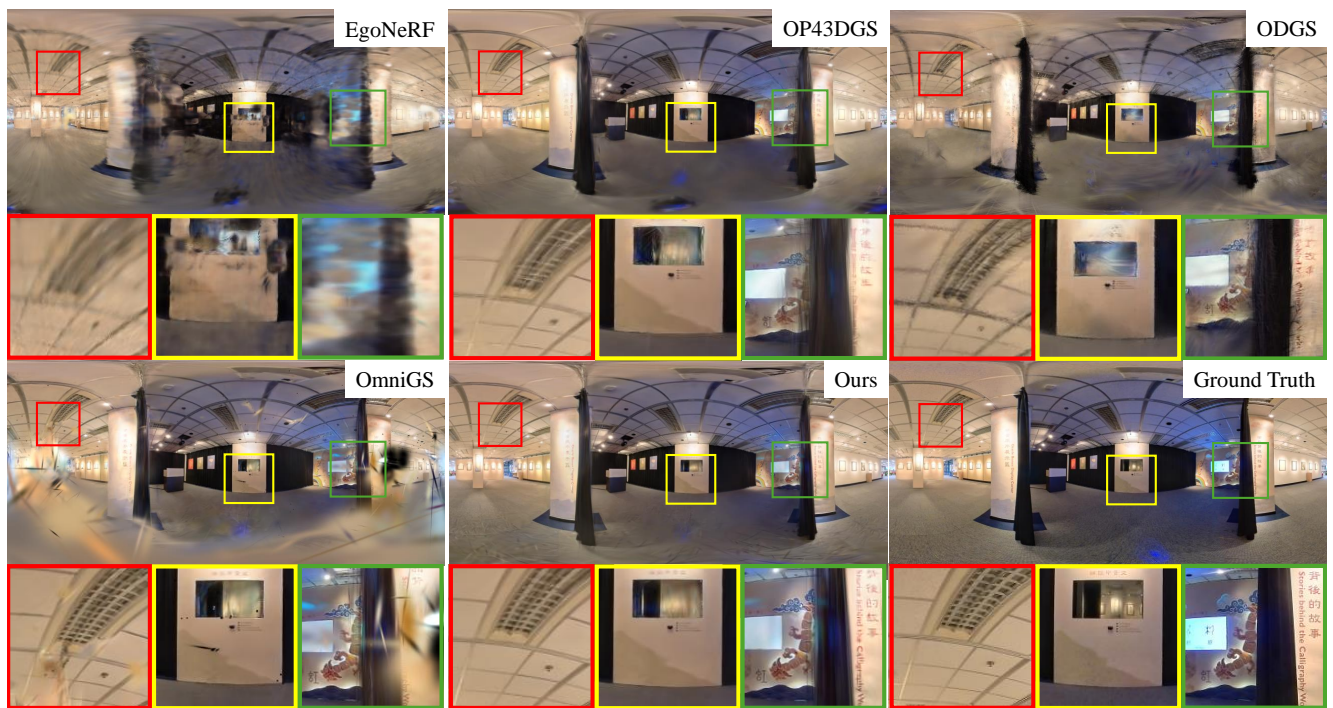


Figure 4. Qualitative comparisons of novel-view synthesis on *library* scene in the 360Roam dataset.