

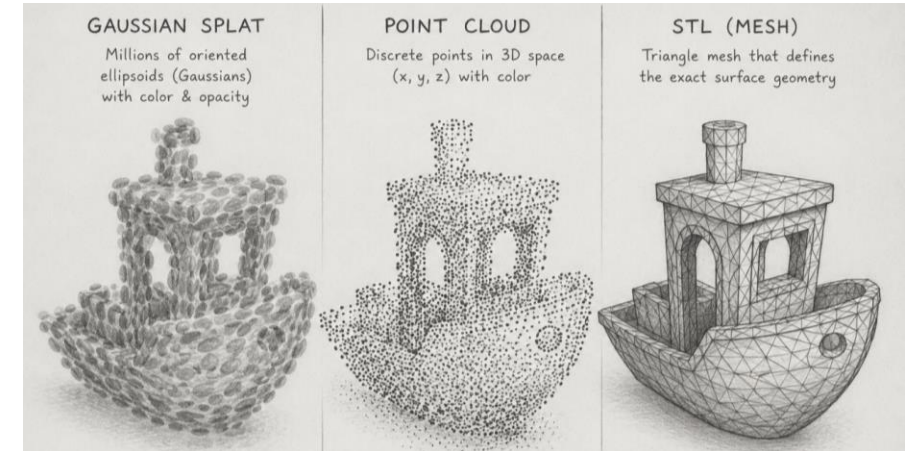
Creating Custom Gaussian Splats with Westwood

H-GAC's Geographic Data Workgroup

Wednesday, October 7, 2026

What is it, again?

- Gaussian Splats are...
 - Interactive, high-fidelity 3D digital renderings of real-world places
 - Composed of tiny ellipsoids called “splats” or “Gaussians” with color and opacity
 - Made from extremely high-grade remote sensing data
- Typically the main visual component of a completed digital twin
- Latest & greatest visualization option



Gaussian Splat construction vs others



3D Mesh vs Gaussian Splat

Data Capture

- Four data types collected
 - Lidar, traditional orthoimagery, oblique imagery, terrestrial photogrammetry
- Four devices used
 - Acecore Noa Hybrid, DJI Mavic Air S2, Harris Aerial Carrier H6, and 360 mobile camera mount
- Four days of missions
 - March 18-20 and September 15, 2026
- Three main sensor types
 - Riegl Vux-120 laser scanner, 61mp digital camera sensor, high-quality mobile phone cameras

DJI Mavic Air S2



Acecore Noa Hybrid



360° Mobile Camera Mount



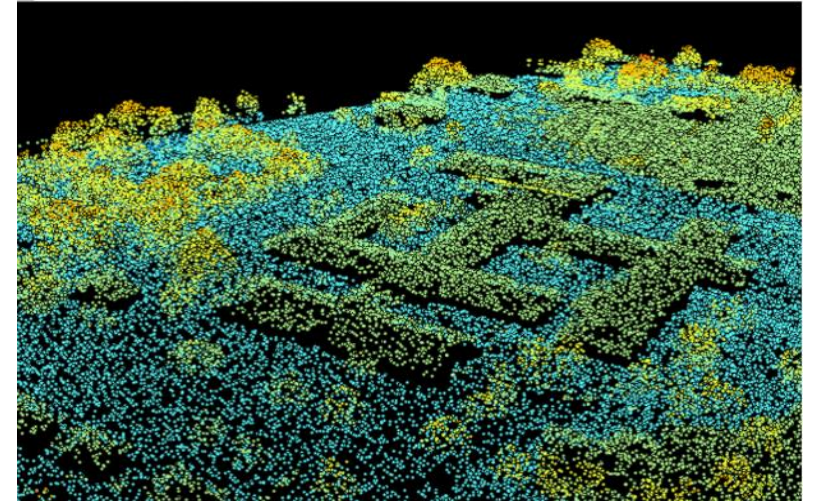
Harris H6



Data Details

- TIN file in LandXML format
- 3D breaklines
- 1' contours in DXF format
- *Ground and Building classified .las**
 - 500 PPSM
- *Model Keypoint .las**
 - 500 PPSM
- *0.1'/1.2" GSD orthophotos**
- *Oblique Aerial Imagery in .jpeg**
- *Terrestrial level photos in .jpeg**
- Accuracy Report

**Captured for entire ~380 acre AOI and used in the creation of the Gaussian Splat*



Lidar Pointcloud



Oblique Imagery

Technical Intro

179v1 [cs.GR] 8 Aug 2023

3D Gaussian Splatting for Real-Time Radiance Field Rendering

BERNHARD KERBL*, Inria, Université Côte d'Azur, France
GEORGIOS KOPANAS*, Inria, Université Côte d'Azur, France
THOMAS LEIMKÜHLER, Max-Planck-Institut für Informatik, Germany
GEORGE DRETTAKIS, Inria, Université Côte d'Azur, France



Fig. 1. Our method achieves real-time rendering of radiance fields with quality that equals the previous method with the best quality [Barron et al. 2022], while only requiring optimization times competitive with the fastest previous methods [Fridovich-Keil and Yu et al. 2022; Müller et al. 2022]. Key to this performance is a novel 3D Gaussian scene representation coupled with a real-time differentiable renderer, which offers significant speedup to both scene optimization and novel view synthesis. Note that for comparable training times to InstantNGP [Müller et al. 2022], we achieve similar quality to theirs; while this is the maximum quality they reach, by training for 51min we achieve state-of-the-art quality, even slightly better than Mip-NeRF360 [Barron et al. 2022].

Radiance Field methods have recently revolutionized novel-view synthesis of scenes captured with multiple photos or videos. However, achieving high visual quality still requires neural networks that are costly to train and render, while recent faster methods inevitably trade off speed for quality. For unbounded and complete scenes (rather than isolated objects) and 1080p resolution rendering, no current method can achieve real-time display rates. We introduce three key elements that allow us to achieve state-of-the-art visual quality while maintaining competitive training times and importantly

Additional Key Words and Phrases: novel view synthesis, radiance fields, 3D gaussians, real-time rendering

ACM Reference Format:

Bernhard Kerbl, Georgios Kopanas, Thomas Leimkühler, and George Drettakis. 2023. 3D Gaussian Splatting for Real-Time Radiance Field Rendering. *ACM Trans. Graph.* 42, 4, Article 1 (August 2023), 14 pages. <https://doi.org/10.1145/3592433>

888v3 [cs.CV] 22 Feb 2025

2D Gaussian Splatting for Geometrically Accurate Radiance Fields

BINBIN HUANG, ShanghaiTech University, China
ZEHao YU, University of Tübingen Tübingen AI Center, Germany
ANPEI CHEN, University of Tübingen Tübingen AI Center, Germany
ANDREAS GEIGER, University of Tübingen Tübingen AI Center, Germany
SHENGHUA GAO, ShanghaiTech University, China

<https://surfsplatting.github.io>

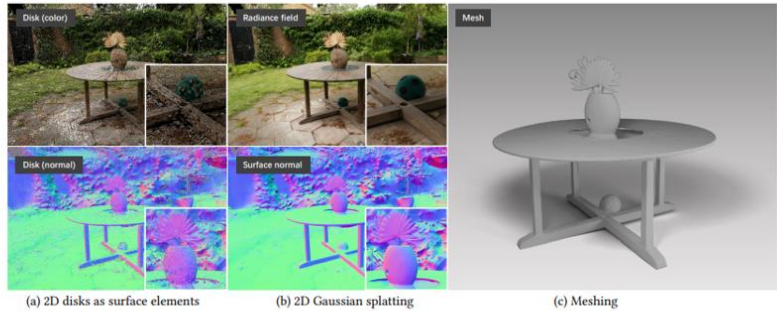


Fig. 1. Our method, 2DGS, (a) optimizes a set of 2D oriented disks to represent and reconstruct a complex real-world scene from multi-view RGB images. These optimized 2D disks are tightly aligned to the surfaces. (b) With 2D Gaussian splatting, we allow real-time rendering of high quality novel view images with view consistent normals and depth maps. (c) Finally, our method provides detailed and noise-free triangle mesh reconstruction from the optimized 2D disks.

2111.12077v3 [cs.CV] 25 Mar 2022

Mip-NeRF 360: Unbounded Anti-Aliased Neural Radiance Fields

Jonathan T. Barron¹ Ben Mildenhall¹ Dor Verbin^{1,2}
Pratul P. Srinivasan¹ Peter Hedman¹
¹Google Research ²Harvard University

Abstract

Though neural radiance fields (NeRF) have demonstrated impressive view synthesis results on objects and small bounded regions of space, they struggle on “unbounded” scenes, where the camera may point in any direction and content may exist at any distance. In this setting, existing NeRF-like models often produce blurry or low-resolution renderings (due to the unbalanced detail and scale of nearby and distant objects), are slow to train, and may exhibit artifacts due to the inherent ambiguity of the task of reconstructing a large scene from a small set of images. We present an extension of mip-NeRF (a NeRF variant that addresses sampling and aliasing) that uses a non-linear scene parameterization, online distillation, and a novel distortion-based regularizer to overcome the challenges presented by unbounded scenes. Our model, which we dub “mip-NeRF 360” as we target scenes in which the camera rotates 360 degrees around a point, reduces mean-squared error by 57% compared to mip-NeRF, and is able to produce realistic synthesized views and detailed depth maps for highly intricate, unbounded real-world scenes.

Neural Radiance Fields (NeRF) synthesize highly realis-

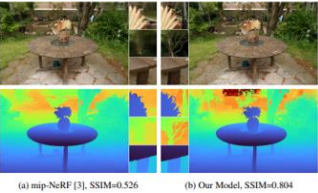
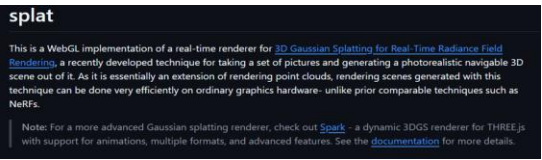
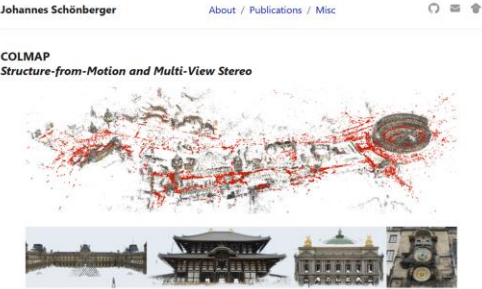


Figure 1. (a) Though mip-NeRF is able to produce accurate renderings of objects, for unbounded scenes it often generates blurry backgrounds and low-detail foregrounds. (b) Our model produces detailed realistic renderings of these unbounded scenes, as evidenced by the renderings (top) and depth maps (bottom) from both models. See the supplemental video for additional results.

raises three critical issues:

1. Parameterization. Unbounded 360 degree scenes can occupy an arbitrarily large region of Euclidean space, but mip-NeRF requires that 3D scene coordinates lie



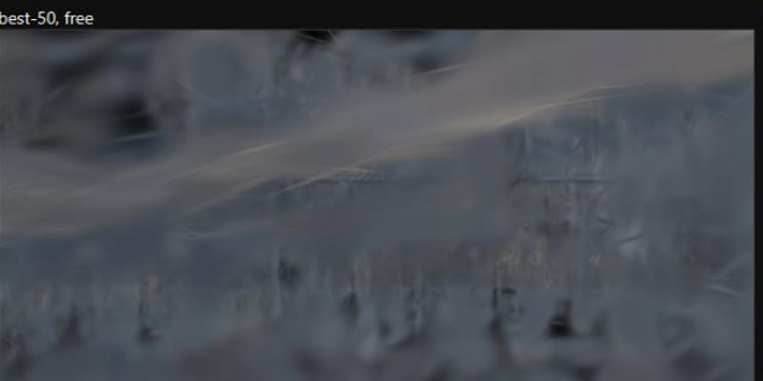
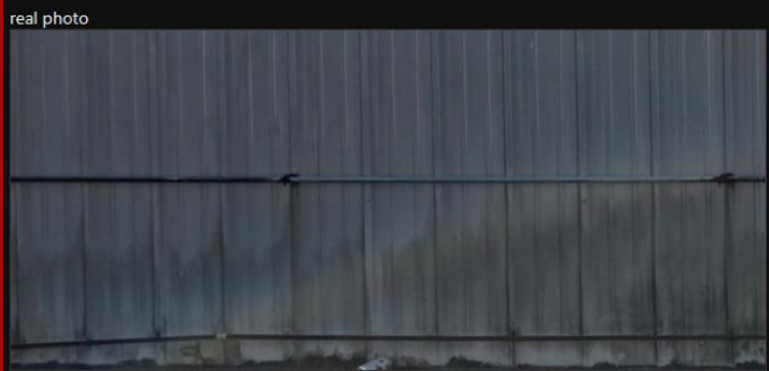
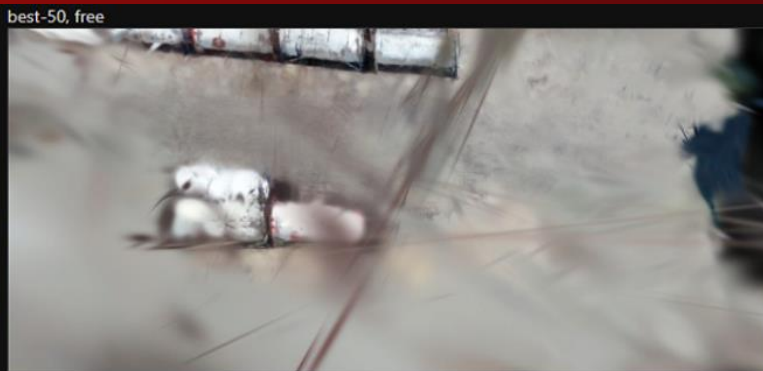
1. <https://www.cns.nyu.edu/pub/eero/wango3-reprint.pdf>
2. <https://arxiv.org/pdf/2403.17888>
3. <https://arxiv.org/pdf/2111.12077>
4. <https://colmap.github.io/index.html>
5. <https://github.com/nerfstudio-project/gsplat>
6. <https://github.com/antimatter15/splat>

The Splats: Before and After

Image

3DGS

Ours



Live Demo



Closeout & Client Use Cases



- Security
- Extreme Weather
- Inspections
- Construction
- Traffic Routes
- Terminal Docking



Thank You

Ananda Fowler | Remote Sensing Project Lead | Ananda.Fowler@westwoodps.com

Brooks Andrews, GISP | GIS Manager | Brooks.Andrews@westwoodps.com