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Today

Proposed plan for Day 1:
2:30 AM - Arrive in San Francisco
Web

Yesterday

Idea for screening
Yesterday: Screened comedy with local st...
Creative

Tennis scorekeeping
Yesterday: Core v. Ted 3-4
Notes

Grocery list
Yesterday: Milk, tomatoes, ground beef...
To Do

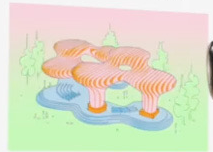
Self-evaluation notes
Yesterday: Failed to work on organization...
Work

Ergonomia pectinacea
Yesterday: Tuffed longhorn...
Work

Idea for programming
Yesterday: Interactive Field Recording in...
13 Notes

Proposed plan for Day 1:

- Arrive in SF hotel and check-in
- Coffee and pastries in the park
- Self-guided walkthrough
- Meeting + Sanjour walkthrough with fabricators



Major question for this concept: how does it mesh with its surroundings? It's a big departure from the current look and feel of the park. I love the design and I'm comfortable presenting something challenging, but let's be thoughtful about its proposed placement.

For the elevated, sloped benches, let's make sure to spend time thinking about sight lines and getting a feel for how it will feel to sit on these benches at different times of day. Where does one get the optimal view of the sunset? Where would people sit and watch the sunset? And where would people sit and watch the sunset?

Navigation icons

App Store icon

Keyboard



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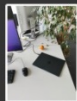
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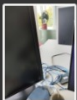
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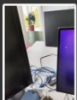
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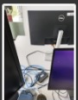
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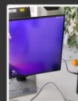
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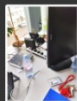
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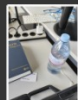
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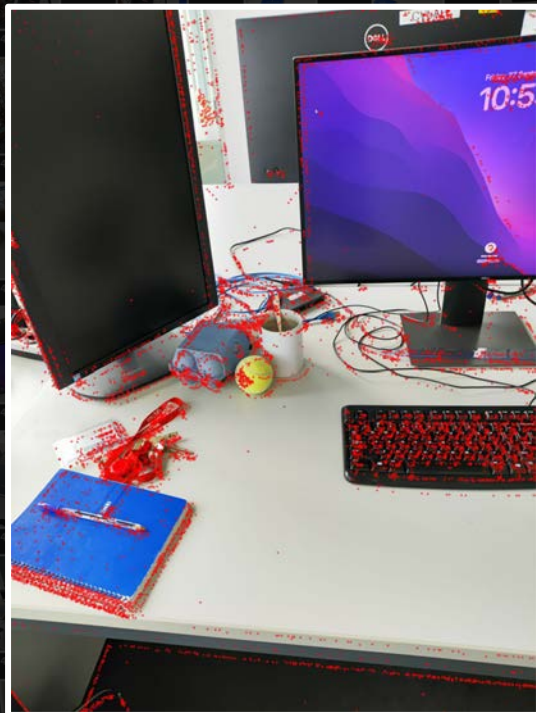
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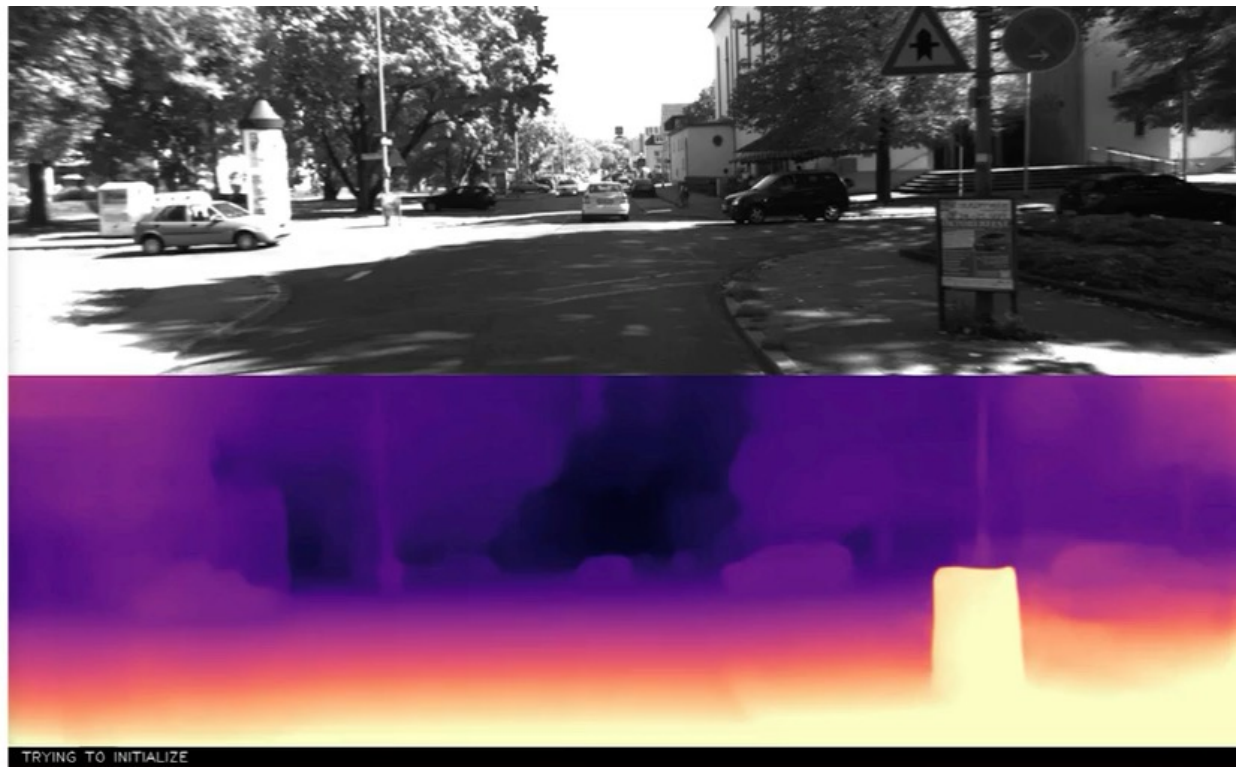
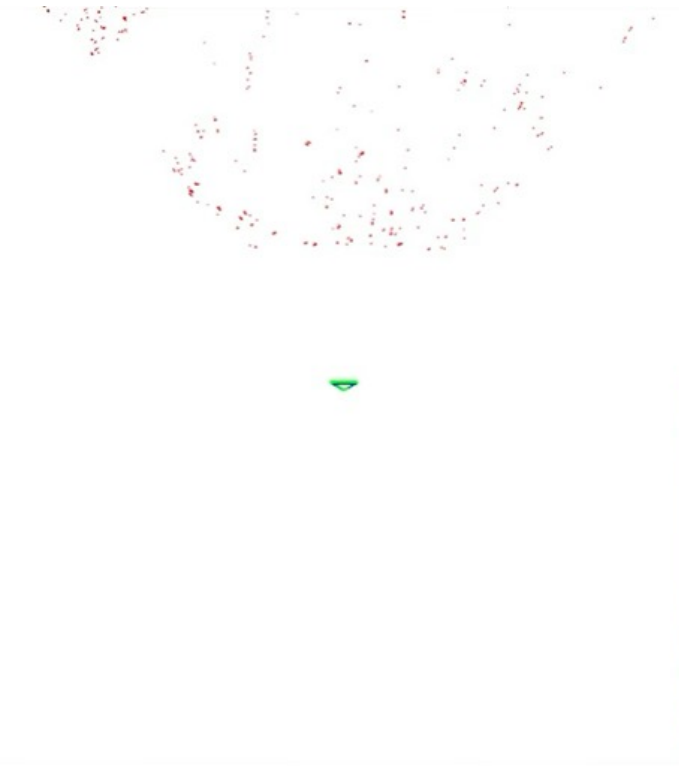




Reconstruction with COLMAP.
Schönberger et al. "Structure-from-Motion Revisited". *CVPR (2016)*.

Road

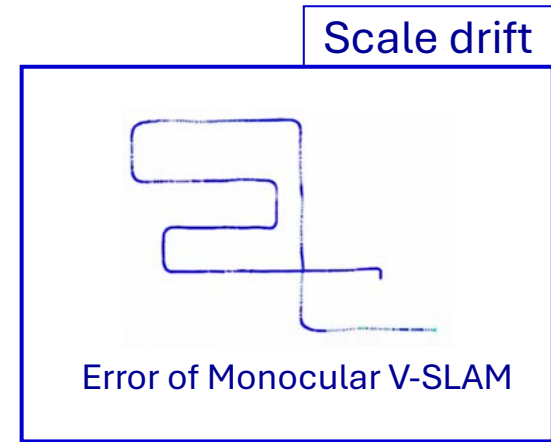
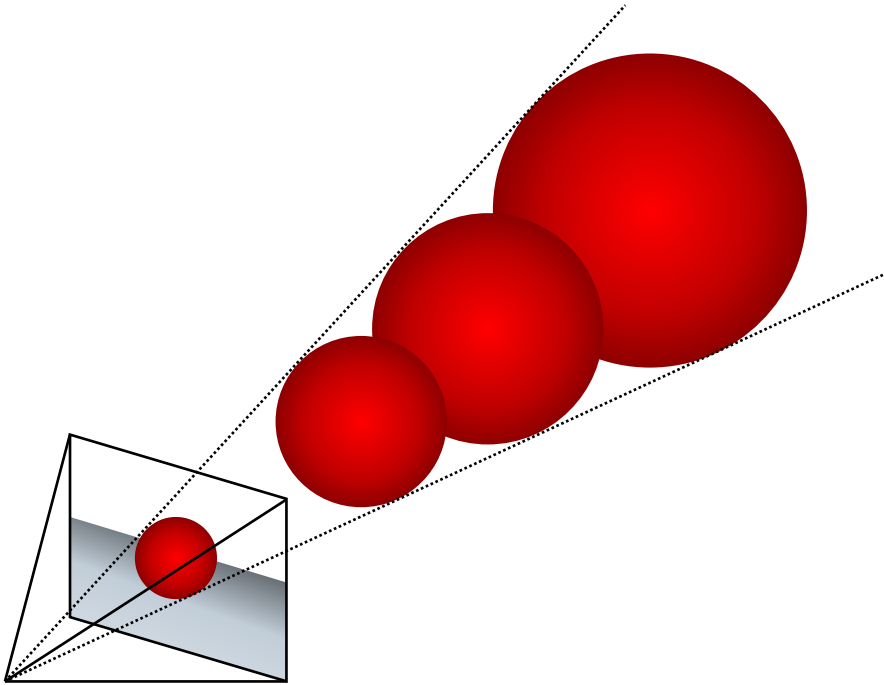




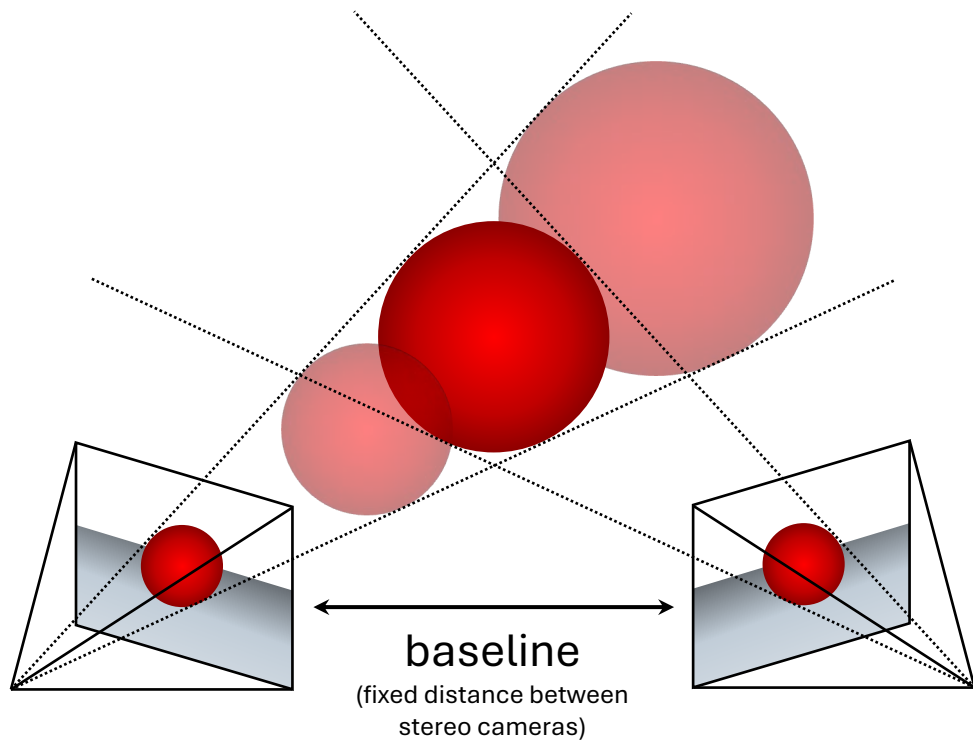
Mur-Artal et al. “ORB-SLAM2: an Open-Source SLAM System for Monocular, Stereo and RGB-D Cameras”. *IEEE T-RO* (2017).

Batlle et al. “Scale estimation in monocular ORB-SLAM2 using deep convolutional networks”. *BSc Thesis, Universidad de Zaragoza* (2020).

But monocular cameras cannot observe metric scale



We integrate **monocular depth estimation** as an equivalent stereo system



Very data hungry.
Estimation is fixed.
Hard to adapt to OOD.

Dense
Texture less
Metric scale
Deformable reconstruction
Robust
Long-term
...

Body





Constricted space.
Almost no data available.



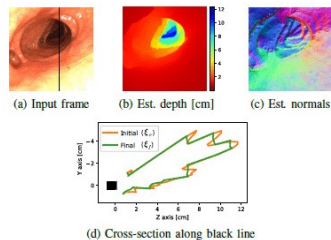
One camera
Three light sources



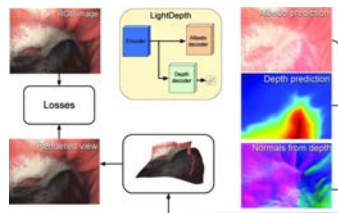


$$I \propto \frac{1}{d^2}$$

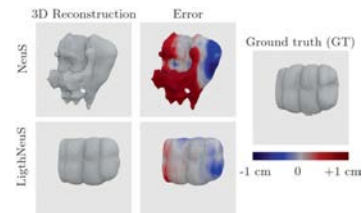




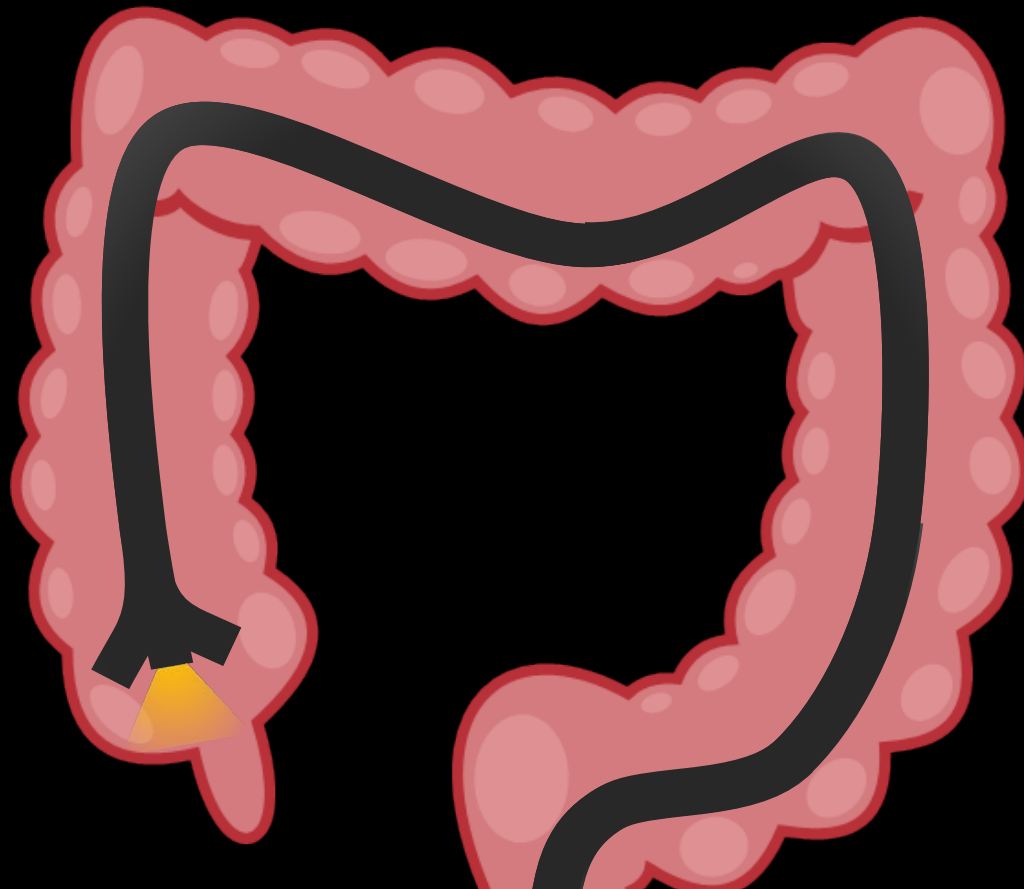
*Photometric single-view
dense 3D reconstruction
in endoscopy.*

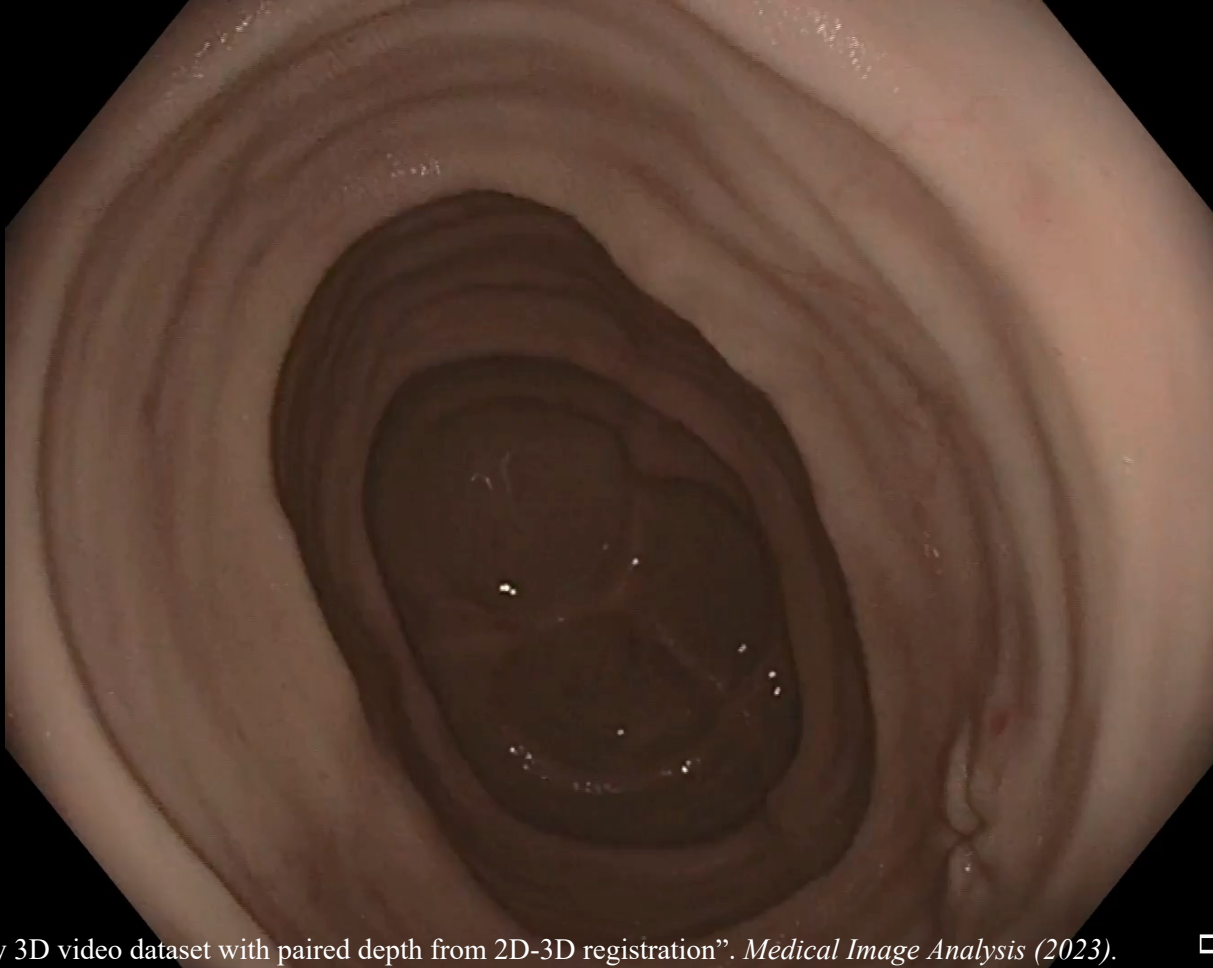


*LightDepth: Single-View
Depth Self-Supervision from
Illumination Decline.*



*LightNeuS: Neural Surface
Reconstruction in Endoscopy
Using Illumination Decline.*





Bobrow et al. "Colonoscopy 3D video dataset with paired depth from 2D-3D registration". *Medical Image Analysis* (2023). □

Illumination decline as depth cue

$$\mathcal{I}(\mathbf{x}) = \left(\frac{\overset{\text{Light source properties}}{L_e}}{\underset{\text{Inverse-square law}}{d^2}} \underset{\text{Surface properties}}{\text{BRDF}(\mathbf{x}, \mathbf{d})} \cos(\theta) \overset{\text{Camera properties}}{g} \right)^{1/\gamma}$$

Batlle et al. “LightNeuS: Neural Surface Reconstruction in Endoscopy Using Illumination Decline”. *MICCAI* (2023).

Calibrating camera and light source

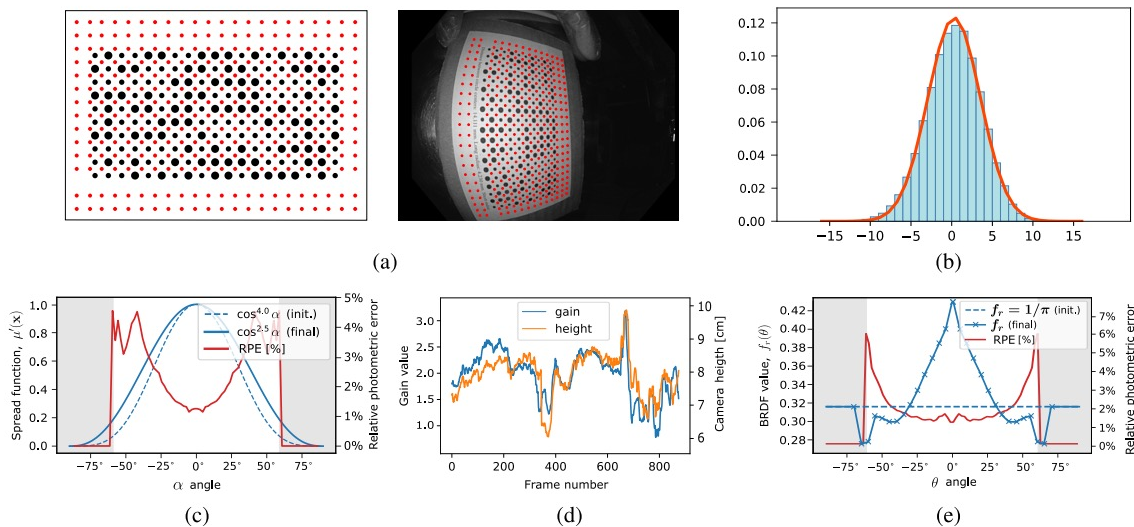
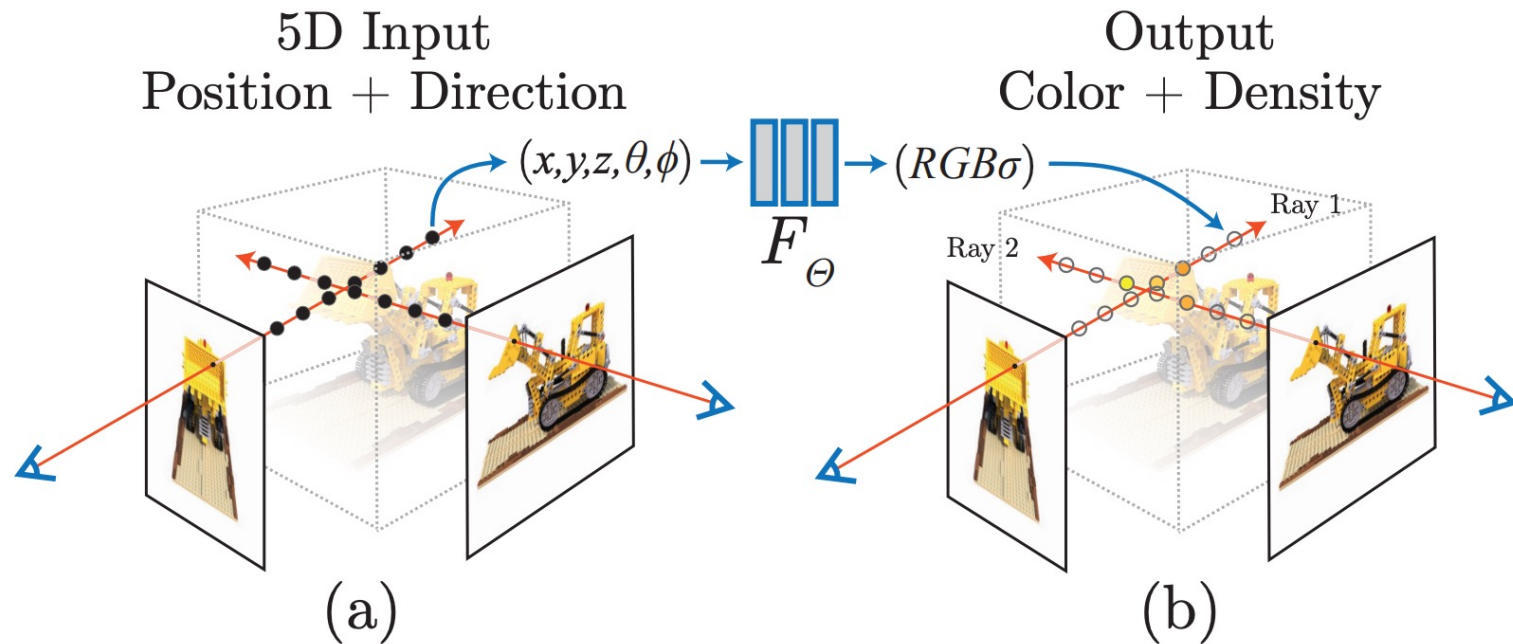


Fig. 3: Sampling the Vicalib pattern: (a) Red marks correspond to each x_j sampled point. Photometric calibration results: (b) Photometric errors of the calibrated model are close to a Gaussian distribution with a mean of 0.3 and std. of 3.2 gray levels. (c) Joint attenuation caused by light spread function $\mu(x)$ and camera vignetting $V(x)$. (d) Estimated auto-gain factors over the calibration video. (e) Non-Lambertian BRDF for the paper sheet used for calibration.

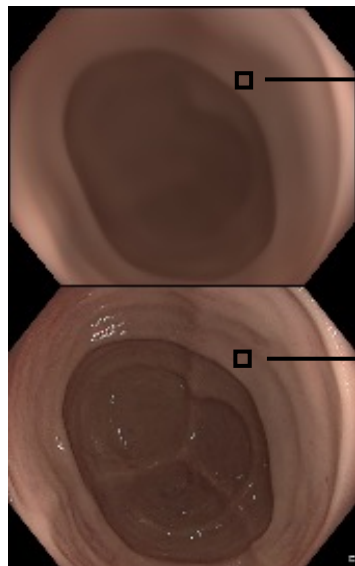
Batlle et al. “Photometric single-view dense 3D reconstruction in endoscopy”. *IROS* (2022).

Radiance Fields

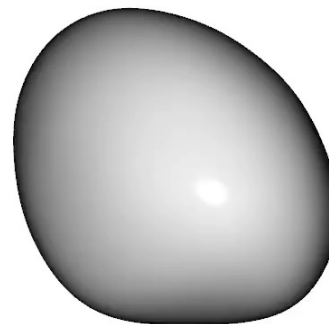
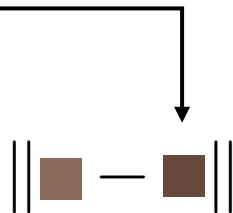


Mildenhall et al. "NeRF: Representing scenes as neural radiance fields for view synthesis.". *ECCV (2020)*.

Render



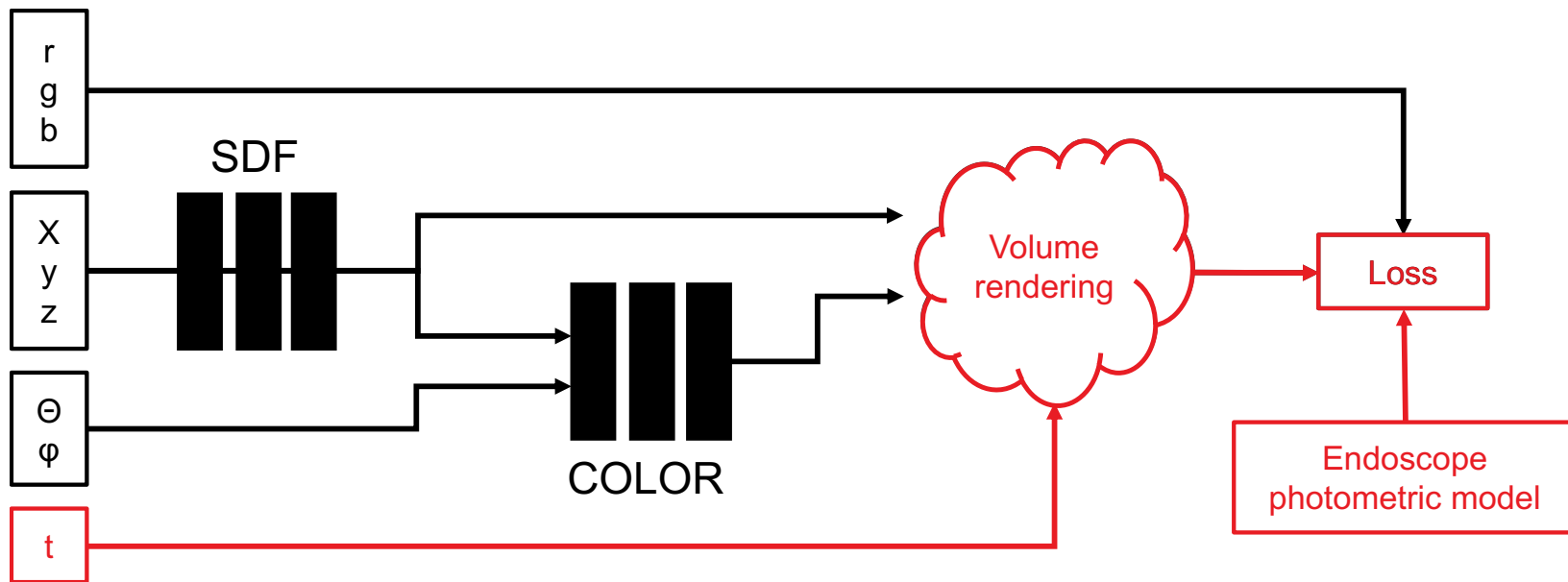
$$\mathcal{I}(\mathbf{x}) = \left(\frac{L_e}{t^2} \text{BRDF}(\mathbf{x}, \mathbf{d}) \cos(\theta) g \right)^{1/\gamma}$$



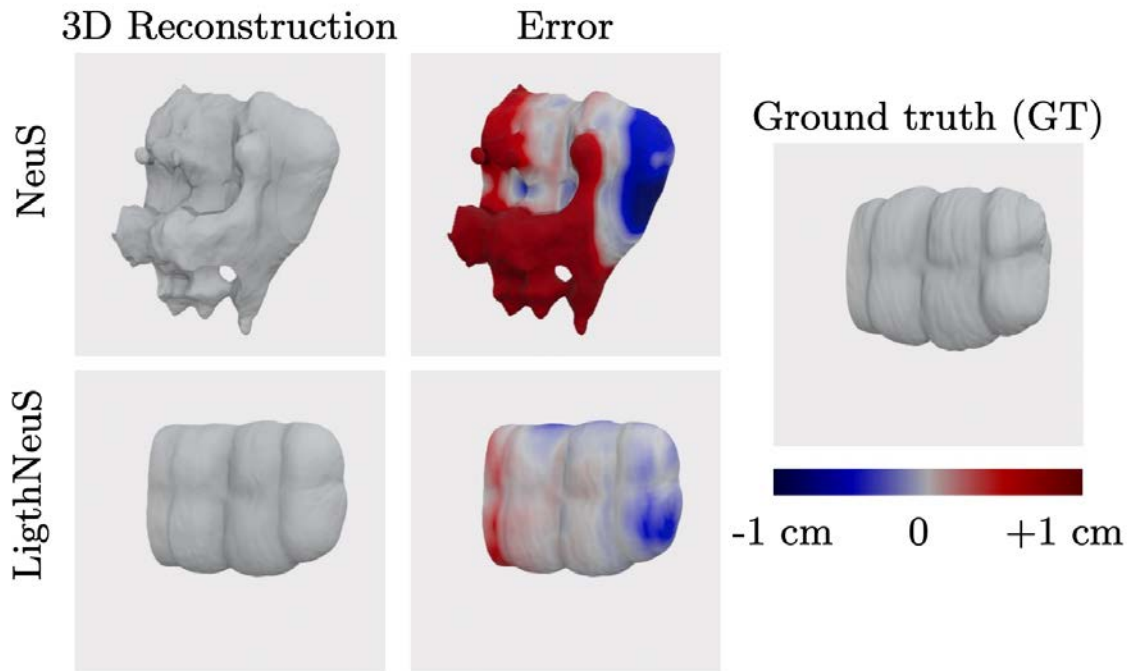
Target

Batlle et al. "LightNeuS: Neural Surface Reconstruction in Endoscopy Using Illumination Decline". *MICCAI (2023)*.

Neural Radiance Fields ▶ NeuS ▶ LightNeus



NeuS vs LightNeuS



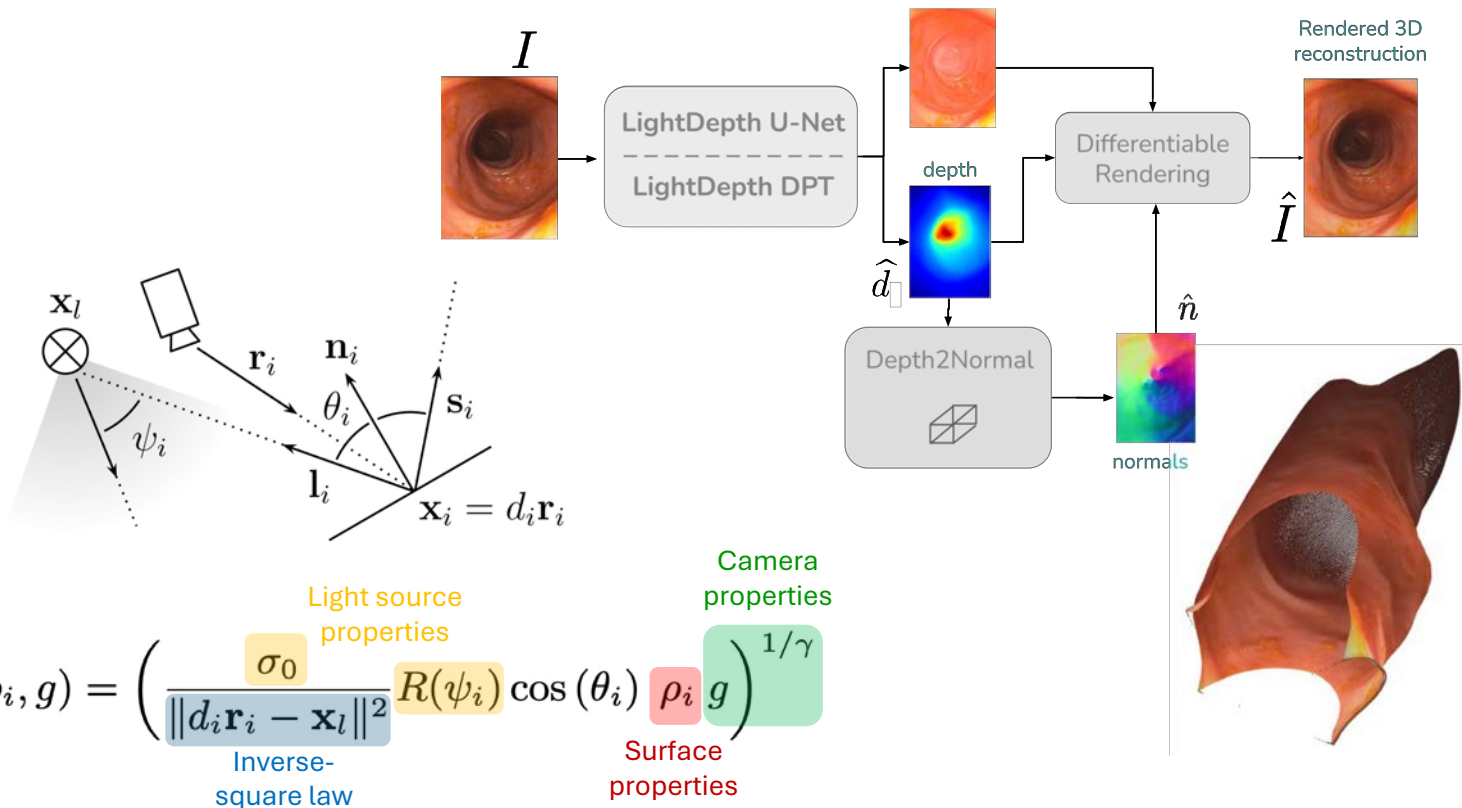


After inspecting a colon section,

EndoMapper

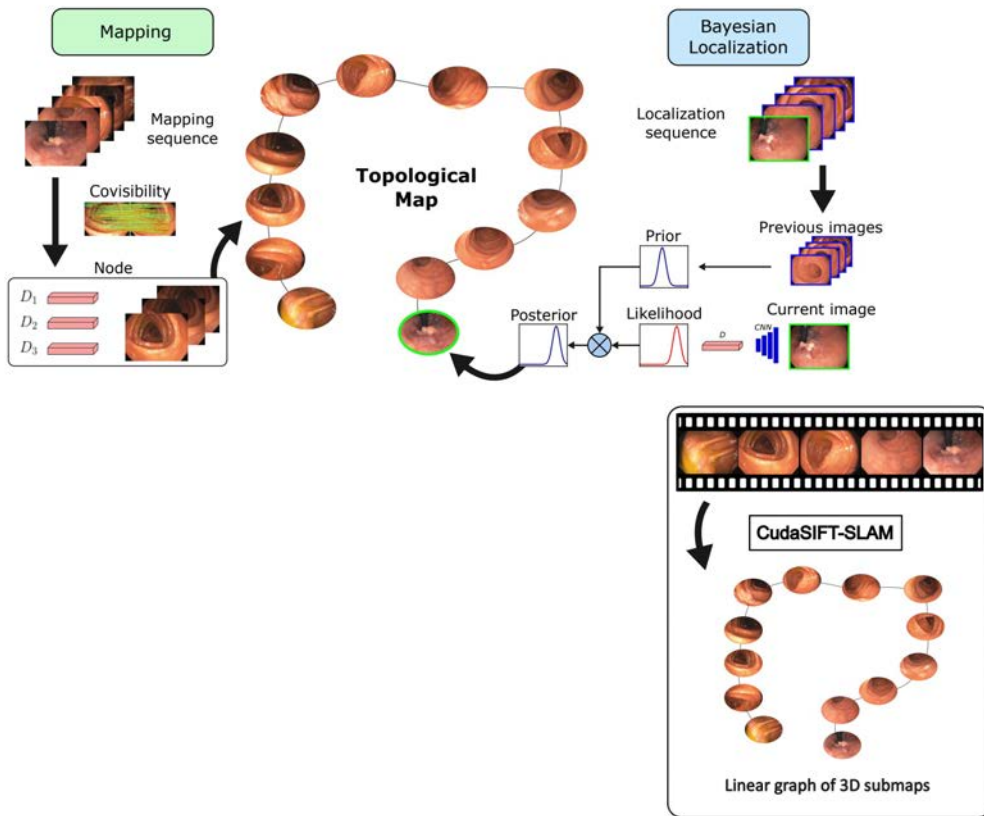


LightDepth: Single-View Depth Self-Supervision from Illumination Decline

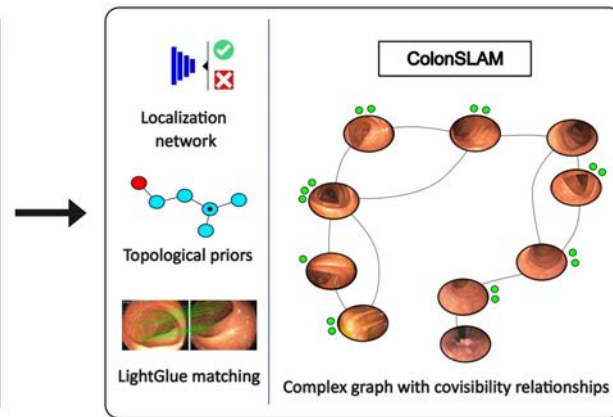




ColonMapper: topological mapping and localization for colonoscopy



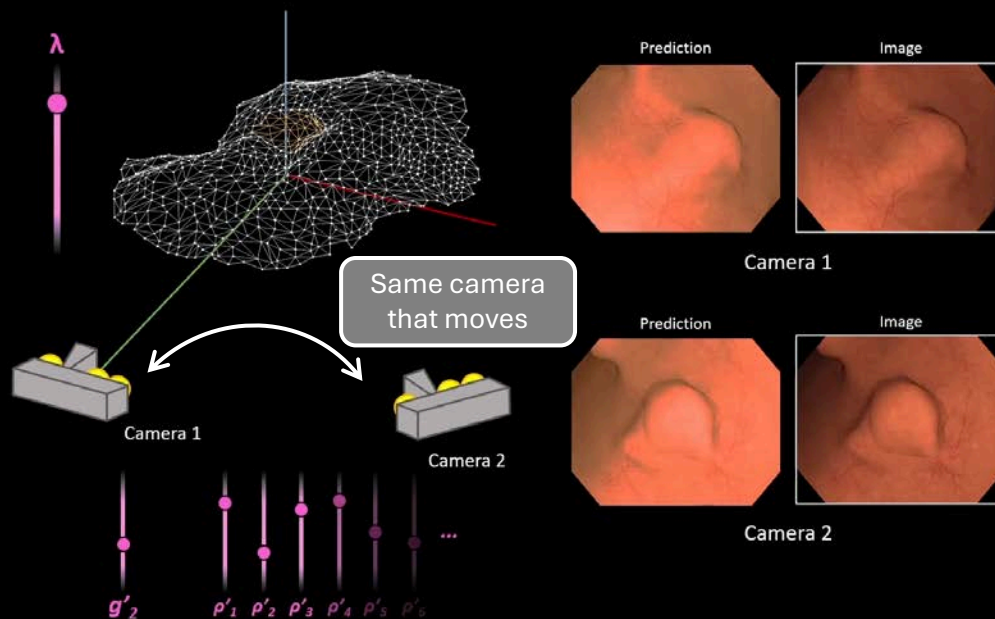
Topological SLAM in colonoscopies leveraging deep features and topological priors





EndoMetric: Near-light metric scale monocular SLAM

Metric scale estimation by minimizing the photometric error





*You can find this presentation
and more on my website!*

SCAN ME

