20220727 Project Meeting

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Contents
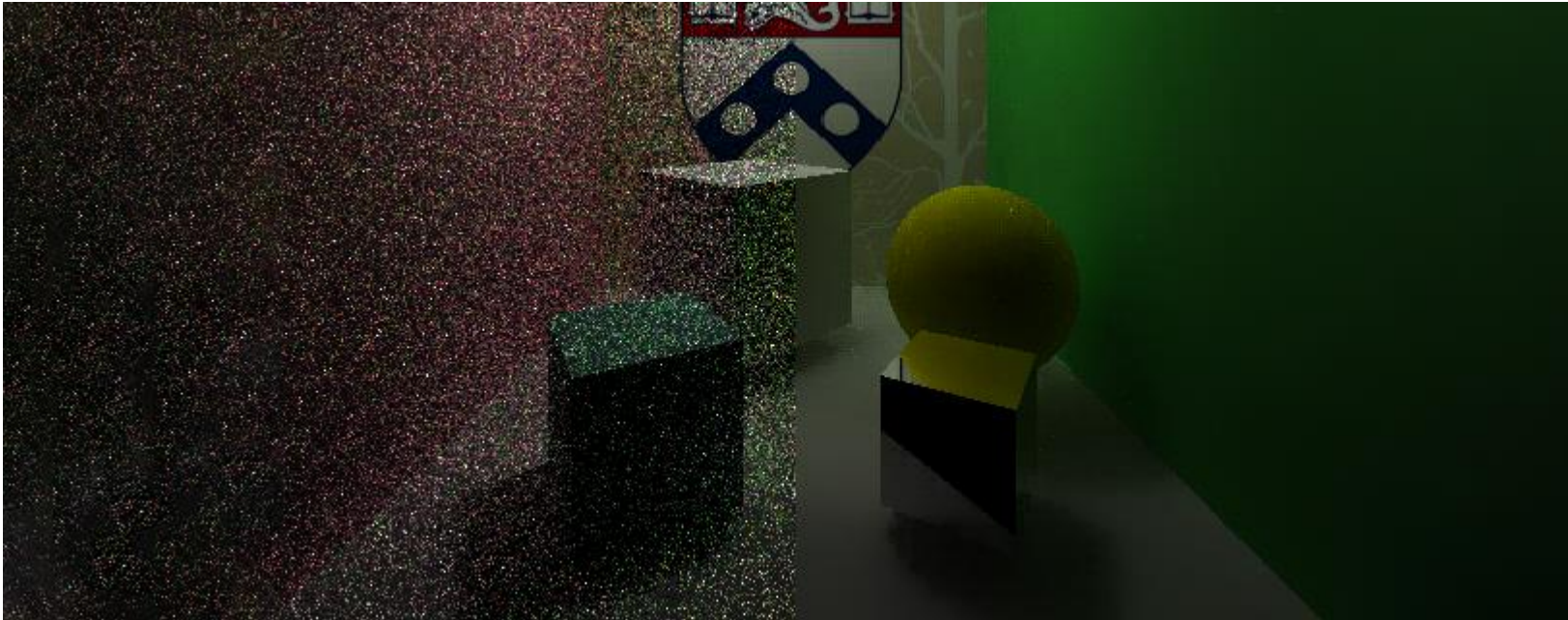
- (4 Week) Work Progress

  - SVGF

- TODO

Recall – (3 Week) Work Progress

- Implemented path tracer with different materials & NEE

Improve Path Tracing Quality

- Largely categorized into two approaches

- (1) Denoising / Filtering / Post processing → SVGF, A-SVGF, neural network based approaches

- (2) Improving sampling quality → ReSTIR, ReSTIR GI
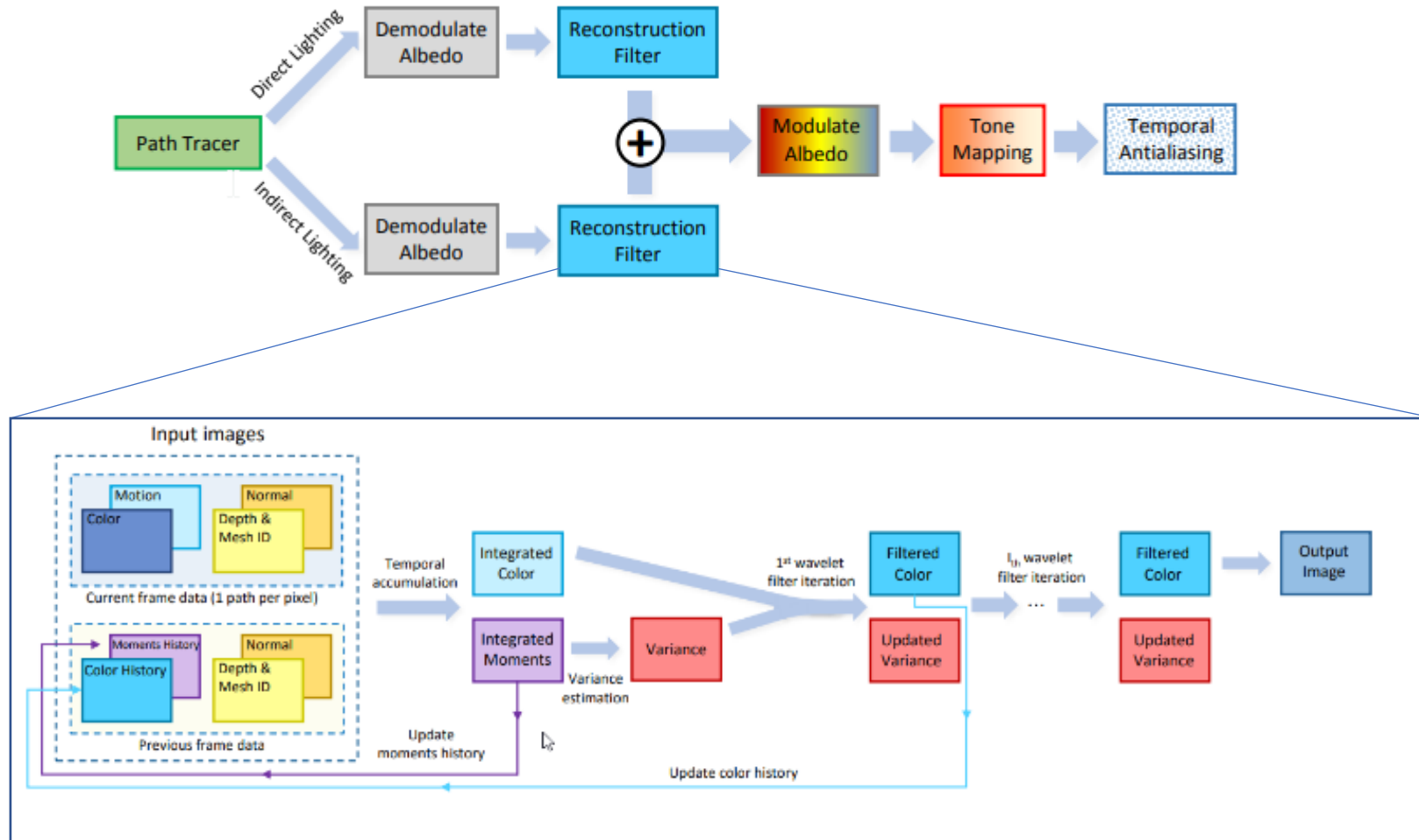
- Currently working on SVGF

1spp path traced   After applying SVGF

SVGF Pipeline Overview

Key idea → temporal accumulation & hierarchical spatial filtering

SVGF Implementation

Post processing based on pixel shader

Path Tracer (1spp)	Motion Vector	Temporal Accumulation	Wavelet Filter	Reconstruction

Outputs
- Radiance (HDR) Normal
- Position
- MeshID
- Direct illumination
- Indirect illumination
- Reflectance

Inputs
- Previous camera info
- Normal/MeshID

Outputs
- Motion vector
- Consistency

Inputs
- Color history
- Moment history

Outputs
- Integrated color
- Integrated moment
- Variance

Inputs
- Integrated color, variance
- Integrated moment
- Position / Normal

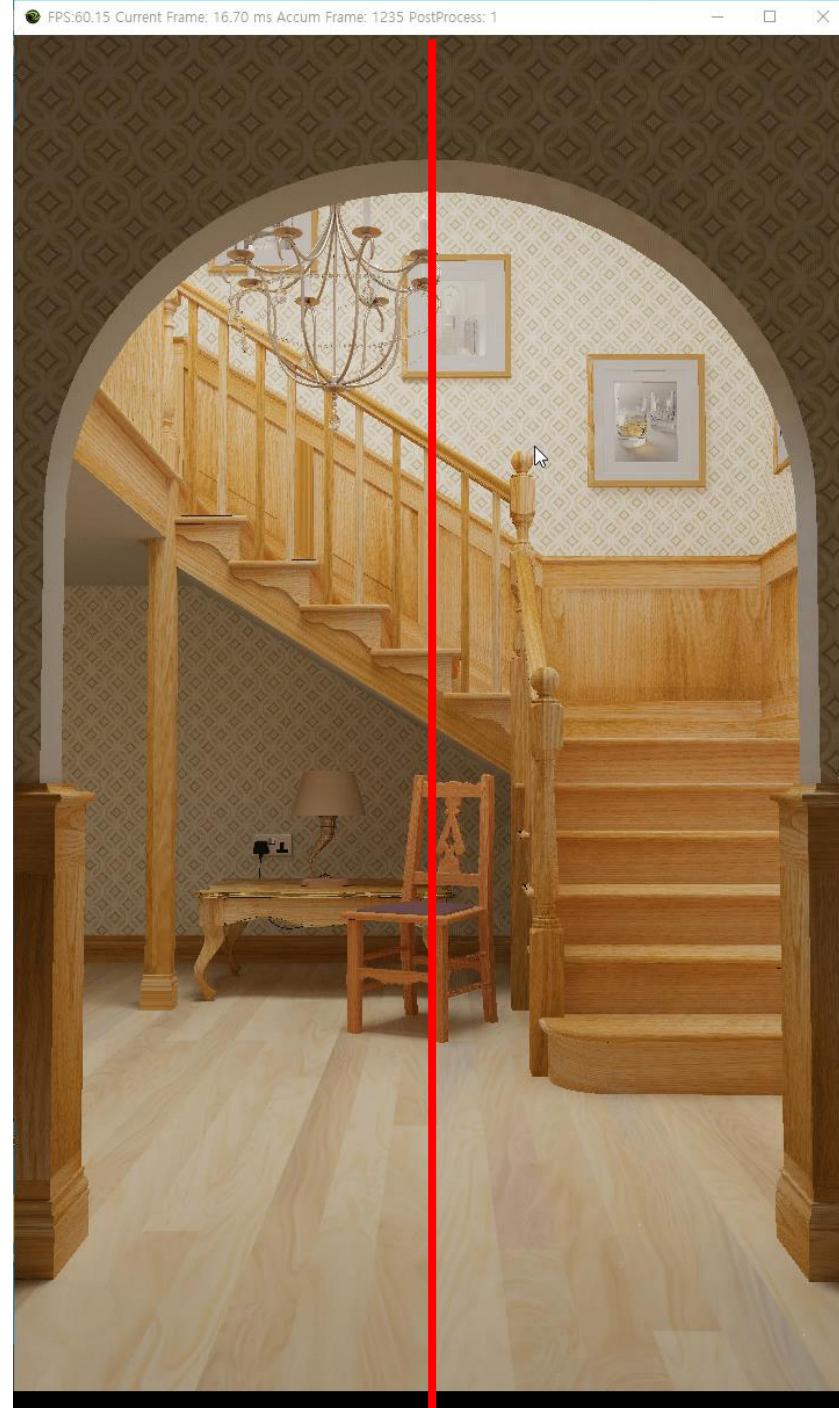**Outputs**
- Filtered Image
- Updated variance

Inputs
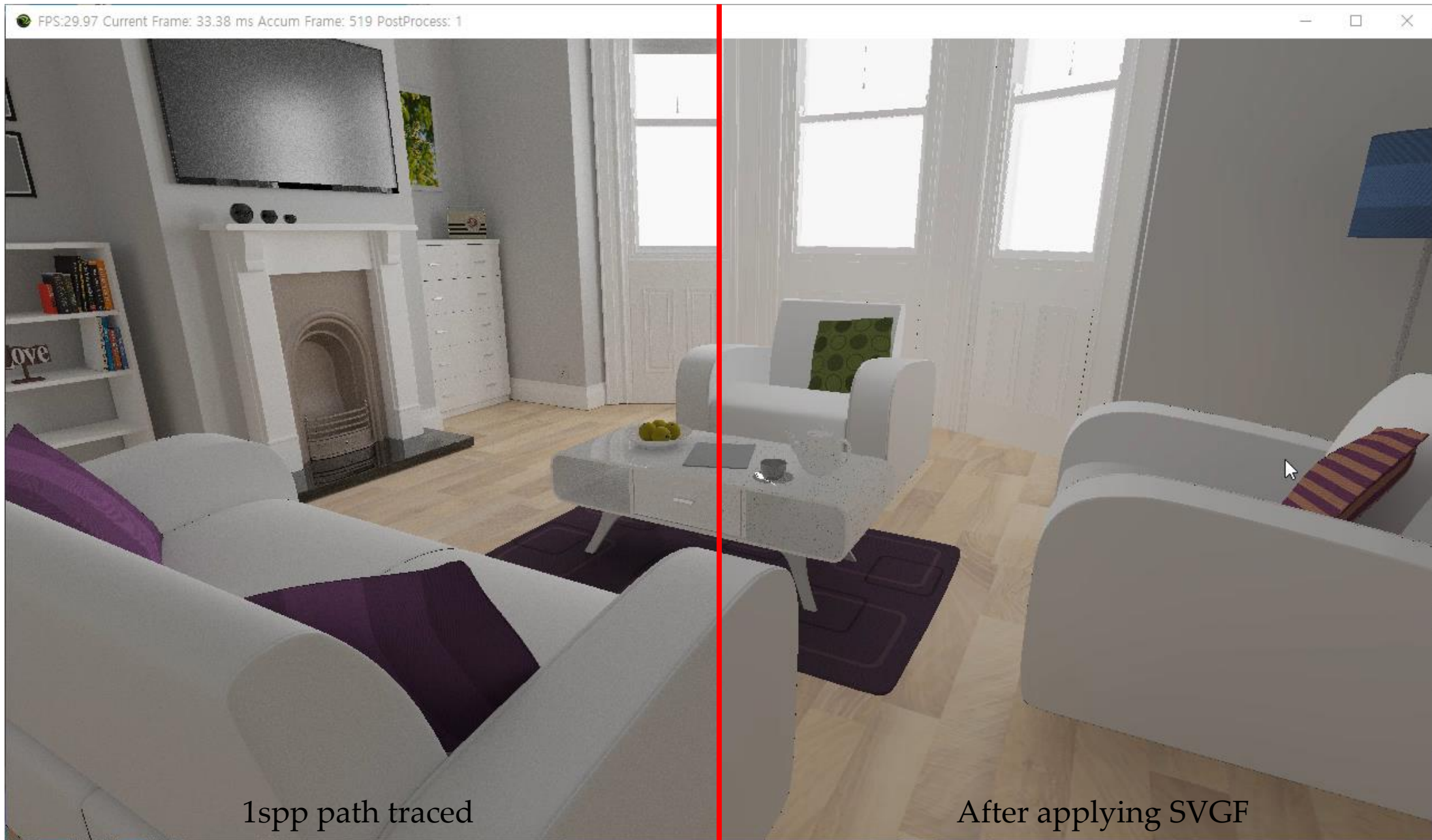- Filtered direct
- Filtered indirect
- Reflectance

Outputs
- Final image

Split direct / indirect pass!

1spp path traced

After applying SVGF

1spp path traced

After applying SVGF

TODO

- Artifacts
    - Temporally unstable
    - Fails on specific materials (only works well on diffuse..)
    - Radiance cannot be represented as multiplication of albedo & illumination

$$L_o(x, \omega_o) = \int_\Omega f_r(x, \omega_o \omega_i) L_i(x, \omega_i)(n \cdot \omega_i) d\omega_i \neq (\text{albedo}) \times (\text{direct illum} + \text{indirect illum})$$

Only above is true for diffuse (lambertian) material

- Re-read SVGF and thoroughly verify the implementation