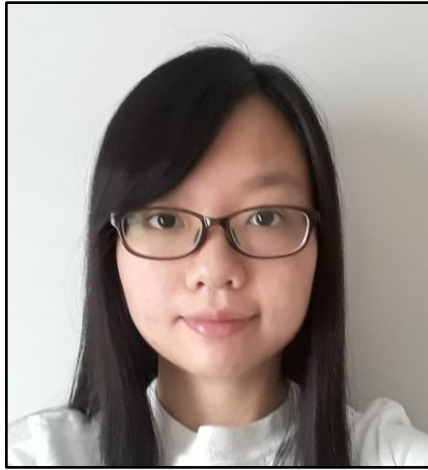


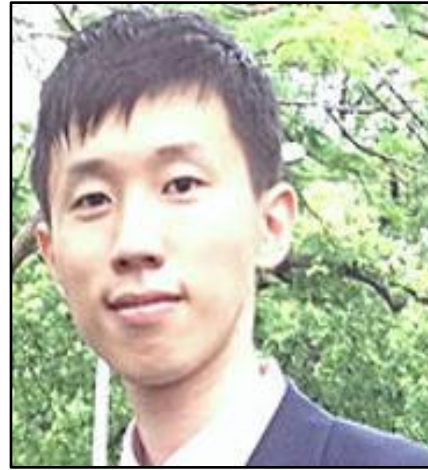
# Semantic View Synthesis



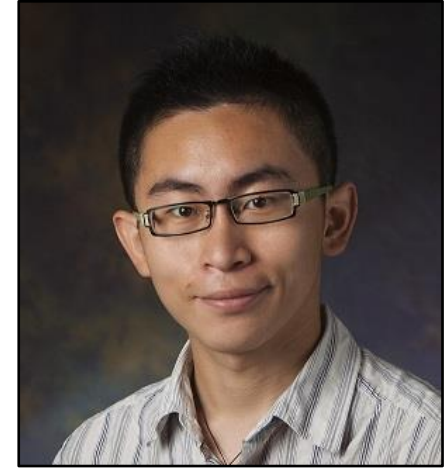
Hsin-Ping Huang  
UT Austin



Hung-Yu Tseng  
University of California, Merced



Hsin-Ying Lee

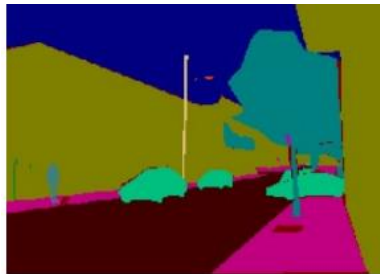


Jia-Bin Huang  
Virginia Tech



# Semantic image synthesis

Input: semantic map



Output: image



CRN



SIMS



Pix2pixHD



SPADE

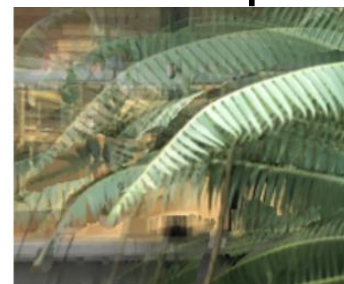
(Park et al., CVPR 2019)

# Novel view synthesis

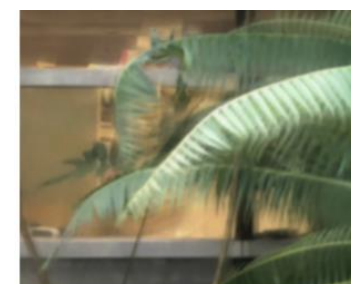
Input: multiple images



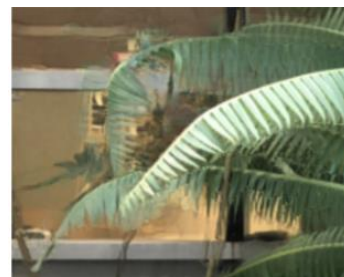
Output: novel views



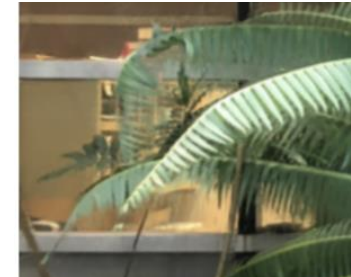
ULR



Soft3D



BW Deep



LLFF

(Mildenhall et al., SIGGRAPH 2019)

Input: semantic map



Output: novel view



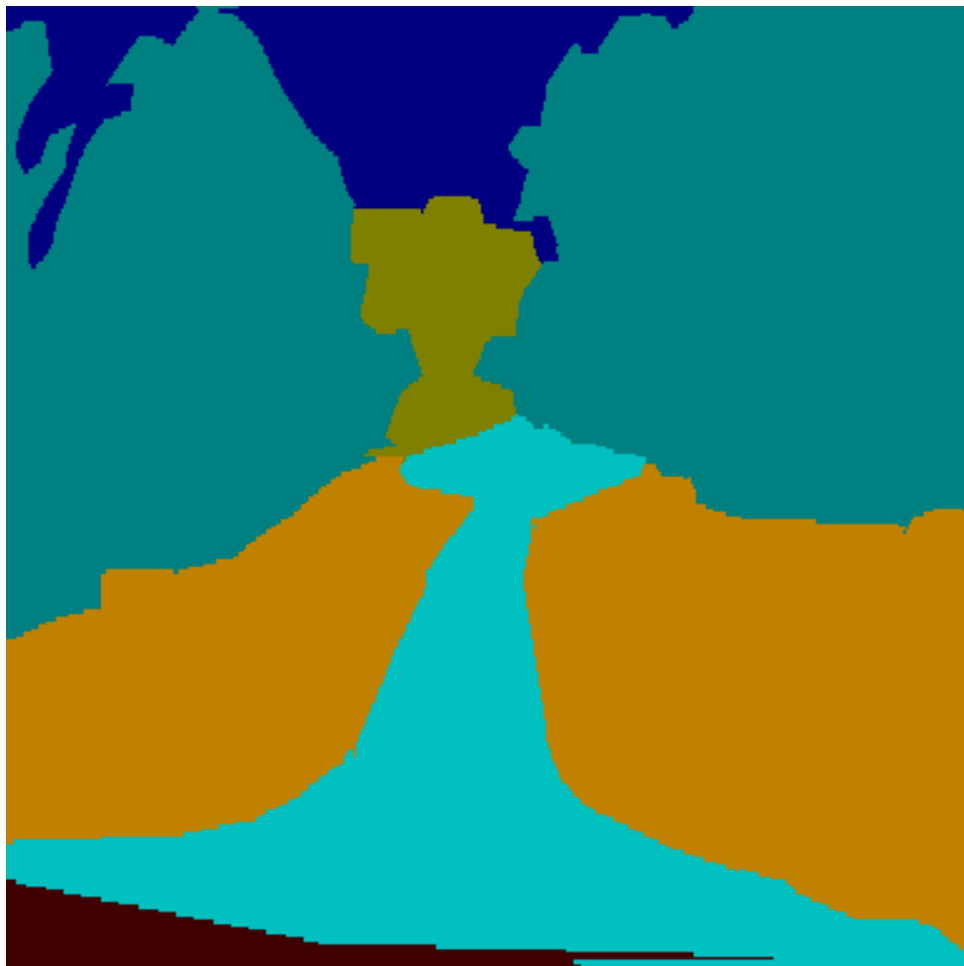
Input: semantic map



Output: novel view



Input: semantic map



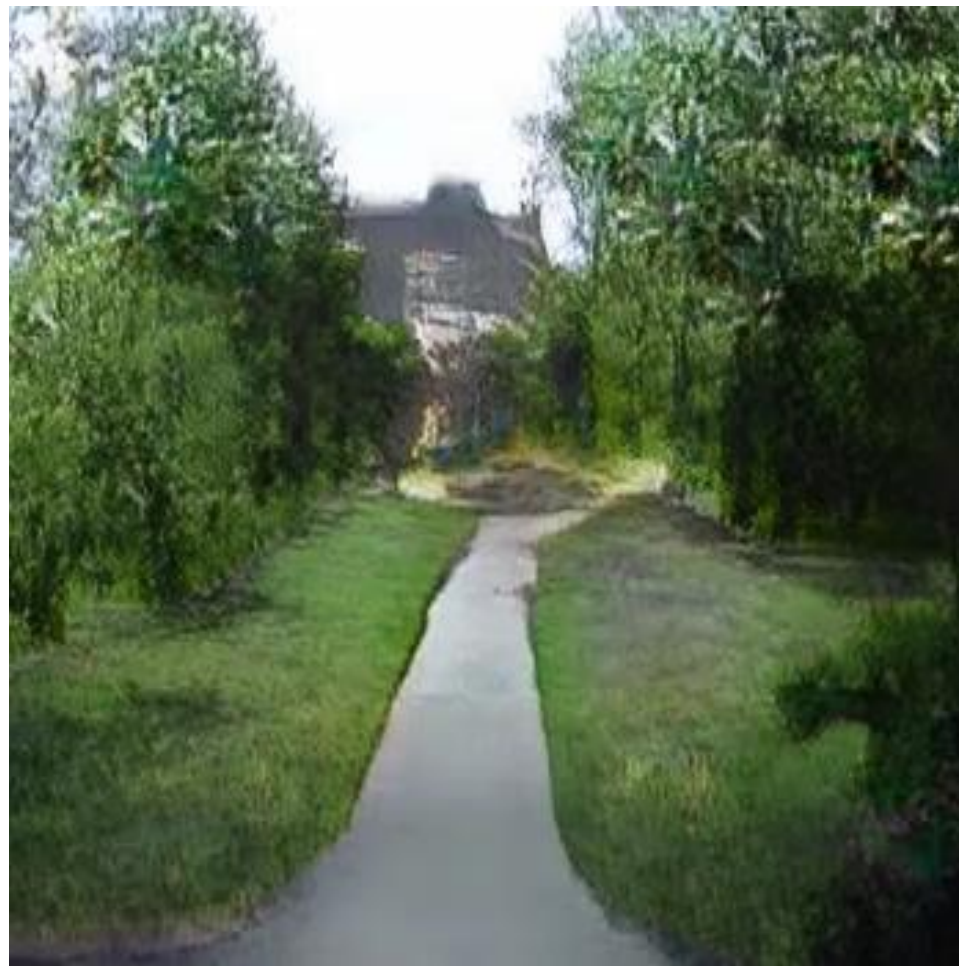
Output: novel view



Input: semantic map



Output: novel view



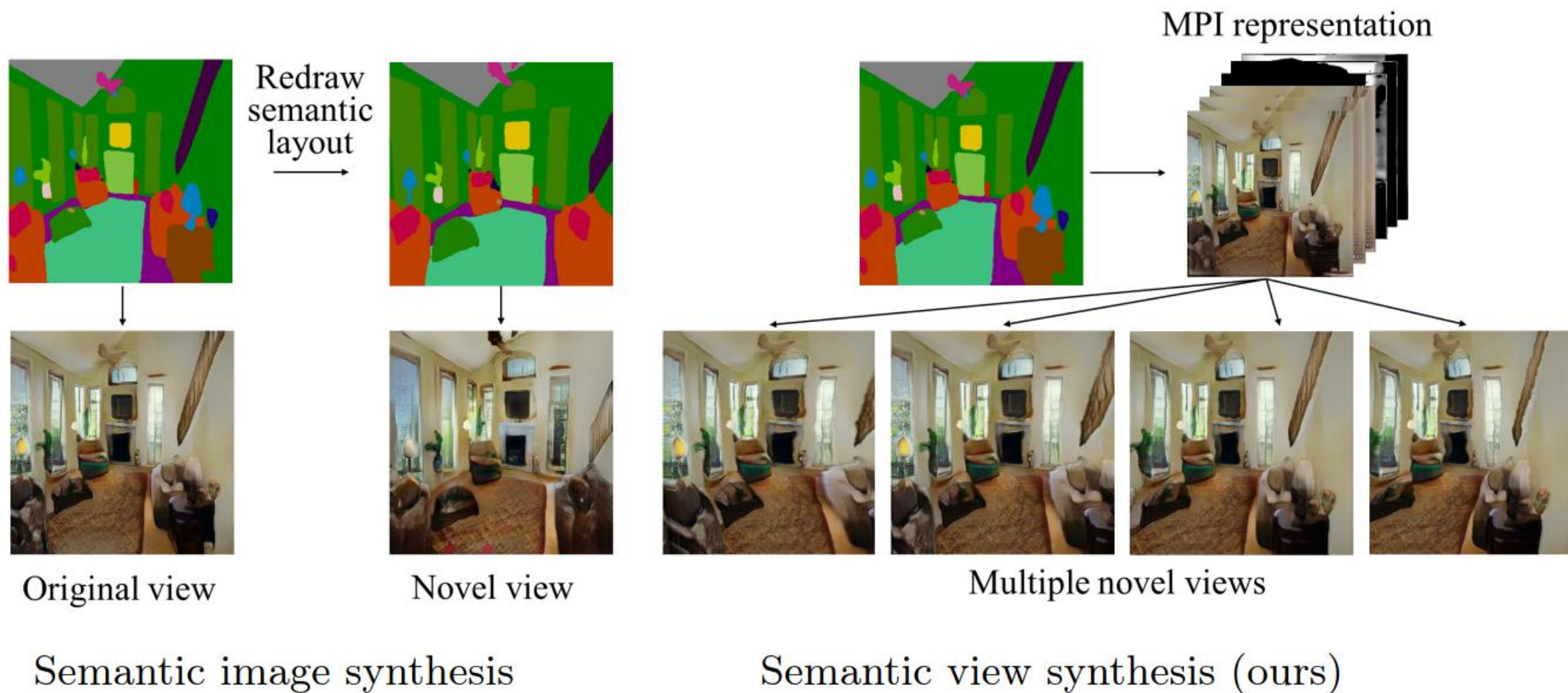
Input: semantic map



Output: novel view

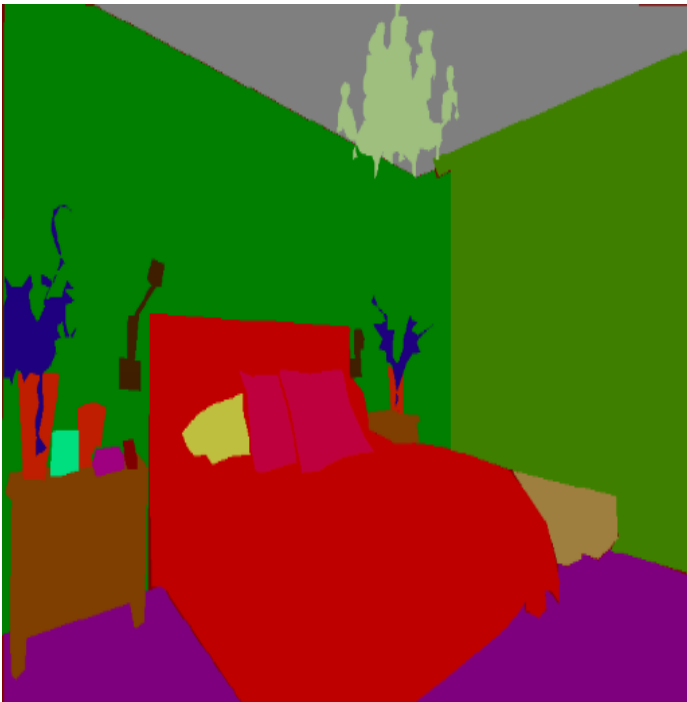


# Motivation





# Semantic map



?



# Novel view



# Semantic map



3D  
representation

---

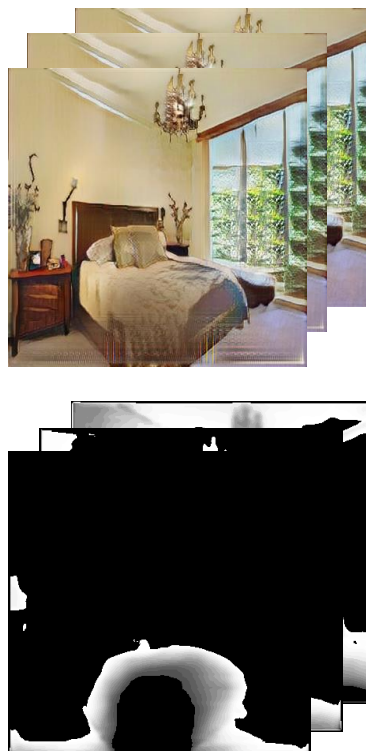
# Novel view



# Semantic map



# MPI

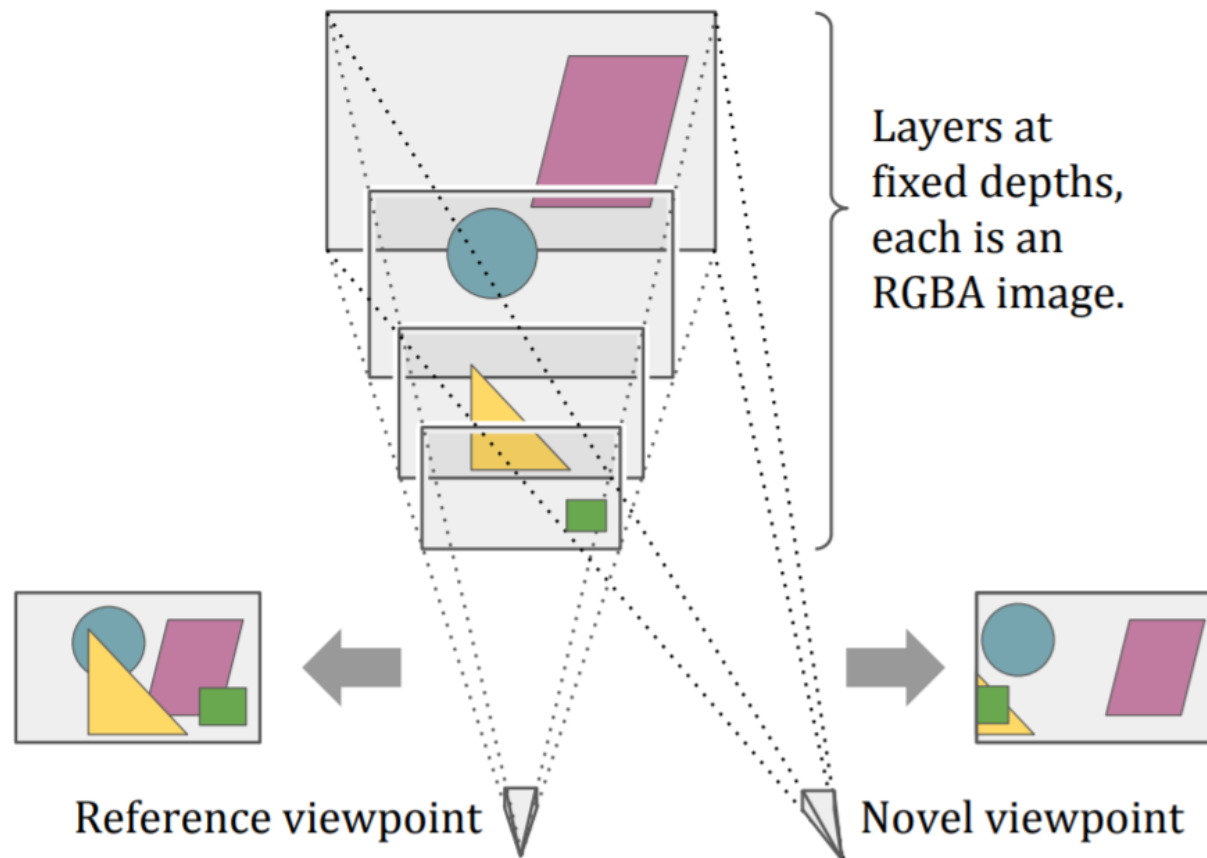


# Novel view



# Multiplane image (MPI) representation

MPI Representation



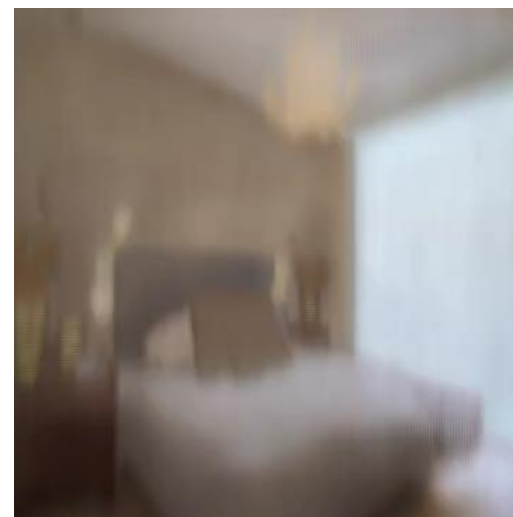
# Existing solution: direct prediction

Semantic map

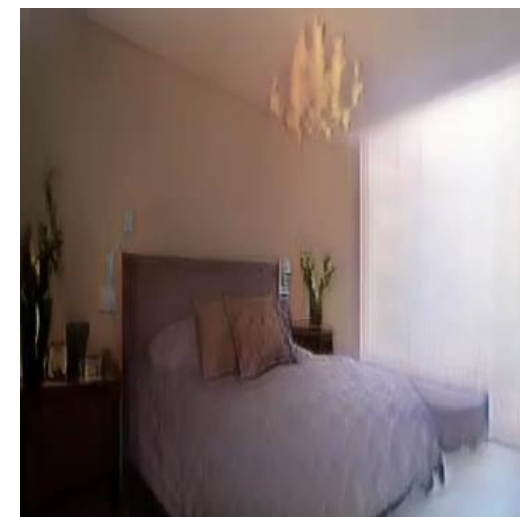


→ MPI →

Novel view



U-net

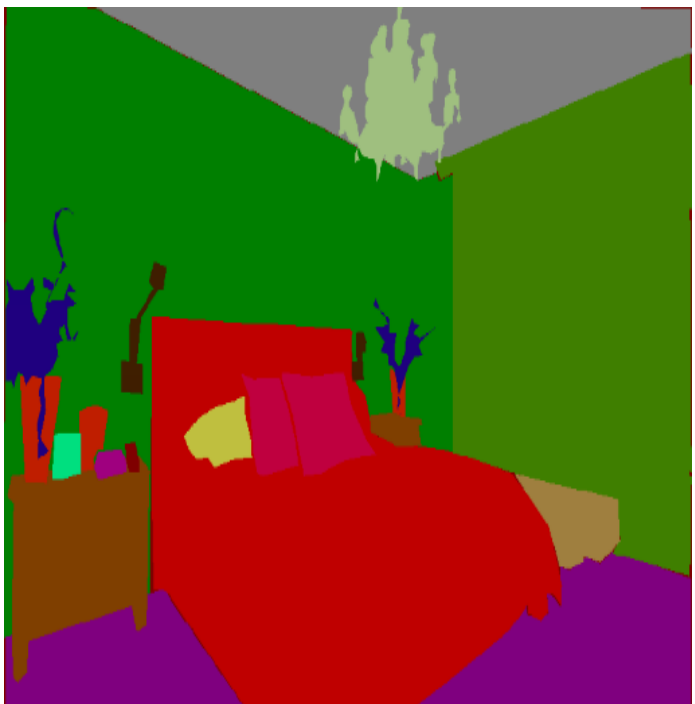


SPADE



# Existing solution: cascade prediction

Semantic map



Color image



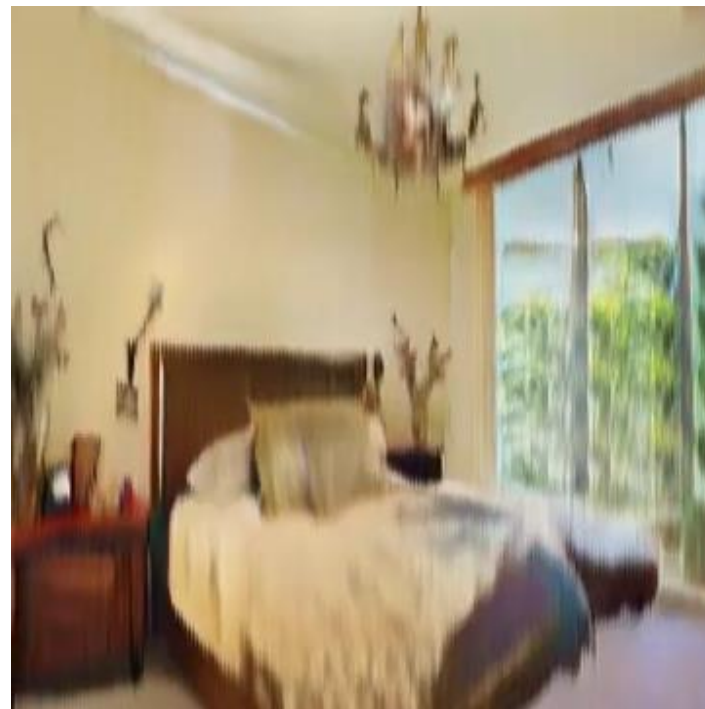
# Existing solution: cascade prediction

Color image



→ MPI →

Novel view



# Ours

## Semantic map

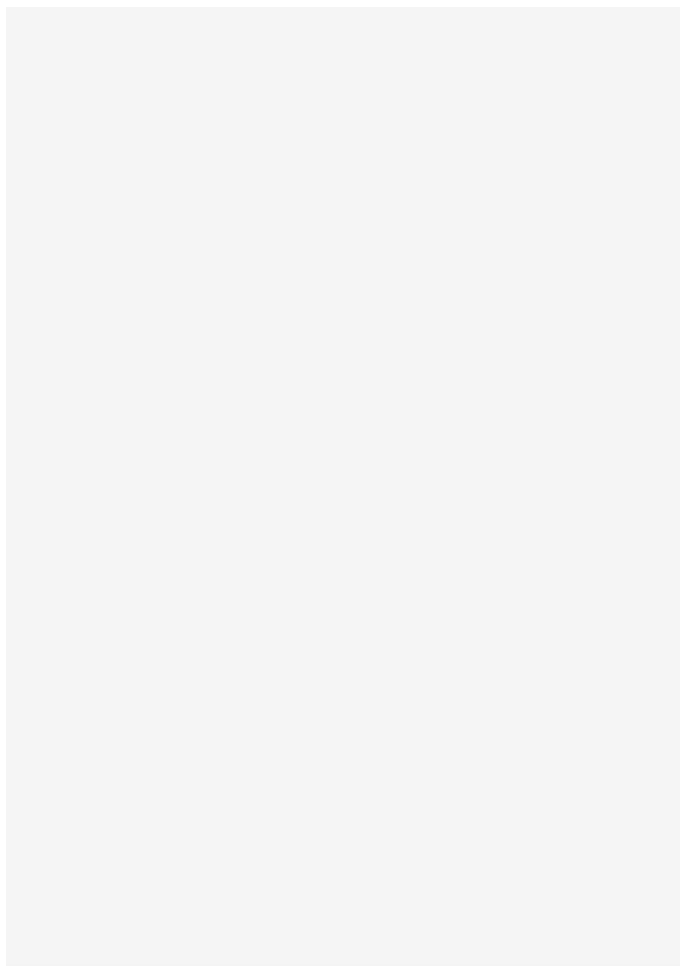


## Novel view

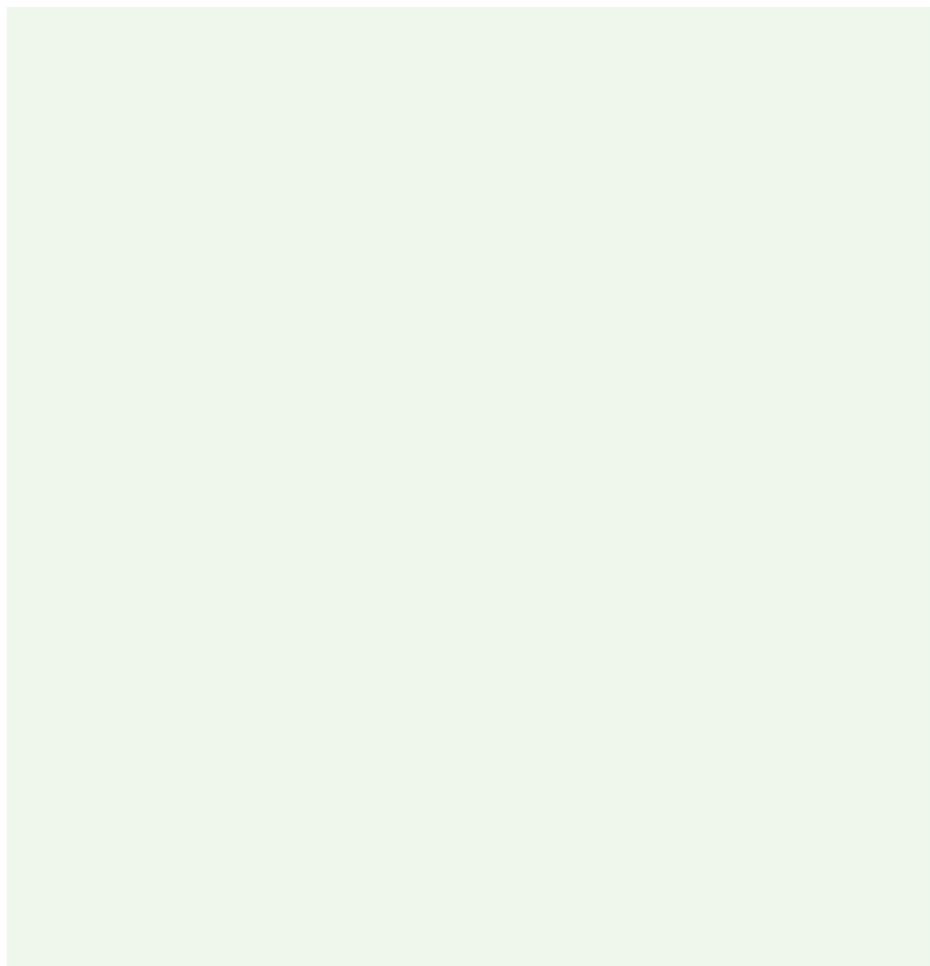




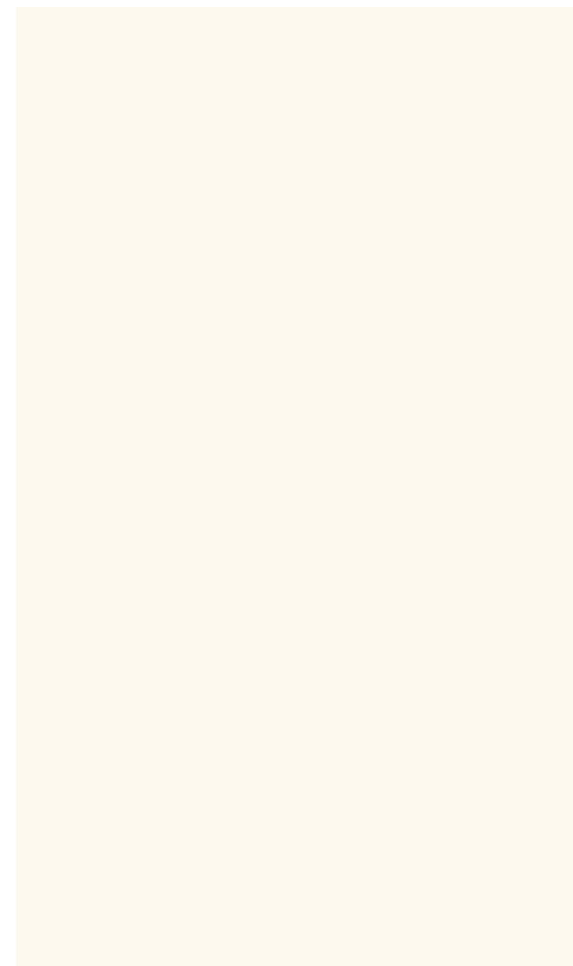
# Semantic view synthesis framework



(a) Image/disparity generation



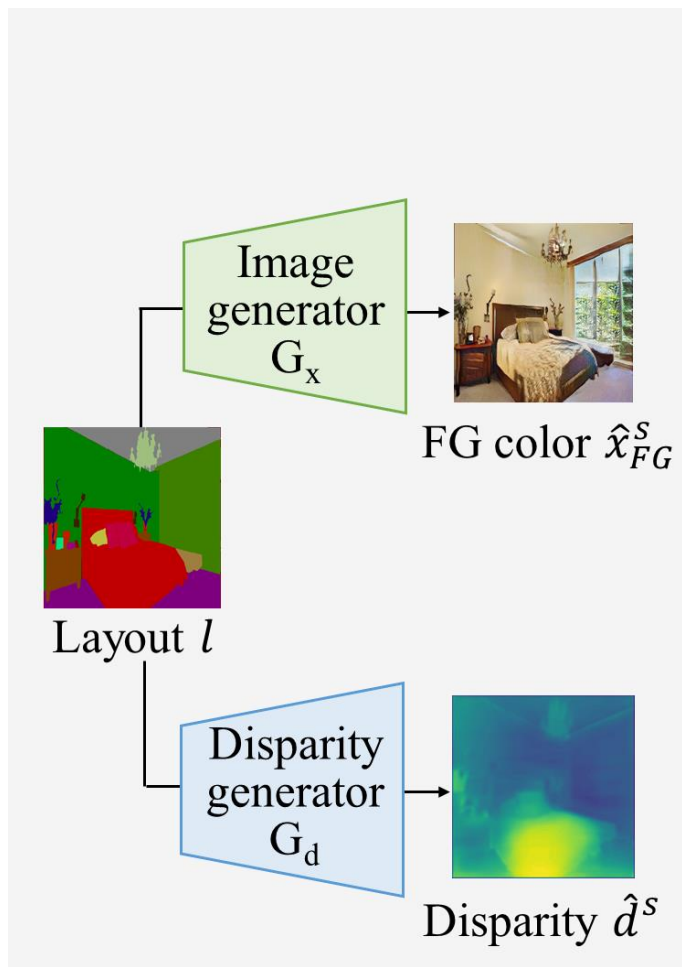
(b) MPI prediction



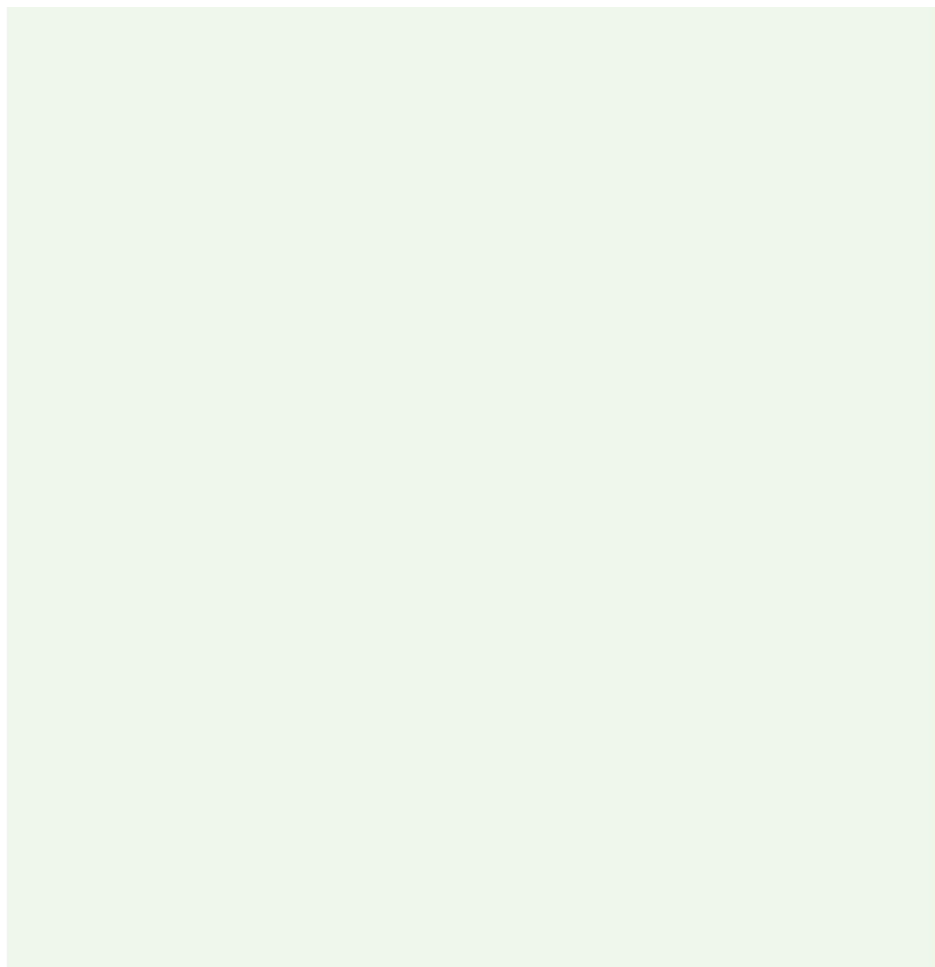
(c) Novel view synthesis



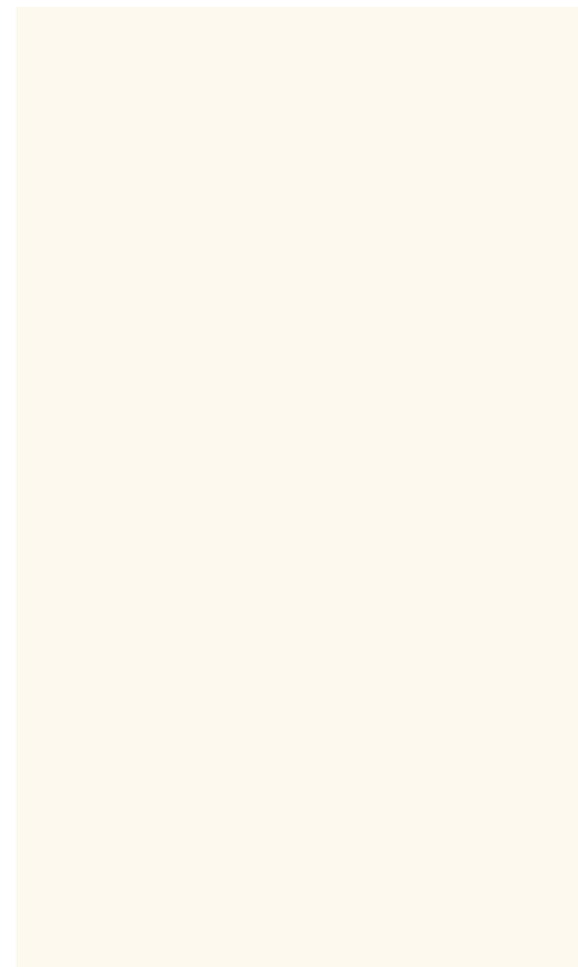
# Semantic view synthesis framework



(a) Image/disparity generation



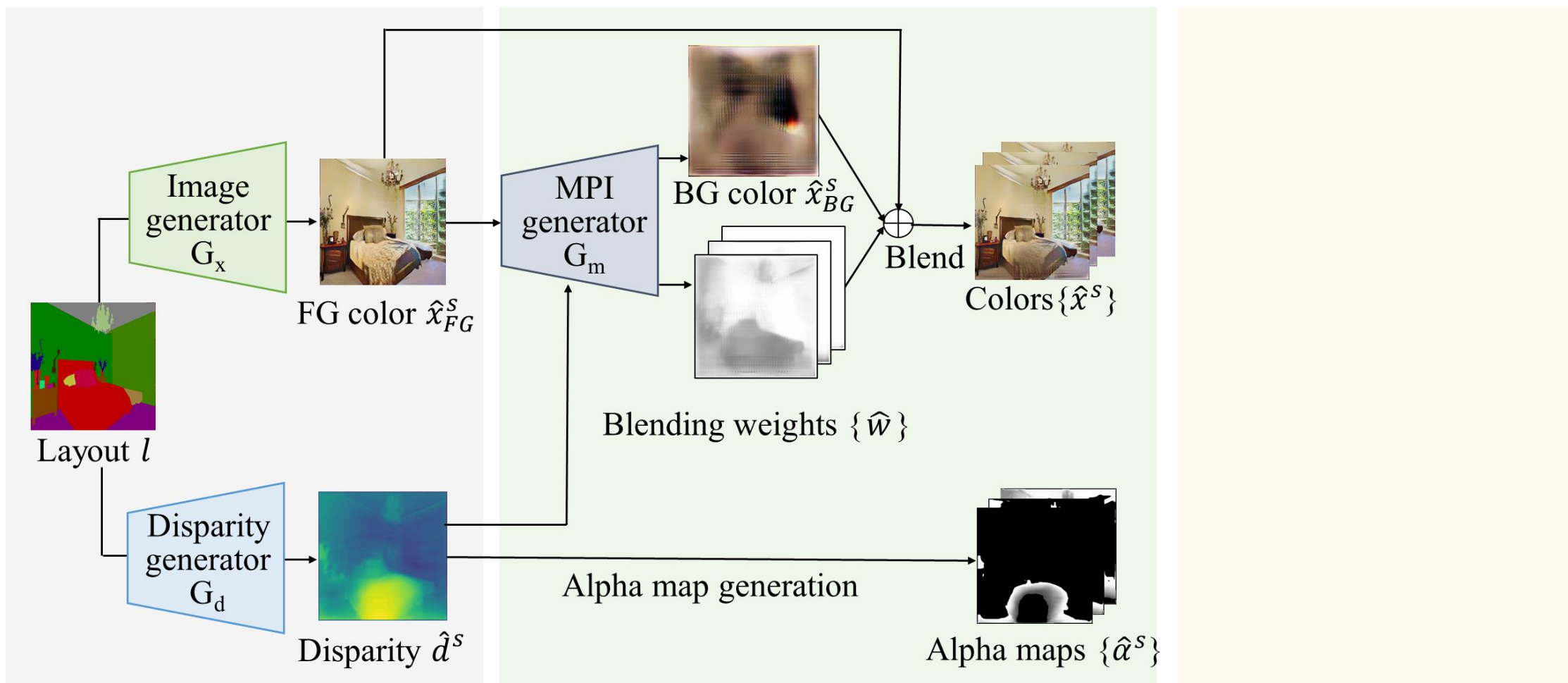
(b) MPI prediction



(c) Novel view synthesis



# Semantic view synthesis framework



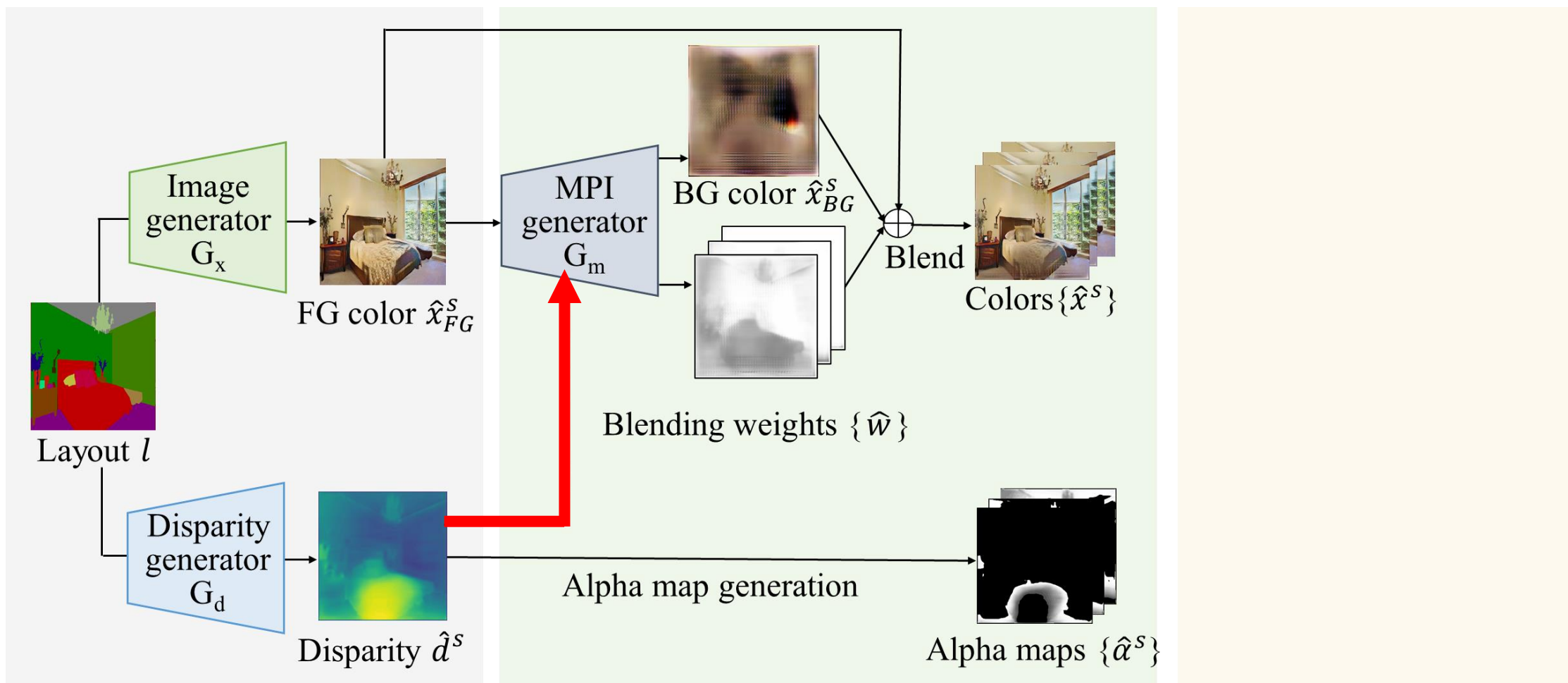
(a) Image/disparity generation

(b) MPI prediction

(c) Novel view synthesis



# Semantic view synthesis framework



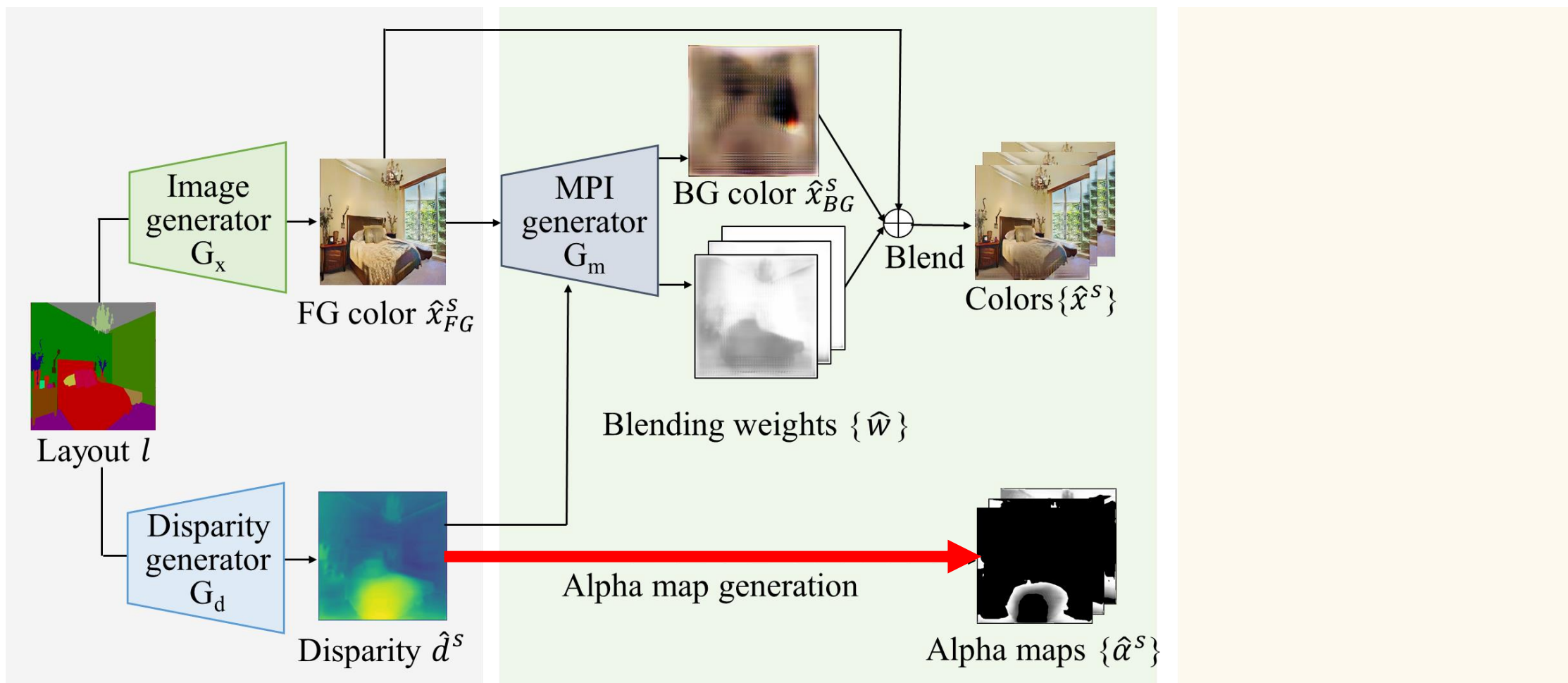
(a) Image/disparity generation

(b) MPI prediction

(c) Novel view synthesis



# Semantic view synthesis framework



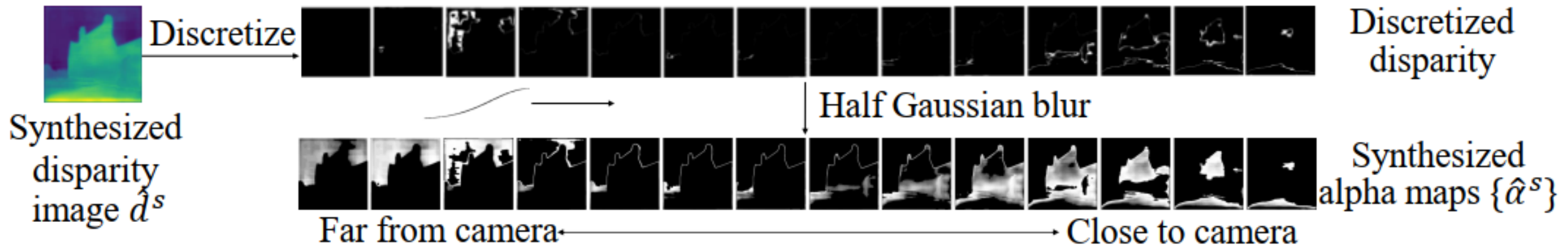
(a) Image/disparity generation

(b) MPI prediction

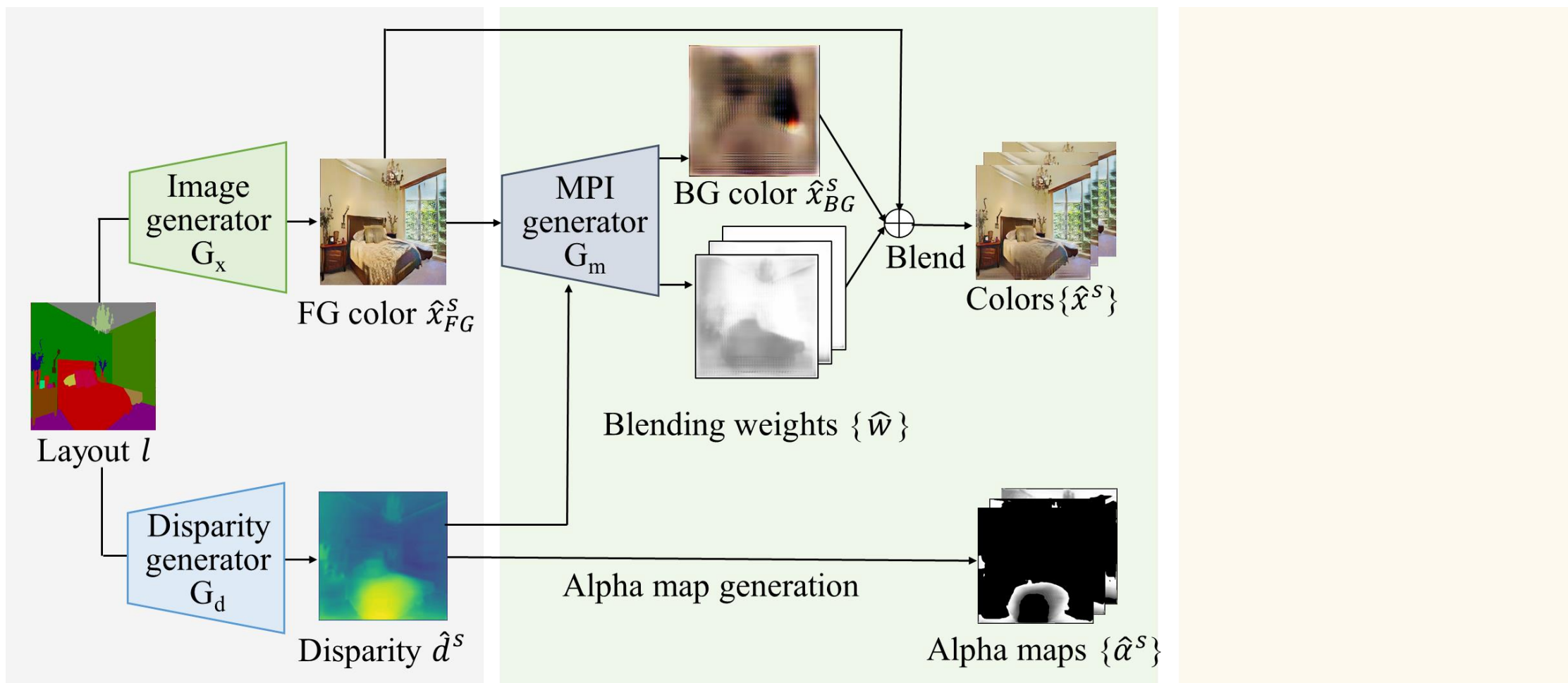
(c) Novel view synthesis



# Alpha images



# Semantic view synthesis framework



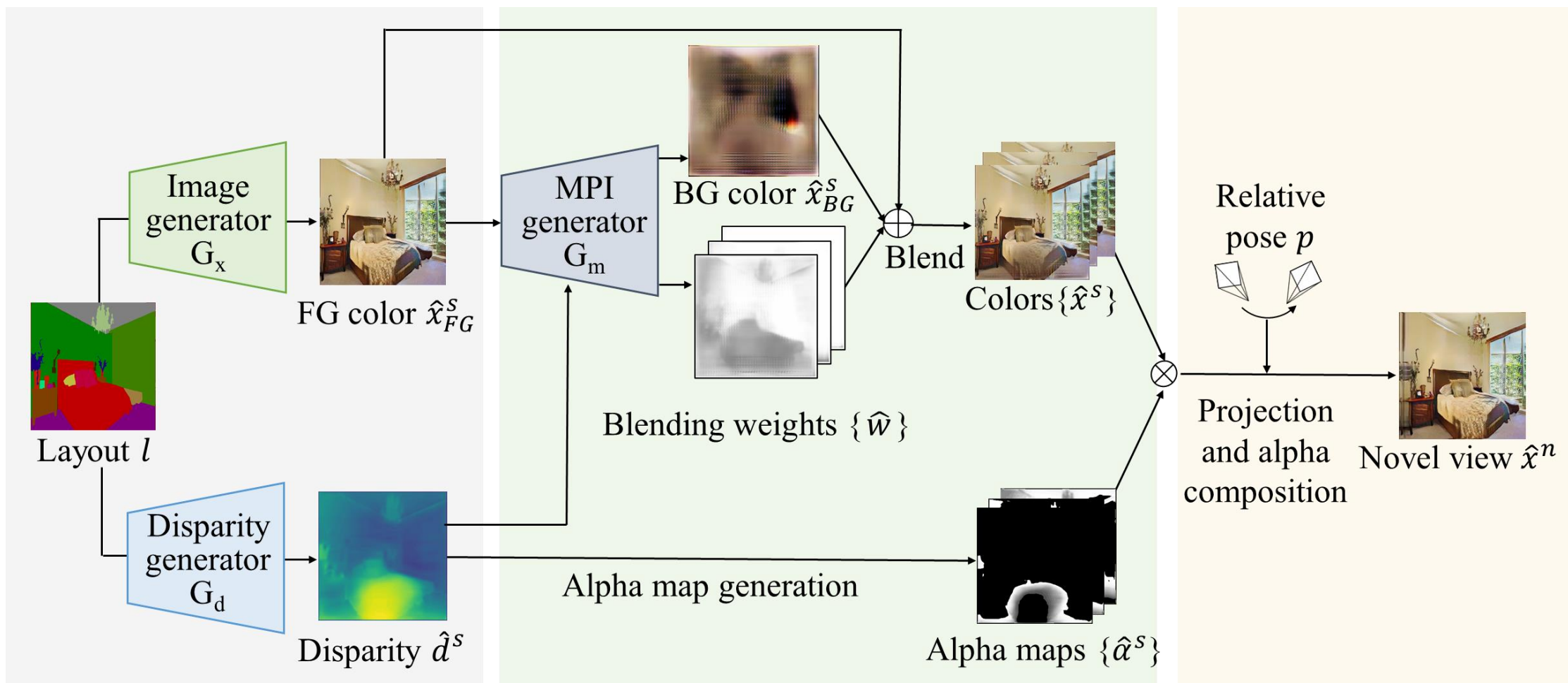
(a) Image/disparity generation

(b) MPI prediction

(c) Novel view synthesis



# Semantic view synthesis framework



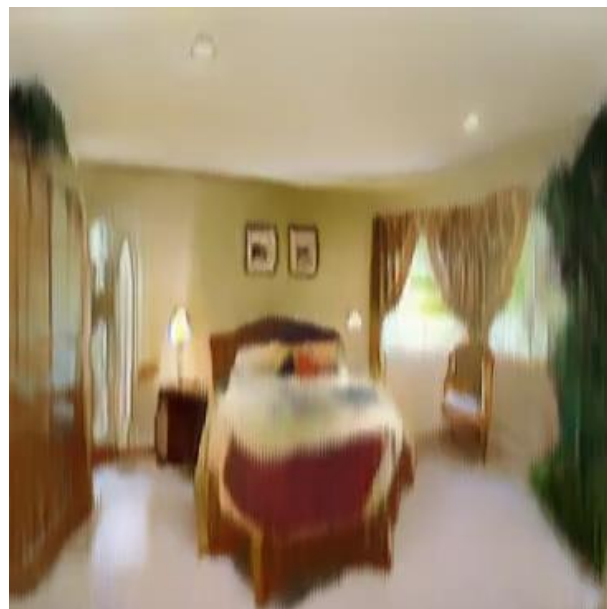
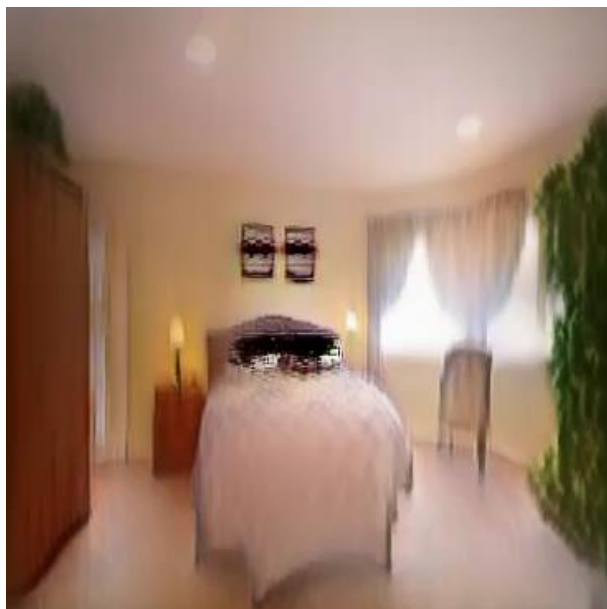
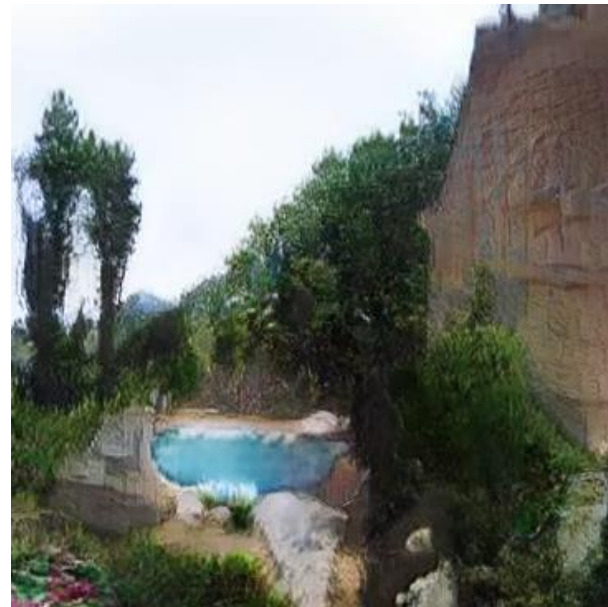
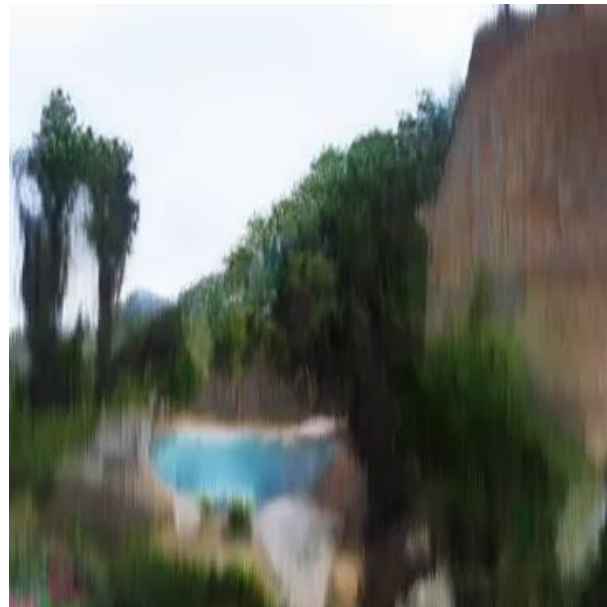
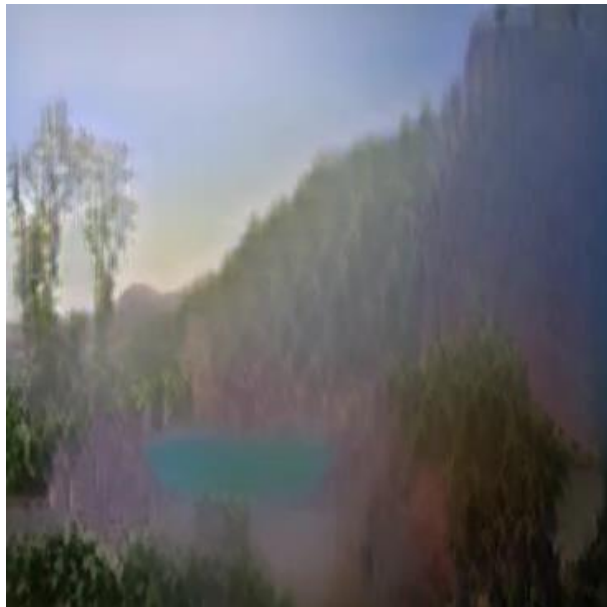
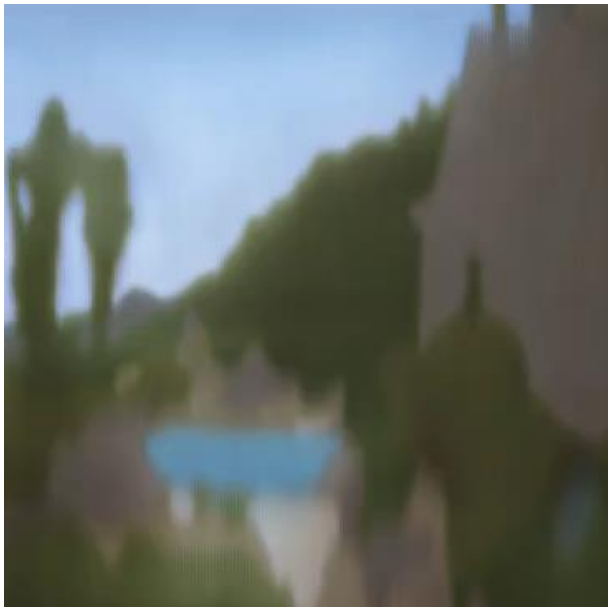
(a) Image/disparity generation

(b) MPI prediction

(c) Novel view synthesis







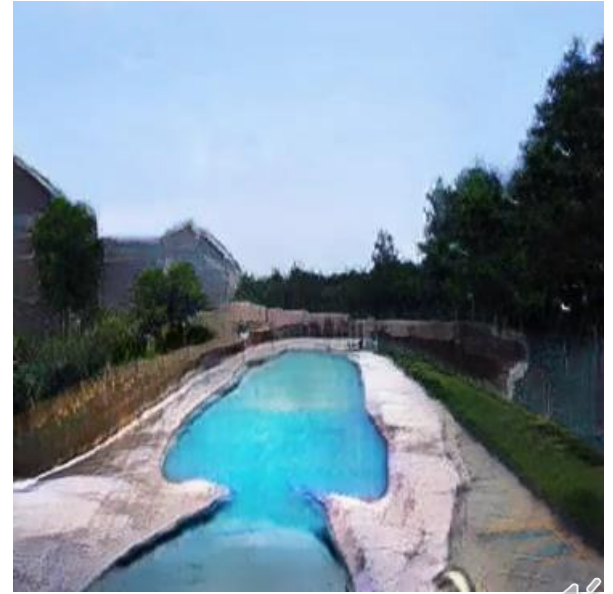
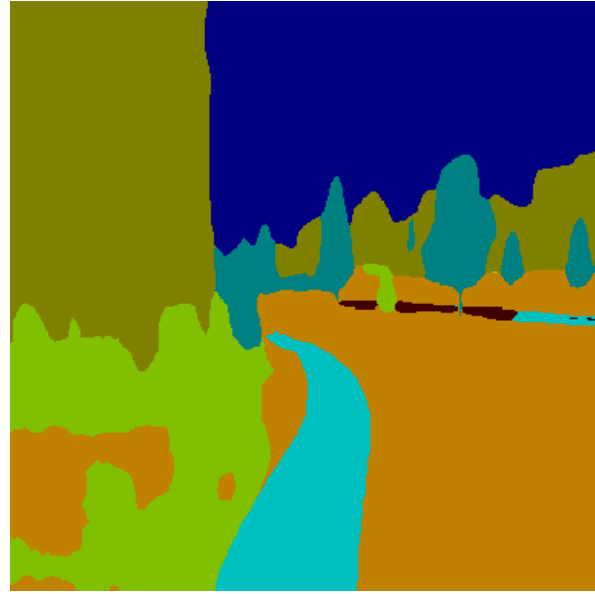
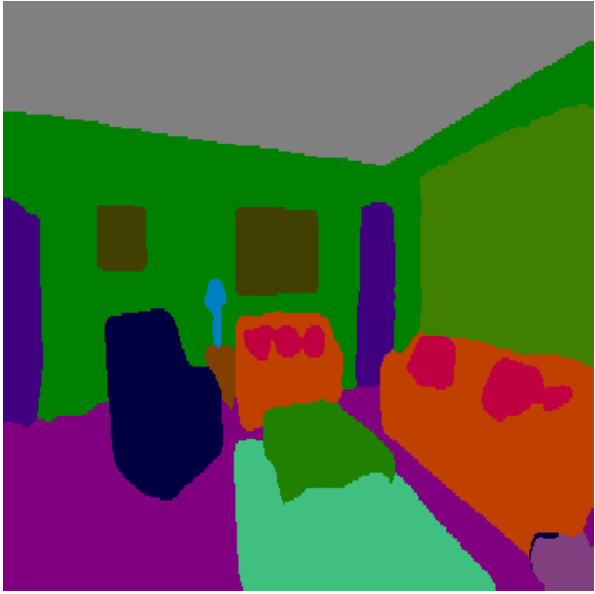
Direct (U-net)

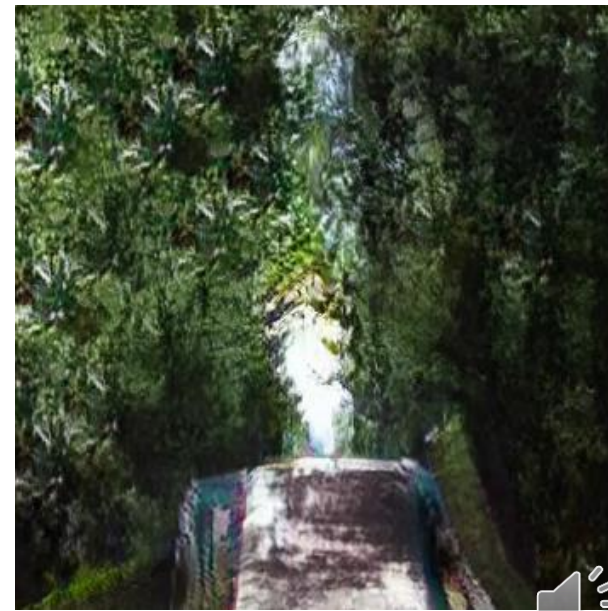
Direct (SPADE)

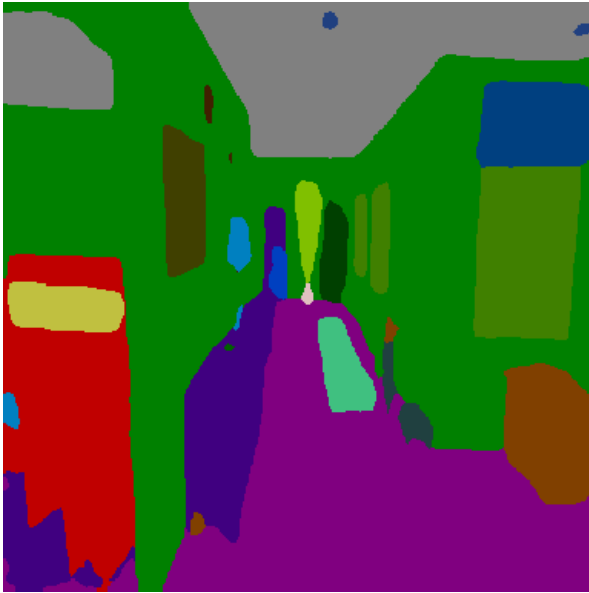
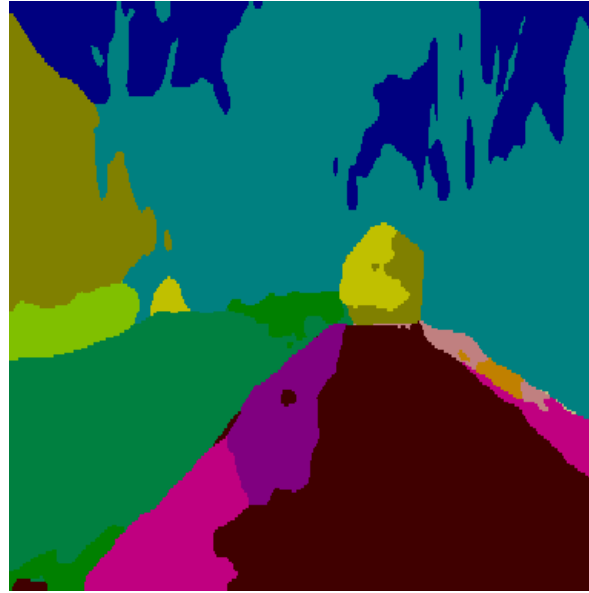
Cascade (MPI)

Ours

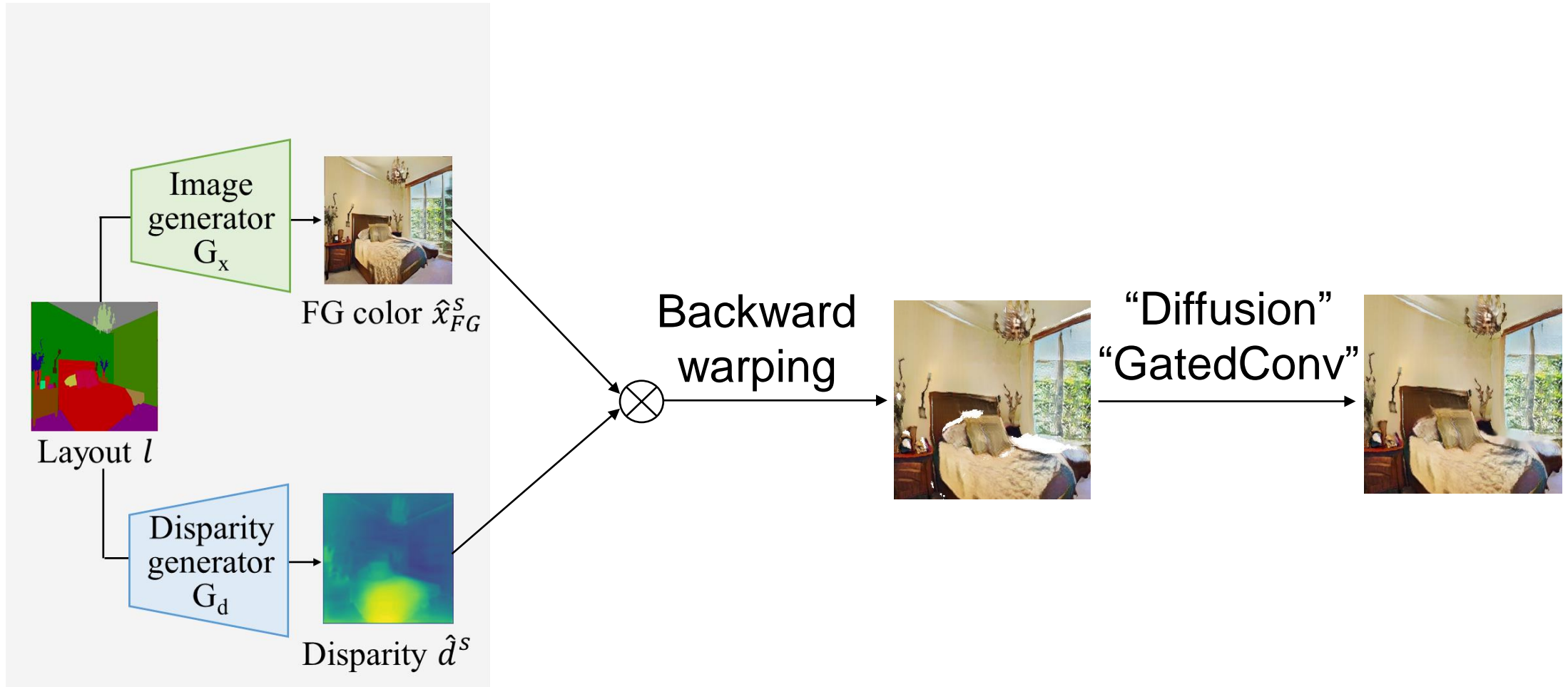








# Alternative designs





FG only



Ours



Diffusion



GatedConv



# Conclusions



<https://hhsinping.github.io/svs/>

## Semantic view synthesis

Semantic label map  $\rightarrow$  novel view synthesis

## Two-step approach

1. Predicting color and depth of the visible surface
2. Inferring the MPI scene representation

