

Learning to Synthesize Motion Blur

CVPR 2019

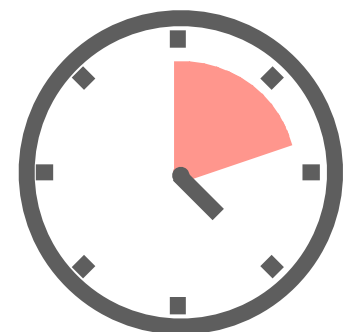
Tim Brooks and Jon Barron



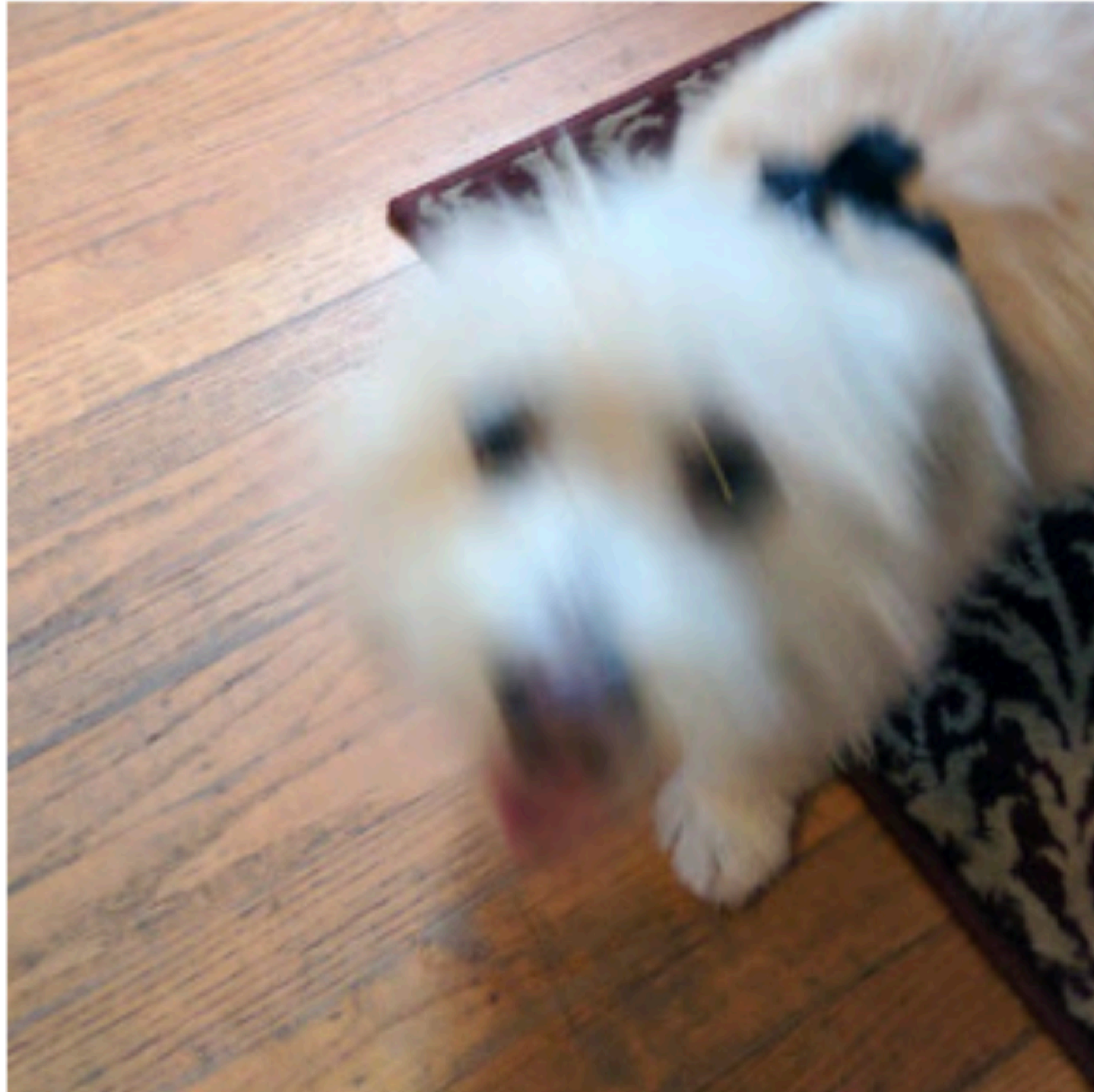
Motion During Exposure Causes Blur



Motion During Exposure Causes Blur



Accidental Motion Blur



Purposeful Motion Blur



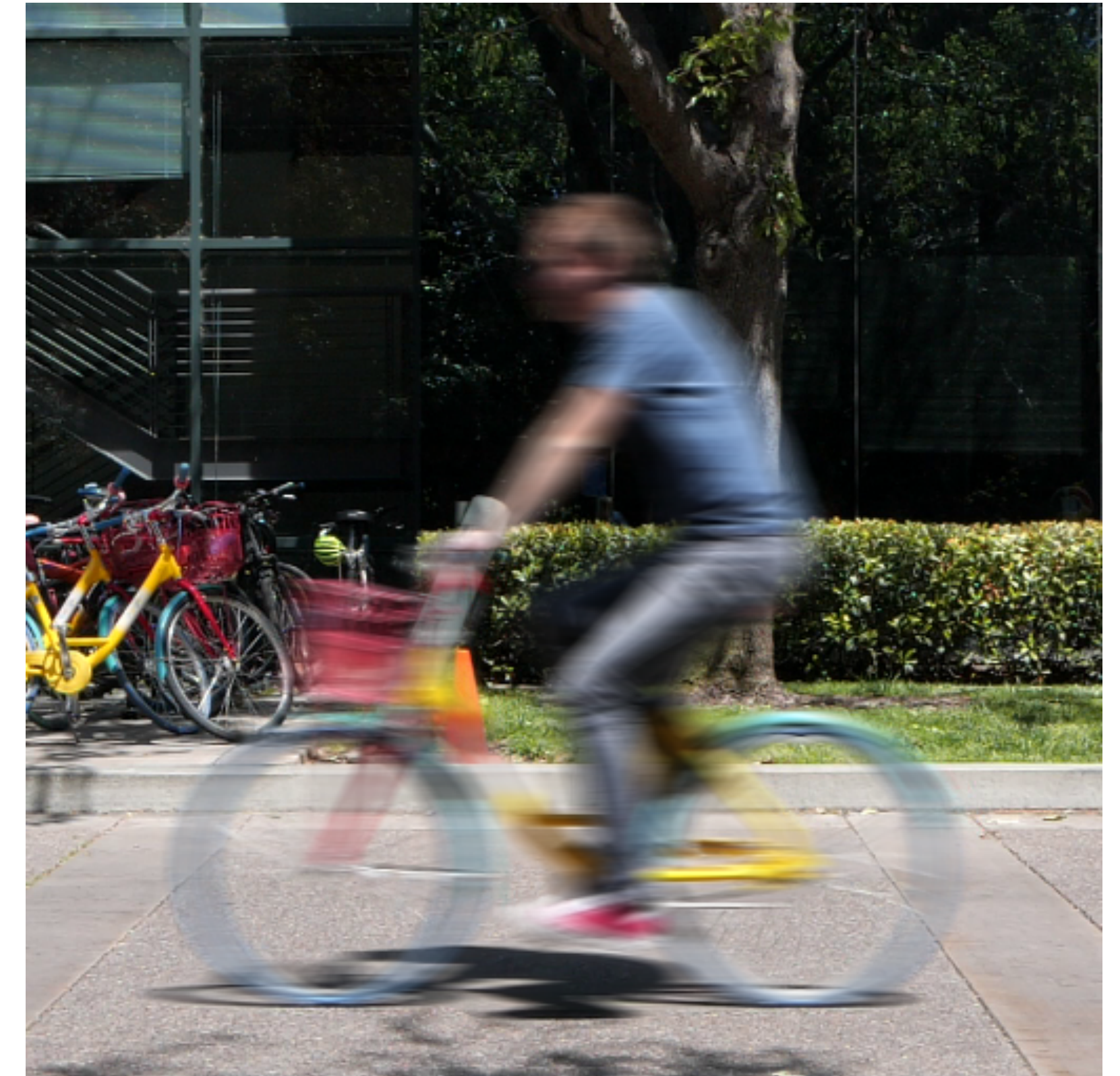
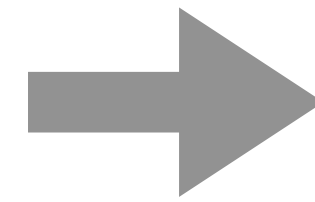
Synthetic Motion Blur



Input Image 1

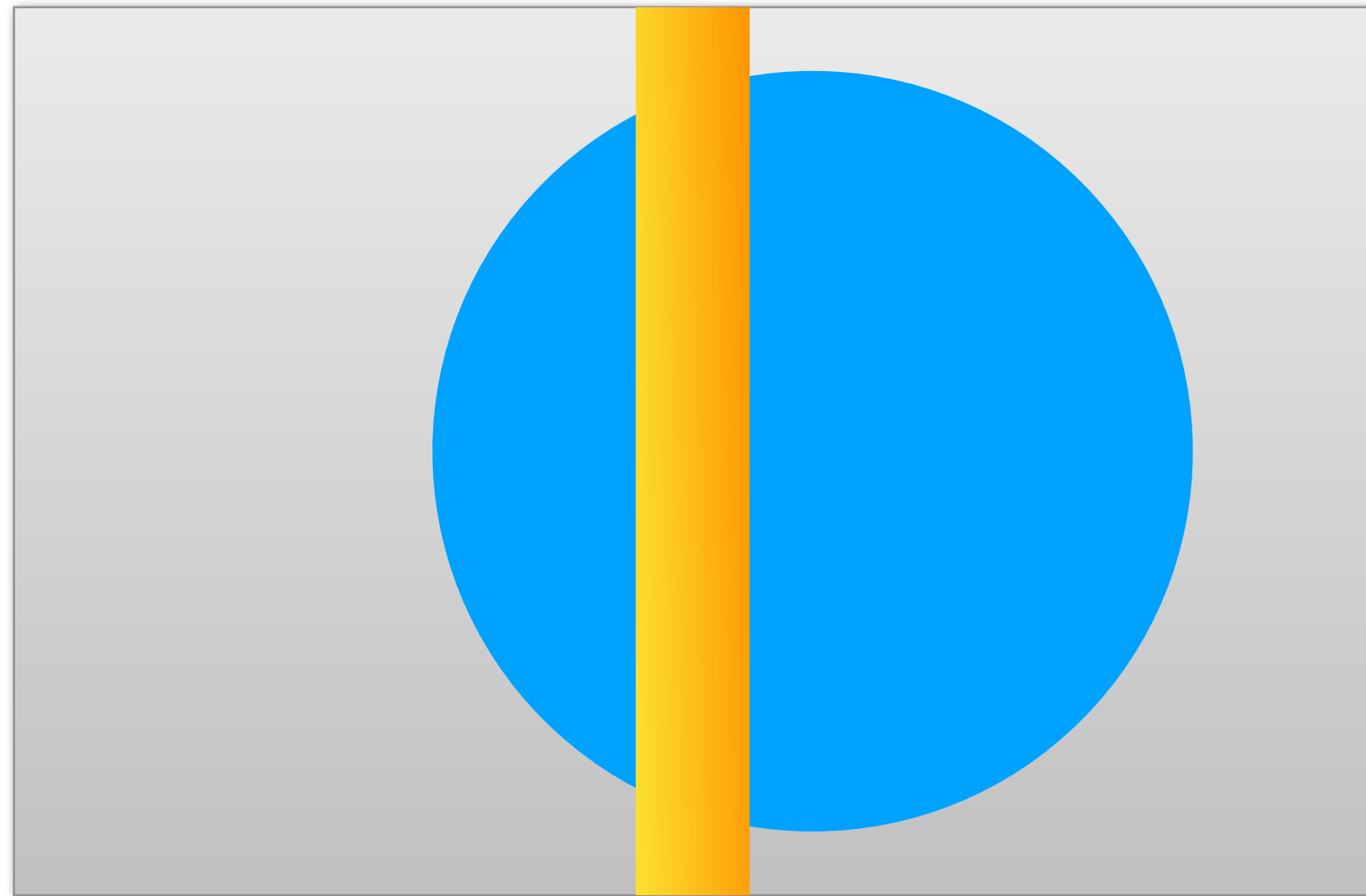
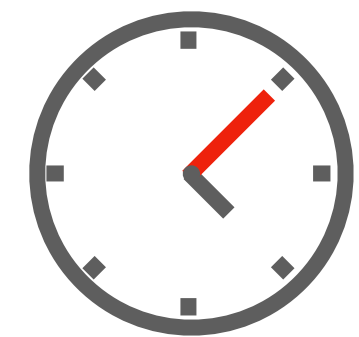
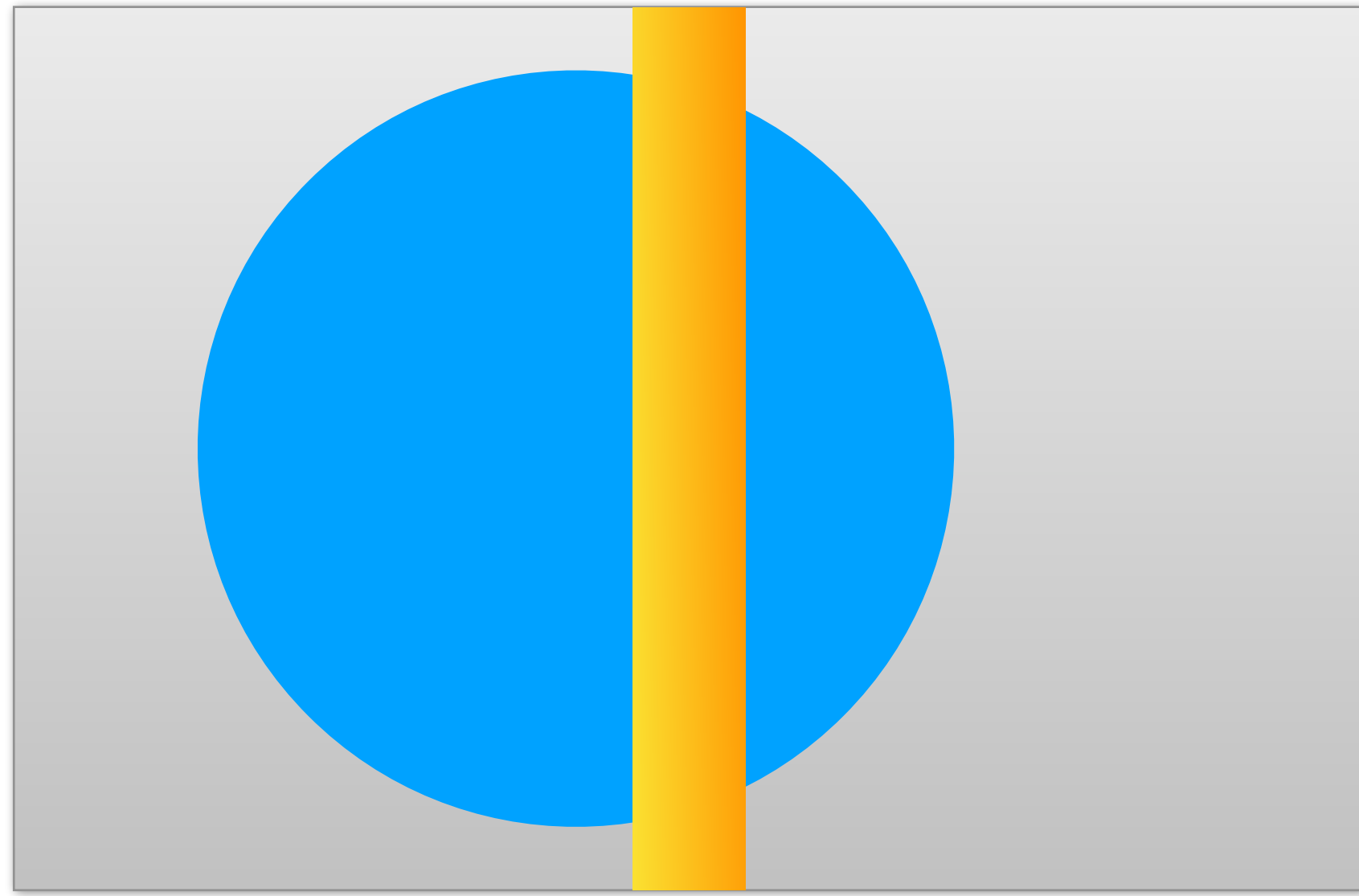


Input Image 2

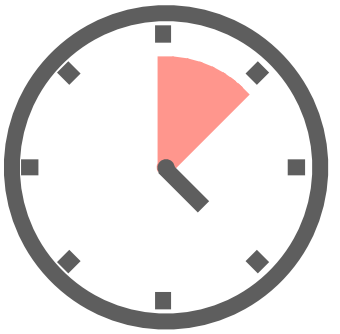
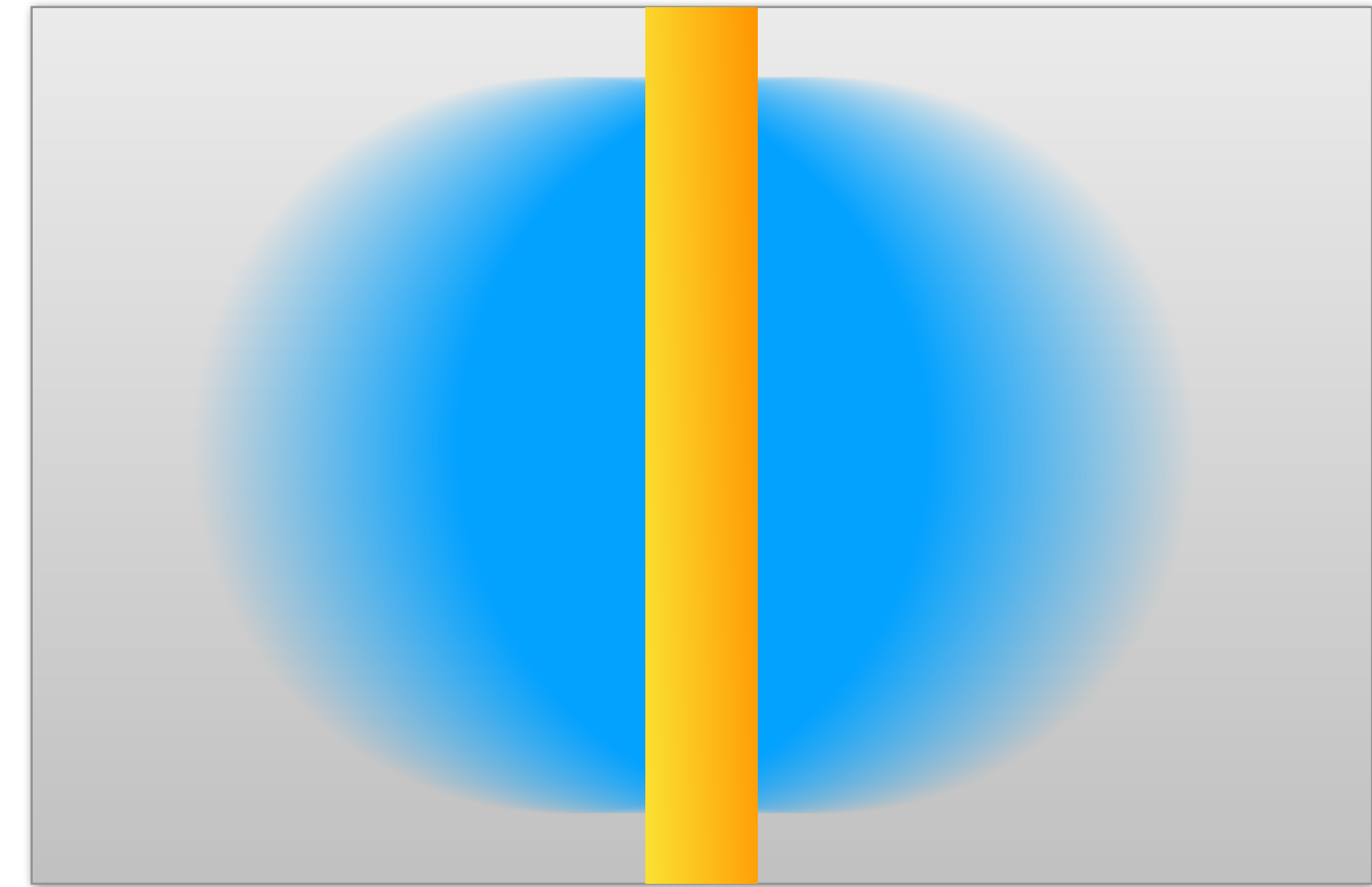


Output Image

Toy Example with Occlusion

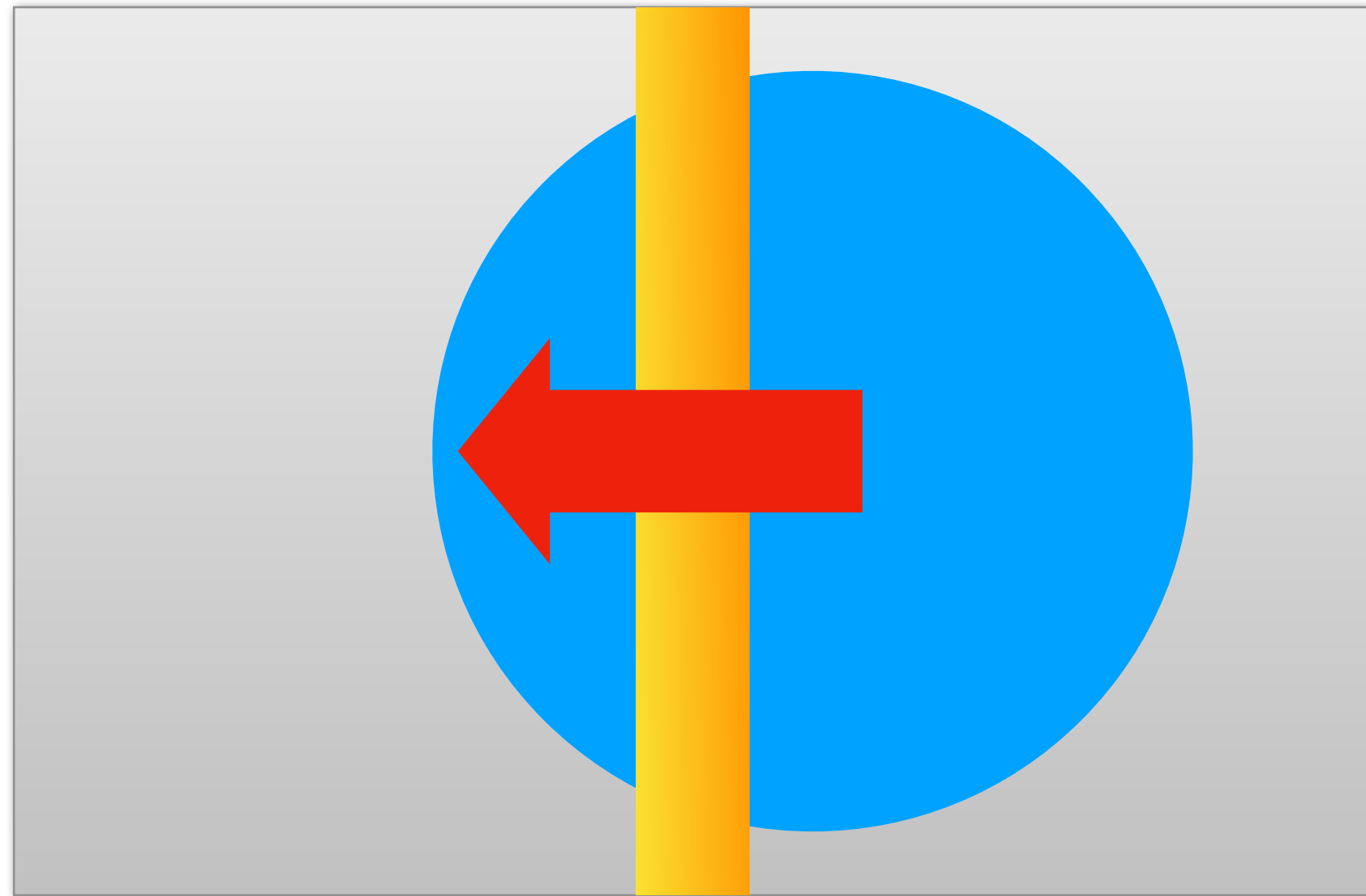
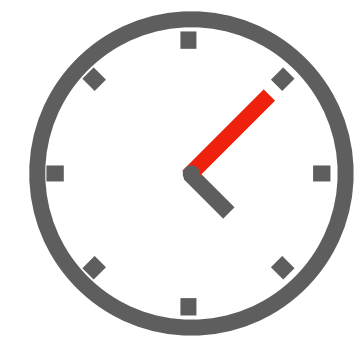
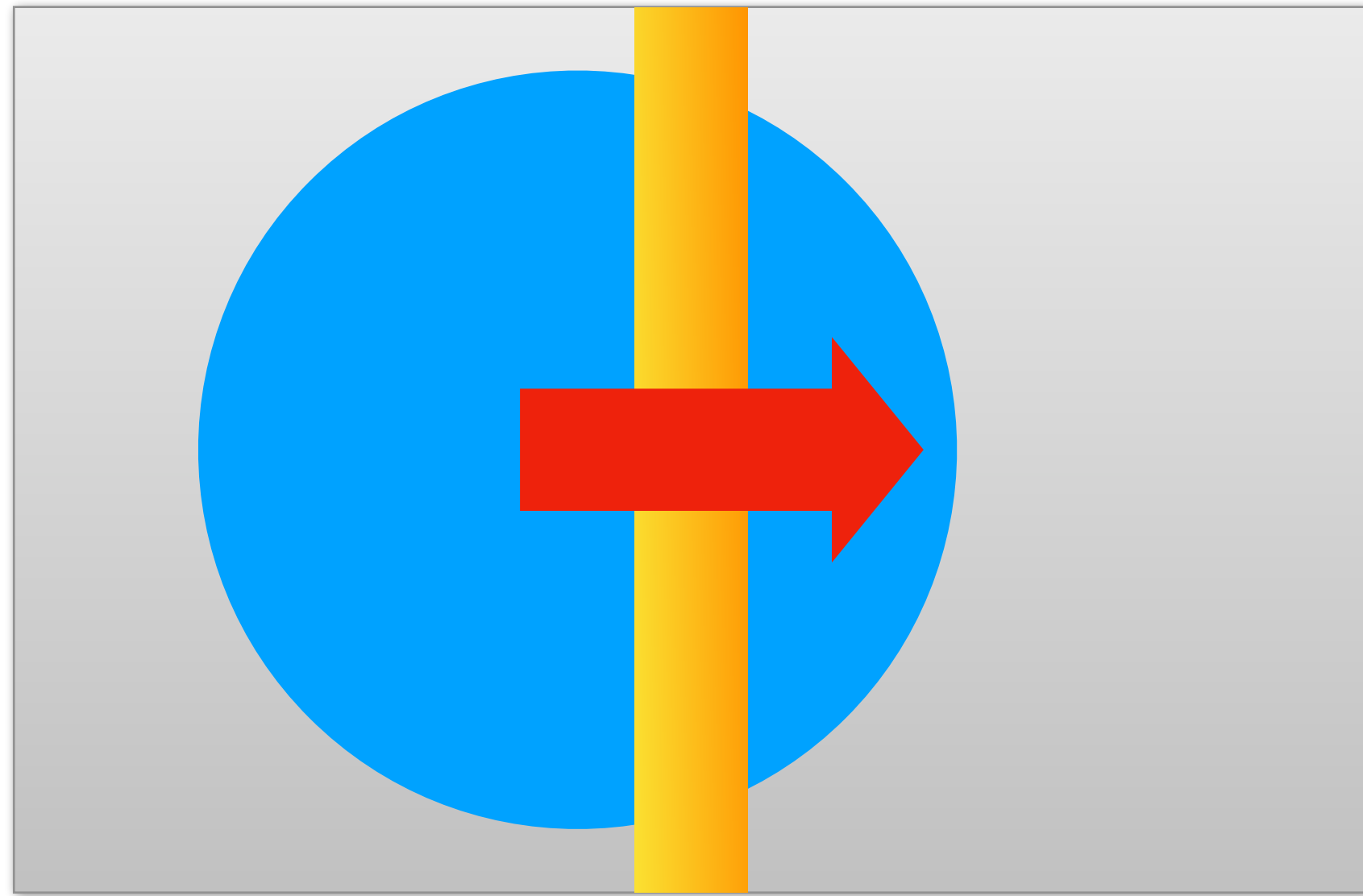


Input Images

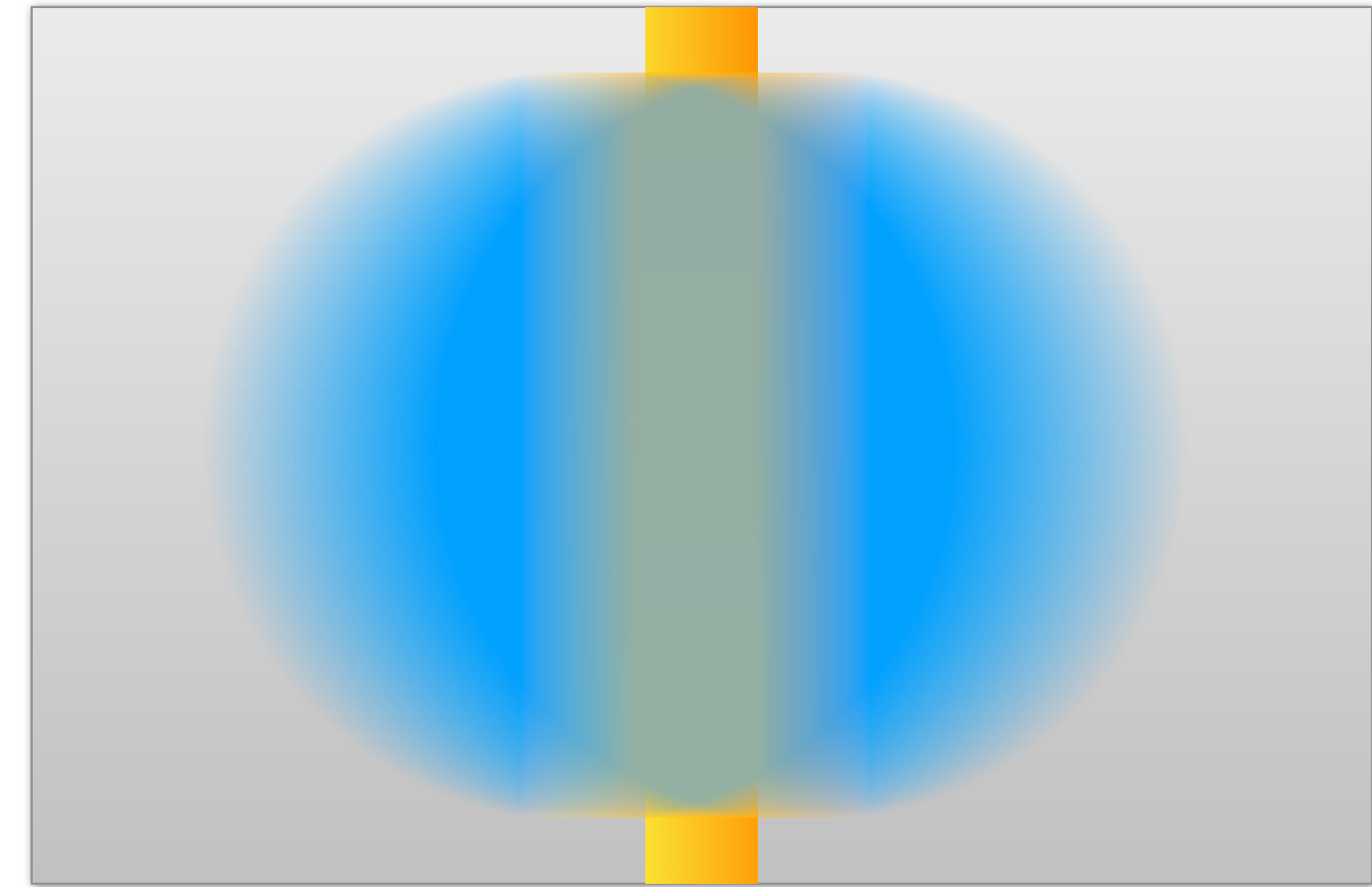


Ideal Motion Blur

Toy Example with Occlusion

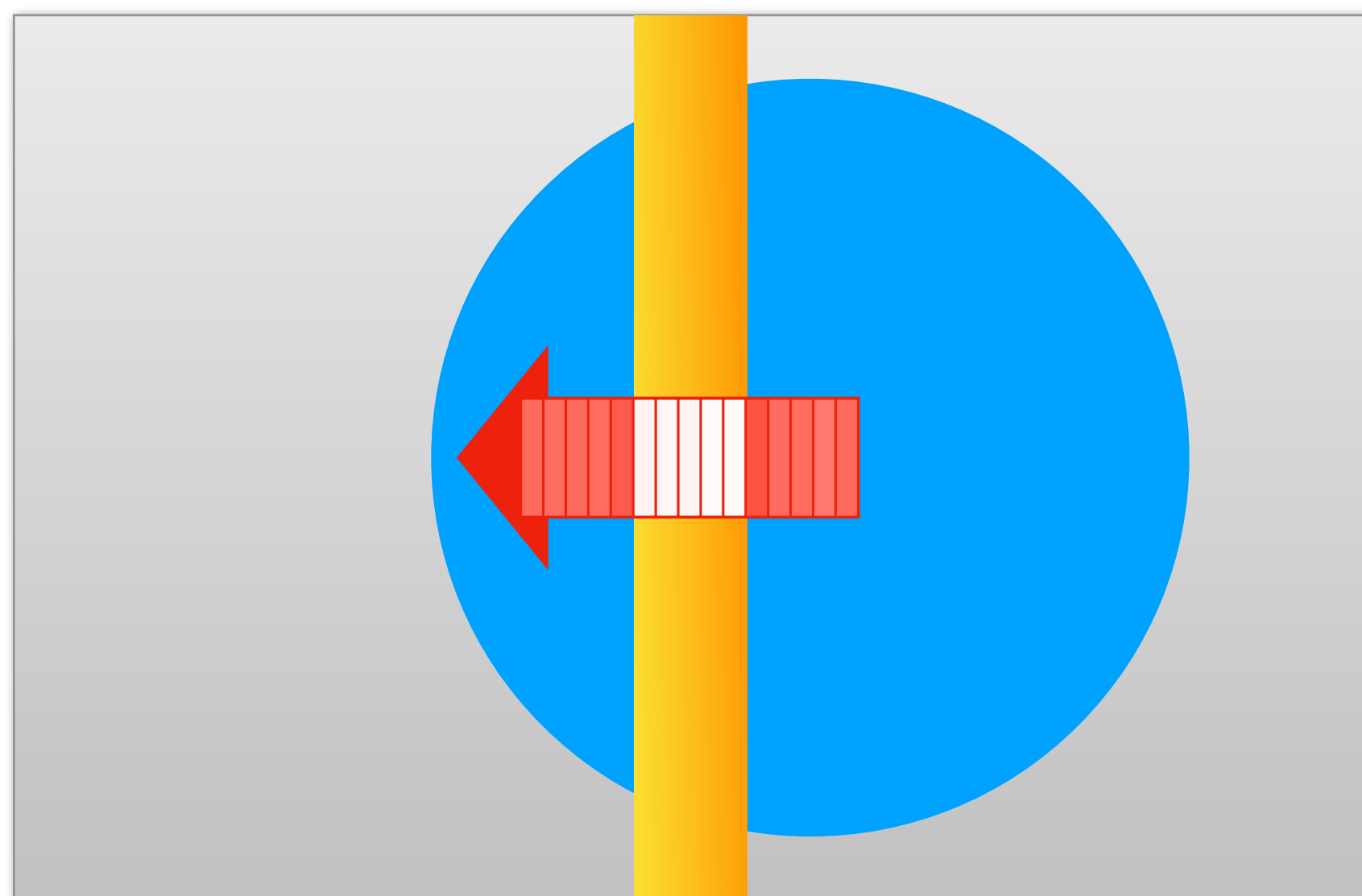
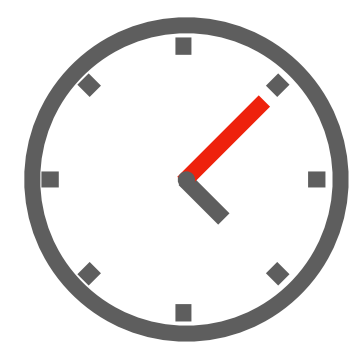
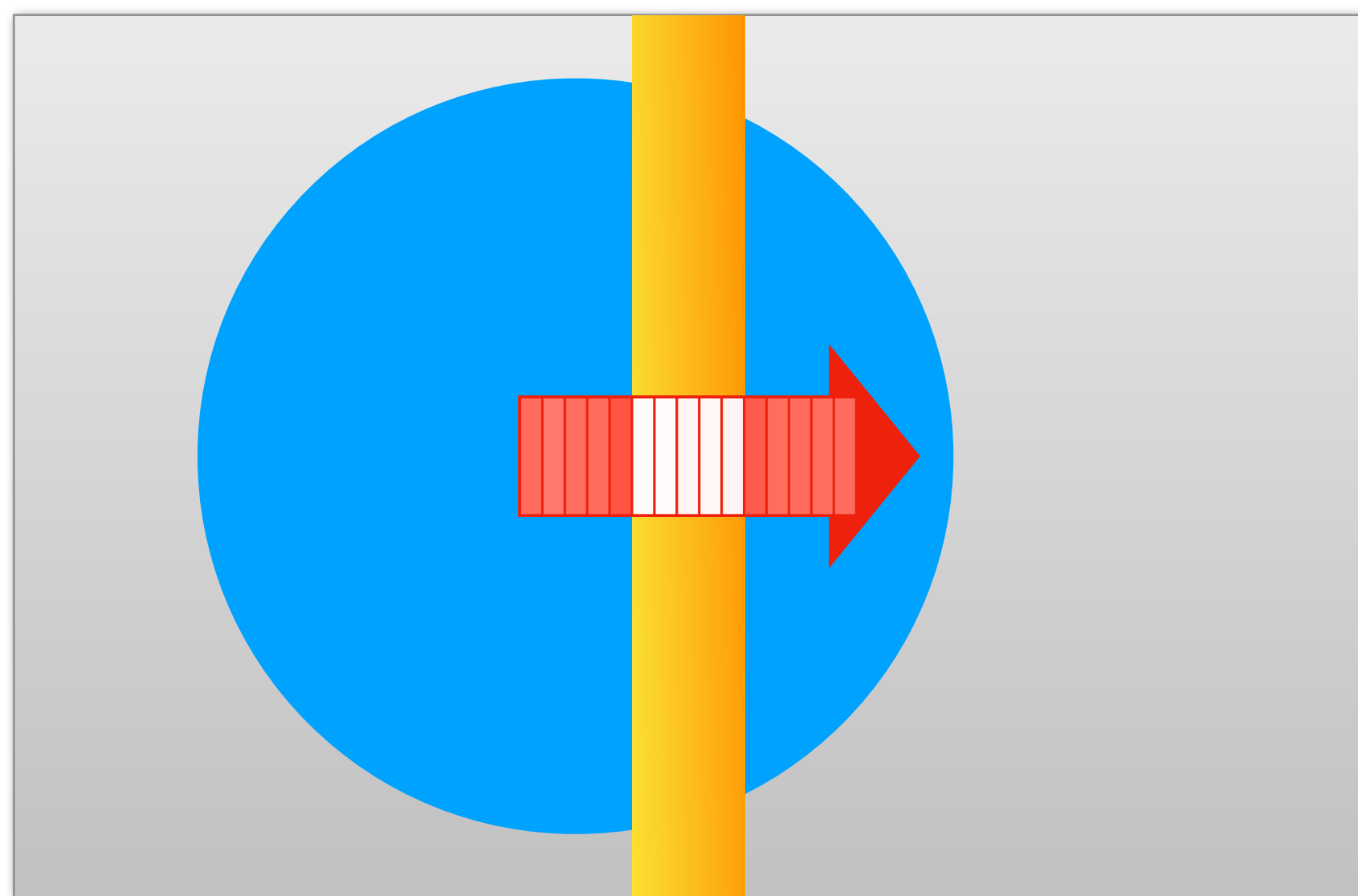
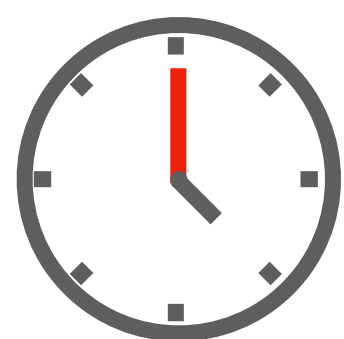


Optical Flow

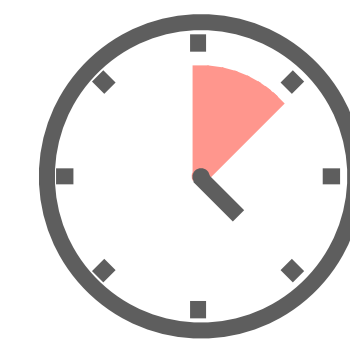
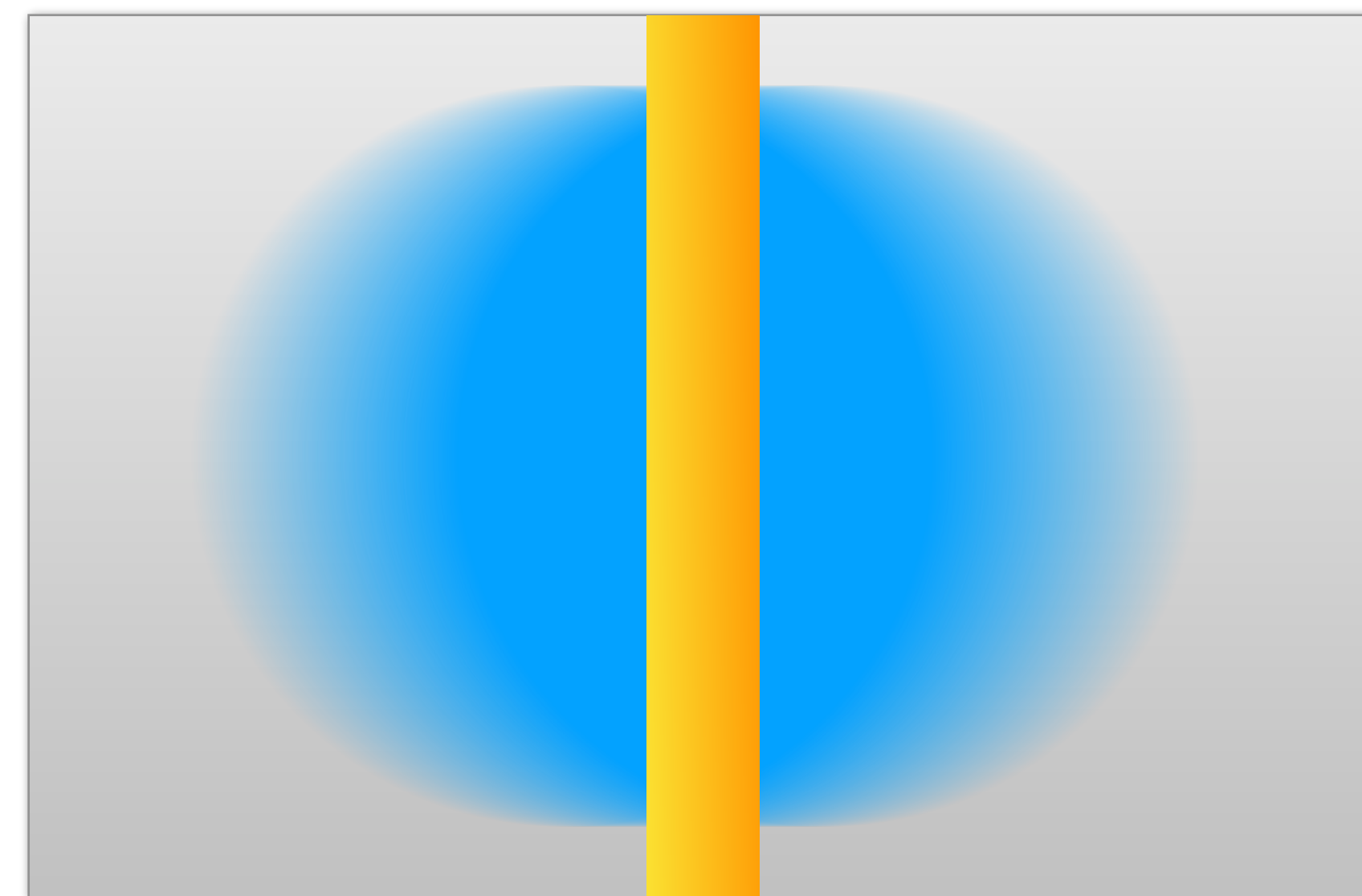


Output

Toy Example with Occlusion

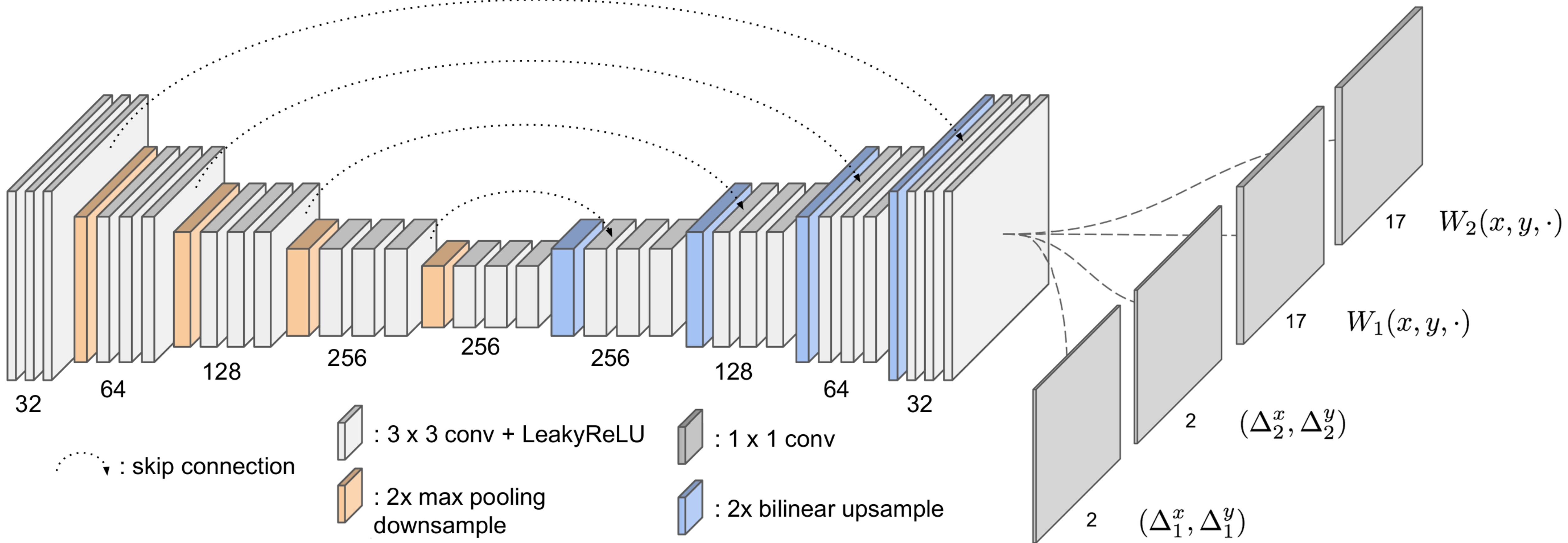


Line Prediction (Our Model)



Output

Line Prediction Network



Training Data Generation

Recursive Frame Interpolation



Average

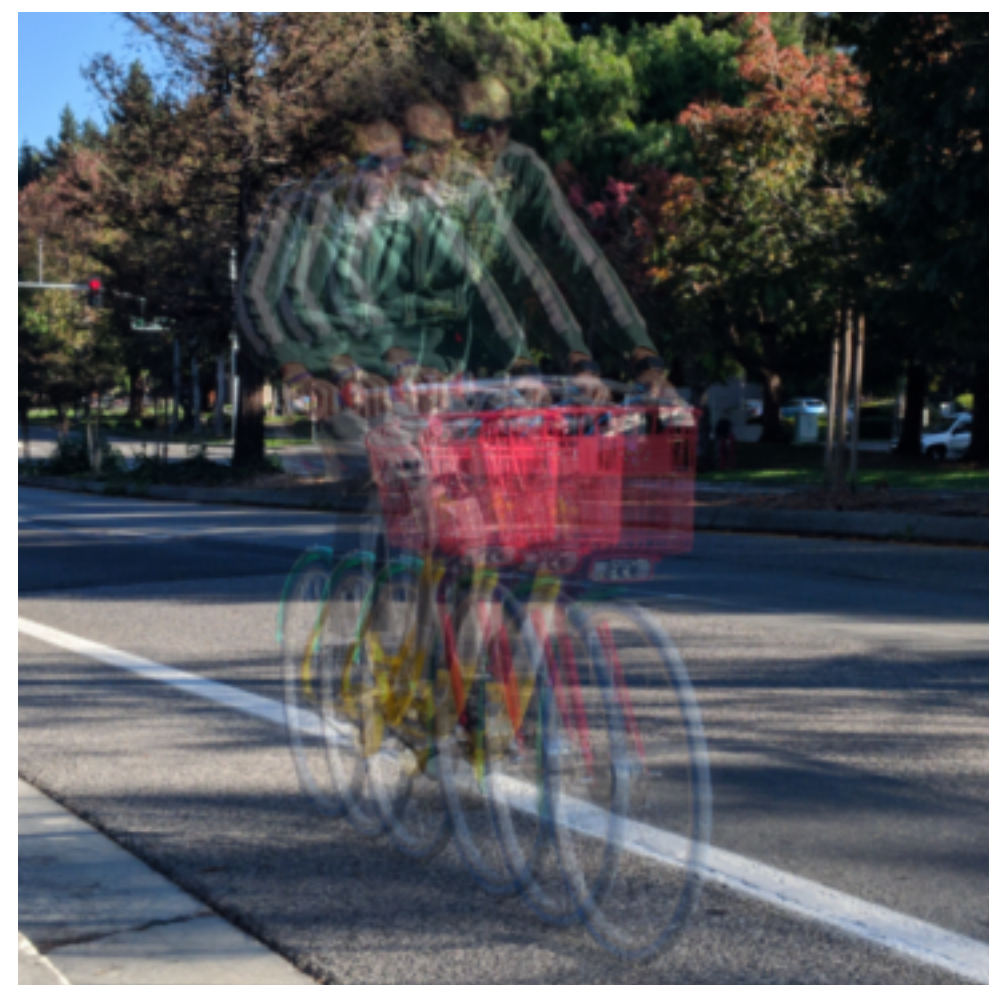


Training Data Generation

Recursive Frame Interpolation



Average

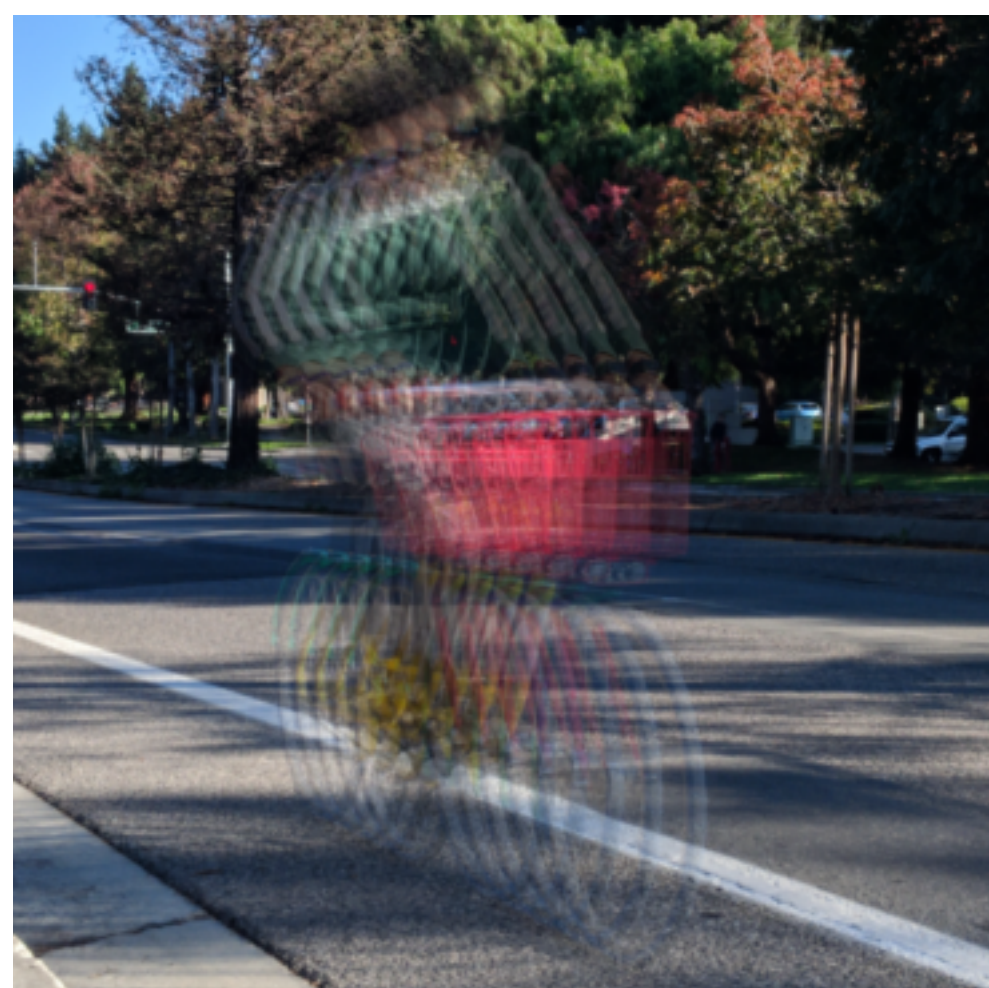


Training Data Generation

Recursive Frame Interpolation



Average

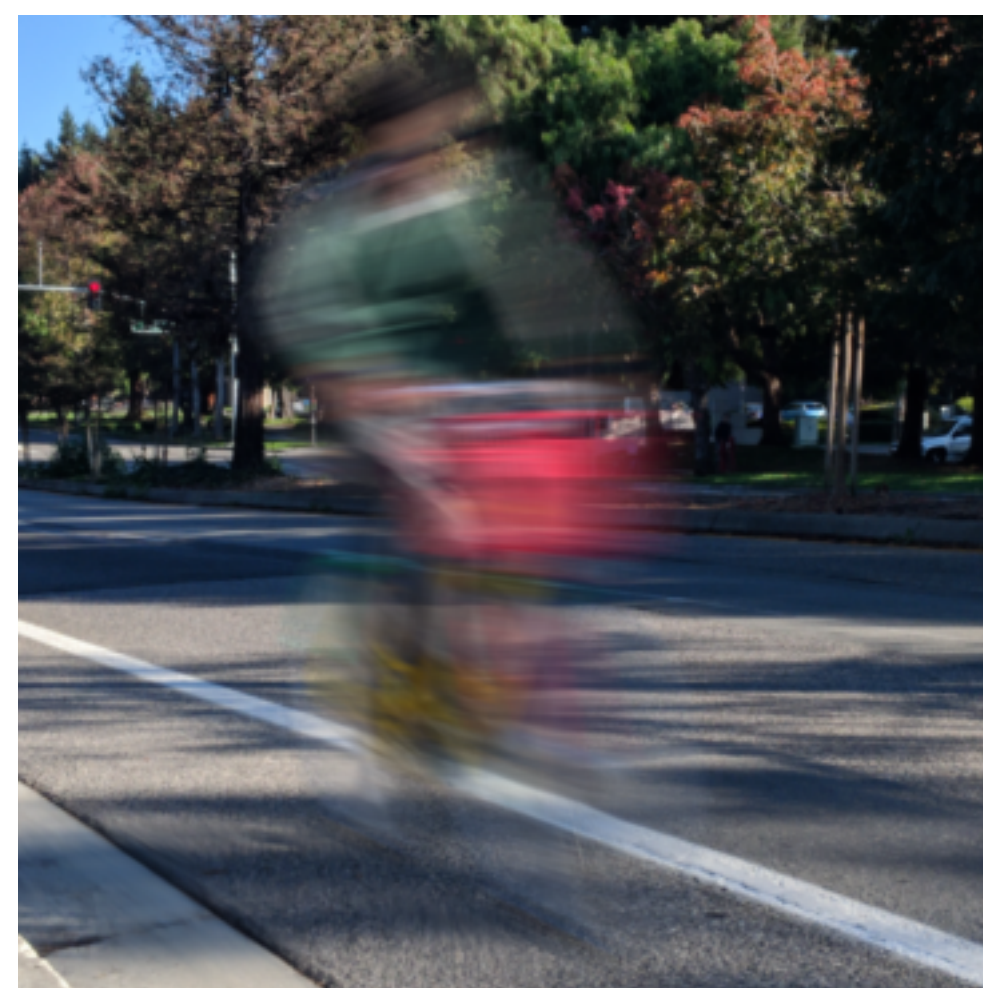


Training Data Generation

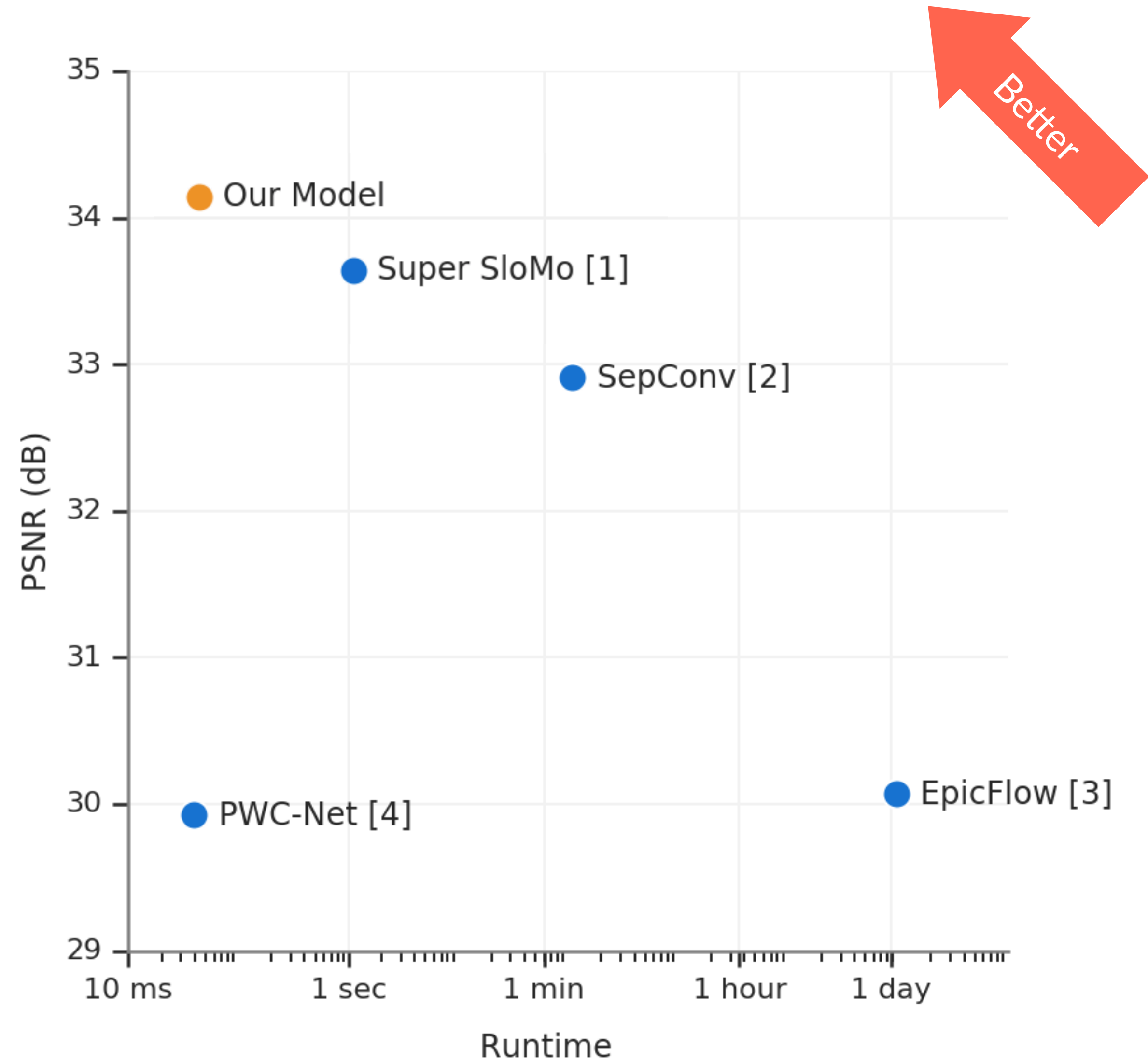
Recursive Frame Interpolation



Average



Results



- [1] Jiang et al., CVPR 2018
- [2] Niklaus et al., ICCV 2017
- [3] Revaud et al., CVPR 2015
- [4] Sun et. al, CVPR 2018

Handling Complex Motions



Input Images (Averaged)



Our Model

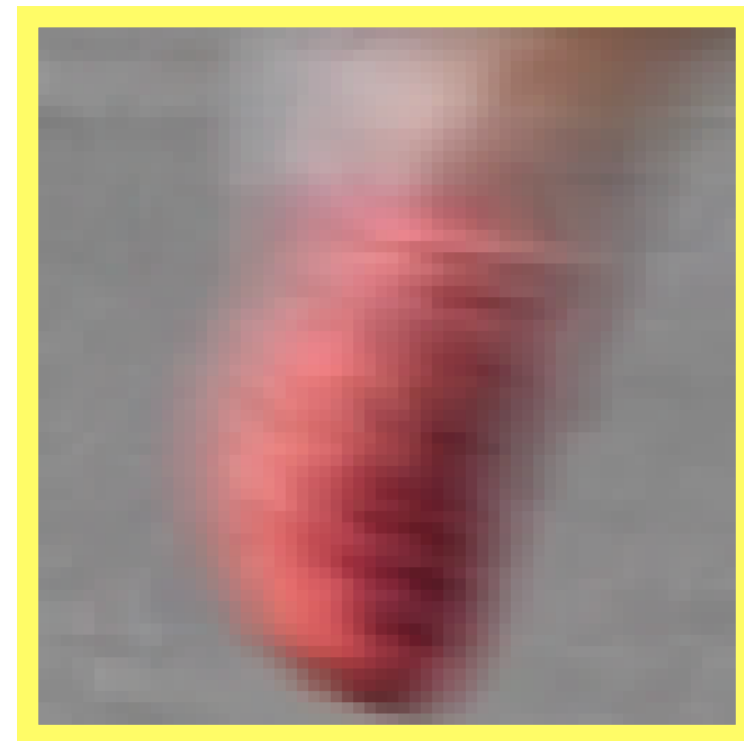
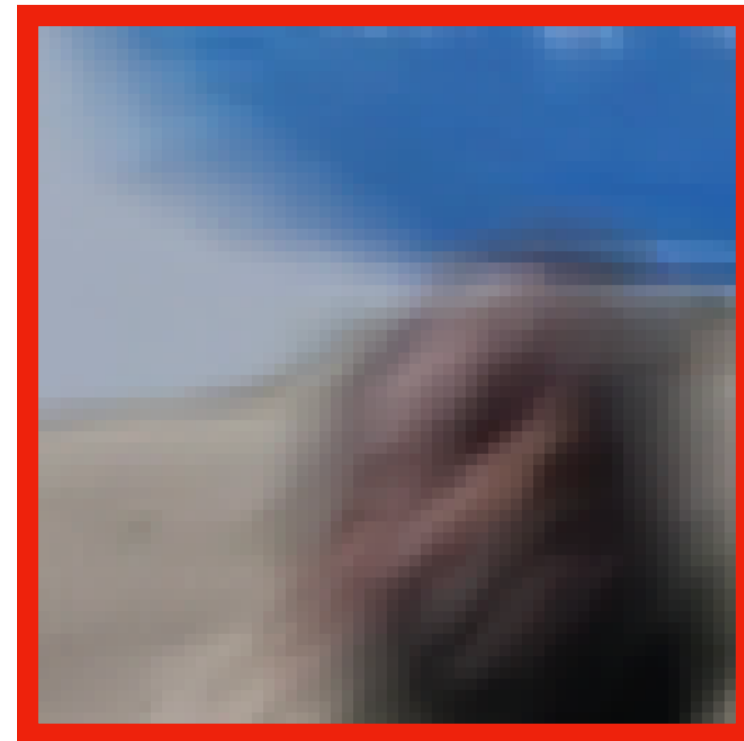


Optical Flow (PWC-Net) [1]

Handling Complex Motions



Our Model



Optical Flow (PWC-Net) [1]

Results



Results



Results: Timelapse

Input Video
8x Speedup



Input Video
8x Speedup
+ Our Motion Blur



Thank You

More information:

timothybrooks.com/tech/motion-blur

Paper:

arxiv.org/abs/1811.11745

Open source code:

github.com/timothybrooks/motion-blur

