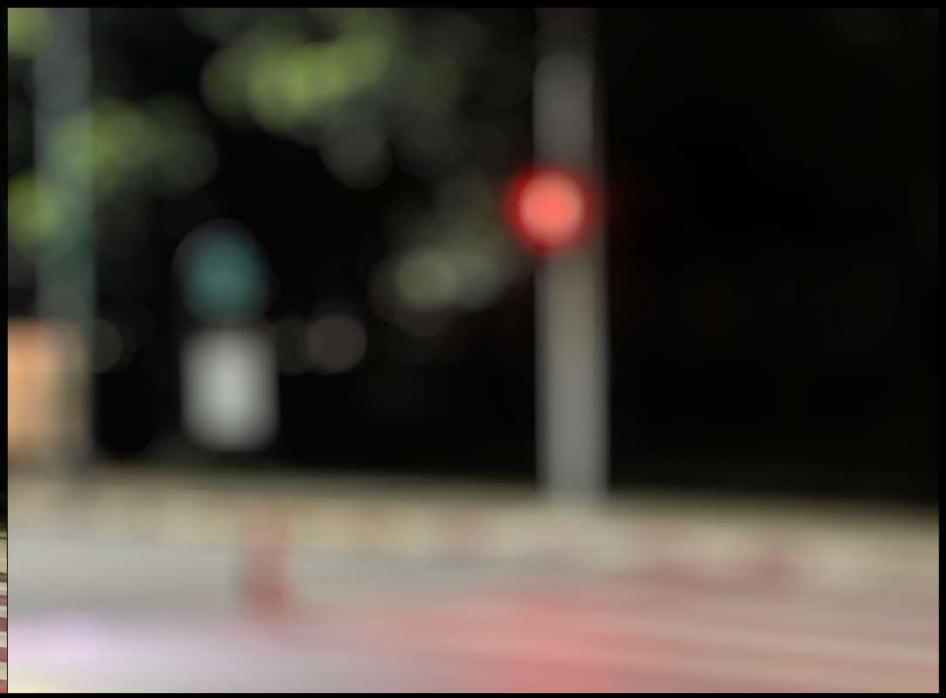
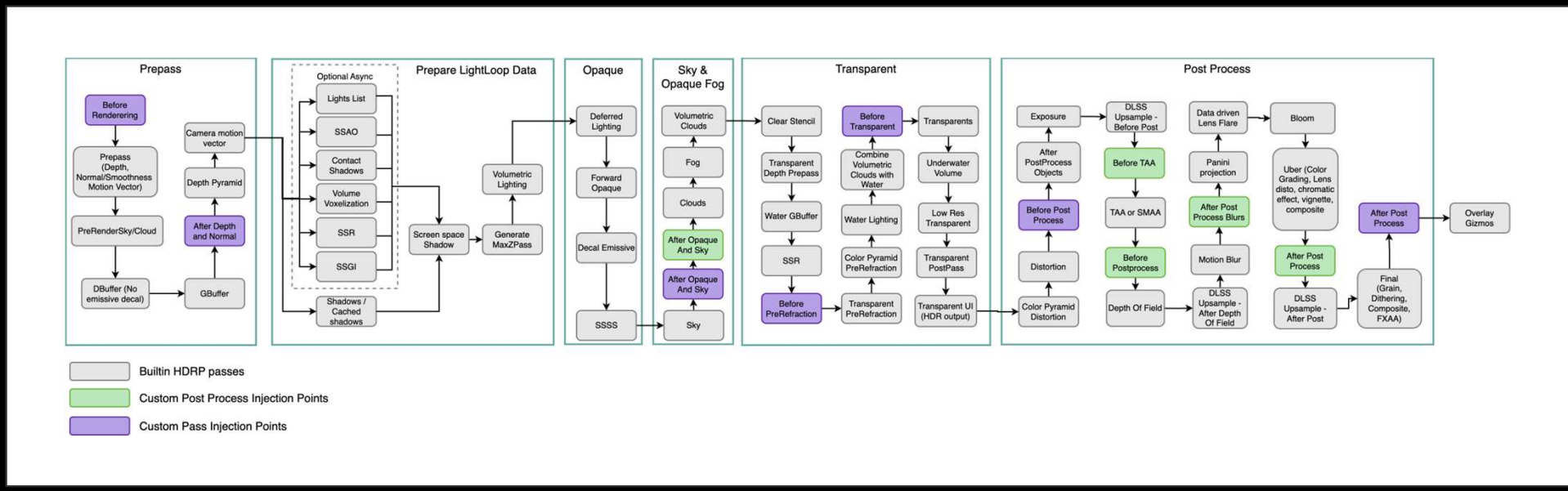
Circular Separable Convolution
~~Depth Of Field~~ Lens Blur

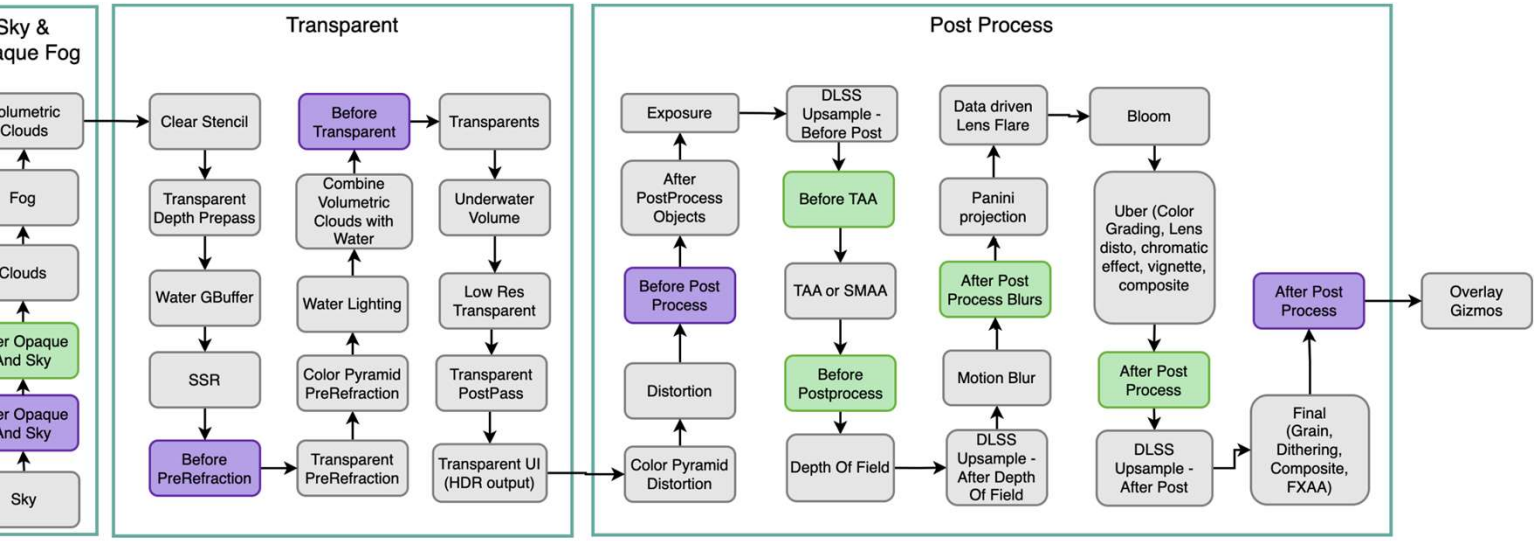
GPU COMPUTE SHADER IMPLEMENTATION IN ~~UNITY~~ MATLAB



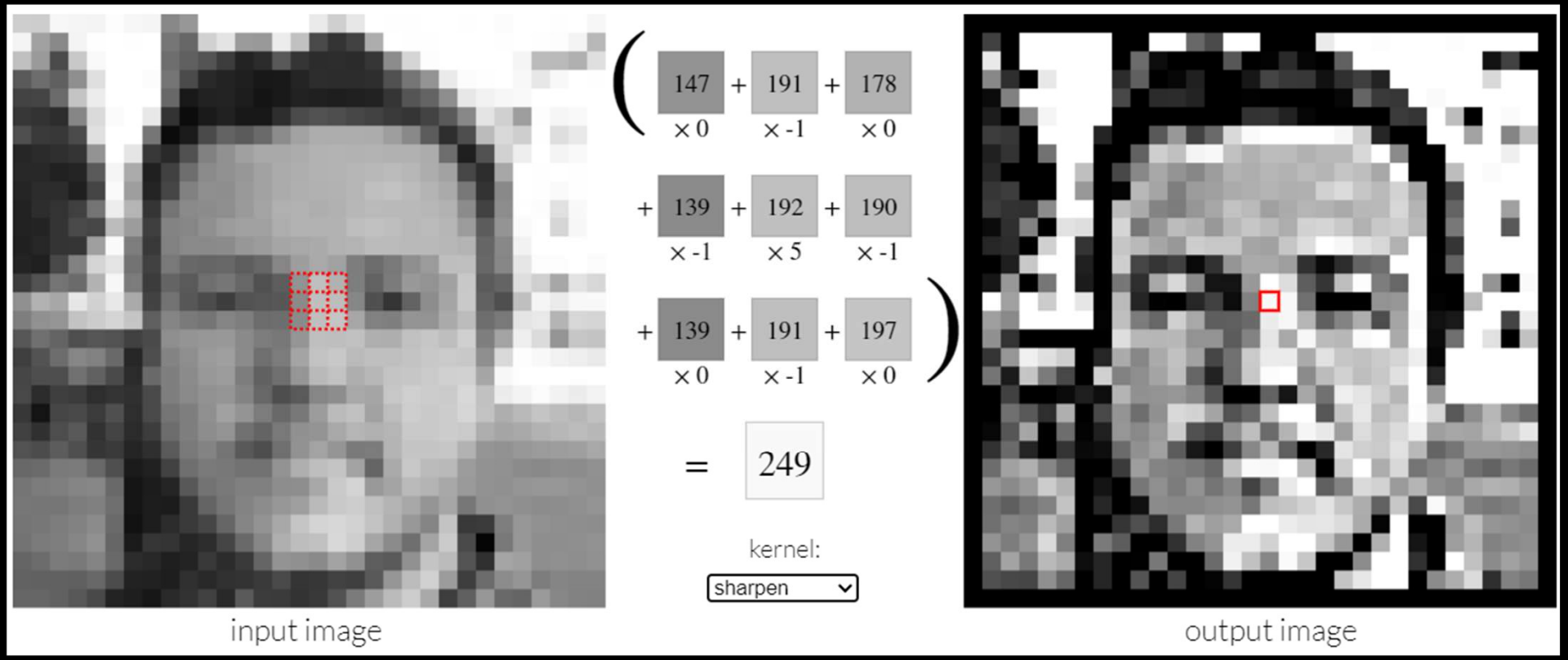
Unity's Universal Rendering Pipeline (URP)



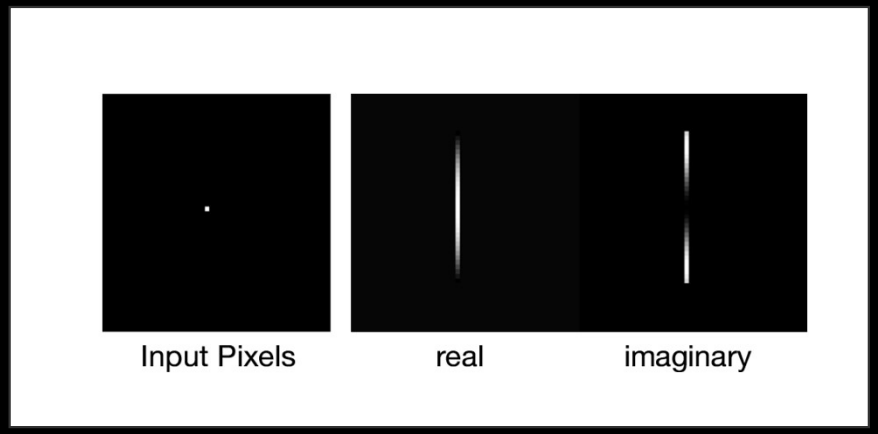
Unity's Universal Rendering Pipeline (URP)

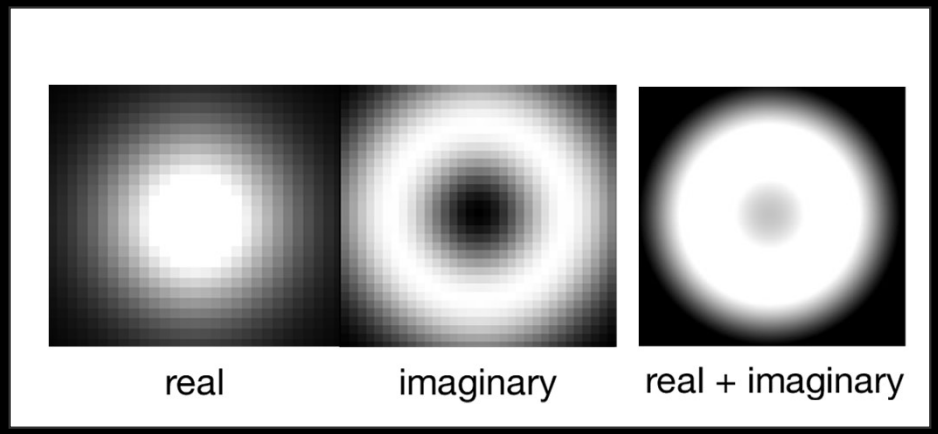


Convolutional Image Processing



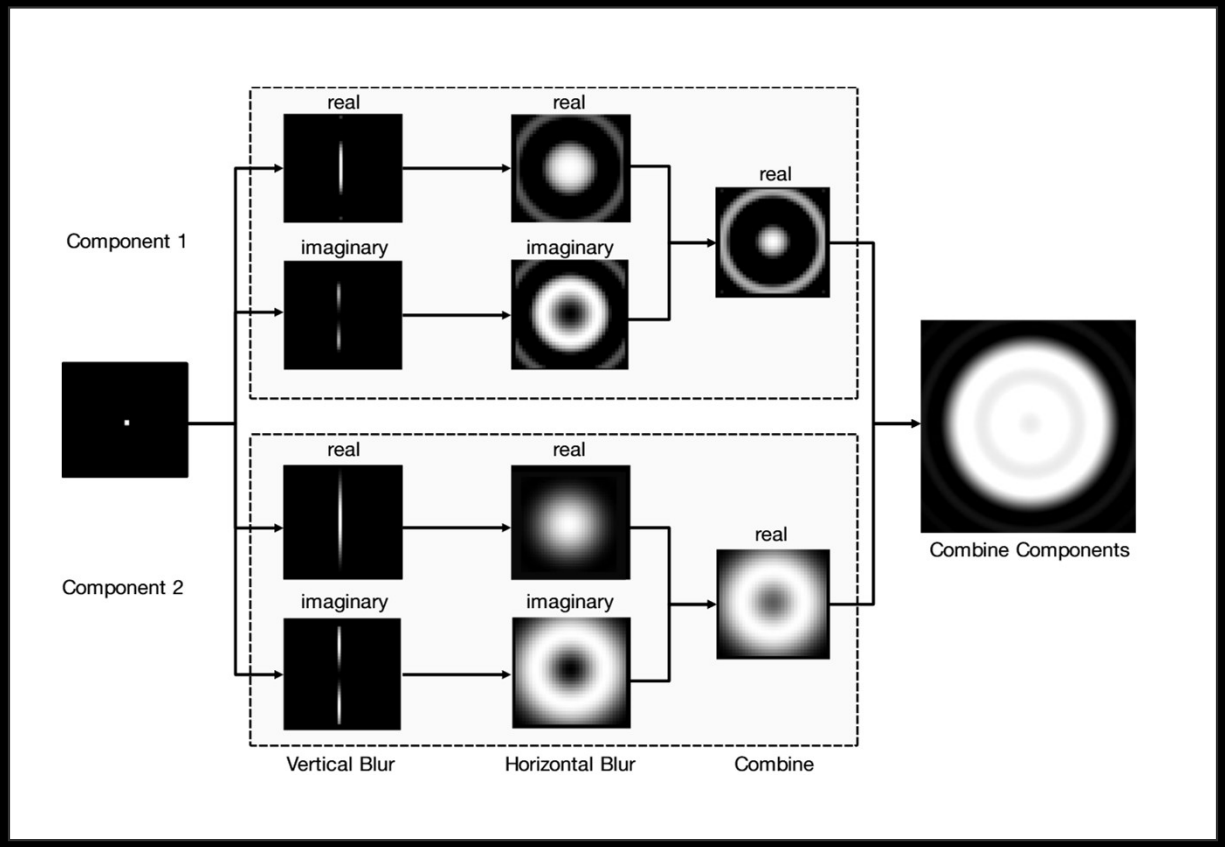
Modelling the circle of confusion using real and imaginary components.

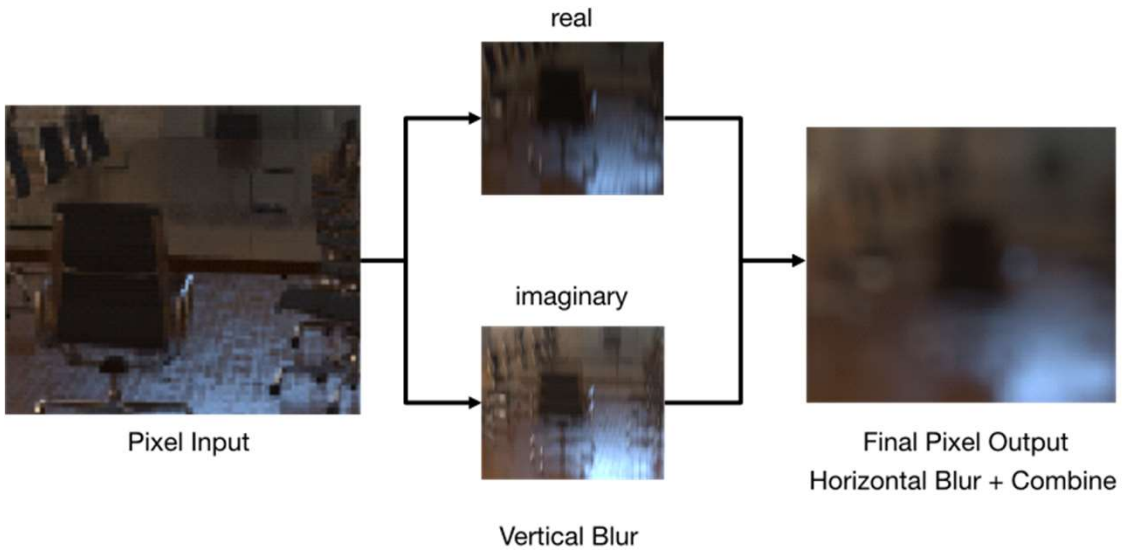




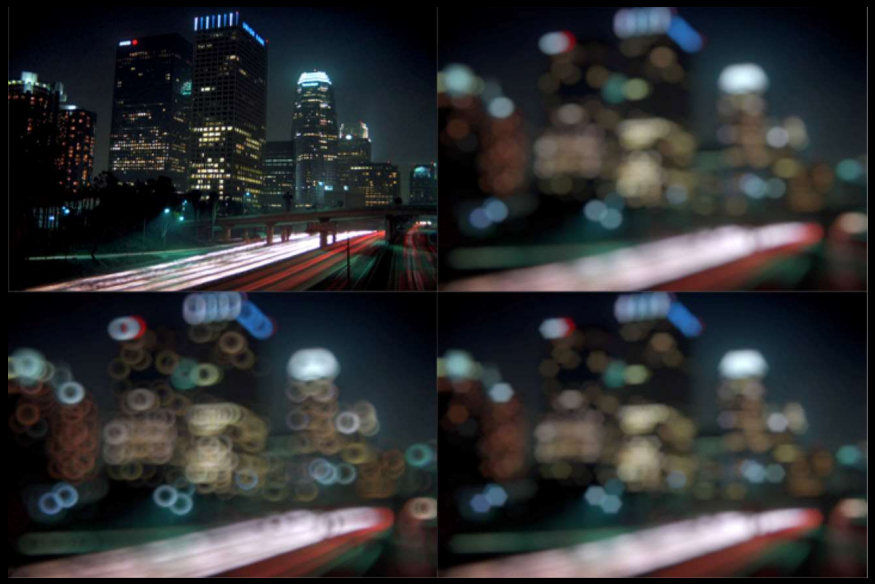
$$F(x) = e^{-ax^2}(\cos(bx^2) + i\sin(bx^2))$$

$$Color(x) = A * F_{real}(x) + B * F_{imaginary}(x)$$


real
real
real
Component 1
imaginary
imaginary
real
real
real
Component 2
imaginary
imaginary
Combine Components
Vertical Blur
Horizontal Blur
Combine


real
imaginary
Pixel Input
Vertical Blur
Final Pixel Output
Horizontal Blur + Combine

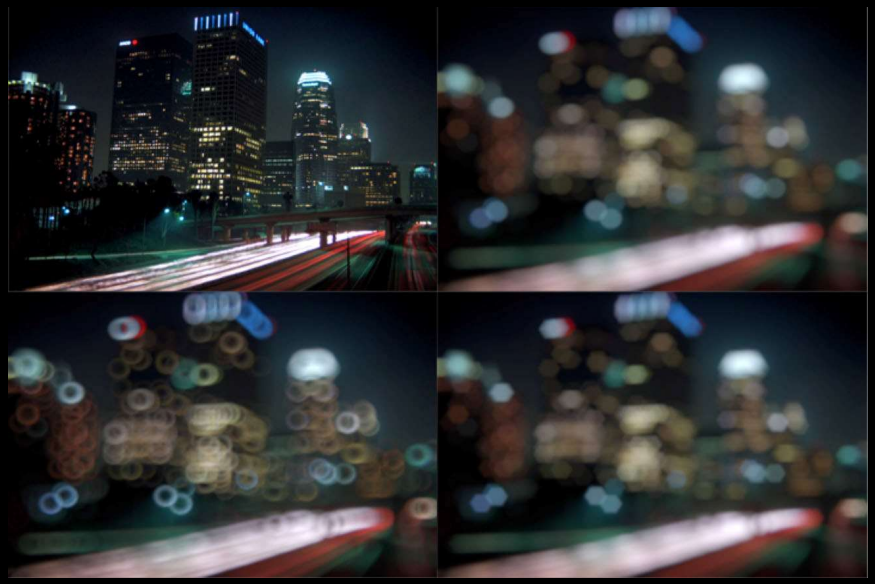
Reference



Boris Effects (BCC Lens Blur)

Unreal Engine 4

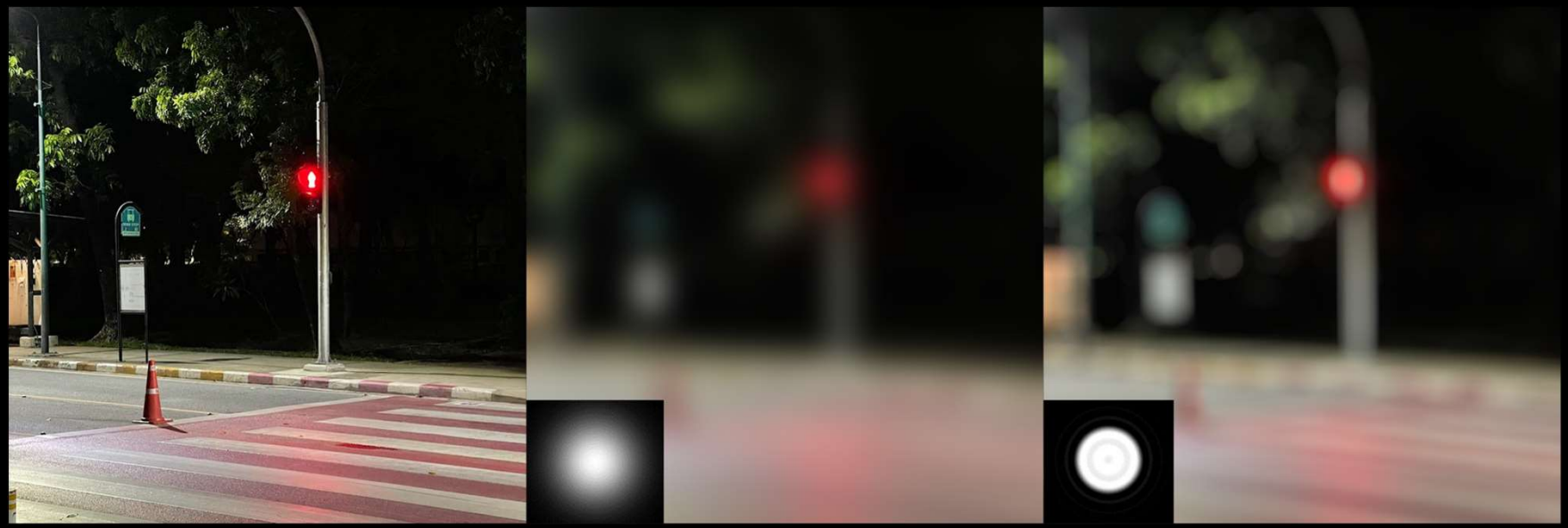
Reference



Boris Effects (BCC Lens Blur)

Unreal Engine 4

Results Implementation MATLAB



Results Implementation UNITY