

## CS 557 Computer Graphics Shaders

### Project #5

#### Image Manipulation in a "Magic Lens"

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**Video Link:** <https://youtu.be/d1IMrizy-wQ>

#### **Description:**

This project implements a shader for a "magic lens" that can apply magnification, whirl, and mosaic effects to the portion of a 2D image within the lens. The selected 2D image is a drawing of Toro Inoue, retrieved from [https://x.com/DDI\\_Bot/status/1885380263770722655](https://x.com/DDI_Bot/status/1885380263770722655).

Since the 2D image is mapped as a texture onto an XY-quad, the image manipulation occurs in the fragment shader using texture coordinate information provided by the vertex shader. The magic lens is controlled by **uSc** and **uTc**, which determine its center, and **uRad**, which sets its size. Any fragment within a distance of **uRad** from the lens center will be transformed by the manipulation, while fragments outside this range remain unchanged.

For magnification, the parameter **uMag** scales down the distance of the current fragment from the lens center in texture coordinates so that the texel closer to the center to be sampled at the current fragment. This results in a zoomed-in effect within the lens region. For whirling, a transformation is applied where fragments farther from the center undergo greater rotation, with **uWhirl** controlling the intensity of the effect. For the mosaic effect, the area inside the lens is divided into a grid of blocks, where each takes the color of its center. The block size is controlled by **uMosaic**. You can also experiment with different combinations of these image effects to create various interesting image manipulation results.

[ Screenshots are on the next page. ]

## Screenshots:



*Fig 1. Original Image*



*Fig 2. Magnified head of Toro Inoue with  $uMag > 1$ .*



*Fig 3. The lens displays a grid of multiple images with  $uMag < 1$ .*



*Fig 4. Whirling TV screen*



*Fig 5. Bird is pixelated*