Title : Image Manipulation in a "Magic Lens"
Video : https://media.oregonstate.edu/media/t/1_t63ogp0j
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Codes from the Fragment Shader

```
main ()
{
      vec2 sct = vec2(uScenter, uTcenter);
      vec3 rgb = texture2D(uImageUnit, vST).rgb;
      float s = vST.s;
      float t = vST.t;

      ivec2 ires = textureSize(uImageUnit, 0);
      ResS = float(ires.s);
      ResT = float(ires.t);

      if(uCircle){
           if((s-uScenter)*(s-uScenter) + (t-uTcenter)*(t-
uTcenter) <  uRadius)
           {

                s=(s-uScenter)/uMagFactor;
                t=(t-uTcenter)/uMagFactor;
float x2=s*cos(uRotAngle)-t*sin(uRotAngle);
float y2=s*sin(uRotAngle)+t*cos(uRotAngle);

                                vec2 r = vec2(x2+uScenter, y2
+uTcenter);
                vec3 n = texture2D(uImageUnit, r).rgb;

                                vec2 stp0 = vec2(1./ResS,
0. );
                vec2 st0p = vec2(0. , 1./ResT);
                vec2 stpp = vec2(1./ResS, 1./ResT);
                vec2 stpm = vec2(1./ResS, -1./ResT);
```

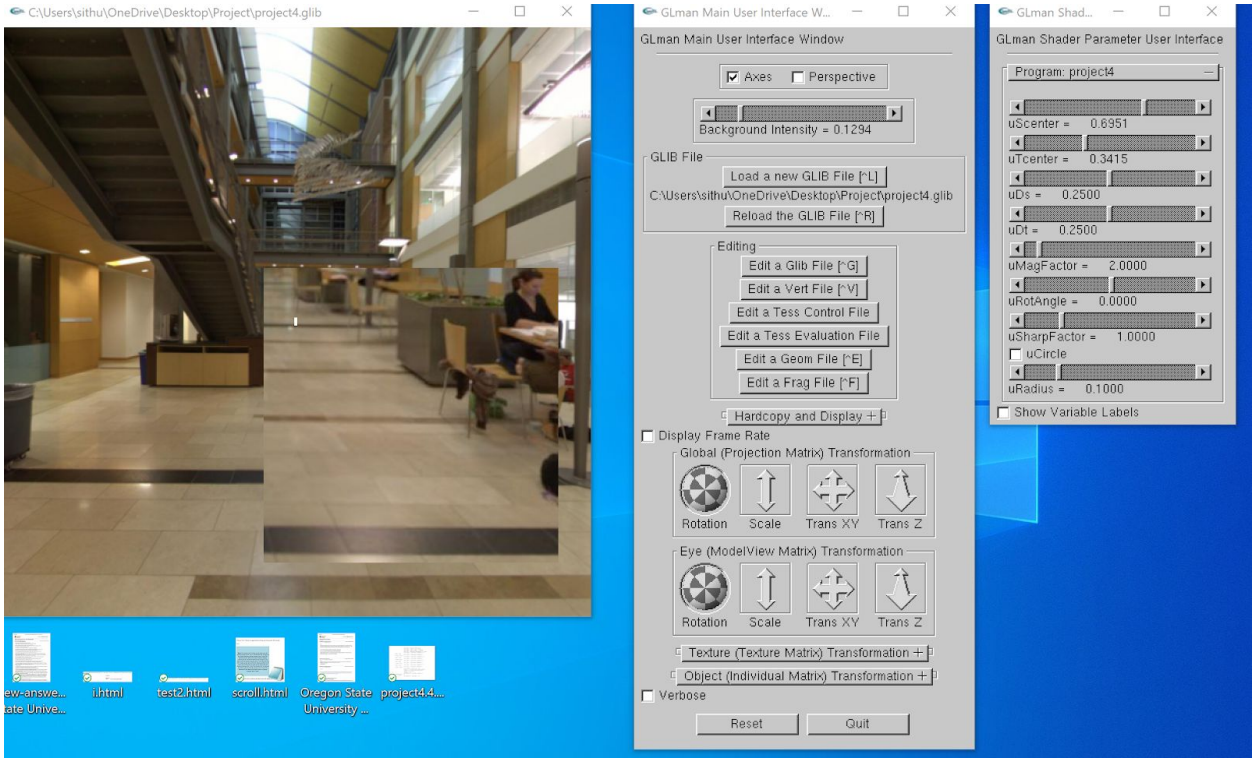
```
distance(t, vec2(uScenter, uTcenter)) < uRadius)
          {

                s=(s-uScenter)/uMagFactor;
                t=(t-uTcenter)/uMagFactor;
float x2=s*cos(uRotAngle)-t*sin(uRotAngle);
float y2=s*sin(uRotAngle)+t*cos(uRotAngle);

                                vec2 r = vec2(x2+uScenter, y2
+uTcenter);
                vec3 n = texture2D(uImageUnit, r).rgb;

                                vec2 stp0 = vec2(1./ResS,
0. );
                vec2 st0p = vec2(0. , 1./ResT);
                vec2 stpp = vec2(1./ResS, 1./ResT);
                vec2 stpm = vec2(1./ResS, -1./ResT);
                vec3 i00 = texture2D( uImageUnit, r ).rgb;
                vec3 im1m1 = texture2D( uImageUnit, r-
stpp ).rgb;
                vec3 ip1p1 = texture2D( uImageUnit,
r+stpp ).rgb;
                vec3 im1p1 = texture2D( uImageUnit, r-
stpm ).rgb;
                vec3 ip1m1 = texture2D( uImageUnit,
r+stpm ).rgb;
                vec3 im10 = texture2D( uImageUnit, r-
stp0 ).rgb;
                vec3 ip10 = texture2D( uImageUnit,
r+stp0 ).rgb;
                vec3 i0m1 = texture2D( uImageUnit, r-
st0p ).rgb;
                vec3 i0p1 = texture2D( uImageUnit,
r+st0p ).rgb;
                vec3 target = vec3(0.,0.,0.);
```

```
                vec3 i0m1 = texture2D( uImageUnit, r-
st0p ).rgb;
                vec3 i0p1 = texture2D( uImageUnit,
r+st0p ).rgb;
                vec3 target = vec3(0.,0.,0.);
                target += 1.*(im1m1+ip1m1+ip1p1+im1p1);
                target += 2.*(im10+ip10+i0m1+i0p1);
                target += 4.*(i00);
                target /= 16.;
                gl_FragColor = vec4(mix( target, n,
uSharpFactor), 1.);
     }else{
                gl_FragColor = vec4(rgb, 1.);
     }}
     else{
          if((s>(uScenter-uDs)) && (s<(uScenter+uDs)) && (t>
(uTcenter-uDt)) && (t<(uTcenter+uDt))) {

                s=(s-uScenter)/uMagFactor;
                t=(t-uTcenter)/uMagFactor;
float x1=s*cos(uRotAngle)-t*sin(uRotAngle);
float y1=s*sin(uRotAngle)+t*cos(uRotAngle);

                vec2 r = vec2(x1+uScenter, y1+uTcenter);
                vec3 n = texture2D(uImageUnit, r).rgb;


                vec2 stp0 = vec2(1./ResS, 0. );
                vec2 st0p = vec2(0. , 1./ResT);
                vec2 stpp = vec2(1./ResS, 1./ResT);
                vec2 stpm = vec2(1./ResS, -1./ResT);
                vec3 i00 = texture2D( uImageUnit, r ).rgb;
                vec3 im1m1 = texture2D( uImageUnit, r-
stpp ).rgb;
                vec3 ip1p1 = texture2D( uImageUnit,
```

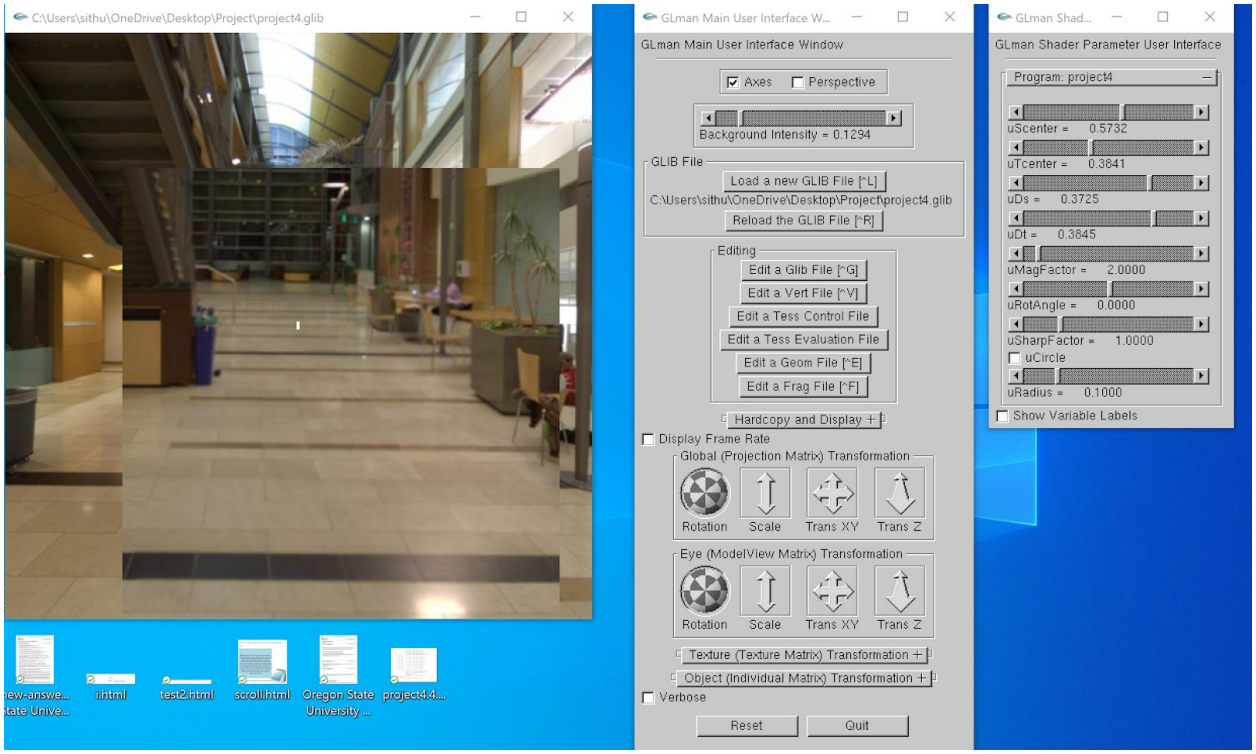
```
                vec2 stp0 = vec2(1./ResS, 0. );
                vec2 st0p = vec2(0. , 1./ResT);
                vec2 stpp = vec2(1./ResS, 1./ResT);
                vec2 stpm = vec2(1./ResS, -1./ResT);
                vec3 i00 = texture2D( uImageUnit, r ).rgb;
                vec3 im1m1 = texture2D( uImageUnit, r-
stpp ).rgb;
                vec3 ip1p1 = texture2D( uImageUnit,
r+stpp ).rgb;
                vec3 im1p1 = texture2D( uImageUnit, r-
stpm ).rgb;
                vec3 ip1m1 = texture2D( uImageUnit,
r+stpm ).rgb;
                vec3 im10 = texture2D( uImageUnit, r-
stp0 ).rgb;
                vec3 ip10 = texture2D( uImageUnit,
r+stp0 ).rgb;
                vec3 i0m1 = texture2D( uImageUnit, r-
st0p ).rgb;
                vec3 i0p1 = texture2D( uImageUnit,
r+st0p ).rgb;
                vec3 target = vec3(0.,0.,0.);
                target += 1.*(im1m1+ip1m1+ip1p1+im1p1);
                target += 2.*(im10+ip10+i0m1+i0p1);
                target += 4.*(i00);
                target /= 16.;
                gl_FragColor = vec4(mix( target, n,
uSharpFactor), 1.);
     }else{
                gl_FragColor = vec4(rgb, 1.);
     }}

}
```

The kec image is used since the image which corresponds to the project5 cannot be found.

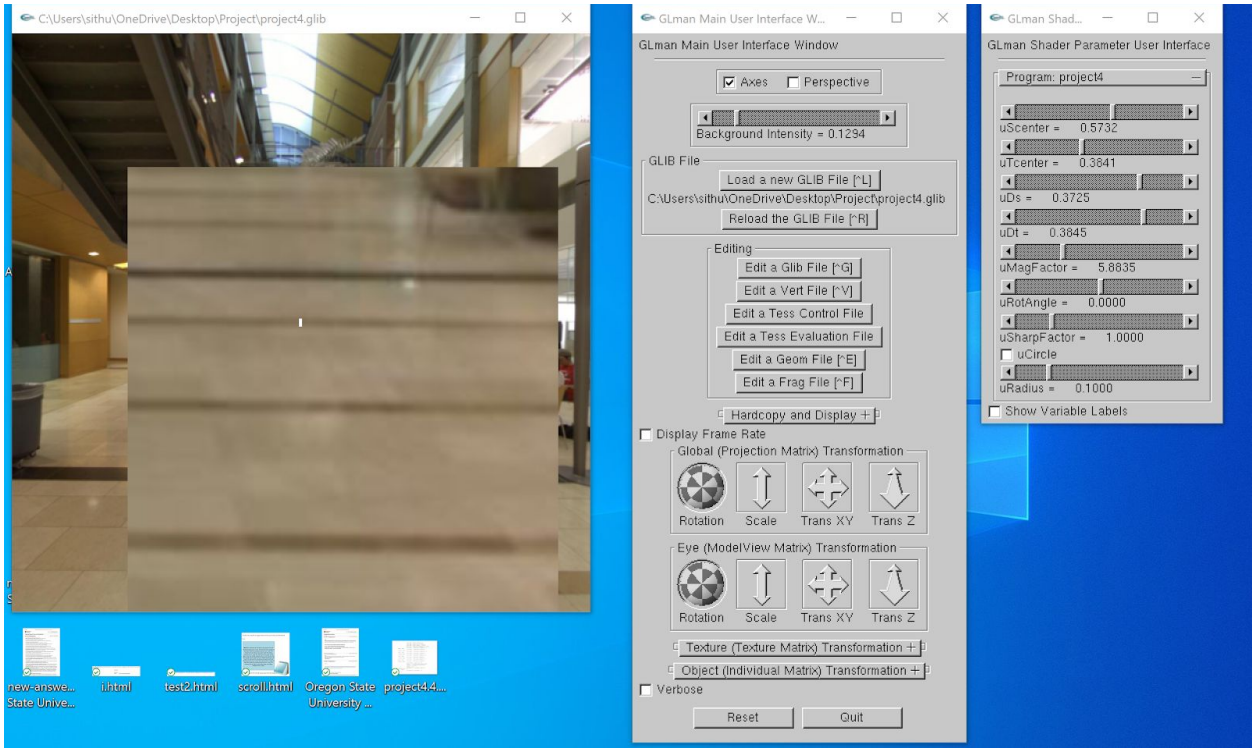
Changing the position of the rectangle



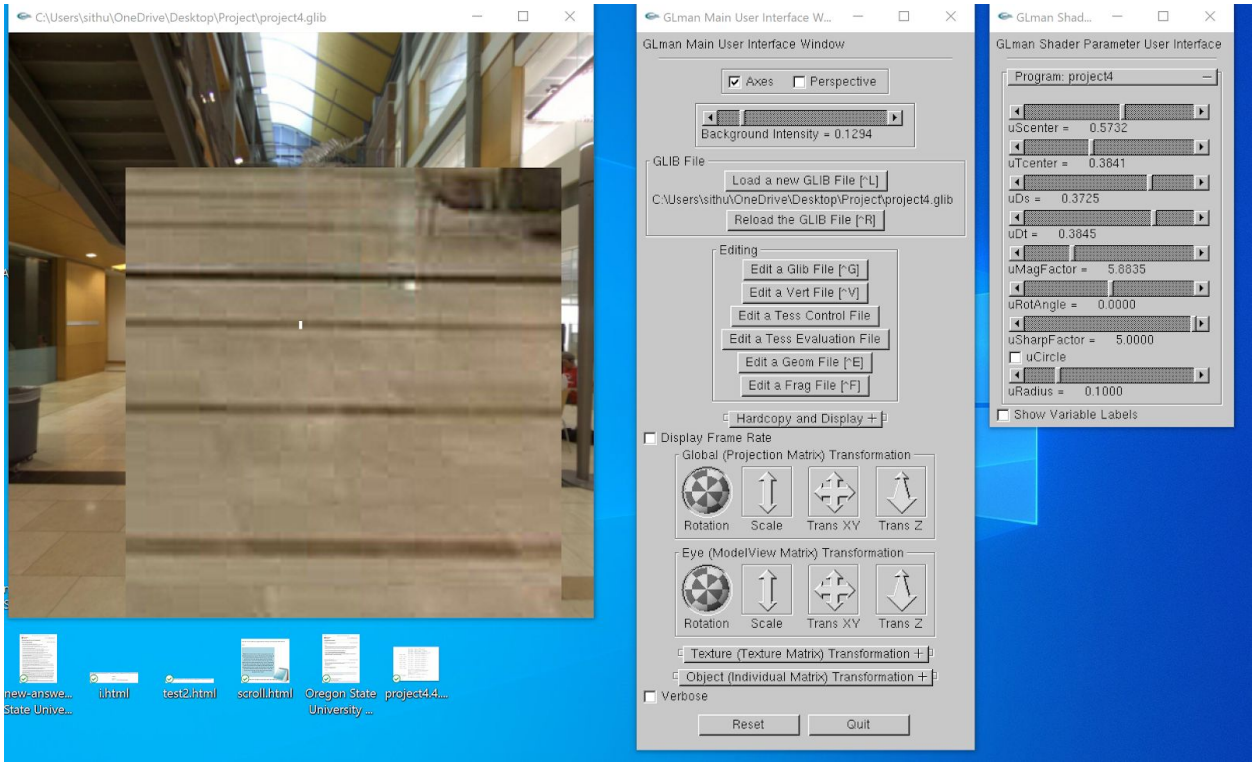
Changing the size of the rectangle



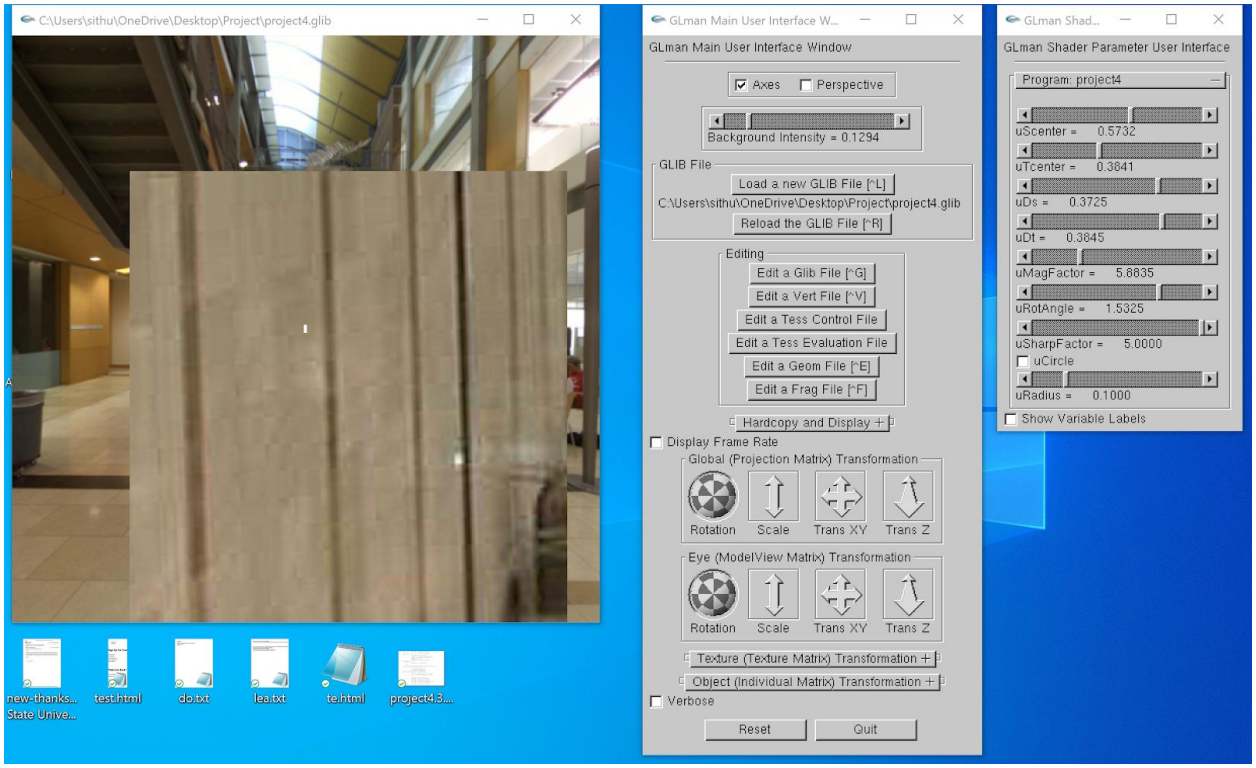
Increasing the uMagFactor



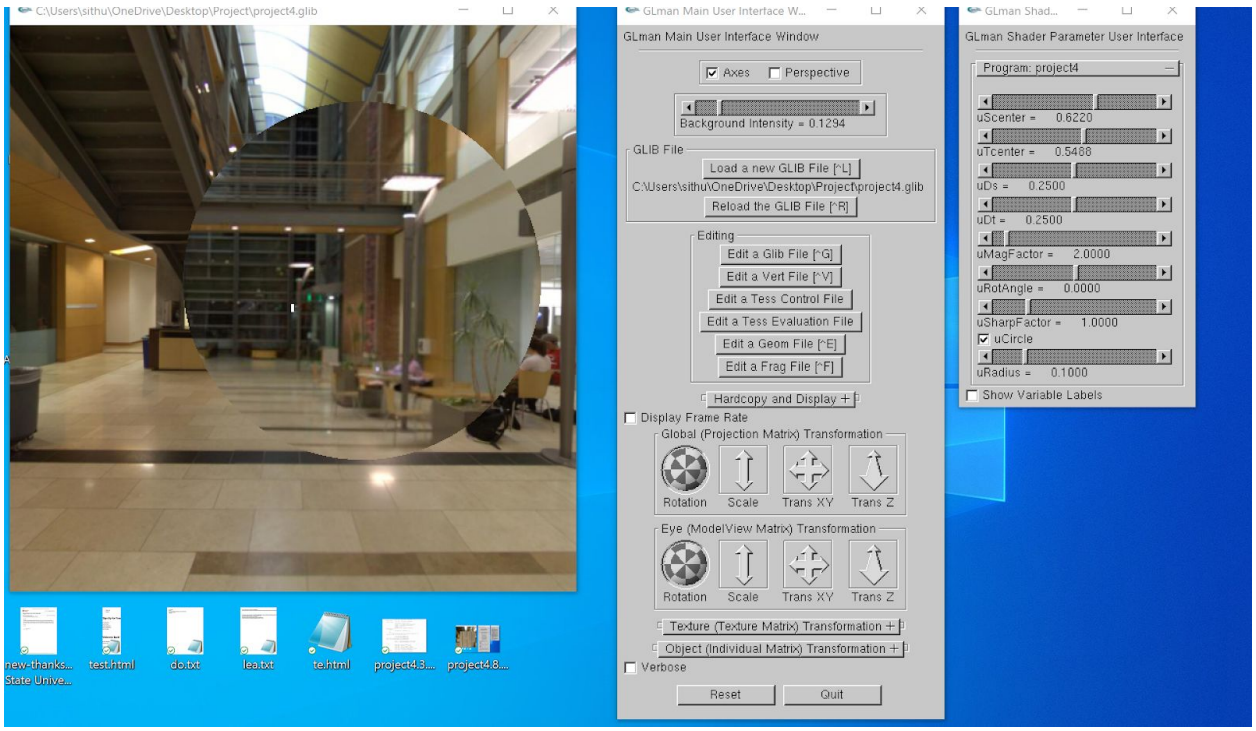
Increasing the uSharpFactor



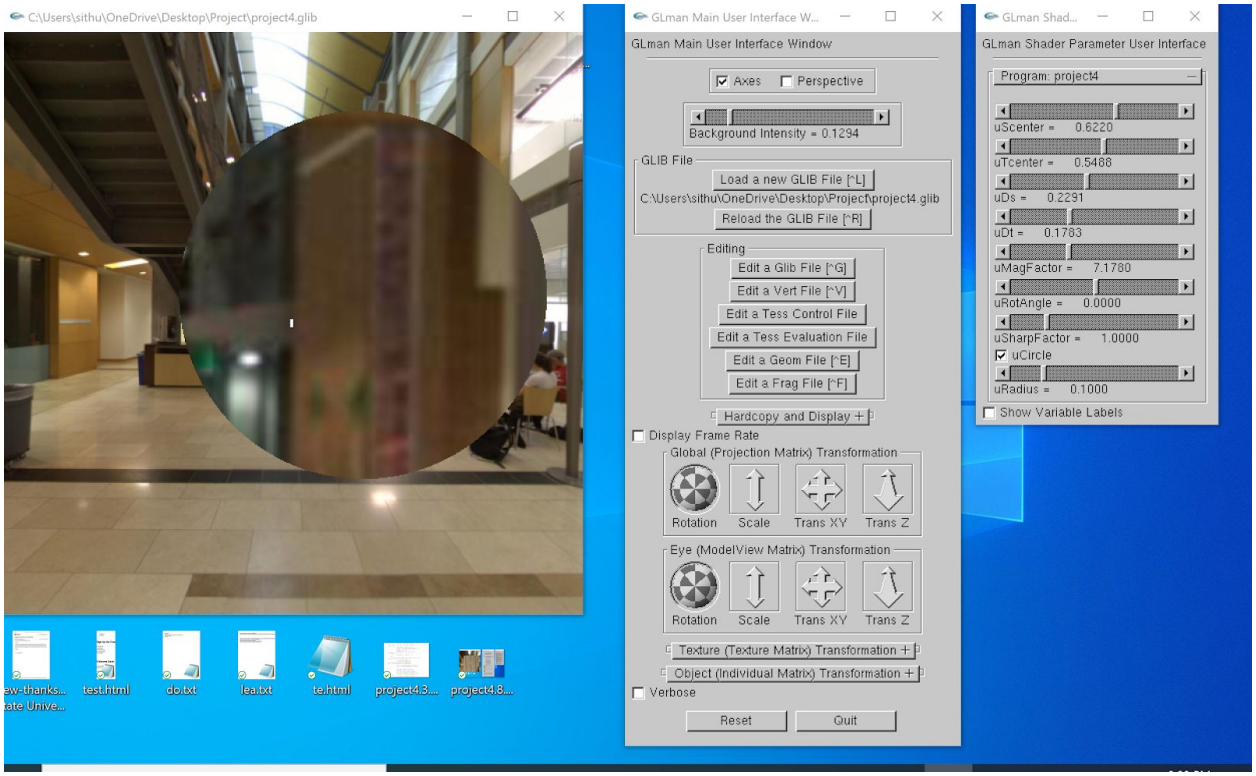
Rotating the rectangle



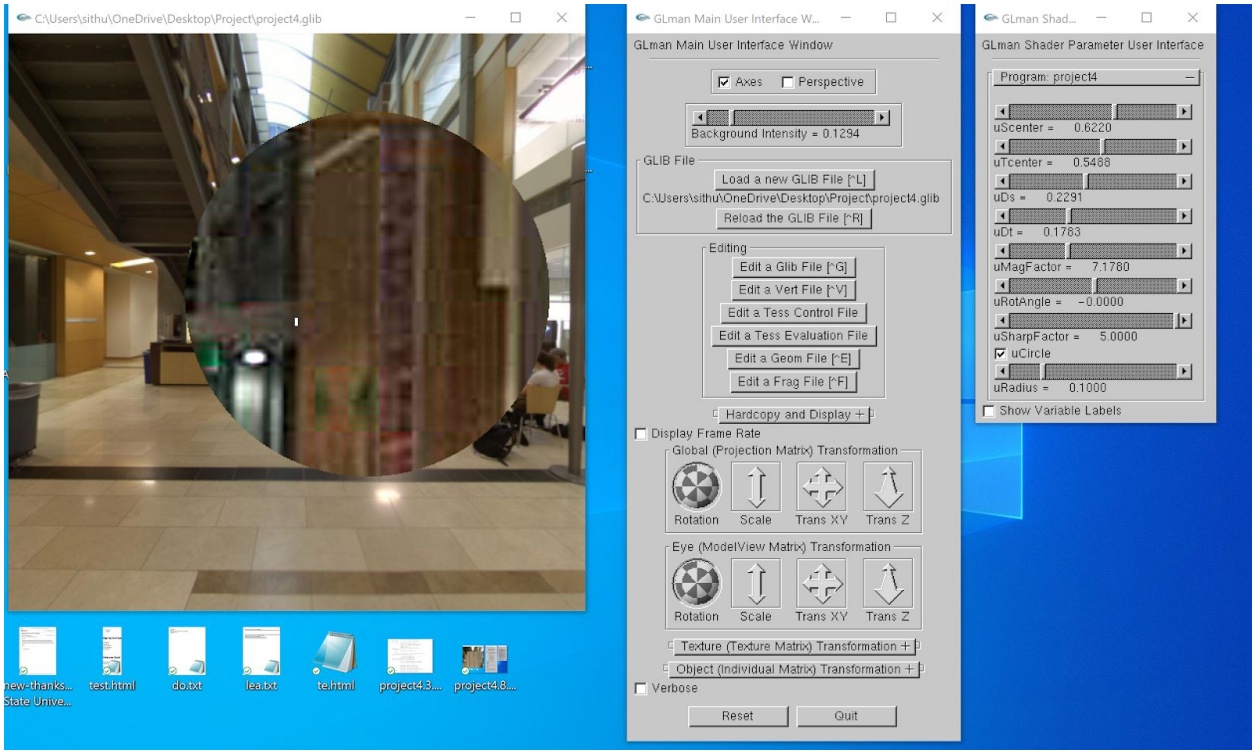
Changing the rectangle to the circle and moving the circle



Increasing the uMagFactor



Increasing the uSharpFactor



Rotating the circle