

# Into the Graphicsverse: developing OpenGL FXs for an animated short in the style of ‘Into the Spider-verse’

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## ABSTRACT

As part of a project based graduate course, we developed OpenGL FX for an original CG animated short in the style of ‘Spiderman:Into the Spider-verse’. We present the FX for the short that we developed using OpenGL to support producing the original CG animated short. Some of the FX developed and integrated into the short include various particle systems for specific animated elements including a tornado like portal and viscous acid, boids to drive a crowd of small spiders’ behavior, blobby modeling to merge spider eyes into human eyes, and geometric ‘glitching’. The main characters of the short were produced by students creating original models and animations in Blender, then exported in the gltf format and rendered using our OpenGL rendering system, however, the short also included many FX animations driven by the systems described here.

## KEYWORDS

particle FX, production pipeline in a technical course, physically based animation

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## 1 INTRODUCTION & BACKGROUND

Creating authentic production style learning experience for students in computer graphics courses can be a challenge. In the fall of 2019, an experimental project based graduate level computer science course focused on providing students with the opportunity to be creative and develop their technical computer graphics skills while producing an animated short.

During this ten week course, we wrote and developed the script, assets and software for an original animated computer graphics short in the style of ‘Spiderman:Into the Spider-verse’. The short is titled ‘Into the Graphics-verse’ and depicted a brief imagined story of what might have happened to the spider after it bit the main human protagonist, Miles. The short includes several FX to help convey the story, these include:

- Particle systems [3] for portals and minion spider acid.
- Geometric Glitch intended to give the audience a similar experience to the geometric glitch in the film: a sense that something in the character’s world is going wrong and must be fixed. The algorithm for the glitch includes a concept called *array splitting*.
- Blobby models for the hero spider eyes to merge into human like eyes (also known as metaballs [1] or implicit surfaces.
- Boids to control the behaviour of a group of small spiders [2]
- Hierarchical modeling animation for some scenes.
- Ray marching to simulate an alternative portal effect.

## 2 RESULTS

We were able to produce an OpenGL rendering engine (described in another poster submission) and the OpenGL FX described here in addition to producing the short itself all in a ten week academic quarter. The short can be seen at: <https://youtu.be/7SmURgZGSmc> and here we demonstrate frames highlighting the various FX we developed and incorporated into our story.

The boid system for controlling a group of small spiders is seen in Figures 2. Blobby modeling to show the spiders eyes merging into more human like eyes shown in Figure 1. Particle systems for various FXs seen in Figure 5 and 6. Figure 4 shows a scene in which hierarchical modeling was used to drive the character animation (due to time constraints to rig all models). The ‘glitching’ FX is shown in Figure 3. Finally, an alternative portal created with a ray marching technique is shown in Figure 7.

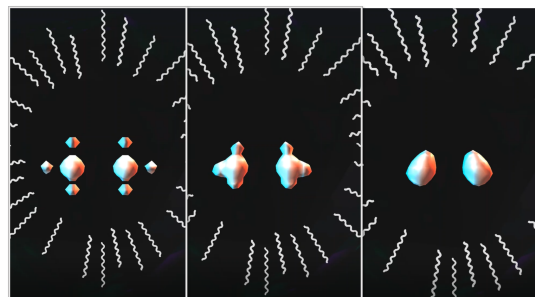


Figure 1: One of the OpenGL FX implemented and incorporated into the short was blobby modeling to animate the spider’s 8 eyes merging into 2 after biting a human.

We learned a great deal from this quarter long production focused computer graphics class, specifically that production is hard, but fun and would love to present our work and learning via this poster.

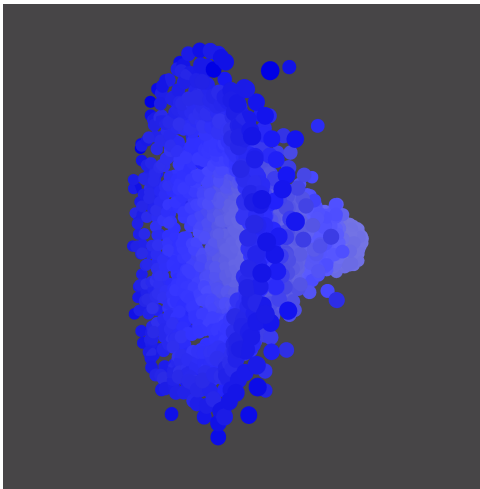


Figure 5: Particle systems were implemented for the final portal, shown here.

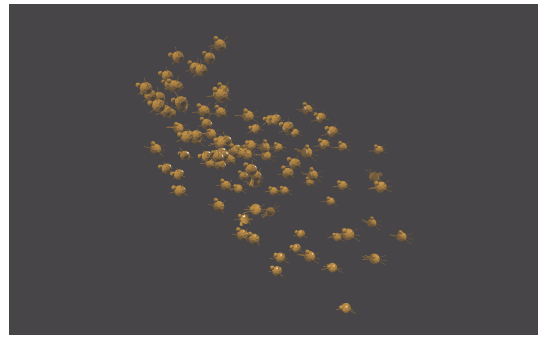


Figure 2: One of the OpenGL FX implemented and incorporated into the short was boids to control a swarm of spiders.

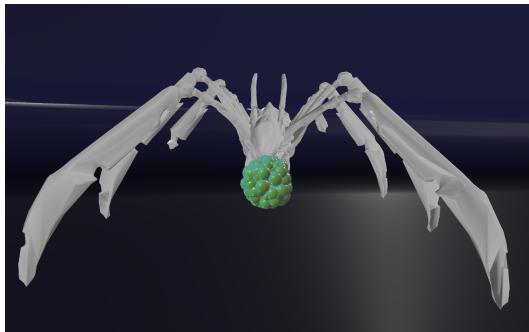


Figure 6: Particle systems including viscosity were implemented for the evil minion spider's to spit acid.

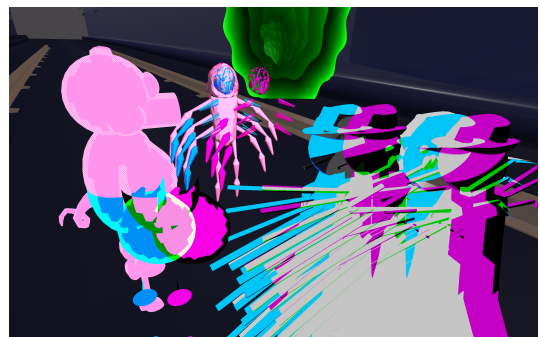


Figure 3: Geometric 'glitching' was implemented such that complete character models are broken into several parts.

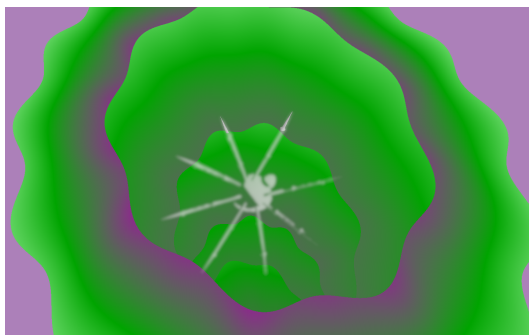


Figure 7: Ray marching is used for another OpenGL FX implemented and incorporated into the short (portal).



Figure 4: Some of the scenes included simple hierarchical modeling such as the Noir origin scene.

## REFERENCES

- [1] Paul Baker. 2002. Metaballs. <http://www.paulsprojects.net/opengl/metaballs/metaballs.html>
- [2] Craig Reynolds. 1987. Flocks, herds and schools: A distributed behavioral model.
- [3] Andrew Witkin. 1997. Physically Based Modeling: Principles and Practice: Particle System Dynamics. <https://www.cs.cmu.edu/~baraff/sigcourse/notesc.pdf>