

# Asset Integration: An Exceptional Undergraduate Student Project

Adam Redford<sup>1</sup> 

<sup>1</sup>The National Centre for Computer Animation, Bournemouth University, UK



**Figure 1:** A student submission of the “Asset Integration” assignment, showing an empty background on the left, the computer generated goblet composited into the live action photographed background in the middle, and a reference shot of a real goblet for comparison on the right.

## Abstract

*This paper outlines an exceptional 1st year undergraduate student project that involves the creation of a CG asset (goblet), and the integration of that asset into a live action photographed background. The final created shot of the animated asset shows a high level of photo-realism, and is an exceptionally close match to the live action reference photography of the real goblet.*

## 1. Introduction

Practical production projects are a core component of many undergraduate degree programmes in visual effects and computer animation. For more than 25 years the National Centre for Computer Animation (NCCA) has run various production focused projects and assessments across all three years of their undergraduate programmes. The project presented here was assessed as part of one of the production focused courses running in the first year of the Visual Effects degree at the NCCA, and shows a high level of final quality, good attention to detail, and a good understanding of appropriate production tools and techniques on behalf of the student.

## 2. Project Context

In this course students are required to plan and execute an asset integration VFX shot. This involves them choosing and digitally recreating a real world asset, photographing an appropriate live action background [RFA19], and compositing the asset into it. They are required to create every aspect of the asset themselves, so they must model, UV unwrap, texture, shade, and light the asset before compositing the final render onto the live action background. The asset must also be animated to do a simple movement such as falling over and rolling. They are free to hand-animate the asset, or to use a simple rigid body dynamics simulation if they wish.

The course is delivered in the Bachelor of Arts in Visual Effects degree, as part of the NCCA’s undergraduate framework [CMA10]. The programme is aimed at students with aspirations to work in the feature film visual effects industry and other related areas. The course is worth 10 ECTS credits, and runs in the 2nd semester of the 1st year of the programme. The duration of the course is 15 weeks, 12 of which contain taught workshops that explore the tools and techniques that form the asset creation process, the remaining 3 are student-led project working weeks. Each taught week of the course also contains a feedback session where the students can get feedback from academics regarding their work in progress.

Prior to this course the students will have completed a pre-requisite course focusing on the basics of asset creation and integration [RFA19], the main difference being that in the pre-requisite course the asset to be created, and the background on which it must be composited, are prescribed by the academic team rather than chosen by the student. The main difference in the academic-led workshops is the focus on slightly more advanced tools and techniques than are covered in the pre-requisite course. The general quality of student output from this course is fairly high, but the project presented as the main subject of this paper shows an exceptional level of final quality and photo-realism, to the point where it is difficult to tell the difference between a still render of the final output and a reference photograph, as shown in figure 1.



**Figure 2:** Light probe reference photographs.

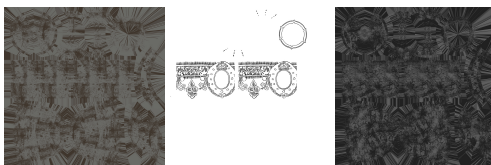
### 3. Asset Integration

The aim of this course is to teach the students the necessary tools and techniques to produce a high quality photo-real visual effects shot that integrates a CG asset into a live action backplate. The student is responsible for every aspect of the shot, from planning through to final output. Students need to be strategic in choosing the asset to be created, therefore they are encouraged to choose an asset that would not require any deformation when animated, and also would not look like it should break apart when falling over or being dropped. For this particular project the student chose to create a goblet asset, and integrate it into a simple shelf background. The asset choice required a number of challenges to be overcome, like the highly reflective surface, and the detailed engraving work. The student started by photographing a number of different versions of the background plate, including versions with light probes for light matching purposes as shown in figure 2.

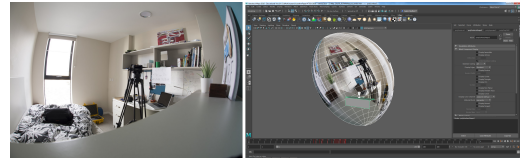
The student also photographed the background with a colour checker chart and a real goblet in place, to enable him to visually match other elements like the colours, shadows and reflections accurately. As the goblet had a highly reflective surface, the student needed to also shoot an image of the reverse of the scene to be reflected in the goblet's surface, which he did using a wide angle (semi fish-eye) lens (Figure 4, left image).

The next step was for the student to model the goblet asset, which was accomplished using a simple CV curve and revolve process in Autodesk Maya. The model was then UV unwrapped before the texturing process could begin. The student created 3 simple texture maps comprising of colour, bump, and specular roughness maps, as shown in figure 3.

After the modelling, UV unwrap, and texturing were completed, the student created some basic dummy geometry to represent the background shelf and aligned it with a CG camera that matched the focal length of the live action camera. A simple animation was then produced using a basic rigid body dynamics simulation, in which the goblet falls over and rolls a little. The goblet was then shaded with the three texture maps applied to a simple V-Ray material, ready for rendering. The reverse image (Figure 4, left image)



**Figure 3:** Colour, bump, and specular roughness texture maps.



**Figure 4:** A photograph of the reverse of the scene (left), mapped onto the inside of a hemisphere for the goblet to reflect (right).

was mapped onto the inside of a hemisphere (Figure 4, right image) and placed behind the CG camera, so that the goblet would reflect it when rendered with raytrace reflections enabled.

The rendering of the goblet was completed with V-Ray, and the resultant images were output in multi-channel .exr format ready for compositing with The Foundry's Nuke software. The student also rendered separate shadow and reflection passes to add to the final composite of the shot, which enabled him to control the look of the final output in terms of the colour, contrast, brightness, and saturation of the shadows and reflections.

### 4. Discussion

The final result the student has achieved shows an exceptionally high level of quality and photo-realism. The student made good strategic choices with regards to the type of asset to recreate, and the background in which to integrate it. There was a high level of attention to detail in areas that are often overlooked by undergraduate students in this early stage of their education, such as the accurate environment reflections on the surface of the goblet. He also demonstrated an appropriate use of simple hand-painted texture maps (for instance the bump map), without relying too heavily on procedural texturing software. It is the opinion of the academic team responsible for marking the project that it was approaching a sufficiently high enough quality to be considered production-ready for industry standard usage in feature film and television, as a background to mid-ground level asset.

As shown in figure 1, it is difficult to tell the difference between the final rendered output and a photograph of the same scene with the real goblet in place. Overall, this is an excellent quality project that makes use of simple tools and techniques to produce an exceptional quality final shot.

### 5. Acknowledgments

I would like to acknowledge the student who created the project, Kekeru Sasa. The work is of exceptionally high quality, and his attitude toward the project was exemplary.

### References

- [CMA10] COMNINOS P., MCLOUGHLIN L., ANDERSON E. F.: Educating technophile artists and artophile technologists: A successful experiment in higher education. *Computers & Graphics* 34, 6 (2010), 780–790. doi:10.1016/j.cag.2010.08.008. 1
- [RFA19] REDFORD A., FODRITTO M., ANDERSON E. F.: A Breadth-First Introduction to VFX: A Holistic Approach for Teaching the Visual Effects Production Pipeline. In *Eurographics 2019 - Education Papers* (2019). doi:10.2312/eged.20191029. 1