# Grip and Filament: A USD-Based Lighting Workflow

Steve Agland
Animal Logic
stevea@al.com.au

Simon Bunker
Animal Logic
simonbu@al.com.au

Jakub Jeziorski
Animal Logic
jakubj@animallogic.ca

Manuel Macha
Animal Logic
manuelm@al.com.au

Eoin Murphy
Animal Logic
eoin.murphy@gmail.com

Francesco Sansoni
Animal Logic
francescos@al.com.au

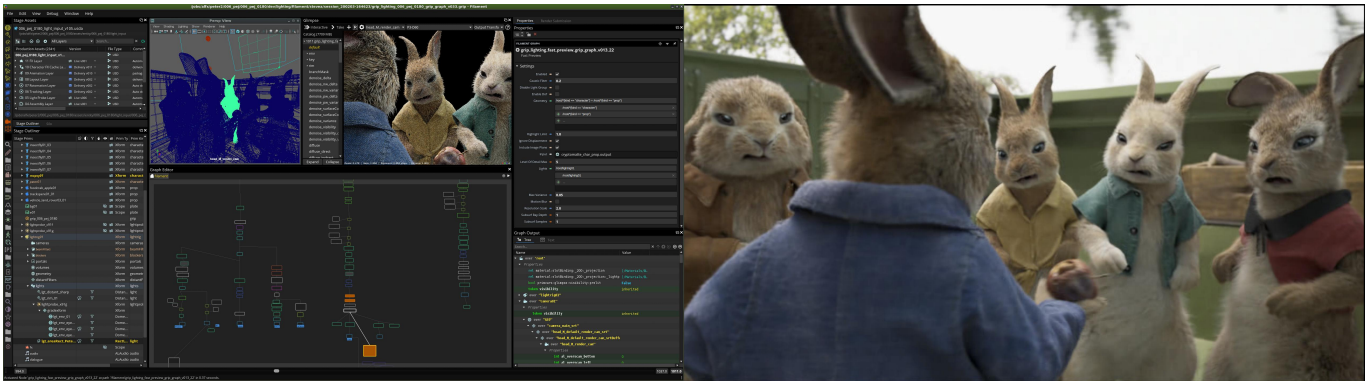

**Figure 1: The Filament application at work on a *Peter Rabbit 2* shot. PETER RABBIT and all associated characters ™ & © Frederick Warne & Co Limited. PETER RABBIT™ 2, the Movie © 2020 Columbia Pictures Industries, Inc. All Rights Reserved.**

## ABSTRACT

Animal Logic recently overhauled its outmoded lighting workflow for the film *Peter Rabbit 2*. Since Pixar's Universal Scene Description (USD) was being adopted as the primary scene description format throughout the studio pipeline, this technology became a natural backbone around which to implement the new lighting toolkit. Following previous work to integrate USD into our animation pipeline[Baillet et al. 2018] we introduce *Grip*, a USD-native library which provides a node-based approach to authoring procedural modification of scenes; and *Filament*, a Qt-based application serving as the artist front end for interacting with a USD scene, the Grip engine, the production renderer, and pipeline tools.

## CCS CONCEPTS

• **Computing methodologies** → **Computer graphics**.

## KEYWORDS

USD, VFX pipeline, lighting

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## 1 HISTORY

For a decade prior to *Peter Rabbit 2*, Animal Logic's Lighting team used a text-based render management tool known as *RSS* (Render Submission Script). Working scenes were assembled in Maya, but contained a mixture of native Maya data, Alembic files, Glimpse archives and other in-house formats, all "bridged" into Maya in different ways.

The RSS system had a number of disadvantages. When working interactively, it made destructive/non-undoable changes to the scene. Light rigs were built in Maya as a separate asset to the associated RSS script. There was only limited support for reusability, and limitations on which scene changes could be made.

We experimented with in-house solutions to some of these problems in the form of *CSD - Common Scene Description* (an extension of Glimpse's GSS Format[Fascione et al. 2019, p. 110]) and *Glance* (a Glimpse-centric pre-render scene modification system, with some resemblance to Renderman RiFilters).

Meanwhile, Pixar shared an early cut of USD with us, and we started to use it in Animation in 2016. Soon after, Animal Logic embarked on an ambitious project to build an end-to-end USD-based pipeline, and by 2018 Lighting was ready to adopt the technology as part of the effort to replace RSS with a next-generation toolkit. The goals were to reduce the number of data representations to a minimum, move to a more interactive lighting workflow, unify several separate pipeline tools, and retain the best aspects of the