# Millions of Bricks: Rigging, Animation, Render

Jens Jebens
Animal Logic
jens.jebens@al.com.au

Simon Bull
Animal Logic
simon.bull@al.com.au

Aloys Baillet
Animal Logic
Aloys.Baillet@al.com.au

Oliver Dunn
Animal Logic
oliver.dunn@al.com.au


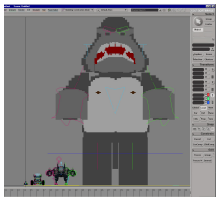
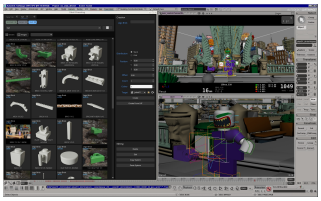

**Figure 1: Complex Gotham City at Night, differing rig sizes, and Brick Tools UI ©Warner Bros Inc., The LEGO Corporation. All rights reserved.**

## ABSTRACT

Animal Logic is literally pushing the boundaries of possibility when managing the numbers of CG bricks for the recent slate of LEGO movies. If one were to build (*The LEGO Batman Movie*) Gotham City from real LEGO bricks, it would cover an area larger than 6 football fields. A series of new tools was developed to manage this significant increase in complexity and scale. Building upon well-established, rigging, and environment construction principles, with a focus on scalability, instancing and light weight scene representations, Animal Logic sought unique ways to give all departments' new and powerful ways to interact with complexity.

## CCS CONCEPTS

**•Computing methodologies →Animation;**

## KEYWORDS

ACM proceedings,Animation, FX, Instancing

**ACM Reference format:**
Jens Jebens, Simon Bull, Aloys Baillet, and Oliver Dunn. 2017. Millions of Bricks: Rigging, Animation, Render. In *Proceedings of SIGGRAPH 2017 Talks, Los Angeles, CA, USA, August 2017,* **??** pages.
DOI: 10.475/123_4


*SIGGRAPH 2017 Talks, Los Angeles, CA, USA*

DOI: 10.475/123_4

## 1 SET DISPLAY AND COMPLEXITY MANAGEMENT

Even with a number of automated mechanism to build optimised setpieces and environments, the interactive requirements of Animation and Layout necessitated further tool development to manage shot based complexity. A system of *Scene Partitions* was used to automatically assign the right object LOD to each setpiece. Using the unique parameters of any shot, *Scene Partitions* would automatically cull objects that weren't required, set background objects to bounding box or ultra low display, and set the highest LOD on objects needed for detailed interaction. Artists could easily add or remove objects from any of these partitions. The partitions themselves were automatically checked in, resulting in persistent configurations that would be automatically applied as environment updates occurred.

## 2 REAL-TIME CONTROL FOR SUPER-SIZED LEGO BUILDS

For *The LEGO Batman Movie*, the complexity of rigs needed to match the increased mechanical complexity of the larger scale models. To support this, the library of self-contained, modular, components that make up each rig, needed to expand considerably. The rigs themselves, were built procedurally from a python build file that defined the input and output connections of the components. The ongoing development of this procedural system provided the ability to easily manage and maintain a huge number of rigs. Similarly, the massive numbers of individual bricks involved in rigged assets required new ways to address the high number of transforms that they contained. The result was multiple ways to represent the brick geometry in a rig. Most notably, *ALF tweak Rigs* (where geometry is pushed direct to OpenGL), and *Uber Rigs* (where *Glimpse* Archives result in instanced bricks that are generated at render time only). Further adding to complexity was the requirement to arbitrarily include, and animate, any brick from the Animal Logic LEGO Brick

Library. This resulted in the extension of *Brick-Tools* for animators, allowing complete access to all bricks via a visually rich searchable GUI and on-the-fly creation of complex brick rigs.

## 3 ANIMATING SETS

Even with new developments in rigging, the size of some objects were simply too large for the established animation pipeline. This was primarily due to caching requirements of a traditional animation approach. Earlier systems developed on *The LEGO Movie* enabled controls constrained to the set to flow downstream to lighting. These systems were further enhanced for *The LEGO Batman Movie* enabling Assembly and Layout artists to easily connect controls on the fly, to any part of the set and have them immediately flow downstream. Artists could select any number of complex setpieces within an environment, and add controls for animation. Eventually this technique was used to animate the whole of Gotham city for the final sequences of the film.

## 4 RENDERING

By combining *Scenery* with Animal Logics scene building tool *Constructor*, the team could create environments of various flavours to be used in different workflows. This allowed optimisation of each for their specific use case. Utilising instancing at every level (from LEGO bricks to city blocks), the team was able to negate the requirement for LOD during rendering and feed the in-house renderer *Glimpse* huge, previously unrenderable, scenes. *Glimpse's* high interactive speed also allowed integration it into Maya's viewport, resulting in real time preview of surfacing variations and massive scene complexity.