Getting To Know The Movie

- **Pixar** Animation Studios & Walt Disney Pictures
- released on **November 22, 2017**
- **6 years** of production
- the **15th highest-grossing** animated film ever
- **2 Academy Awards**, 67 awards in total
- directed by **Lee Unkrich**

Lee Unkrich's other works
Plot
Dia de los Muertos
Characters: Living and Dead

The story takes place in both Real World and in The Land of the Dead.
Characters
Mama Coco

Her face wasn't modeled; instead separate layers of detail were designed, which were then added to her face with a shade.
Great-Grandma vs Grandma
They gave skeletons a lower jaw that detaches, eyes, teeth, eyebrows, hair.

Breaking Rules: Not "Staying True" To The Materials
Skeletons

- tens thousand of skeletons
- 80 different skeletons were designed
- skeletons had 127 bones instead of 206

“The animators kept requesting little bones, but I resisted that. I didn’t want the shaders to have to deal with more bones”
- Christian Hoffman, characters supervisor.
More About Skeletons

- more than 80 of bones are shown at all times
- bones are not fused together
"Automating the Handmade: Shading Thousands of Garments for Coco" (2018)

Bashforth B., De Goes F., Kuenzel J., Merrell J., Xenakis A.
AutoSeams

Power tool separates the artistic process of authoring seam curves from the actual texture synthesis.
Embroidery exemplars were used to synthesize detailed stitching textures.
Baking: Miguel's Hoodie

Since Miguel's hoodie appears in most of the scenes, baking was applied to its seams.
What Is Baking?

It is consolidation a **system of data** into a **simplified**, more permanent form.

The most common type is **Texture Baking**: the power of texture baking lies in the ability to transpose characteristics of 3D geometry into a 2D image texture.
Retargeting shader

it re-colors the garment and selects compatible colors for its details
Clothing On Skeletons
Continuous Collision Detection (CCD): Why use it?

In one frame the object is in front of the wall, in the next frame the object is behind the wall.

Objects are separated in one frame, penetrating each other in the next frame.
Discrete vs. Continuous Collision Detection
Ways To Implement CCD

- Supersampling (brute force)
- Ray casting (comparing adjacent frames)
- Bisection (binary search)
- etc.
Fizt (Physical Tool)

- was used for detangling
- speeds up the production of special effects - sometimes, by more than 150
- makes the effects appear more life-like
- was developed for fur motion in *Monsters Inc* (2001)
Other Ways To Avoid Collision

- filled negative spaces
- fused arm and leg bones when needed
- inserted wind spheres or pillows
Simgrab

a new gizmo developed called “simgrabc”. It constrains pieces of a garment in a specific location.

- Miguel's hoodie has 58 different variants (hands in pockets, hood up/down, etc.)
- Dancers grabbing their skirts

“If Miguel wanted to push up his sleeves, we could turn simgrabc on, animate the sleeve, then turn simgrabc off and his sleeve would stay there.”
Making It Various

29,000 lights
on the train station

18,000 lights
on the cemetery

8,200,000 lights
in the Land of the Dead
“It’s not dark and sad; it’s festive. Thousands of candles put off this beautiful orange glow, which creates a wonderful mood — romantic, warm, and interesting.”
Land of The Dead

"We wanted it to be an explosion of color and texture"
Land of The Dead: Complexity

*RenderMan* created **700 special point cloud lights**, which, when expanded, is equivalent to **8.2 million lights**.

“We figured out a way to introduce a single light — but give it a million points. The renderer sees it as one light, but we see a million lights.”
Pixar RenderMan

- photorealistic 3D rendering software
- by Pixar Animation Studios
- used for all 3D Pixar movies
- latest release 22/10/2018

- available for commercial use
- free for personal use
RenderMan's Inside: Buildings and Lighting
Hours per frame

It refers to the time it would have taken if the frame was rendered on a single core machine.
Do Much
With Little

Only 3 towers were built for Land of the Dead.

Variety was achieved by rotating them and changing their heights.
Do Much With Little 2

Rather than calculating color and brightness for a million lights, they calculate one and extrapolate that into the million.

That way they controlled everything with 12-15 lights.
Particle Light

- a new kind of light called a **particle light** that can have many, many points on it
- every petal has **unique** light
  (some have a source of light, some have glow around them)
- when the characters are walking, they can activate the particle lights for the petals anywhere they touch
Progression
1. Thumbnail

also called storyboard

with notes from the director
2. Layout

placing storyboard in 3D space

stiff, immovable models
3. Blocking

selling the idea,
making sure
the energy is right

some details are
intentionally rough
4. Final Animation

adding details
5. Final Shot

applying
textures, lighting, etc
References

4. RenderMan Stories: The World of Coco
   https://renderman.pixar.com/stories/the-world-of-coco
5. RenderMan's Visuals for Coco
   https://www.fxguide.com/featured/rendermans-visuals-for-coco/
6. Coco: Making Of
   https://www.youtube.com/watch?v=NCAuK_gBSTE&t=275s
7. Coco: Fashion Through the Edges
   https://www.youtube.com/watch?v=npvJx9uLBts
8. Behind the Scenes: Coco's New Technology
   https://www.thewaltdisneycompany.com/disney%E2%80%A2pixars-coco-uses-innovative-visual-effects-celebrate-family-tradition/
10. Coco: Meet the Pixar Family
    https://www.youtube.com/watch?v=-osTBm4UZV4
11. Continuous Collision Detection
    http://www.stencyl.com/help/view/continuous-collision-detection/
12. Continuous Collision Detection (Background Information)
13. Pixar Animator Frank Abney Shares Coco Animation Progression Video
14. A Night to Remember: Coco