Special Session – Industrial Light & Magic
Yoda and Beyond: Creating the Digital Cast of Star Wars Episode II

Computer graphics play a starring role in the production of Star Wars Episode II: Attack of the Clones. This session focuses on the creation of the digital cast of the latest prequel to the Star Wars saga. Industrial Light & Magic developed a variety of systems to make the
computer-generated characters in this film stand up to the actors with whom they share the screen, both in visual quality and physical realism. These systems also made it possible for digital doubles to stand in for actors in scenes either too difficult or too dangerous to shoot practically. In an effort to match the fidelity of motion of the computer graphics characters to that of their live-action counterparts, physically based simulation was used extensively throughout the production of this film. Multi-layered clothing, skin with underlying musculoskeletal structures, and the motion of rigid bodies each played a key role in imparting a new level of physical realism into the performance of computer graphics elements. The challenge of employing this level of proceduralism is also providing methods for directing the resulting performances. In this session, we will present an overview of the pipeline and systems used to produce Episode II, with the focus of the discussion being on the specialization required to evolve technologies, deeply rooted in academic research, into effective filmmaking tools. The panel will include individuals who played key roles in the development of key digital characters for the latest prequel to Star Wars.

1. Geoff Campbell, Senior Digital Model Supervisor
The creation of a 3-D digital Yoda involved a careful transition from physically based puppet to digitally animated character.

From early screen tests and George Lucas' concerns to match Yoda's watermark performance set on *Empire Strikes Back*, this section of the talk focuses on the development of Yoda's facial performance.

2. Sebastian Marino, Computer Graphics Principal Engineer
Sebastian will discuss cloth simulation with an emphasis on the direction of the performance of the simulated garments. The depth and breadth of our pipeline will be discussed with an emphasis on how our choice of algorithms and their implementations is motivated by their application to filmmaking.

3. Zoran Kacic-Alesic, Computer Graphics Principal Engineer
Zoran Kacic-Alesic Rigid Body Dynamics is an established tool in computer animation and visual effects production at ILM. We will discuss complexity, quantity, and variety of its application in Episode II. We will also touch on some surprising ways in which artists use this tool in order to achieve a desired performance.

4. James Tooley, Technical Animation Supervisor
As digital characters play a larger role in motion pictures, there is an increasing need to enhance their appearance with simulated costumes. The specific digital costumes from *Star Wars Episode II: Attack of the Clones* will be a focus of this talk. Cloth dynamics as well as rigid body dynamics were utilized in the creation of these costumes. We will discuss methods, procedures, and problems of digitally creating costumes for a cast of digital creatures.