



National Centre for Computer Animation

UK's Games Development: an R&D Perspective



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Outline



- Brief introduction of the National Centre for Computer Animation (NCCA) at Bournemouth University
- R & D perspective - animation and special effects related:
 - Some related work from our Research Centre
 - Personal experience with UK's computer games production houses





National Centre for Computer Animation

Computer Animation Research Centre



- NCCA established in 1989
- Research
 - Mixture of art and science
 - Fundamental technology for animation and computer games
 - 3D virtual human animation and simulation
 - Character modelling, rigging, skinning and motion
 - Physics-based animation and simulation
 - Rendering
 - Natural phenomenon simulation





Computer Animation Research Centre



- RAE 2008
 - 100% 4* (Esteem Indicators)
 - >70% 4* & 3* (outputs)
- Ranked No. 1 computer animation institute in the UK by ‘3D World’ magazine
- Close relationship with industry



Game Classification



- Categories:
 - strategic, shooting, racing, sports, ...
- Hardware:
 - Personal computer based
 - Console based: PlayStation, Xbox, ...
 - Handheld device based
- Players:
 - Network games, single users
- Serious games:
 - education, simulators, training, ...
- Visual and geometry:
 - 2D, 3D, stylised, ...
- Game controllers:
 - Traditional game interface (mouse, keyboard, joystick, ...), motion devices (Wii, PlayStation Move, Xbox Kinetic, ...)



UK Games Industry



- The UK games industry takes a leading role in the world arena with a strong track record of research and development
- Game trailer demos ...



Modern Games



- Components of the scene/background
 - Complex, large scale constructions
 - Natural phenomena: explosions, fluids, vegetation, complex destructions (building collapsing, etc), ...
- Components of the main character(s)
 - Motion (humans, aliens, animals, creatures)
 - Facial expressions
 - Deformation
 - ...



Key Aspects of Modern Games



- Engagement
- Visual quality
- Realism
- Response speed
- Emotion
- Rewarding strategy
- ...



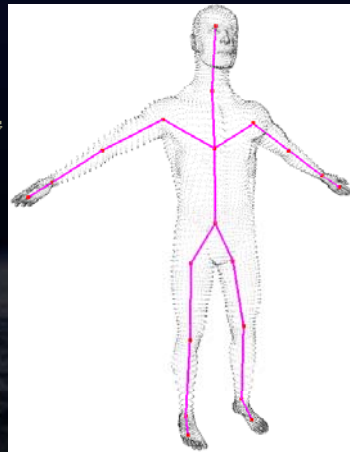
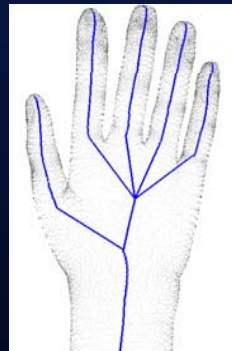
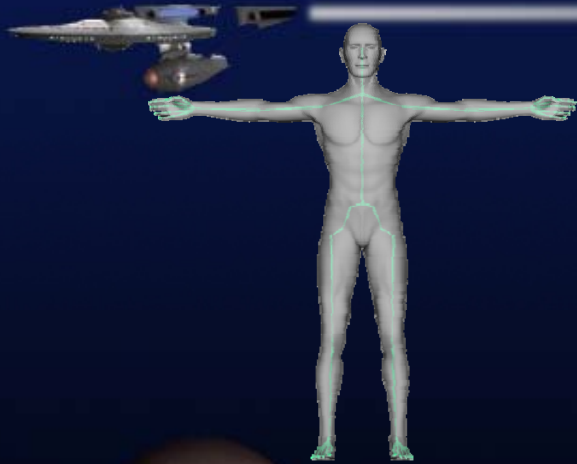
Research perspective



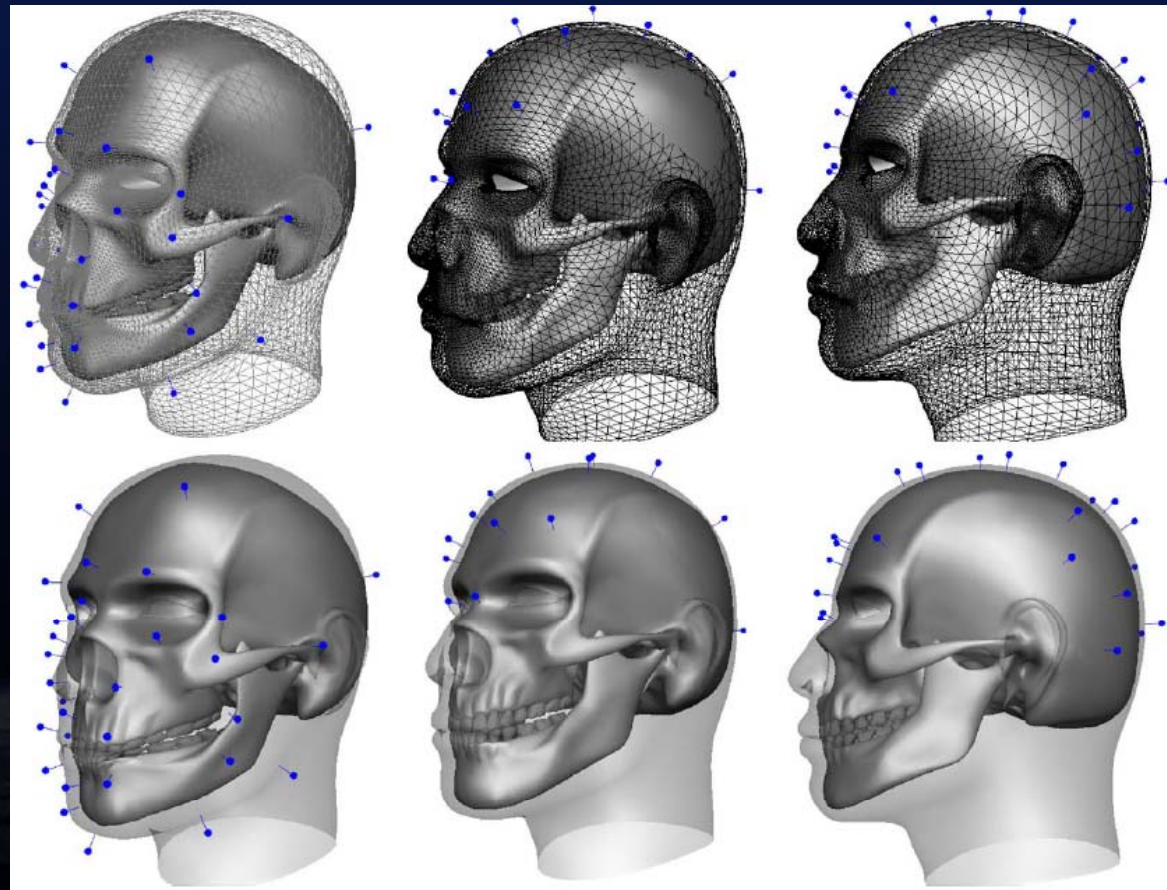
- How do these features relate to research and development?
 - Character(s)
 - Character modelling, motion, rigging and skinning, facial animation, hair, clothing, ...
 - Environment
 - Rendering, physical simulation, natural phenomena, ...
 - Intersection between and with CG objects/characters
 - Deformation, smashing, motion controllers (Wii, Kinect, etc), ...



Rigging, Skeletonization and Skinning



Anatomy-based Facial Animation



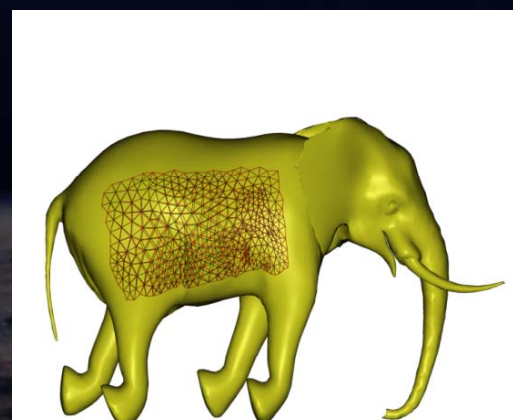
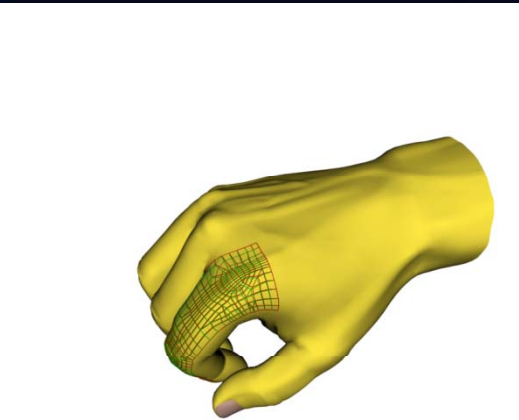
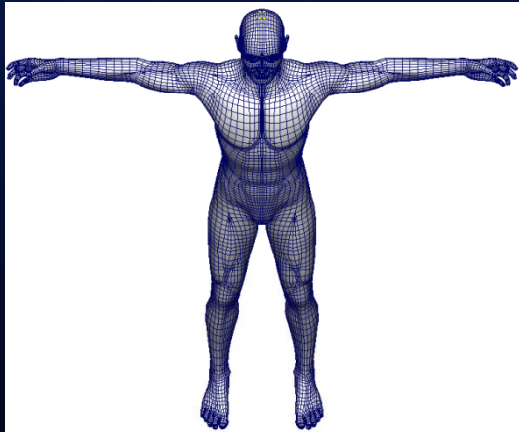


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Data Driven Facial Animation



Skin Sliding





Deformation Simulation



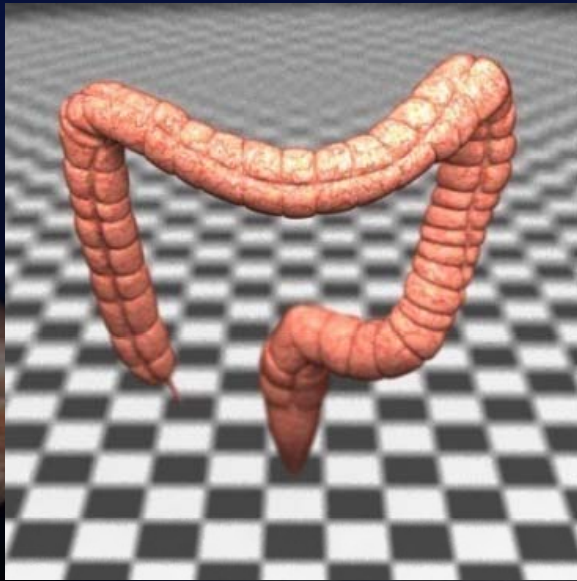
- Soft body dynamics
 - Finite element computation
 - Mass-spring systems
 - Mess-free deformations
- Demo
 - Rubber squirrels





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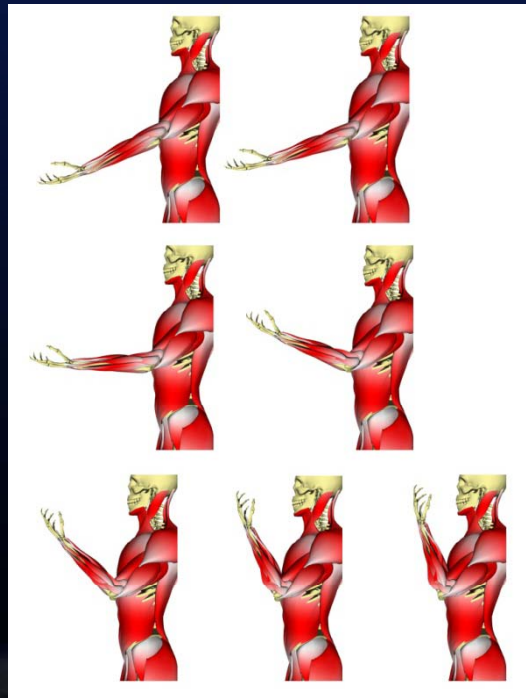
Deformation Simulation





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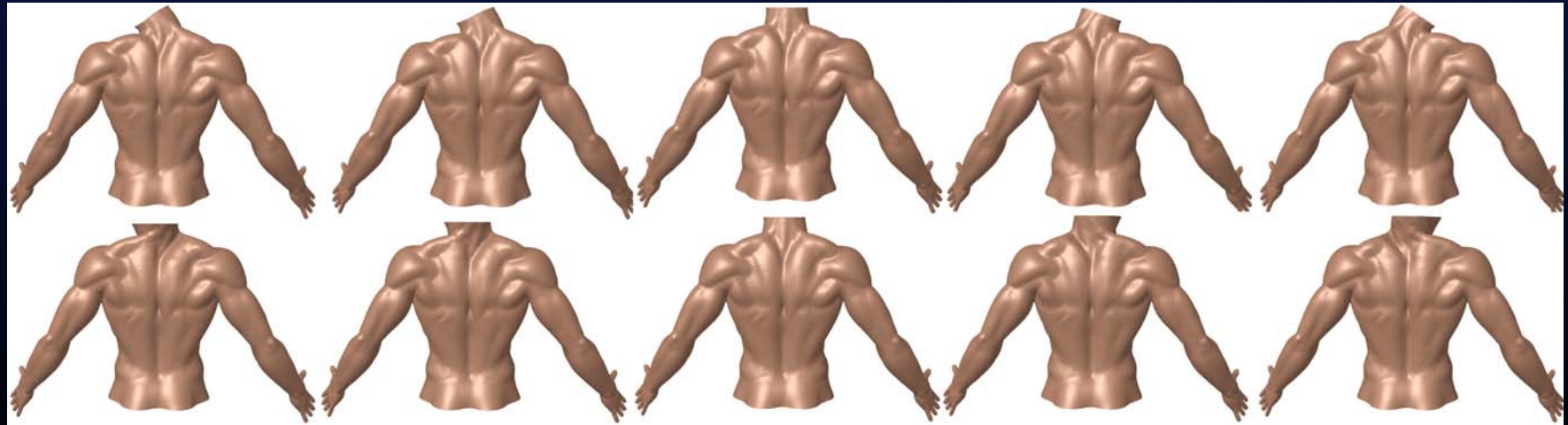
Deformation Simulation





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Deformation Simulation





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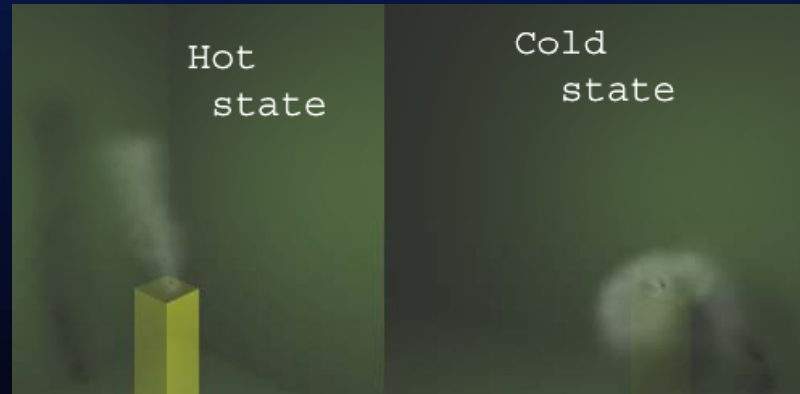
Fast Vehicle Crash for Games





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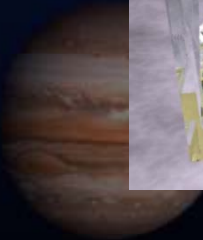
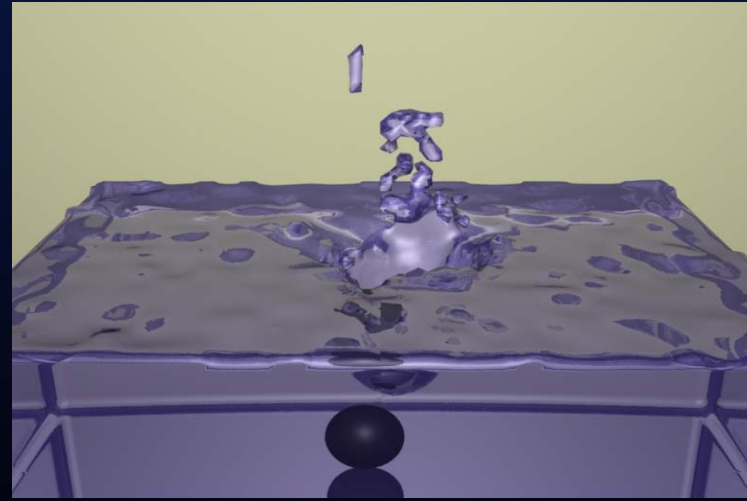
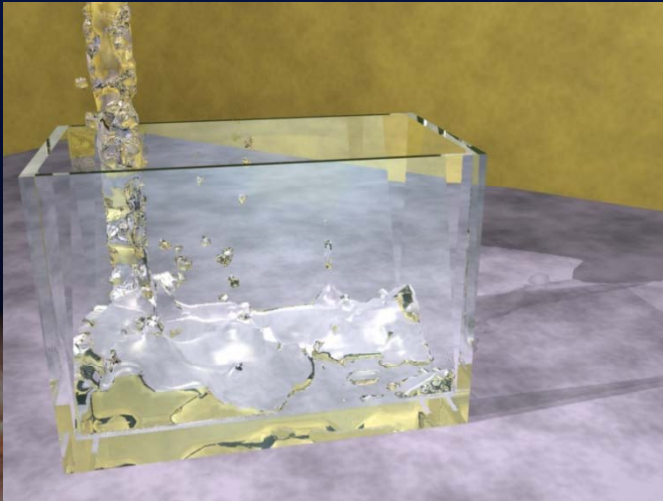
Smoke Simulation





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Fluids Simulation





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Hair Simulation





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Frontier Developments Ltd



- Independent games studio based in Cambridge
- Strong R & D team
- Developed cutting edge in-house 'engine' technology & software tools
- Demos...





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NaturalMotion Ltd



- Games and animation technology provider and games developer – ex-Oxford University spin out company
- Research and technology driven
- Games production department
- Demos ...

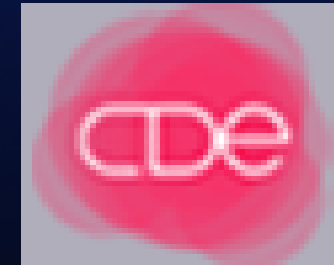


Academia Industry Collaboration



- Centre for Digital Entertainment

- An Industrial Doctorate Centre funded by the Engineering and Physical Science Research Council (EPSRC)
- £6.3 million between Bournemouth University and the University of Bath
- 50 doctorate students over five years
- 4 year programme, students based in a host industrial company
- CDE provides tuition fees and stipends to the students



Finally



- Increasingly realistic game special effects
- Complex interaction between and with game characters
- New generation of game consoles and hardware, e.g. Kinect
- Ever higher demand on R & D capability
- Fundamental sciences (maths, physics,...)
- Industry - academic collaboration





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Thank you

