



siggraph 2007

Animation Theater Program Part II

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In an anonymous country, a man works at a base that is equipped with powerful missiles. Today is his son's birthday, and he has just finished making a model plane that he has been secretly creating in his spare time.

He intends to give the plane to his son as a present when he returns home. However, just when the day's work is coming to an end, the telephone rings. He wonders what it can be ... This is a story of the paradoxical situation in which a typical father wishes peace and happiness for his family, though he works at a place where weapons of mass destruction exist. We also live in a complex society where happiness and anxiety are interwoven. This work is a metaphor that expresses this kind of situation.

Production: Character design was achieved through sketches and modeling clay based on polygonal modeling. Texture was achieved by scan-reading painted objects, making adjustments to them, and then pasting them onto polygonal models.

Total production time: 39 months; Writing the story and producing the storyboard: 24 months; CG production: 15 months

Hardware: PC Intel Pentium 4, 2.8GHz CPU, 1GB RAM

Software: Autodesk 3ds Max; Adobe After Effects, Photoshop

Director/Producer: Ichiro Iwano

Contributors: Story, Design, Animation: Ichiro Iwano

Music: Keiji Fujii

Contact:

Ichiro Iwano
Iwano Design
Nishiura 63-1
Nagakute
Aichi 480-1131
Japan
+81.561.63.7221
iwano16@ceres.ocn.ne.jp

02 **Olis Chance**

9:56

On a late summer afternoon Oli, a 12 year old boy, plays lazily on a railway track. After almost getting caught by a passing train, he wanders off into a deserted train depot. To his surprise, he meets a group of children on the depot, who seem to be just as lost as he is. He befriends them, and each of them seems to have his own story to tell, stories changing Oli's view on the afternoon he thought to have spent amongst new friends.

Directors: Saschka Unseld, Johannes Weiland
 Producer: Carsten Bunte
 Contributor: Character Design: Jakob Schuh

Contact:

Carsten Bunte
 studio soi
 Königsallee 43
 71638 Ludwigsburg
 Germany
 +49.7141.97.43.670
 contact@studiosoi.de
 www.studiosoi.de

03 **Fetch!**

1:16

Colin takes his dog Cumberland to the park for a game of fetch, but Cumberland has other ideas.

Software: NewTek LightWave; Adobe Photoshop, Premiere

Director: Dana Dorian
 Producer: Sam McCarthy
 Contributors: Writer: Dana Dorian
 Animator: Steve Townrow
 Voice: Gareth Howells
 Art Director: Jon Beeston
 Lighting, Compositing: Nuno Conceicao
 Music, Sound Effects: Joris De Man

Contact:

Dana Dorian
 Axis Animation
 Pentagon Business Centre
 Suite 225
 36 Washington Street
 G3 8AZ Glasgow
 United Kingdom
 +44.1415.722.802
 +44.141.572.2809 fax
 dana.dorian@axisanimation.com
 www.axisanimation.com

04 **VERSUS**

5:42

From two islands lost in the ocean, two samurai clans fight for a little island.

Directors: François Caffiaux, Romain Noel, Thomas Salas

Producers: Marie Anne Fontenier, Supinfocom Valenciennes

Contributor: Distributor: Annabel Sebag

Contact:

Annabel Sebag
Premium Films
130 rue de Turenne
75003 Paris
France
+33.1.42.77.06.39
+33.1.42.77.06.39 fax
animation@premium-films.com
www.premium-films.com

05 **clikclak**

5:34

Two robots and a young boy try to communicate.

Directors: Aurélie Fréchin, Victor-Emmanuel Moulin, Thomas Wagner

Producers: Anne Brotot, Supinfocom Arles

Contributor: Distributor: Annabel Sebag

Contact:

Annabel Sebag
Premium Films
130 rue de Turenne
75003 Paris
France
+33.1.42.77.06.39
+33.1.42.77.06.39 fax
animation@premium-films.com
clik.clak.free.fr

06 **It's JerryTime!: The Big Time**

3:39

"It's JerryTime" is an original animated web-series based on the true-life misadventures of Jerry, a middle aged single guy who's life is just a bit tougher than it should be. Published quasi-monthly, each episode is a 2D mashup of digital photos and clip art. The series, created by Jerry and Orrin Zucker, was the first podcast to be nominated for an Emmy Award.

In this episode, entitled "The Big Time", Jerry recalls his early days trying to break into showbiz, including an unfortunate incident when he was cast as a sheep in a mattress commercial.

Hardware: Mac
Software: Adobe After Effects,
Photoshop; e frontier Poser

Director: Orrin Zucker
Producer: Ozone Inc.
Contributors: Writer, Composer: Jerry Zucker
Animator: Orrin Zucker

Contact:

Orrin Zucker
Ozone Inc.
41 Lynn Road
Needham, MA 02494
USA
+1.781.449.6282
+1.781.449.8018 fax
ozonetv@mac.com
www.ozonetvdesign.com

07 **Alter Ego**

6:54

Somewhere in the wilds, there is a tower sheltering an aging Jester's solitude. There, a sullen weirdo feeds on dreams about his own greatness. Secluded from the world and reality, he seems not to notice how much his life differs from the idealized image of himself. He doesn't notice his funny habits, his clumsiness or the appearances of glamour of his surroundings. He derives satisfaction from the little pleasures of the everyday, which give him a delusion of life in a better world. This vision is so real that it becomes an obsession in which the Jester loses his identity.

Software: Autodesk 3ds Max; Adobe After Effects, Photoshop

Director: Kuba Gryglicki
Producer: Maciej Cwiek
Contributors: Studio Mansarda
Writer, Director, Designer, Animator: Kuba Gryglicki
Music: Zbigniew Kozub
Musicians: Lech Balaban, Agnieszka Balaban, Zbigniew Kozub
Sound: Zbigniew Kozub
Voice: Krzysztof Kowalewski

Contact:

Kuba Gryglicki
ul. 28 Czerwca 247/8
61-485 Poznan
Poland
+48.0663.162.745
+48.61.830.79.43 fax
kuba@alterego-film.pl
www.alterego-film.pl

08 The Grandfather of Soul

2:00

On the heels of the very sad news of James Brown's passing, Keytoon Animation Studio is proud to present their latest animated short entitled "The Grandfather of Soul". The short celebrates the soul and energy of the unforgettable James Brown hit "I Got You" with a comical music video of an old man getting his groove on in the privacy of his own home, or so we think.

Software: Autodesk 3ds Max; Next Limit Maxwell Render; Adobe Photoshop, After Effects; Apple Final Cut Pro

Director: Jaime Maestro

Producers: David Lacruz, Cecile Hokes

Contributors: Executive Producer: Nina Rowan

Lighting, Texturing Director: Jonatan Catalan

Compositing Supervisor: Santi Agusti

Animation Supervisor: Daniel Peixe

Rigging: Luis San Juan, Rudi Hammad

Audio Post: Splash Studios NYC

Sound Design, Mix: Peter Levin

Sound Editors: Barbara Parks, Alex Noyes, Neil Benezra

Music: I Got You (I Feel Good), James Brown, Fort Knox Music Inc., Warner Chappell Music Spain, S.A.

Keytoon Team: Alex Mateo, David Cuevas, Jonathan Cuevas

Contact:

Cecile Hokes
Keytoon Animation Studio
11 San Rafael Avenue
San Anselmo, CA 94960
USA
+1.415.454.4600
cecilehokes@mac.com

09 Beach Ball

1:02

For this spot the task was to create a 3D beach ball in the image of the Pepsi 'globe' logo. The idea was to have the ball look photorealistic and natural as if this global beach ball game was actually taking place. Crowds and locations were complete in camera with a few crowd scenes built using 3D crowd simulations.

Software: Autodesk Flame; SOFTIMAGE|XSI; Silhouette Roto

Director: Sam Bayer

Producers: Sarah Dowland, Bernadette Castillo

Contributors: Visual Effects: MassMarket

Lead Flame: Chris Staves

Flame Artists: Patrick Ferguson, Brian Benson, Jaime Aguirre, Dave Elkins

VFX Executive Producer: Justin Lane
VFX Producer: Sarah Dowland, Bernadette Castillo
CG Artists: Pakorn Bupphavesa, Jacob Slutsky,
Young Jang, Florian Witzel, David Barosin,
Kris Rivel, Paul Liaw, Laurent Barthelemy
Designer: Zoe Wishart

Contact:
Jennifer Treuting
PSYOP, Inc.
124 Rivington Street
New York, NY 10002
USA
+1.212.533.9055
+1.212.533.9112 fax
jennifer@psyop.tv
www.psyop.tv

10 **Beck “Girl”**

3:28

When considering how to visually represent the lighthearted tone and dark lyrics of Beck’s “Girl”, Motion Theory found inspiration in Al Jaffee’s classic fold-ins for Mad magazine, creating real-life scenes where reality seems to fold-in on itself. Throughout the video, Beck travels and performs the song, moving through naturalistic settings in East L.A., Boyle Heights, and McArthur Park, the genuine, culturally vibrant sides of Los Angeles that often get lost behind the glitz of Hollywood and Beverly Hills. The three-day shoot employed local artists to create murals and miniature neighborhoods, and local mariachis to play along with Beck near a wall famously known as ‘Mariachi Corner’.

Directors: Mathew Cullen, Grady Hall
Producer: Scott Gemmell
Contributors: Artist: Beck
Label: Interscope Records
Video Commissioner: Kathy Angstadt
Production Company: Motion Theory
Executive Producer: Javier Jimenez
DP: David Morrison
Production Designer: Matthew Holt
Post Production: Motion Theory
Creative Directors: Mathew Cullen, Grady Hall
Art Director: Jesus de Francisco
Artists: Martha Rich, Kevin Christy, Ethan Marak, Gary Garay
Visual Effects Supervisor: Vi Nguyen
Assistant Visual Effects Supervisor: Gabriel Dunne
Compositing: Phil Pham, Matt Motal, Mike Slane
Designers, Animators: Kirk Shintani, Jesse Franklin, Christopher Janney,
Linas Jodwalis, Christopher Leone, Mark Lai, Juston Hsu
Editor: Jeff Consiglio (Motion Theory)
Colorist: Clark Mueller (Riot)

Contact:
Caroline Gomez
Motion Theory
321 Hampton Drive
Suite 101
Venice, CA 90291
USA
+1.310.396.9433
+1.310.396.7883 fax
caroline@motiontheory.com
www.motiontheory.com

11 Chevrolet “Buildings”

:53

The 60 second entirely computer generated hi-definition commercial was completed by The Embassy Visual Effects, Vancouver for Chevrolet Mexico and advertising agency McCann Erickson Mexico. Based on an original concept from McCann’s creative VP and directed by The Embassy, the spot features 5 Chevrolet SUVs driving aggressively over a glass and steel structure which eventually reveals itself to be a 110 story building in the centre of a fictional metropolis.

Software: SOFTIMAGEXSI; Newtek LightWave; Apple Shake; Custom software

Directors: The Embassy Visual Effects Inc.,
Vancouver

Producer: Charlie Bradbury

Contributors: VFX Supervisor:

Simon van de Lagemaat

Lead CG Artist: Michael Blackburn

CG Artists: Marc Roth, Paul Copeland,

Dan Prentice

Senior Compositor: Stephen Pepper

Compositor: David Casey

Contact:

Charlie Bradbury
The Embassy Visual Effects,
Inc.
177 West 7th Avenue
4th Floor
Vancouver, BC V5Y 1L8
Canada
+1.604.696.6862
+1.604.696.6863 fax
charlie@theembassyvfx.com
theembassyvfx.com

12 La Marche des Sans Nom

5:29

The destiny of a soldier in the middle of a battlefield.

Directors: Jean Constantial, Nicolas Laverdure,
Lucas Vigroux

Producers: Anne Brotot, Supinfocom Arles

Contributor: Distributor: Annabel Sebag

Contact:

Annabel Sebag
Premium Films
130 rue de Turenne
75003 Paris
France
+33.1.42.77 06.39
+33.1.42.77.06.39 fax
animation@premium-films.com
www.premium-films.com

13 13 Ways to Die at Home

2:26

Poison toads, missing socks and carpet leeches. So many ways to die at home!

Software: Autodesk Maya; Adobe After Effects; Apple Final Cut Pro

Director/Producer: Lee Lanier

Contact:

Lee Lanier
BeezleBug Bit
806 Buchanan Boulevard
Suite 115, PMB 122
Boulder City, NV 89005-2144
USA
+1.702.203.1487
+1.702.293.2164 fax
info@beezlebugbit.com
www.BeezleBugBit.com

14 Esc

4:00

A mouse cursor creates a 3D character that comes to life after an unknown program error and begins a journey across the computer desktop.

Software: Autodesk 3ds Max; Adobe Photoshop, Premiere, After Effects

Director/Producer: Justin Henton
Contributor: Music: Michael Creber

Contact:

Justin Henton
Emily Carr Institute
10451 Southgate Road
Richmond, BC V7E 4Z8
Canada
+1.604.761.6379
jchenton@gmail.com
www.jchenton.com

15 Moutons

5:41

Are sheep born in the froth of waves?

Directors: Simon Blanc, Vivien Cabrol,
Arnaud Valette
Producers: Anne Brotot, Supinfo.com Arles
Contributor: Distributor: Annabel Sebag

Contact:

Annabel Sebag
Premium Films
130 rue de Turenne
75003 Paris
France
+33.1.42.77.06.39
+33.1.42.77.06.39 fax
animation@premium-films.com
www.premium-films.com

16 **Respire, Mon Ami - Breathe, My Friend** 2:11

Set in France, a lonely child finds companionship with an unlikely friend.

Hardware: HP Workstations

Software: Autodesk Maya; Pixar RenderMan; Adobe Shake, Photoshop, Premiere;
MAXON BodyPaint3D; Luxology Modo; SyFlex; Tsunami

Director: Chris Nabholz

Producer: Ringling School of Art and Design

Contributors: Animation, Story: Chris Nabholz

Voice: Katherine Tanner

Music: The Music Bakery

Faculty Advisor: Heather Thomson

IT Department: Karissa Miller, Jennifer Bradley,

Rosa Disla, Iva Lovell

Contact:

Chris Nabholz
14530 Laurel Road
Felton, PA 17322
USA
+1.717.586.5875
posetopose@gmail.com
www.chrisnabholz.com

17 **The Animator and the Seat** 2:09

Chunk has been awake for an immeasurable amount of time, slaving away in his cubicle on an animation that is long overdue. Armed only with caffeinated beverages, Chunk must overcome his animated struggles and fatigue-induced hallucinations without going completely insane. He has wrongly assumed, however, that the only comfort available to him is that of his warm, padded computer chair. He does, in fact, have no comfort available to him, and his chair is out to prove that.

Software: Autodesk Maya; Apple Shake; Pixar RenderMan; Adobe Photoshop, Premiere; Tsunami

Director: Eric Drobile

Producer: Ringling School of Art and Design

Contributors: Animation: Eric Drobile

Music: Bill Drobile III

Faculty Advisor: Jim McCampbell

Contact:

Eric Drobile
7508 Wyndam Road
Pennsauken, NJ 08109
USA
+1.609.502.2738
edrobile@rsad.edu
www.rsad.edu/~edrobile/

18 Space

2:29

Two kinds of Aliens meet, and struggle to find peace. Finally, they create a tap dancing performance.

Hardware: Intel 1.83 GHz, 1 GB RAM
Software: Autodesk Maya; Adobe Premiere

Director/Producer: Sang yeong Jeong
Contributors: Effects: Ji Woon Hwang
Title Illustration: Miae Kim

Contact:

Sang yeong Jeong
NCsoft
IL SONG Building, 10th Floor
157-37 Samsung-dong,
Kangnam-gu
Seoul 135-090
Korea
+82.02.6201.0757
beaqueer@hotmail.com

19 Space Shower Hot

:39

Inspired by 1980's deadtech, cyberpunk, junk art and industrial style.

Hardware: PC, Intel Xeon 3.2 GHz Dual, 2GB RAM
Software: Autodesk Maya, Combustion, Flint; Matchmove

Directors: Synichi Yamamoto, Yasuo Koga
Producers: Yoshifumi Sadahara, Akinori Kojima
Contributors: CG Artists: Yasuo Koga, Tetsuaki Matsumoto
Music: SALAD

Masaomi Shiratori, Sohei Saito, Takashi Sugisaki, Junya Hirasawa, Kentaro Ohira,
Wakako Sekine

Contact:

Synichi Yamamoto
Omnibus Japan
7-9-11 Akasaka
Mitato-ku
Tokyo 107-0052
Japan
+81.3.6229.0601
+81.3.6229.0604 fax
s-yama@omni.co.jp
www.omnibusjp.com

20 Chocolate Pillows

:50

In a series of adventures we find out that there is more in the Chocolate Pillows than one can expect.

Hardware: PCs, Octane, Tezro; Rendering farm: 10 CPUs

Software: Autodesk Maya, mental ray, Flame, Combustion; Shake;

Adobe After Effects

Director: Yariv Gaber

Producer: Kadishzon Production Ltd.

Contributors: Agency: Bauman Bar Rivanay

VFX Animation: Gravity Visual Effects & Design

Contact:

Doron Fiterman
Gravity VFX & Design
3, Hata'siah Street
Tel Aviv 67139
Israel
+972.3.5622270
+972.3.5622433 fax
doron@gravity.co.il
www.gravity.co.il

21 Aditya Birla Group India

1:00

We travel across continents with the flow of elements which interact with various people, forming the identity and logo of Aditya Birla Group of India.

Hardware: PCs; Octane Tezro; Rendering farm: 10 CPUs

Software: Autodesk Maya 6, mental ray, Flame, Combustion; RealFlow, Shake; Adobe After Effects

Director: Yariv Gaber

Producer: Adi Shoval

Contributors: VFX Animation: Gravity Visual Effects & Design

Contact:

Doron Fiterman
Gravity VFX & Design
3, Hata'siah Street
Tel Aviv 67139
Israel
+972.3.5622270
+972.3.5622433 fax
doron@gravity.co.il
www.gravity.co.il

22 The Fallen Oak

2:42

HMS Royal Oak is the largest maritime war grave in the Northern Hemisphere, sunk by U-boat torpedoes while at anchor in the early weeks of WWII in Scapa Bay, Orkney. This Sovereign class warship was the final resting place of 833 sailors. The wreck has been leaking oil for the past 67 years and has led to attempts by the Ministry of Defense's Marine Salvage team to prevent damage to the local environment.

The images show the impact damage of the four torpedoes that sank the ship. One of the most powerful images is of the starboard side of the upturned hull in which a bite appears to have been taken out of the bow where the first torpedo struck. The 3D images have been animated using digital cinematography techniques to allow the viewer to explore the wreck in detail. The effect of movement across the wreck site gives a much clearer understanding of the structure.

Hardware: Point cloud data gathered with Reson multi-beam sonar technology
Software: IVS 3D Fledermaus; Autodesk Maya; Custom 'WreckSight' plug-ins

Director/Producer: Chris Rowland

Contact:

Chris Rowland
School of Media Arts and
Imaging
DJCAD, University of Dundee
Perth Road
DD1 4HT Dundee
United Kingdom
+44.1382.345.359
c.rowland@dundee.ac.uk

This visualization shows all 27 named storms that formed in the 2005 Atlantic hurricane season and examines some of the conditions that made hurricane formation so favorable. Many records were broken during the 2005 season, including the most hurricanes, the most at Category 5, and the most intense hurricane ever recorded in the Atlantic as measured by atmospheric pressure.

The animation begins by showing the regions of warm water that power the hurricanes advancing northward through the peak of hurricane season and then receding as the waters cool. Strong shearing winds in the troposphere can disrupt developing young storms, but measurements indicate that there was very little shearing wind activity in 2005 to impede storm formation.

This visualization shows actual data that NASA and NOAA used to predict the paths and intensities of hurricanes. Satellite data plays a vital role in helping us understand the land, ocean, and atmosphere systems that have such dramatic effects on our lives.

Hardware: Dual Linux systems running Fedora Core 4; Dual Mac running OS-X 10.4
Software: Adobe Photoshop, After Effects; Autodesk Maya; Pixar RenderMan; RSI IDL; Custom software, shaders, scripts

Director: Gregory W. Shirah

Producer: Dr. Horace G. Mitchell

Contributors: B. Alex Kekesi, Lori Perkins, Stuart A. Snodgrass, Michael Starobin, Marte Newcombe, Randall Jones, Kevin Mahoney, Mike Velle, Jeff Halverson, Jesse Allen, Jeff de La Beaujardiere, Tom Bridgman, Cindy Starr, Eric Sokolowsky, Joycelyn T. Jones, Vicky Weeks, James W. Williams

Contact:

Greg Shirah
NASA Goddard Space Flight
Center
Scientific Visualization Studio
Building 28, Room E102A,
Code 610.3
Columbia, MD 20771
USA
+1.301.286.7903
+1.240.266.0307 fax
greg.shirah@nasa.gov
svs.gsfc.nasa.gov

24 Magic Fluid Control

2:32

Three clips to showcase the possibilities of controlled water simulations. Two of them involve a magician that creates fluid figures. The third one shows a fluid flowing up several stairs and forming a human figure. The water is simulated using the lattice Boltzman method and is controlled using particles which define local force fields. They are generated automatically from either a physical simulation or a sequence of target shapes. At the same time, as much of the natural fluid motion as possible is preserved.

Software: Blender; GIMP;
Custom LBM Fluid Solver

Director: Nils Thuerey
Producer: Mark Pauly
Contributors: Richard Keiser, Ulrich Ruede

Contact:

Ils Thuerey
Computer Graphics
Laboratory, ETH Zurich
IFW ETH Zentrum
Room C 28
8092 Zurich
Switzerland
+41.44.63.274.69
+41.44.63.215.96 fax
nils@thuerey.de
graphics.ethz.ch/%7Ethuereyn/

25 Capturing and Animating Occluded Cloth

:49

This video demonstrates results from a new method for cloth motion capture which can produce detailed surface meshes for full garments. Traditionally, capturing complicated deforming surfaces such as cloth has been difficult due to substantial self-occlusion and folding. This method overcomes these problems by preserving physical characteristics of the cloth and by filling holes using a data driven model.

Examples include a dancing actor in a full garment, a heavily wrinkled sleeve, and a rag interacting with a solid object. It also demonstrates re-use applications of cloth capture data by binding skeletal mocap data to a data-driven skinning system.

Contact:

Keenan Crane
University of Illinois
201 North Goodwin Avenue
Urbana, IL 61801
USA
+1.502.821.3239
keenan.crane@gmail.com
www.uiuc.edu/~kcrane

Hardware: Foculus FO214C; Nikon D200, D50; Perfection sewing machine kit
Software: MathWorks MATLAB; Luxology Modo; NewTek LightWave;
Adobe Photoshop, Illustrator, Premiere; Custom software

Directors/Producers: Keenan Crane, Ryan White, David Forsyth

Venus was as beautiful inside, as out.

First ever 3D laser measurements of the Venus de Milo resulted in 'point cloud data' composed of tens of millions of points, which are beautiful as they are, allowing us to focus on the artistic form of the statue, and on the intentions of the creator thousands of years ago. But, when full texture was applied, it started to tell a story, as well as arouse questions.

How did the goddess of love and beauty come to the Louvre Museum from the island of Melos, Greece where she was found? How were the statue's missing arms arranged? When was she made? Who made her? She herself is a mystery wrapped in enigma.

"Venus Venus" made its debut at a 3D stereogram theater inside The University Art Museum of the Tokyo National University of Fine Arts and Music in Tokyo, as part of an exhibition called "Ancient Greek Art from the Louvre Museum," which opened in June, 2006. Minor change has been made to the content since then.

Art transcends time, space, and dimension to stimulate sense of wonder. This is one such example.

Director: Kazumasa Otsuki

Producers: Yoshiyuki Hamano, Naomi Matsuzawa, Tomoko Nagai

Contributors: Jean-Luc Martinez, Yukiko Kamijima, Yutaka Takase,

Shinichi Takayama, Osamu Yamada, Tomoko Nagai, Yoshitaka Nakamura,

Yuko Okura

Contact:

Naomi Matsuzawa
CAD CENTER
CORPORATION
2-3-21, Kouraku, Bunkyo-ku
Tokyo 112-0004
Japan
+81.3.5842.7300
+81.3.5842.7307 fax
n-matuzawa@cadcenter.co.jp
www.cadcenter.co.jp/en/

27 L'Odysée de la vie

2:41

The adventure of the inside life, from conception until the final transformation as a baby.

Director: Niels Tavernier

Producers: Mac Guff, 17 Juin Production, Transparence Productions

Contributors: VFX Director: Philippe Sonrier,
Vincent Wauters

VFX Producer: Laleh Sahrai

Animation: Pascal Anquetil, Herve Pigeon,

Bartelemy Boirot

Lead Lighting: Nicolas Brack

Shading, Rendering: Max Touret,

Emmanuel Prevot

Compositing: Philippe Sonrier, Vincent Wauters

Modeling: Xavier Duval, Benoit Vincent

Music: Caroline Petit

Contact:

Solange Lobo

Mac Guff Ligne

6, rue de la Cavalerie

75015 Paris

France

+33.1.53.58.46.46

+33.1.53.58.46.47 fax

losange@macguff.fr

www.macguff.fr/?lang=en

28 ToyShop

4:00

"ToyShop" demonstrates state-of-the-art, real-time rendering on consumer graphics cards, such as ATI Radeon X1800. A variety of high-end techniques were designed with the sole purpose of creating an immersive, detail-rich, real-time environment. And while these methods surpass convention, they are implemented efficiently within the current specs of the most cutting-edge, popular videogame engines.

One of these complex techniques is parallax-occlusion mapping, a per-pixel ray tracing algorithm for inverse-displacement mapping with dynamic lighting, soft shadows, self-occlusions, and motion parallax for rendering complex surface details with low polygonal meshes. A novel post-processing rain effect was developed to simulate multiple layers of raindrops with a compositing pass over the rendered scene. The rain illumination is computed by combining water-to-air refraction for individual raindrops, a Fresnel effect, and reflections due to surrounding light sources.

Physics-based particle systems with stretched normal mapped quads generated raindrops falling off objects, complete with the illusion of motion blur. The illumination from the lightning system accurately simulated refraction and reflection of the droplets, adding further realism to the scene. An offline raindrop simulation system was adapted to the GPU to simulate and render water droplets trickling down glass panes in real time.

Hardware: ATI Radeon X1800 Graphics card, Intel Pentium IV 3.4 GHz CPU, 1 GB RAM

Software: ATI Sushi, NormalMapper, CubeMapGen, RenderMonkey; Autodesk Maya; Adobe Photoshop

Directors: Natalya Tatarchuk, David Gosselin, Dan Roeger

Producers: Callan McNally, Lisa Close

Contributors: Lead Programmers: Natalya

Tatarchuk, David Gosselin

Programming, Shader Programming: John Isidoro, Dan Ginsburg, Thorsten Scheuermann, Chris Oat

Lead Artist: Dan Roeger

Artists: Daniel Szecket, Abe Wiley, Eli Turner

Previous Programming: Alex Vlachos,

Chris Brennan

QA: Paul Cintolo

Sound Design: Bill Chesley

Composer: Augustus DiCadillac

Audio Producer: Kate Gibson

Contact:

Natalya Tatarchuk
Advanced Micro Devices,
Inc. (AMD)
3D Application Research Group
/ ATI Research
10 Sunset Road
Wayland, MA 01778
USA
+1.508.303.3977
natashat@bu.edu
ati.amd.com

29 **Liquid Simulation** **on Lattice-Based Tetrahedral Meshes**

1:09

This video shows results using a simulation method for animating the behavior of incompressible liquids with complex free surfaces. The region occupied by the liquid is discretized with a boundary-conforming tetrahedral mesh that grades from fine resolution near the surface to coarser resolution on the interior. At each time-step, semi-Lagrangian techniques are used to advect the fluid and its boundary forward, and a new conforming mesh is then constructed over the fluid-occupied region.

The tetrahedral meshes are built using a variation of the body-centered cubic lattice structure that allows octree grading and deviation from the

lattice-structure at boundaries. The semi-regular mesh structure can be generated rapidly and allows efficient computation and storage while still conforming well to boundaries and providing a mesh-quality guarantee.

Pressure projection is performed using an algebraic multi-grid method, and a thickening scheme is used to reduce volume loss when fluid features shrink below mesh resolution.

Examples are provided to demonstrate that the resulting method can capture complex liquid motions that include fine detail on the free surfaces without suffering from excessive amounts of volume loss or artificial damping.

Hardware: Pentium IV, 2 GB RAM
Software: Pixie Renderer;
Custom liquid simulator

Director/Producer: Nuttapon Chentanez
Contributors: Bryan E. Feldman,
Francois Labelle, James F. O'Brien,
Jonathan R. Shewchuk
Music: Bjorn Lynne

Contact:

Nuttapon Chentanez
University of California, Berkeley
EECS, Computer Science
Department
537 Soda Hall, Mail Code 1776
Berkeley, CA 94720
USA
+1.510.439.7433
nchantan@eecs.berkeley.edu
www.eecs.berkeley.edu/~nchantan

30 Physics on GPUs

2:06

The current trend in processor technology is to improve efficiency in parallel architectures. To exploit this new computational power, we have to develop data-parallel algorithms. We demonstrate a method that enables us to implement rigid body and fluid simulation entirely on the GPU which is a parallel processor, obtaining unprecedented performance. The method is applicable to other simulations and it also accelerates coupling simulations as shown in this movie.

Director/Producer: Takahiro Harada
Contributors: Seiichi Koshizuka,
Yoichiro Kawaguchi

Contact:

Takahiro Harada
The University of Tokyo
Interfaculty Initiative in Information
Studies
7-3-1, Hongo, Bunkyo-ku
Tokyo 113-0033
Japan
+81.3.5841.5936
takahiroharada@iii.u-tokyo.ac.jp
www.iii.u-tokyo.ac.jp/~takahiroharada/

31 **Perceptive Pixel Multi-Touch Demo Reel** 3:32

This reel showcases our latest research into multi-touch interaction techniques, an exciting area of human-computer interaction that has seen a recent surge of activity from many research groups. Since the introduction of the core sensing technique two years ago at SIGGRAPH 2005, we've been prolifically exploring the wide range of interaction techniques that have become enabled.

Multi-touch inherently implies multi-user, and the scalability of our sensing technique has given us a unique ability to explore larger interaction scenarios, such as walls and tabletops, that can accommodate multiple users working either independently or collaboratively.

Hardware: PC
Software: Custom

Director/Producer: Jefferson Y. Han
Contributor: Philip L. Davidson

Contact:

Jefferson Han
Courant Institute of
Mathematical Sciences
719 Broadway
12th Floor
New York, NY 10003
USA
+1.212.998.3392
jhan@cs.nyu.edu
cs.nyu.edu/~jhan

32 **Jet Production from a Rotating Black Hole**

:57

NCSA worked with the University of Virginia to visualize a relativistic magnetohydrodynamic simulation of a rapidly rotating black hole surrounded by a magnetized accretion disk.

As the simulation proceeds, a jet forms: a small fraction of the disk's matter is expelled outward along the poles of the disk's rotation. The jet carries a helical magnetic field. A custom scientific data plugin read the original spherical grid simulation data into a Fluid Effects volume. The brightness of the jet region, physically far less dense than the disk, is greatly enhanced in this visualization.

Jets are observed to emerge from the environments of many real black holes into which matter is falling — those left as remnants of massive stars, and the much larger ones at the centers of most galaxies. The

process for producing these jets is only partly understood. This simulation represents a realization of one possible mechanism for launching and powering jets. The NCSA visualization group also used these data to produce one of the animations used in the October, 2006 PBS NOVA program, "Monster of the Milky Way".

Hardware: NCSA Linux Visualization Cluster
Software: NCSA data visualization plug-ins

Director: Robert Patterson
Producer: Donna Cox
Contributors: Visualization: Donna Cox,
Robert Patterson, Alex Betts, Stuart Levy
Scientific Simulation: John F. Hawley,
Julian H. Krolik

Contact:

Robert Patterson
NCSA
University of Illinois at Urbana-
Champaign
1205 West Clark Street
Urbana, IL 61801
USA
+1.217.244.4863
robertp@ncsa.uiuc.edu

33 **Solar - Terrestrial Interaction from Cosmic Collisions**

2:35

A data visualization from captured solar imagery to solar wind interaction with Earth's magnetosphere. Magnetosphere visualized in 3D from a fluid dynamic model fit to satellite observations concurrent with solar imagery. Volumetric supercomputer rendered element of the Aurora Borealis shown between the heights of the International Space Station and that of airliners. Earth imagery from NASA satellite mosaic.

Software: Pixar RenderMan; Spot star rendering software; Autodesk Maya;
Apple Shake; CISM space physics visualization software

Director: Carter Emmart
Producer: Christopher Scollard
Contributors: Executive Producer: Anthony Braun
Lead Technical Director: Mark Bajuk
Scientific Visualization: Erik Wesselak, Ryan Wyatt
Digital Artist: Bill Bourbeau
Computer Scientist, Visualization: Jon Genetti

Contact:

Carter Emmart
American Museum of Natural
History/Rose Center
79th Street at Central Park
West
Room 407
New York, NY 10024
USA
+1.917.567.7033
+1.212.313.7868 fax
carter@amnh.org
www.amnh.org

34 Flight to the Center of the Milky Way

1:37

We start out at the position of our sun, 26,000 light years from the center of the Milky Way Galaxy, where we've embedded the Hipparcos star catalogue data, 118,000 mapped star positions. This particle model is based on a hi-resolution image of another Milky Way like galaxy, m83.

We created particle groups for stars, birthing stars regions, gas, numerous dust lanes and H₂ regions. We can control each of these elements separately in the rendering process. There are about 100 particle groups, totaling 57 million particles in the model. The background galaxies are based upon Brent Tully's galaxy catalog, a collection of 36,000 galaxy positions.

We modeled the galactic center elements based upon hi-resolution images from a variety of wavelengths, such as radio, infra-red, optical and x-ray. One of the primary images was the wide field radio atlas image. Astronomers Mark Morris from UCLA and Doug Roberts from Northwestern consulted on the modeling of the galactic center.

A modified version of this animation appears in the Denver Museum of Nature and Sciences "Black Holes: The Other Side of Infinity" digital dome show and "Monster of the Milky Way" PBS/NOVA program.

Hardware: NCSA Linux Visualization Cluster
Software: Star Renderer

Director: Robert Patterson
Producers: Donna Cox, Robert Patterson,
Stuart Levy
Contributors: Visualization: Donna Cox,
Robert Patterson, Stuart Levy, Thomas Lucas
Science Advisors: Mark Morris, Doug Roberts

Contact:

Robert Patterson
NCSA
University of Illinois at Urbana-
Champaign
1205 West Clark Street
Urbana, IL 61801
USA
+1.217.244.4863
robertp@ncsa.uiuc.edu

35 **Coal Fire Research. A Sino-German Initiative**

3:01

Satellites observe our planet day and night, making visible what is unseen to the naked eye, for example the CO₂ concentration in the atmosphere. Within the last 200 years the CO₂ level has grown by 25%, a major reason for green house effect and global warming.

One source of CO₂ hasn't gained much attention yet. All around the world coal fires are burning under the soil, in North America and Australia for centuries, in South Africa, Indonesia or India for decades. The problem is worst in China where more than 100 sites are on fire all the time.

A Sino-German research project with contribution of the German Aerospace Center is working on the detection of coal fires by the help of satellites.

This animation features the problem of CO₂ emissions from subsurface coal fires. After an introduction to the CO₂ problem, we focus on coal fires in China and explain their ignition, development and effects. In the final part of the animation we describe the detection of coal fires by finding heat patterns in satellite images.

Hardware: PC, Dual Int I X ON 3.0 GHz CPU, 2 GB RAM

Software: Visual Natur Studio; Autodesk 3ds Max, Combustion; Adobe After Effects, Premiere, Photoshop; PCI G omatica; ESRI ArcView

Director: Nils Sparwasser

Producers: GeoVisualizationCenter, German Remote Sensing Data Center (DFD), German Aerospace Center (DLR)

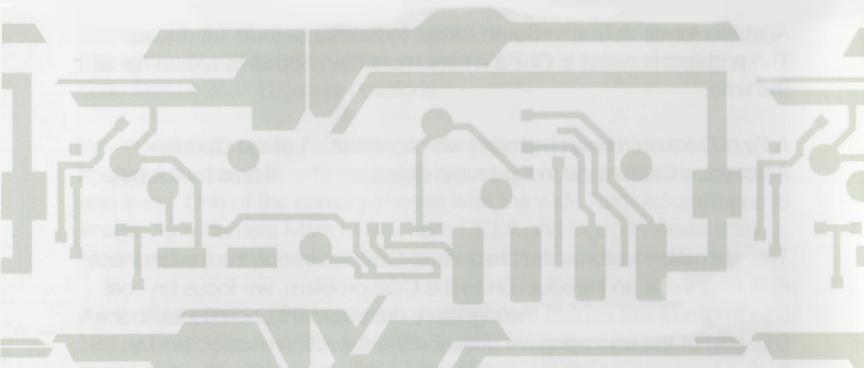
Contributors: Thorsten Andresen,
Christian Gredel, Stephan Reiniger,
Robert Meisner

Contact:

Thorsten Andresen
GeoVisualizationCenter
German Aerospace Center (DLR)
Muenchener Strasse 20
82234 Wessling
Germany
+49.8153.28.1327
+49.8153.28.1313 fax
thorsten.andresen@dlr.de
www.dlr.de/caf/satellitendaten/geovis/

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