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FORUM
2012

June 20, 2012

COEX Conference Room South (3F) 307-308



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Ministry of Culture, Sports and Tourism

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2012 글로벌 CT 포럼 프로그램

시 간	프 로 그 램	
10:00~10:05	인사말 (한국콘텐츠진흥원 홍상표 원장)	
10:05~10:10	축 사 (문화체육관광부 박순태 실장)	
10:10~10:50	기조연설 : VFX 산업의 기술과 미래 (Bill Taylor)	
	기술 트랙 (#307)	산업 트랙 (#308)
11:00~11:50	3D 스테레오 기술 : 3D 기술의 적용 (Ray Feeney)	VFX 제작 공정 효율성 증진 : 할리우드 사례 (Matt Aitken)
11:50~13:20	점 심	
13:20~14:10	유체 및 비유체 시뮬레이션 기술 : 최신 기술 동향 및 적용 사례 (Markus Kurtz)	비주얼 이펙트 : 엔터테인먼트산업의 새로운 중심 (Eric Roth)
14:10~15:00	퍼포먼스 캡처 기술 : 최신 기술 동향 및 적용 사례 (James Knight)	국제공동제작을 통한 지역 스토리의 세계화 사례 (Erika Burton)
15:00~15:30	커피브레이크	
	* CT R&D 주요 성과 발표 (307호)	
15:30~15:50	- (주)에프엑스기어 (최광진 이사)	
15:50~16:10	- 서울대학교 디지털클로딩센터 (감해원 디렉터)	
16:10~16:30	- 원더월드스튜디오(주) (최성철 감독)	
16:30~16:50	- 한국과학기술원 (노인식 선임연구원)	
17:00~18:00	종합토론 (307호) VFX 산업의 미래와 국제공동제작 기회 만들기 : 국제파트너 찾기	

2012 GLOBAL CT FORUM PROGRAM

TIME	PROGRAM	
10:00~10:05	Opening Remarks	
10:05~10:10	VIP Speech	
10:10~10:50	Keynote Speech (Bill Taylor)	
	Technology Track (#307)	Industry Track (#308)
11:00~11:50	3D Stereo Technology (Ray Feeney)	VFX Production Process Efficiency (Matt Aitken)
11:50~13:20	Lunch	
13:20~14:10	Challenges and Opportunities of Fluid & Non Fluid Simulation Technology (Markus Kurtz)	VISUAL EFFECTS: The New Center of the Entertainment Industry (Eric Roth)
14:10~15:00	Performance Capture Technology (James Knight)	Globalization of Local Stories through International Co-Productions (Erika Burton)
15:00~15:30	Coffee Break	
	* KOCCA's R&D support case study (#307)	
15:30~15:50	FX Gear	
15:50~16:10	Digital Clothing Center	
16:10~16:30	Wonderworld Studios	
16:30~16:50	KAIST	
17:00~18:00	Closing Panel Session Topic : The Future of the Visual Effects Industry and Finding Opportunities for International Cooperation	

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기조 연설
KEYNOTE SPEECH

Bill Taylor
Visual Effects Supervisor and Cinematographer

KEYNOTE SPEECH

Bill Taylor

Inspired by Ray Harryhausen's miraculous effects in JASON AND THE ARGONAUTS (1963) and by a lifelong interest in stage magic and sleight-of-hand, BILL TAYLOR ASC began his movie career at the Ray Mercer Co. in Hollywood, an optical effects company with roots in the silent film era.

At Mercer he shot optical effects and titles on thousands of commercials, trailers and feature films. He learned Petro Vlahos Color Difference Travelling Matte system from a night class Vlahos taught at USC and became Mercer's resident blue screen expert. Vlahos became a friend and mentor, a relationship that continues to the present day.

After 11 years at Mercer, a year of free-lance optical and title work followed, working for another mentor, Linwood Dunn ASC, at Film Effects of Hollywood. During that year Bill took on the optical effects for John Carpenter and Dan O'Bannon's DARK STAR, also writing the lyrics to the title song, "Benson Arizona".

Later the same year Taylor was hired to work for another longtime mentor, Universal Studios' matte artist Albert Whitlock. Taylor's future business partner Syd Dutton came on board a month later.

THE HINDENBURG (1975), Taylor's and Dutton's first film with Whitlock, received the Oscar for visual effects, Whitlock's second Oscar in two years.

Whitlock was a magnet for distinguished film-makers; as a result Syd and Bill got to work on films directed by everyone from John Huston (THE MAN WHO WOULD BE KING, UNDER THE VOLCANO), to Alfred Hitchcock (FRENZY, FAMILY PLOT) to Franklin Schaffner (PAPILLON).

When Whitlock retired in 1985, Taylor and Dutton founded Illusion Arts Inc, where they earned credits on nearly 200 films, with directors as diverse as Martin Scorsese (CAPE FEAR, THE AGE OF INNOCENCE), John Landis (THE BLUES BROTHERS, COMING TO AMERICA, INNOCENT BLOOD), and Mike Nichols (THE BIRDCAGE).

Later, Taylor served as on-set visual effects supervisor on THE FAST AND THE FURIOUS (2001), BRUCE ALMIGHTY (2003), and CASANOVA (2005). More recently Bill and Syd Dutton co-supervised MILK (2008), their sixth film for Gus Van Sant, for which they created more than 150 "invisible" shots. As Illusion Arts wound up its 26 year run, the company completed dozens of shots for Michael Mann's PUBLIC ENEMIES and some key environments for GI JOE.

Taylor's most recent credit as Visual Effects Supervisor is for John Hillcoat's LAWLESS, which will release in August 2012.

Bill is the co-author with Petro Vlahos of the chapters on blue-screen and green-screen compositing in both the "American Cinematographer Manual" and the "Visual Effects Society Handbook".

Taylor was the founding co-chair of the Motion Picture Academy Science and Technology Council, and is in his fifth term as an Academy Governor representing the Visual Effects Branch, where he chairs the Executive Committee.

Taylor has received a Saturn Award, an Emmy and a Motion Picture Academy Technical Achievement Award. He is a Founder and Life Member of the Visual Effects Society, and the recipient of the Society's 2009 Founder's Award. Both Bill and Syd Dutton were granted honorary "Doctor of Humane Letters" degrees from the Academy of Art University in San Francisco. In 2011 Syd and Bill received the "Creative Imagery" award from the Art Directors' Guild.

Bill Taylor's still photographs illustrate a dozen books about magic performance, crooked gambling and exotic clocks. He continues to create large- and small-scale illusions for professional magicians around the world

Bill will always be grateful to the three men who made everything possible: his mentors Petro Vlahos, the late Linwood Dunn ASC, and the late Al Whitlock.

Vlahos, the late Linwood Dunn ASC, and the late Al Whitlock.

Abstract

Bill Taylor outline for Korea conference:

Future demands on VFX technology: Exhibition, content

Avenues for future development

TECHNOLOGY Intelligence

VENUES Home vs. Theatrical
Gaming
New venues

OTHER VOICES Dennis Muren, Douglas Trumbull, Thad Beier, Ray Feeney, Andy Maltz

THE HUMAN FACTOR A worldwide network
A worldwide industry

A look back, and a look ahead.

The real limits

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기술트랙 (307호)
Technology Track (#307)

VFX 기술의 미래
The future of VFX Technology

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3D 스테레오 기술 : 3D 기술의 적용

3D Stereo Technology

Ray Feeney

President and Founder / RFX Inc

3D STEREO TECHNOLOGY

Ray Feeney

Ray Feeney, president and founder of RFX Inc, earned a Bachelor of Science degree in electrical engineering from Caltech and began his career at Robert Abel & Associates. He has been honored by the Academy of Motion Picture Arts and Sciences with four Scientific and Engineering Academy Awards, the John A. Bonner Medal of Commendation, and the Gordon E. Sawyer Oscar for his pioneering efforts to improve visual effects in the motion picture industry. In addition, Feeney is a founding Board member of the Visual Effects Society as well as a Fellow of SMPTE. He is on the executive board of the Visual Effects Branch of the Academy and has often chaired the Academy's Science and Technology Council.

<http://www.rfx.com/ray>

Abstract

Stereoscopic Film Making Overview: including both the business aspects along with the technical status. This will cover (at a high level) a discussion of shooting with two camera rigs, the practicality of post conversions, the reasons for choosing one vs the other, the ramifications of the newly emerging tools, the current challenges in exhibition, and the general state of the US and European stereoscopic markets.

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유체 및 비유체 시뮬레이션 기술 : 최신 기술 동향 및 적용 사례

Challenges and Opportunities
of Fluid & Non Fluid Simulation Technology

Markus Kurtz

Vice President of Production Technology / Rhythm and Hues Studios

CHALLENGES AND OPPORTUNITIES OF FLUID & NON FLUID SIMULATION TECHNOLOGY

June 20, 2012
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Markus Kurtz

Markus Kurtz serves as vice president of production technology at Rhythm & Hues Studios, one of the world's leading visual effects companies. The studio, which celebrates its 25th anniversary in 2012, has earned two Oscars® for Achievement in Visual Effects ("Babe," 1995, and "The Golden Compass," 2008) as well as four Scientific and Technical Awards from the Academy of Motion Picture Arts and Sciences (AMPAS), which recognizes innovations in movie making technology.

With more than 16 years of experience in visual effects production, Markus works closely with each of the studio's production and technology teams to oversee technical and creative solutions based on current production challenges and future technology goals. Among their accomplishments is a water simulation tool which earned an AMPAS Sci-Tech award in 2008.

Markus and his teams have been actively involved in such current and recent R&H productions as "Life of Pi," "Snow White and the Huntsman," "Alvin and the Chipmunks: Chipwrecked," "X-Men: First Class," "Yogi Bear" and "The A-Team."

Previously, Markus worked as a digital effects supervisor at Rhythm & Hues and CG supervisor at Digital Domain. His many film credits include "Titanic," "Lord of the Rings," "Happy Feet" and "Superman Returns." Markus Kurtz holds a Master of Fine Arts from the University for Arts and Industrial Design in Linz, Austria, where he was born and lived before moving to the United States in 1996.

CHALLENGES AND OPPORTUNITIES OF FLUID & NON FLUID SIMULATION TECHNOLOGY

Abstract

This talk will explore different water simulation tools which are being developed and used in productions at Rhythm & Hues Studios. The successful combination of different techniques allows for the creation of great CG water scenes in various productions.

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퍼포먼스 캡처 기술 : 최신 기술 동향 및 적용 사례

Performance Capture Technology

James Knight

Virtual production Consultant / Knight Vision Studios

PERFORMANCE CAPTURE TECHNOLOGY

James Knight

QUALIFICATIONS

- VFX professional with extensive experience in production and post production
- Proficient in motion capture and its integration into VFX pipelines
- Managed both VFX/motion capture production and post production crews
- Managed one of only three simulcam shoots in film history
- Production experience in Europe and North America
- Meets tight deadlines and agreed budgets, adapting to changing circumstances
- Grew up in the UK, has since lived and worked in Asia and North America
- Active Member of Visual Effects Society (VES)
- Director and Board Member of BAFTA
- Scientific & Technical Awards Committee member – The ACADEMY

FILM

PROJECT	STUDIO/PRODUCTION CO.	TITLE
The Amazing Spiderman	Columbia Pictures	Motion capture supervisor
Hereafter	Warner Bros./Kennedy Marshall	Motion capture producer/ project manager
Avatar	20th Century Fox/Lightstorm Entertainment	Motion capture producer/ project manager
The Incredible Hulk	Universal Studios/Marvel/Rhythm & Hues	Motion capture project manager
Prince Caspian	Walt Disney Pictures/Walden Media	Motion capture project manager
I Am Legend	Sony Pictures Imageworks	Motion capture project manager

GAMES

PROJECT	STUDIO/PRODUCTION CO.	TITLE
Unannounced WB game	Warner Brothers Games	Motion capture Supervisor
Project Natal (became Kinect)	Microsoft Games Studios	Motion capture project manager
Star Wars-Old Republic	Lucas Arts/Bioware	Motion capture project manager
Tomb Raider 8	Crystal Dynamics	Motion capture project manager

RELATED EXPERIENCE

VIRTUAL PRODUCTION CONSULTANT

Knight Vision Studios – Los Angeles, CA

2010 - present

- As a principal of Knight Vision, our team and I work with studios, producers and VFX artists to adapt the groundbreaking techniques pioneered on Avatar for use on their projects.
- Relationships include Universal, Mark Burnett Theatrical, The Third Floor, DuMondeFX, Believe Media, Game On Audio, Warner Bros. and Double Helix Games.

POST PRODUCTION SUPERVISOR

Crawford Post Production – Atlanta, GA

2003 – 2006

- Supervised multiple facets of post production for feature film and television at largest Post Production facility in the Southeast
- Established and maintained relationships with studios and independent producers including Warner Brothers and United Artists
- Spearheaded development, expanding client base to include Universal, Lionsgate and ABC
- Supervised editors, colourists, and audio engineers

GENERAL MANAGER, PRODUCER

CinePost – Atlanta, GA

2001 – 2002

- Managed post production staff
- Pioneered new methods of compressing video for DVD and creating new DVD menu techniques
- Coordinated post production of indie films, music videos and DVD projects
- Established and maintained relationships film distribution companies, producers and record labels
- Expanded business to include feature films and national television
- Grew the post production business by 500%

EDUCATION

Bachelor of Science in Finance / Berry College / Rome, Georgia

University of Tokyo / Tokyo, Japan

Chalfont St. Peter's College / Chalfont, England

MISCELLANY

Before transitioning to film, spent several years as a DJ on Atlanta's popular 99X Covered Rock and Roll Hall of Fame inductions for VH1

Abstract

In my presentation about performance capture, I'll show examples of very early motion capture, talk about the evolution and uses of it, show never before seen behind-the-scenes clips from various feature films I have worked on. I will also show some fun, creative ways we are pushing the envelope with motion capture at Knight Vision Studios, and leveraging our personal experiences on feature films like AVATAR, as well as a company.

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산업트랙 (308호)
Industry Track (#308)

효율성 창출
Efficiency creation

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**비주얼 이펙트
: 엔터테인먼트산업의 새로운 중심**

**VISUAL EFFECTS
: The New Center of the Entertainment Industry**

Eric Roth

Executive Director, Visual Effects Society (VES)

VISUAL EFFECTS: THE NEW CENTER OF THE ENTERTAINMENT INDUSTRY

June 20, 2012
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South

Eric Roth

Eric Roth brings over 20 years of strategic management, communications and public affairs experience to his position as Executive Director of the Visual Effects Society (VES). During the past 7 years he has more than doubled the size of the VES and is frequently consulted on worldwide visual effects trends by journalists and vfx practitioners of all stripes. VES now has approximately 2500 members in 29 countries comprised of the most talented visual effects artists worldwide in film, TV, animation and video games.

Prior to joining VES, Eric was a former Chief of Staff at Los Angeles City Hall, in addition to managing the Government Affairs Department for the Southern California Association of Governments (SCAG) and being the Executive Director of L.A. Works, the largest Volunteer Action Center in Los Angeles.

VISUAL EFFECTS: THE NEW CENTER OF THE ENTERTAINMENT INDUSTRY

Abstract

With 44 of the top 50 highest grossing movies of all time being visual effects driven, and since the trend toward using visual effects in every form of entertainment – from film to television to animation and to computer games – continues to grow in order to deliver the director’s vision, it now appears that visual effects has entered the "bullseye" of the entertainment industry.

This talk will cover the ever increasing role visual effects plays in creative, business and political decisions for all entertainment that is being produced around the world. Eric Roth, Executive Director of the Visual Effects Society, will give an insider’s view of how the world of entertainment is changing before our eyes on a daily basis and will also describe what it takes to become a member of the most exclusive visual effects club on the planet—the VES.

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국제공동제작을 통한 지역 스토리의 세계화 사례

Globalization of Local Stories
through International Co-Productions

Erika Burton

Co-President of Rhythm & Hues Film Division / Rhythm and Hues Studios

GLOBALIZATION OF LOCAL STORIES THROUGH INTERNATIONAL CO-PRODUCTIONS

June 20, 2012
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South

Erika Burton

A veteran of the visual effects and animation arena, with a career spanning more than twenty years, Erika Burton has held leadership positions in the top tier of entertainment companies, including Disney, Industrial Light + Magic and Rhythm & Hues Studios.

As co-president of Rhythm & Hues' Film division, Erika shares leadership duties with Lee Berger, the division's president. Together, they are responsible for the extensive client relations and production management associated with the studio's core animation and vfx production service work, in tandem with the division's senior management team. In addition, Erika utilizes her vast experience and network of relationships within the entertainment industry to facilitate the studio's emphasis on the development of new original content.

Prior to her current position, Erika served as vice president of production for Disney Animation. She was the executive producer for R&H Films from 2006 to early 2011, overseeing teams whose work included the Academy Award-winning "The Golden Compass," (for Achievement in Visual Effects, 2008), and the highly successful "Alvin & Chipmunks" and "Night at the Museum" franchises. Erika was the vfx producer for R&H on the Oscar-nominated "The Chronicles of Narnia: The Lion, the Witch and the Wardrobe" and vfx produced "Evan Almighty" and "Dr. Seuss' 'The Cat in the Hat' for the studio.

Before joining R&H in 2002, Erika produced effects at The Secret Lab/Dream Quest Images on such films as "Reign of Fire," "The Kid," "Bicentennial Man," "Instinct" and "Deep Rising." At Industrial Light + Magic she moved up through the ranks working on "Mission: Impossible," "Men in Black" and other projects.

Erika's early career featured stints at Jim Henson Productions, Showtime Networks and Triad Artists. Erika is a graduate of UCLA, where she earned a Bachelor of Arts in History.

GLOBALIZATION OF LOCAL STORIES THROUGH INTERNATIONAL CO-PRODUCTIONS

Abstract

As one of Hollywood's leading visual effects and animation production companies, Rhythm & Hues Studios has built and utilized an internationally distributed pipeline for more than a decade. In this presentation, Erika Burton, the studio's co-president of Film, offers key insights learned from the company's extensive experience producing in multiple locations, starting with the initial decision process that led to opening its first international facility in Mumbai, India in 2001, at a time when international production was not yet commonplace. With five facilities in four countries added over the last decade, including the latest, a cloud-computing center in Taiwan announced earlier this year, the studio has addressed the growing complexity of production for an ever-changing, highly competitive industry.

The talk will feature an examination of the cultural, technological and financial challenges faced when navigating the global production marketplace, including the basics of global communication, managing logistics and schedules, and working with cultural differences and sensitivities, while maintaining product quality and the integrity of the creative process.

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CT R&D 주요 성과 발표 (307호)

* KOCCA's R&D support case study (#307)

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세계 최초의 완벽한 분산 병렬 처리의 유체 시뮬레이션

Introducing FluX, the World's First Fully Scalable Fluid
Simulator

Kwang-Jin Choi

CTO / FXGear Corp

INTRODUCING FLUX, THE WORLD'S FIRST FULLY SCALABLE FLUID SIMULATOR

June 20, 2012
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Conference Room
South

Kwang-Jin Choi

SUMMARY

Co-founded FXGear, Inc.

Developing various computer graphics softwares such as cloth, hair, fur, fluid simulation software
(www.qualoth.com)

SPECIALTIES

Computer graphics software development

EXPERIENCE

CTO at FXGear

January 2005 - Present (7 years 5 months)

SKILLS & EXPERTISE

Computer Graphics

3D

Dynamics

MEL

OpenGL

Maya

Software Development

EDUCATION

Seoul National University

Ph.D, Computer Graphics, 1996 - 2002

Seoul National University

BS, electrical engineering, 1992 - 1995

INTRODUCING FLUX, THE WORLD'S FIRST FULLY SCALABLE FLUID SIMULATOR

Abstract

FluX is a fast, node-based 3D fluid simulation software which is fully scalable with all operations, maximizing resources distributed over network. FluX's full scalability makes itself a unique fluid simulator capable of producing extremely detailed simulation close to the real world phenomena.

Ultimate Performance by Distributed Computing A highly detailed fluid simulation requires immense amount of memory and tedious computation time. To solve this problem, FluX is designed to support "data-parallel distributed processing" in all aspects of operations, i.e. solver, surfacing, file I/O, output visualizing etc, so that the memory and computation loads are distributed to as many computers available on your network. Multi-thread processing has limitations in using the memory and the number of cores for computing, whereas distributed processing can infinitely acquire resources on network and will free you from the restriction of memory size and number of cores mountable on a single board.

The computation speed of FluX scales very well according to the number of cores used. FluX evaluates the entire nodes of a scene in a distributed manner, which is made possible by parallelizing all the operations of FluX nodes without exception, and by minimizing the amount of communication over network with state-of-the-art numerical methods.

FluX has no limitation of the numbers of computers to employ on network, thus users can de facto have access to unlimited memory for simulation in extremely detailed resolution. It is helpful for you to easily improve the quality of the fluid motions without depending too much on the post-processing and secondary tweaking to add extra details to your primary simulation results. Simply add more particles and use higher resolution to get details as you want, which would have been prohibitive for other software due to limited memory and cores.

A fluid surface generated from particles is one of the most essential outcomes of fluid simulation. Distributing the memory and the computation enables FluX to generate extremely fine fluid surfaces at a speed which can be unmatched by others software.

FluX supports parallel rendering of the distributed output data as well to pre-visualize results (mesh, particles) of simulation. Thus the number of particles or polygons is not limited by memory of a graphic card and they can be rendered at a very fast speed.

The flexible node-graph workflow allows a user to flexibly design his desired visual effects by assembling nodes. FluX also allows a user to create new operating nodes with FluX API and easily develop a new algorithm by combining the new node with the existing nodes. In addition, FluX's node-based architecture is designed to minimize the waste of memory by sharing memory space as much as possible among all operating nodes.

FluX : A Scalable Fluid Simulator

Kwang-Jin Choi

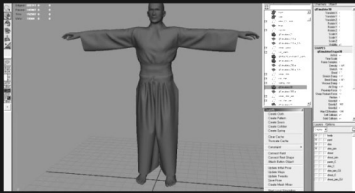


creates Computer Graphics Technology
for next generation Digital Contents



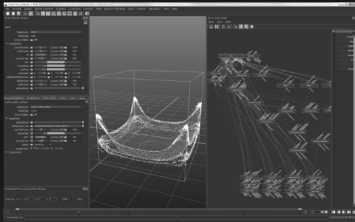
Products

Qualoth



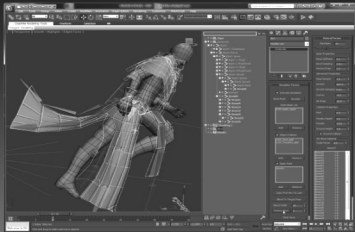
- High quality physics-based cloth simulator
- Fully multi-threaded dynamics and collision resolution
- Customers include Dreamworks, Technicolor, SEGA, Blizzard, Digital Frontier, etc.
- Used in 'Shrek 4', 'How to Train Dragon', 'Kung-Fu Panda', etc
- Patented under US, EU, Japan, Korea

FluX



- Scalable fluid simulator based-on MPI
- The fastest fluid simulator among commercially available softwares
- Working with Intel for parallel computation performance enhancement
- Cloud computing for fluid simulation/rendering is due for commercial service

ezCloth



- Cloth animation authoring tool for 3D games
- Bone-chain simulation coupled with skinned mesh
- Easily integrated into existing production pipeline and game engines
- Customers include NCSoft, Smilegate, Lion Games, LogiWorks, etc.



Products



FXHair – Hair Simulation Plug-in



FXDeform – 3D Morphing Plug-in



mental ray 29'09" renderman 14'35" FXFur@renderman 5'12"

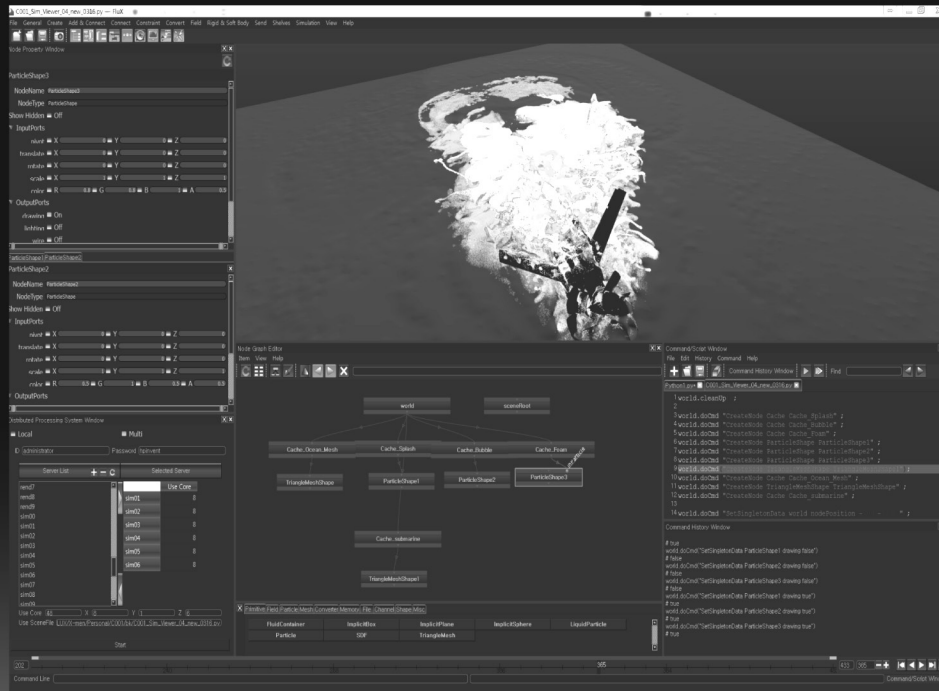
FXFur – Fur Rendering Pipeline Tool



FXCloth – Real-Time Cloth Simulation Engine



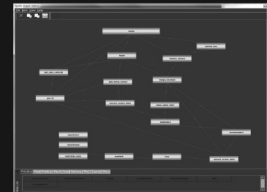
FluX : Fluid for FX



Key Features

Advanced Architecture

- Node-Graph Architecture
- Provides Python Scripting and C++ API
- Interactively customizable GUI for compound nodes → Easy to create node-graph asset library



Distributed Simulation

- 30 times faster with 16 nodes
- Very large scale fluid simulation possible
- Applicable to HPC Service using Cloud

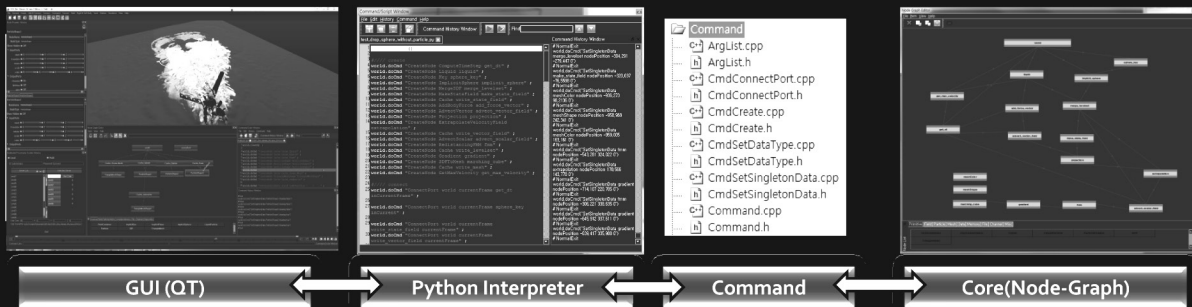


Various Algorithms

- Particle Level-set, SPH, FLIP, Fast stochastic bubbles
- Multi-level simulation, goal shape control, fast particle surfacing algorithms
- Triangle level collision detection, signed-distance-field collision detection



Advanced Architecture



Users can create new effects using node-graph editing GUI

Advanced users can program python scripts for new effects

Programmers can use Flux Command C++ interface for new effects

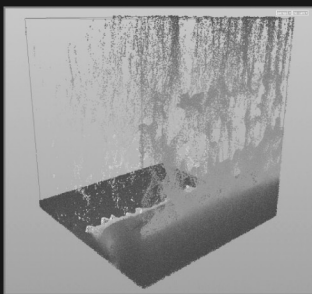
Advanced programmers can use Flux API for adding new features to Flux with new nodes

Easy to extend, Flexible, Cross-platform



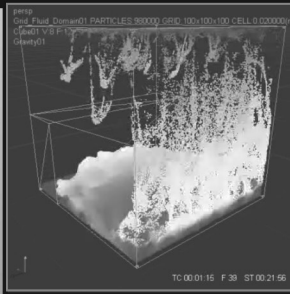
Performance Comparison with Commercial Software Houdini / RealFlow / Naiad / Flux

Simulation : 100 frame / 100^3 resolution / FLIP method
performed on Intel Xeon E5430 2.66GHz Dual CPU(Quad Core)



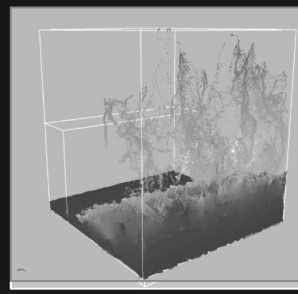
Houdini 12

Number of Particles :
1,000,000
Time : 22 min
Number of Core : 8



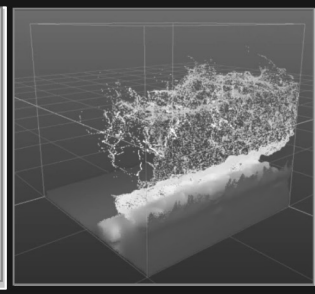
RealFlow 2012

Number of Particles :
980,000
Time : 21 min 50 sec
Number of Core : 8



Naiad 0.6

Number of Particles :
1,130,000
Time : 48 min
Number of Core : 8



Flux 3.0

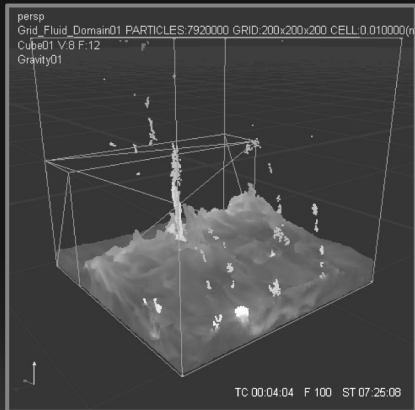
Number of Particles :
1,170,000
Time : 19 min 2 sec
Core : 8

Time : 7 min 59 sec
Core : 48



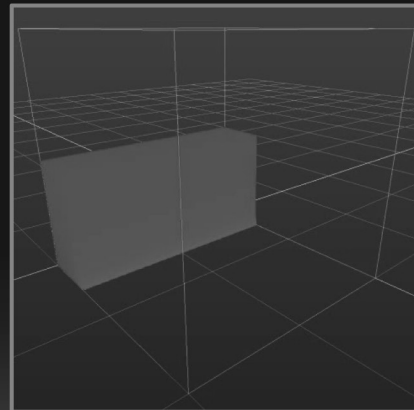
Performance Comparison with Commercial Software RealFlow vs FLUX

Simulation : 100 frame / 200³ resolution / FLIP method
performed on Intel Xeon E5430 2.66GHz Dual CPU(Quad Core)



RealFlow 2012

Number of Particles : 7,920,000
Time : 7 hrs 25 min
Number of Core : 8

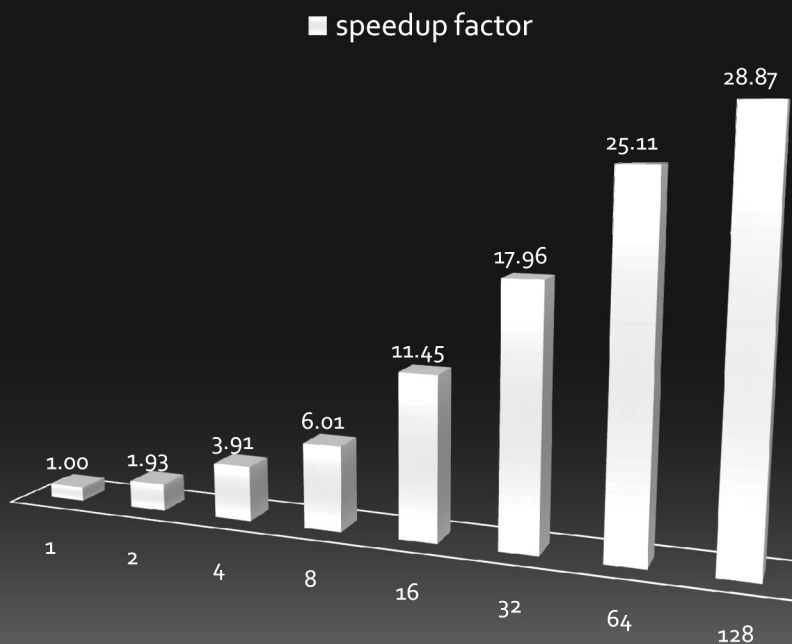


FluX 3.0

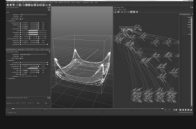



Number of Particles : 8,000,000
Time : 1 hr 45 min
Core : 48



Performance Gain

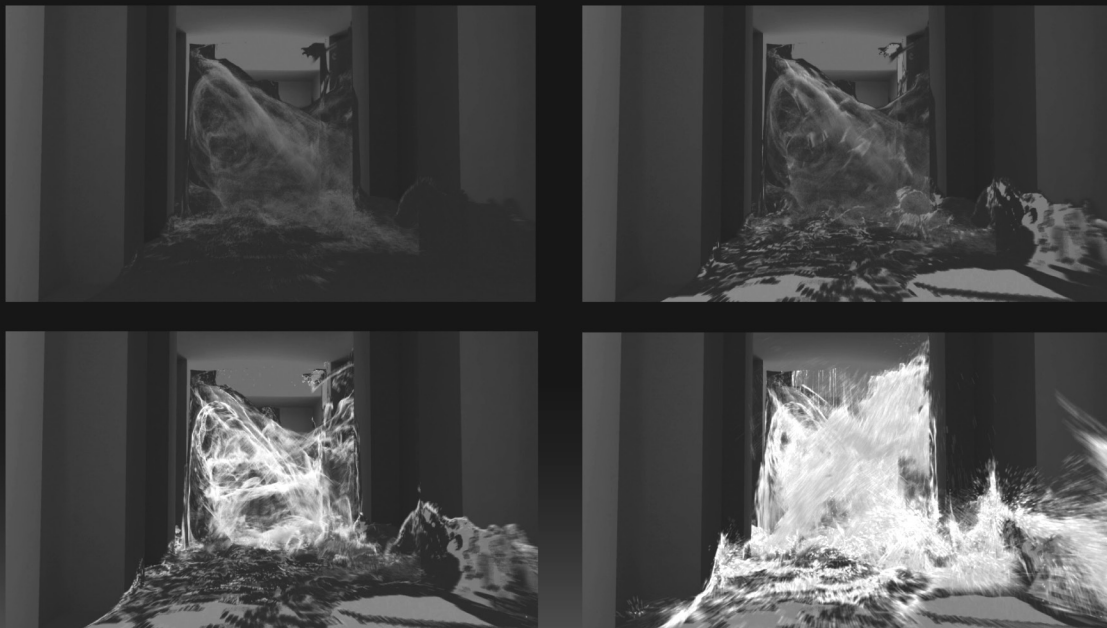


Comparison of Features

	FluX	Naiad	RealFlow	Houdini
				
Node-Graph Workflow	○	○	×	○
Extendability (API, script)	○	△	×	○
Hierarchical Node Structure	○	×	×	○
Distributed Simulation	○	×	×	△
Computation Speed	423% (48 core)	46% (8 core)	100% (8 core)	100% (8 core)
Price	not fixed (license per proc)	\$5,500	\$1,000	\$9,995



Technical Demo



Technical Demo



Technical Demo



1. Description : To verify the practical usefulness in production, FluX was used to reproduce two shots from *X-Men First Class*. Except the fighter plane with the actor, everything else is re-created.
2. Statistics
 - 27M particles are simulated
 - 29M triangle vertices are generated
 - 4.7 min per frame for dynamic simulation with 48 cores
 - 1 min per frame for mesh generation from particles



Thank you

GLOBAL



Culture
Technology



디지털클로딩기술

The innovative Digital Clothing Solution,
Digital Clothing Suite

Haewon Kam

Director of Marketing & Planning / Digital Clothing Center

THE INNOVATIVE DIGITAL CLOTHING SOLUTION, DIGITAL CLOTHING SUITE

June 20, 2012
Conference Room
South

Haewon Kam

SUMMARY

- Specialized Producer with 10+ years experience in planning, producing and marketing at CGI and Digital Media & Production field.
- Proven production and pipeline setup know-how in animation, CGI and 2D to 3D conversion industry.
- Expert relationship builder, negotiator, presenter, marketing strategist.
- Good at international communication with Americans and Europeans, extending the business territory to global market.
- Bridge the gap between fine arts and CGI with deep academic background and various experience in both realms.
- Integrate the strength of scholastic knowledge and commercial practicality for synergic output.
- Proficient coordinator between technicians and artists, help them to understand each other's perspective and to collaborate resourcefully.

EDUCATION

Professional Producing Program of Film School

University of California, Los Angeles 2007~2008

Masters of Fine Arts

The Graduate School of Advanced Imaging Science, Multimedia & Film

Chung-Ang University 2001~2004

Bachelor of Fine Arts

EwhaWomans University 1996~2001

EXPERIENCE

DIGITAL FASHION

Director of Marketing & Planning

Digital Clothing Center May 2011- Present

CGI INDUSTRY

Executive Producer

Binary Fiction at Ein's Group October 2010 - May 2011

2D to 3D Stereo Conversion

Head Producer of CGI Production

MIX FILM Inc. October 2009 - October 2010

NHK Historical Documentary Series _"Cloud on The Hill(坂の上の雲)"

Samsung Virtual World Framework Development & Planning_ financed by KOCCA

Marvel Theme Park

VFX Producer

FXGear Inc. May 2008 ~ September 2009

Nike 3D Commercial Animation "Park JiSung_ Be the legend"

Korean Feature Film "The Sword has No Name(불꽃처럼 나비처럼)"

THE INNOVATIVE DIGITAL CLOTHING SOLUTION, DIGITAL CLOTHING SUITE

Abstract

Digital Clothing Center at Seoul National University, Korea, presents all aspects of digital clothing solution and process for animated virtual humans and characters.

Digital Clothing Center has been developing source technologies for reproducing clothes on the computer, including Clothing Construction CAD, Physics-Based Simulation, and Rendering for 12 years.

Faithful representation of clothing in the digital world requires various challenging technologies. One of the core technologies is the ability to accurately predict the drape of 3D clothing on a virtual body. Starting from the research on the realistic 3D simulation of cloth based on the observation of fabric-specific physical properties, Digital Clothing Center has been developed fundamental technologies required for the accurate representation and intuitive creation process of clothing in digital forms.

Digital Clothing Center also developed comprehensive 3D apparel software, DC Suite for CG and fashion industry.

Those proprietary technologies of Digital Clothing Center are to revolutionize the traditional way of fashion design and clothes manufacturing, which not just reduces the production costs, time, and human errors radically, but enhances the creative conception by offering the realistic and responsive 3D simulation and unlimited experiment opportunities.

Digital Clothing Suite integrates the scientific pattern making, realistic 3D fabric representation, accurate 3D fitting simulation and the connection to actual manufacturing process through the direct control of plotters and cutters.

It can be used as one stop solution for 3D prototyping, manufacturing and professional CGI generation of garments.

DC Suite has the superior solver which provides very fast and accurate physics-based simulation, robust multi-layered collision handling. Intuitive, pattern-based clothing design, flexible pattern editing and 3d garment construction process, and easy creation of details including pleats, gathers, darts, and closure will enhance creativity of cloth production. DC Suite has versatile compatibility with other CAD system and 3D graphic tools. Geometry data with Character setup and animation produced in Maya can be imported to DC Suite. Garments setup and simulation cache created in DC Suite can be exported to Maya with model data.

The Progressive & Innovative Fashion Solution

DC Suite

Digital Clothing Solution

June 20th, 2012



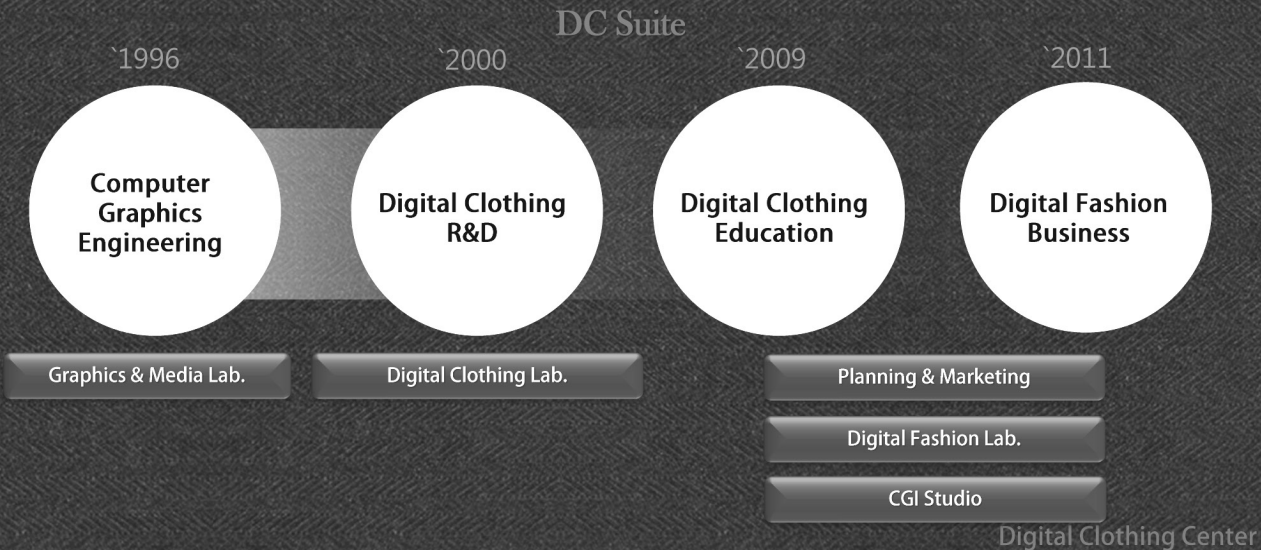
Table of Contents

- I . Digital Clothing Center
- II . DC Suite

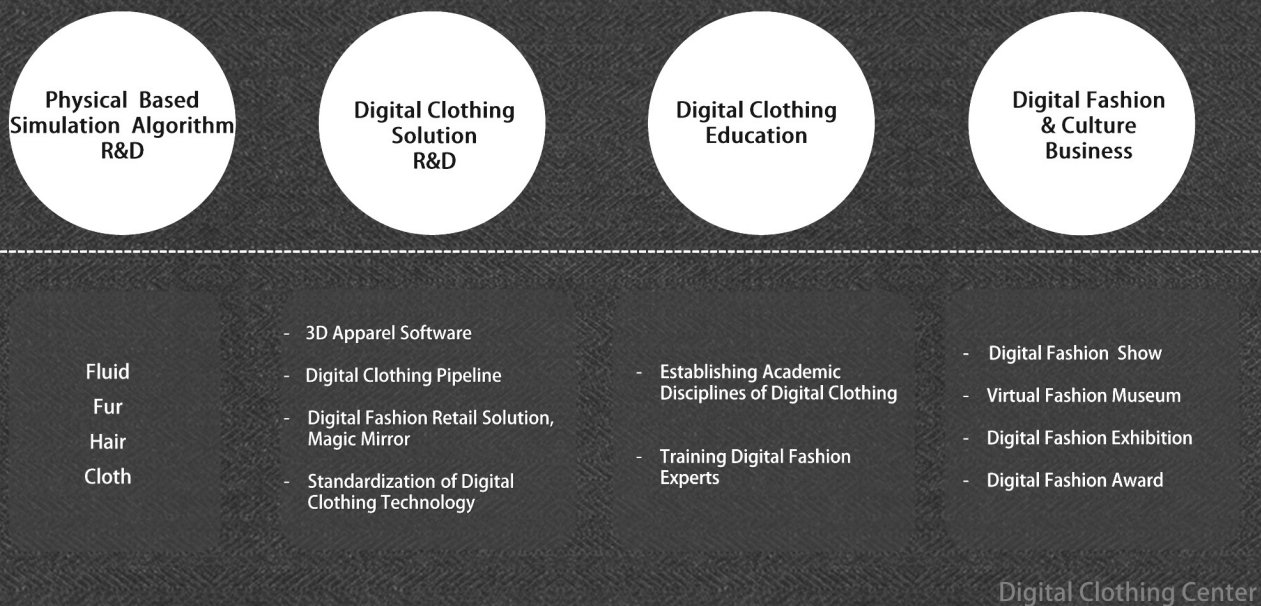


Abstract

We aim to innovate clothing reproduction process by integrating cutting-edge digital clothing construction and simulation technologies.
We also provide clothing-related consultation and technical solutions to CGI studios and game developers.



Business Overview



Technology Achievements International Patent Applications (40)

- USA (10/608,756,2003.6.27), EUROPE03011EP, 2003.7.7), JAPAN2003-11254, 2003.1.20.)
Immediate Buckling Model, Hysteresis, and Cloth Simulation Method Based on the Invented Models, and Computer-Readable Media Storing a Program which executes the invented simulation method.
- USA(11/318,158,2005.12.23), PCT(PCT/KR2005/004547,2005.12.26), UROPE(05823744.4,2007.7.25), ISRAEL(184258,2006.6.27)
Method and System of Real-Time Graphical Simulation of Large Rotational Deformation and Manipulation Using Model Warping.
- USA(11/094,392,2005.3.30), PCT(PCT/KR2006/000248,2006.1.23), UROPE06715738.8,2007.10.24), ISRAEL(186323,2007.10.25)
Method and System for Graphical Hairstyle Generation Using Statistical Wisp and Pseudophysical Approach.
- USA(111/318,171,2005.12.23)
Method for Simulating Stable but Non-Dissipative Water.
- USA(11/317,844,2005.12.23)
Physically Based Motion Retargeting Filter.
- USA(11/398,982,2006.4.5), PCT(PCT/KR2006/004424,2006.10.27)
Method for Simulating Detailed Movements of Fluids Using Derivative Particles.
- USA(11/398,987,2006.4.5), PCT(PCT/KR2006/004423,2006.10.27)
Method for Generating Intuitive Quasi-Eigen Faces.
- USA(11/777, 924,2007.7.13), PCT(PCT/KR2008/004114,2008.7.11), ISRAEL(202381,2009.11.26), EUROPE(8778772.7,2009.12.25), JAPAN(2010-515980,2009.12.25), CHINA (WO2009/011527,2009.12.22)
Method of Cloth Simulation Using Linear Stretch/Shear Model.
- USA(12/045,429, 2008.3.10), PCT(PCT/KR2009/000466, 2009.2.2)
Method and System for Simulating Thin Shells.
- USA(12/198,720, 2008.8.26), PCT(PCT/KR2009/004603, 2009.8.18)
Method and System for 3D Lip-Synch Generation with Data-Faithful Machine Learning.
- USA(12/414,978,2009.3.31), PCT(PCT/KR2010/001892, 2010.3.29)
A Semi-Lagrangian CIP Fluid Solver without Dimensional Splitting
- USA(12/575,360, 2009.10.7)
Population-Driven Identification of Body Landmarks for Human Body Scans
- USA(12/614,295, 2009.11.6)
Method for Simulating Stretching and Wiggling Liquids
- USA(12/870,540, 2010.8.27)
METHOD FOR SIMULATING DISPERSED BUBBLE FLOW
- USA(12/960,335, 2010.12.3)
Method for TRACKING Detail-Preserving Fully-Eulerian Interface
- USA(12/870,446, 2010.8.27)
METHOD FOR CREATING PANELS FOR A GARMENT
- USA(12/870,470, 2010.8.27)
METHOD FOR TAKING BODY MEASUREMENTS WITH DIGITAL CLOTHING
- USA(12/870,483, 2010.8.27)
METHOD FOR CREATING PANELS AND PATTERN-MAKING
- USA(12/870,507, 2010.8.27)
METHOD FOR PANEL POSITIONING
- USA(12/870,514, 2010.8.27)
METHOD FOR CREATING GARMENT
- USA(12/870,514, 2010.8.27)
METHOD FOR CREATING GARMENT

Digital Clothing Center

Academic Achievements Selected/ Recent Publications

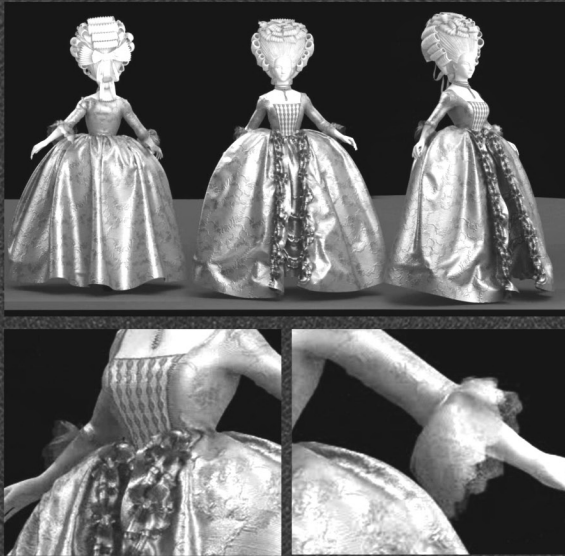
- Kwang-Jin Choi and Hyeong-Seok Ko. **Stable but Responsive Cloth**. Proceedings of SIGGRAPH 2002, pp.604-611, July 2002.
- Oh-Young Song, Hyncheol Shin and Hyeong-Seok Ko. **Stable but Non-Dissipative Water**. ACM Transactions on Graphics, Volume 24, No. 1 (January 2005), pp. 81-97.
- Young-A Ko, Hyon-Sook Choy and Hyeong-Seok Ko. **Evaluation of the Clothing Simulation Technology in the Aspects of Color, Material, Structural Details, and Silhouette**. ITAA 2009. October 2009
- Nambin Heo, DongWook Yoon and Hyeong-Seok Ko. **Population-based Body Generation**. ITAA 2009. October 2009
- DongWook Yoon, Nambin Heo and Hyeong-Seok Ko. **Example-driven Landmarking of Human Body Scans**. ITAA 2009. October 2009
- Byoungwon Choe and Hyeong-Seok Ko. **A Statistical Wisp Model and Pseudophysical Approaches for Interactive Hairstyle Generation**. IEEE Transactions on Visualization and Computer Graphics, Volume 11, No. 2 (March 2005), pp. 160-170
- Min Gyu Choi and Hyeong-Seok Ko. **Modal Warping: Real-Time Simulation of Large Rotational Deformation and Manipulation**. IEEE Transactions on Visualization and Computer Graphics, Volume 11, No. 1 (January 2005), pp. 91-101.
- Min Gyu Choi, Seung Yong Woo, and Hyeong-Seok Ko. **Real-Time Simulation of Thin Shells**. Computer Graphics Forum (Proceedings of EUROGRAPHICS 2007), Vol. 26, No. 3, pp. 349-354, September 2007.
- Ig-Jae Kim and Hyeong-Seok Ko. **3D Lip-Synch Generation with Data-Faithful Machine Learning**. Computer Graphics Forum (Proceedings of EUROGRAPHICS 2007), Vol. 26, No. 3, pp. 295-301, September 2007.
- Seyoon Tak and Hyeong-Seok Ko. **A Physically Based Motion Retargeting Filter**. ACM Transactions on Graphics, Volume 24, No. 1 (January 2005), pp. 98-117.
- Oh-young Song, Doyub Kim, and Hyeong-Seok Ko. **Derivative Particles for Simulating Detailed Movements of Fluids**. IEEE Transactions on Visualization and Computer Graphics, Volume 13, No. 4 (July 2007), pp. 711-719.
- Doyub Kim, Oh-young Song, and Hyeong-Seok Ko. **A Semi-Lagrangian CIP Fluid Solver without Dimensional Splitting**. Computer Graphics Forum (Proceedings of EUROGRAPHICS 2008), Vol. 27, No. 3, April 2008 (To appear).
- Kathi Martin and Hyeong-Seok Ko. **Virtual Historic Costume across Cultures and Disciplines**. Proceedings of VSMM2009. September 2009
- Doyub Kim, Oh-young Song, and Hyeong-Seok Ko. **Stretching and Wiggling Liquids**. Siggraph Asia 2009 December 2009
- Doyub Kim, Oh-young Song, and Hyeong-Seok Ko. **A Practical Simulation of Dispersed Bubble Flow**. SIGGRAPH 2010 September 2010
- Nambin Heo, Hyeong-Seok Ko. **Detail-Preserving Fully-Eulerian Interface Tracking Framework**. SIGGRAPH ASIA 2010, December 2010

Digital Clothing Center

Technology

Physics Based Simulation & Representation / Cloth

Simulation is done with a Discretized Version!
Immediate buckling model makes it positive-definite



Digital Clothing Center

Technology

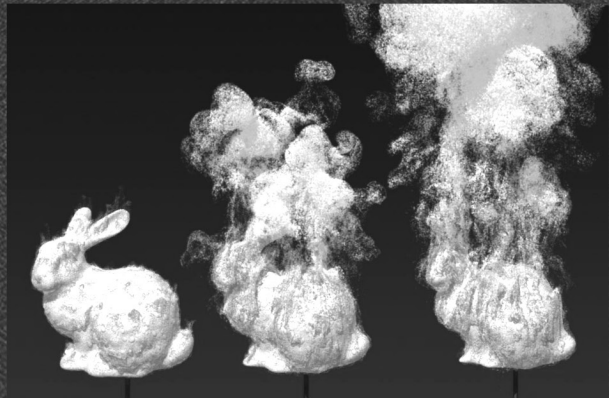
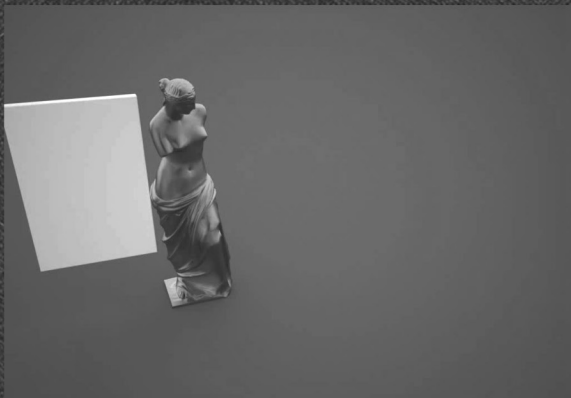
Physics Based Simulation & Representation/ Fluid

- Derivative Particle
- Produce more realistic water
- Less viscous/ More details
- But using reasonable computational cost

Effect of Subgrid Stochastic Solver

Parameter Comparison

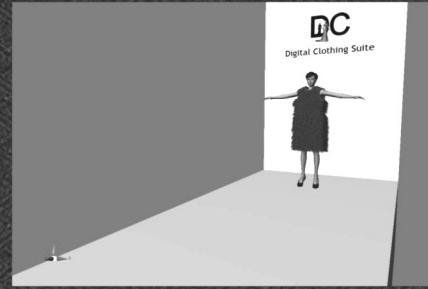
"Stretching, Wiggling, Tearing Liquids"
SIGGRAPH Asia 2009



Digital Clothing Center

Technology

Physics Based Simulation & Representation/ Fur



Digital Clothing Center

Technology

Physics Based Simulation & Representation / Hair
Pseudophysical Approach



Digital Clothing Center

DC Suite

DC Suite is a software system which integrates scientific pattern making, realistic 3D fabric representation, accurate 3D fitting and draping simulation into a single program.



Digital Clothing Solution for CG Industry

Efficient and Interactive Creation of Garments with Robust Collision Handling and Stable Multi-layered Clothes Simulation

Digital Clothing Center

DC Suite Goal

CG industry
For reproducing real-world garments without professional knowledge of pattern design.

Fashion industry
For designing fashion goods in 3D space and using the resulting data for promotional CG images as well as manufacturing.

Without DC Suite

Restricted to Simple Design

Garment Construction
Based on Polygon Editing or Sculpting : Produces Non-professional Quality Garments

Slow Simulation and Collision Handling

2~3days

With DC Suite

Unlimited Design

Garment Construction
Pattern-Based : Produces Professional Quality Garments

Fast Simulation and Collision Handling

5~6 hr

Digital Clothing Center

DC Suite Work Process

1 Body Preparation

2 Pattern Making

3 Garment Construction

4 Textile Mapping

5 Simulation

6 Plotting/Cutting

Digital Clothing Center

DC Suite Work Process

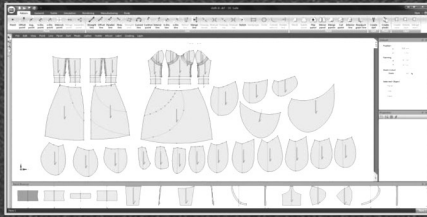


1. Adjust the body size for Body generation
2. Get Patterns from Garment Pattern Library in DC Suite and Edit
3. Construct a Garment by One-Click Sewing Patterns in 3D
4. Simulate the garment in DC Suite
5. Import designed garment with DC 2 Maya Plug-in
6. Simulate the garment in Maya

Digital Clothing Center

DC Suite Work Process

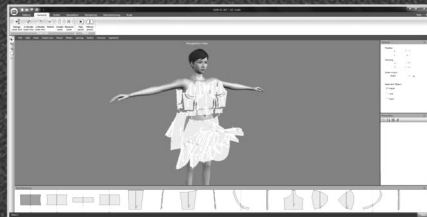
Intuitive, Pattern based Design Process & Flexible Panel Editing and Positioning



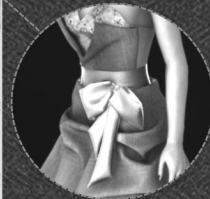
1. Get Patterns from Garment Pattern Library in DC Suite



4. Import designed garment data into Maya



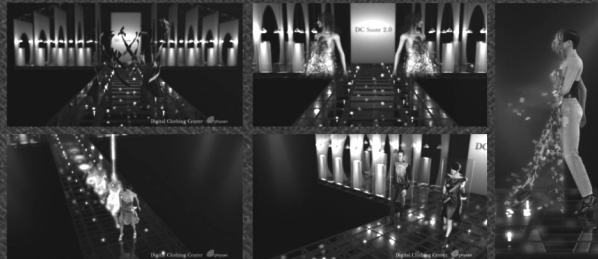
2. Construct a Garment by One-Click Sewing Patterns in 3D



5. Simulate the garment in Maya



3. Drape the garment through 3D ↔ 2D interactive design modification



Digital Clothing Center

DC Suite Compatibility with Maya

DC to Maya Plug-in



DC to Maya Plug-in

Maya to DC Plug-in



Maya to DC Plug-in



Maya to DC Plug-in

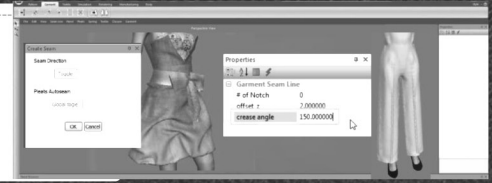
Digital Clothing Center

DC Suite Features

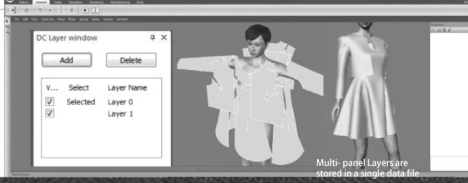
Compatible with Existing CAD data (.DXF)



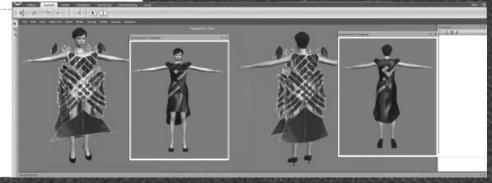
Natural Draping & Crease



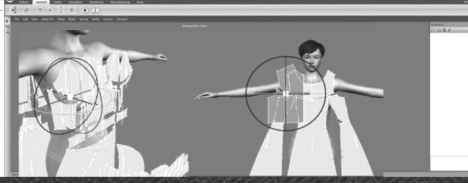
Multi-panel Layers



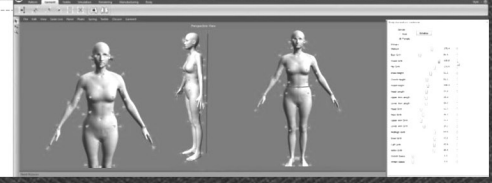
Interactive Draping Simulation



Intuitive 3D Garment Construction



Body Generation



Interactive Textile Editing



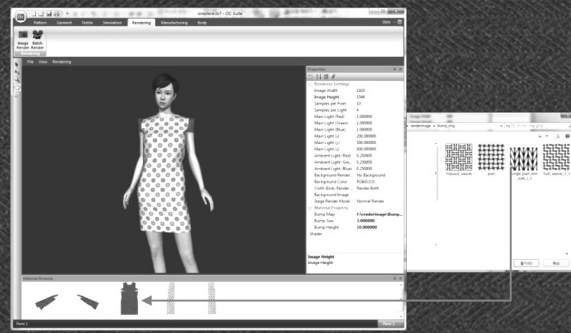
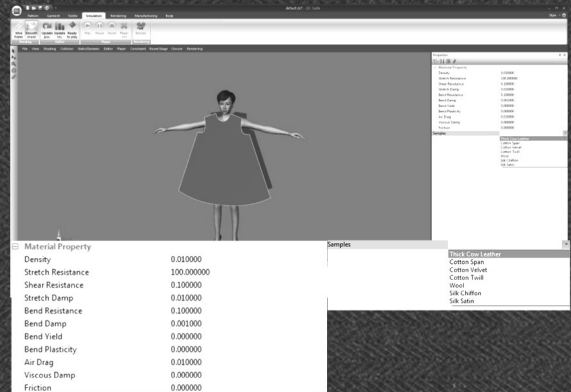
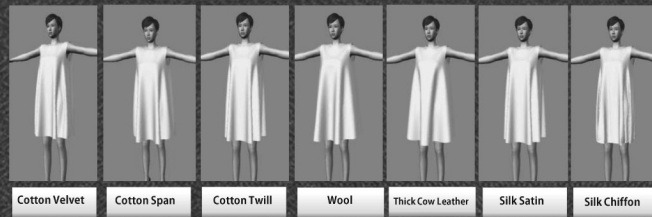
One-click Creation OF Closures



Digital Clothing Center

DC Suite Features

Accurate 3D Draping Simulation based on the Material Property Control & Shader Preset



Applying the fabric weaving to panel

Digital Clothing Center

DC Suite Competitiveness

Enhancing Creativity

- Intuitive, Pattern based Design Process
- Flexible Panel Editing and Positioning
- Easy Creation and Control of Details, such as pleats, shirring, gathers, darts, seam lines and closures

Superior Solver

- Fast and accurate simulation with physically based algorithm
- Robust collision handling and stable multi-layered clothes simulation
- Stable for pinching and steady contacts
- Various tools for art-directing simulation

Reducing Production Cost

- Efficient and Interactive 3D modification
- Garment pattern and textile DB
- One stop solution for 3D prototyping, manufacturing, and professional CGI generation of garments

Versatile Compatibility

- Import DXF data from pattern CAD software
- Import polygonal objects and character setup/animation from Maya
- Export garment setup data or simulation cache to Maya

Digital Clothing Center

Contact Information

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Mobile: 010 3266 3461

Digital Clothing Center
www.digitalclothing.org

Physan Inc.
www.physan.net

Digital Clothing Center

GLOBAL



Culture
Technology



**Machinema 기술기반,
3D입체극장용 애니메이션 "개미"**

Machinema technology
3D stereoscopic animation film "KAEMI"

Sungchol Choi

Animation Supervisor & CG Supervisor / Wonderworld CG Company

MACHINEMA TECHNOLOGY

3D STEREOSCOPIC ANIMATION FILM "KAEMI"

June 20, 2012
COEX
Conference Room
South

Sungchol Choi

119-503 Top's vill Apt., Dangha-dong, Seogu, In-cheon, Korea
010-5404-4456
sungchol@w2studios.com

EDUCATION

Hong-ik Graduate School, Korea, 2001
Master Course. in Animation

EXPERIENCE

Rainbus Animation Company, Seoul, 2000-2007

Animation Supervisor & Director

- 'Tumoya Island' TV Show (Animation Supervisor)
- 'Alexander' DVD Animation movie (Animation Supervisor)
- 'Karol' DVD Animation movie (Director)

Sam-woo CG Company, Seoul, 2008-2010

CG Supervisor & Director

- 'Annihilation' R&D Project (Director)
- 'RDM' Stereoscopic Feature film (CG Supervisor)
- 'NED' Game Cinematic (CG Supervisor)

Wonderworld CG Company, Seoul, 2010-2012

Animation Supervisor & CG Supervisor

- 'Scooby Doo! Curse of Lake Monster' (Warner Premiere) / (Animation Supervisor)
- 'Fairly Odd Parents' (Nickelodeon) / (Animation Supervisor)
- 'Empire of the Ants' R&D Project & Feature Trailer (CG Supervisor)

2011 global project technology development

**Machinema technology
3D stereoscopic animation film" KAEMI"**



content

Project Overview

1. Project(content) Overview
2. R&D purpose

R&D status

1. I.K technology based on auto field height controller for myriapod creature motion develop.
2. Real time hyper realism expressing texture, reflection, refraction and glow producing visual graph type shader editor development.

Demonstration of the content

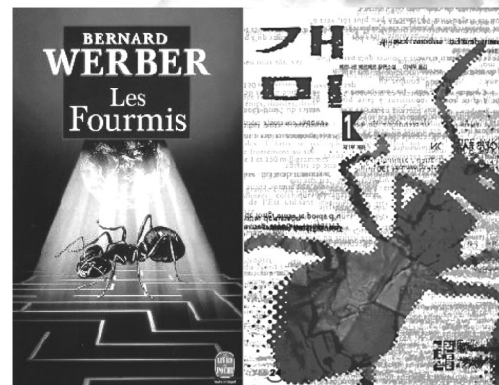


Project summary

1. Project overview

- Format: 3D stereoscopic theatrical animation
- Story: based on Bernard Werber's novel "Les Fourmis"
- Main production: Animahouse
Director: Kim moon saeng (Wonderful days)
- Release: 2014 may (target)

Overseas co-production



Project summary

2. R&D purpose

- Purpose

Creating animation film with thousands and millions of ant crowd.

- Problems

Individual ant rendering will waste time and HR

- R&D

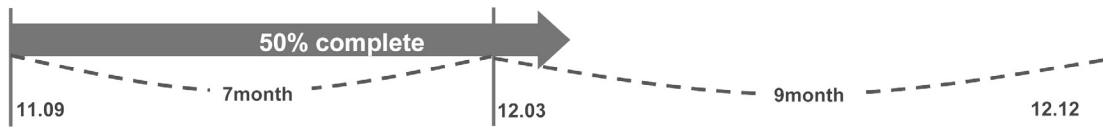
Achieving ant crowd by I.K and game engine will reduce 30% of time and money.



R&D Project status

1. I.K technology based on auto ground recognition controller for myriapod creature movement

- Purpose of development: technology of thousands and millions of ant crowd movement for an animation film
- Development duration and status



2. Realtime Visual graph shader editor expressing hyper-real texture, reflection, refraction and glow

- Purpose of development: achieving high quality by developing shader technology
- Development duration and status

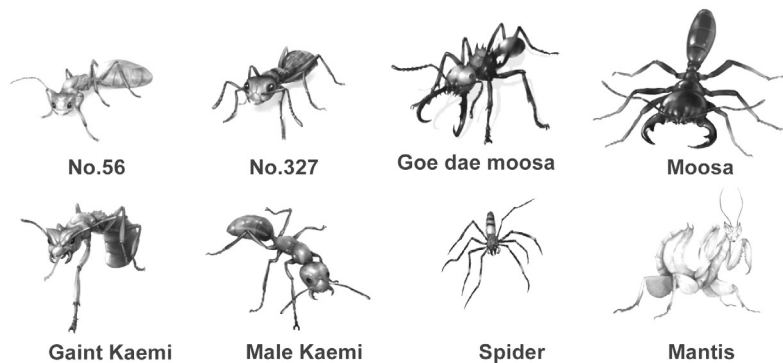


Project status

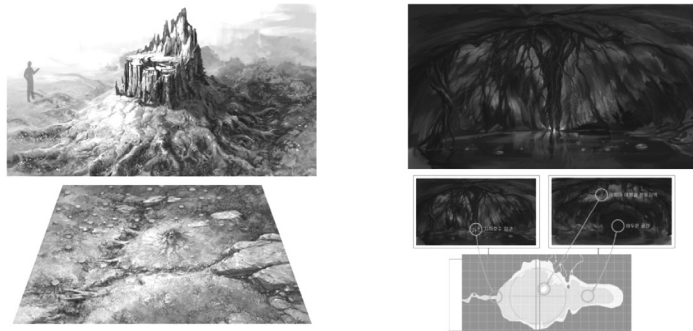
1. I.K technology based on auto ground recognition controller for myriapod creature movement

1-1. I.K technique analysis and technical plan

Character design



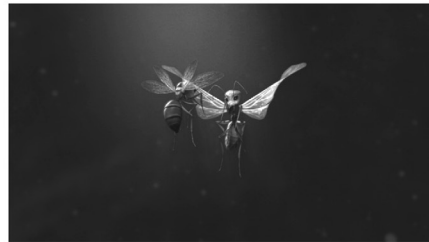
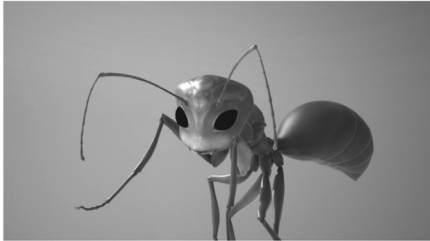
BG design



Project status

1. I.K technology based on auto ground recognition controller for myriapod creature movement

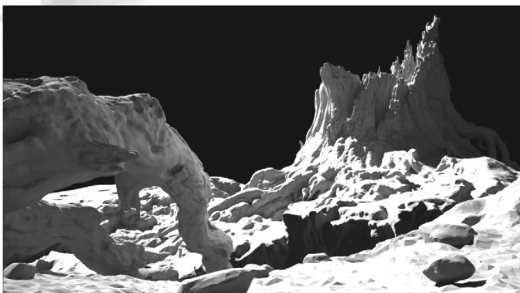
1-2. Producing technical test asset



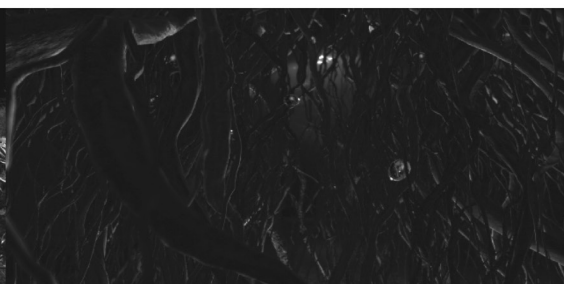
Characters

Project status

1-3. Producing technical test asset



Background



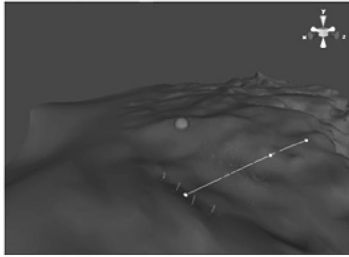
Character & Background

Project status

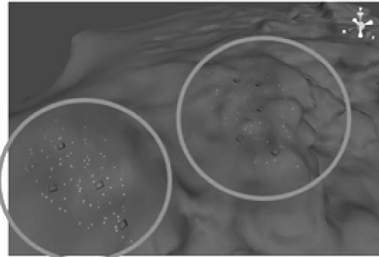
1. I.K technology based on auto ground recognition controller for myriapod creature movement

1-5. Producing myriapod creature controller interface & test asset technology apply.

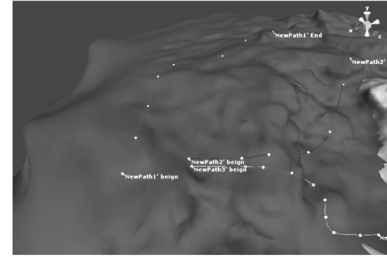
- using unity 3D for interface unity to individual ants.
- import modeling/rigging/animation data from maya to unity3d



<TerrainTool>



<CrowdTool>



<PathTool>

- TerrainTool : tool to set Obstacles to ant crowd path for natural movement.
- CrowdTool : tool to set formation of the ants starting point.
- PathTool : tool set ants path , parent with CrowdTool

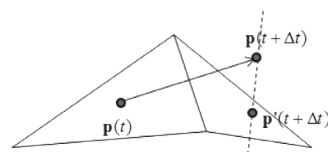
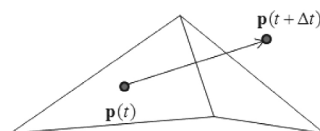


Project status

1. I.K technology based on auto ground recognition controller for myriapod creature movement

1-6. myriapod creatures level adjustment technique according to field height.

- When a temporary ground mesh is set, the ant crowd has to adjust their path.
- 2 steps of process is done throughout the whole simulation.
 - **Apply particle based crowd algorithm, and calculate the next movement of individual ant.**
 - **used verified information and ground information to adjust ants end position.**
- Crowd simulation algorithm
 - calculate power of movement to the selected target point
 - calculate repulsion strength of the ant avoid overlapping in crowd simulation.
 - calculate power of each ant simulation step.
 - **As Newton's law, ants mass applies to Inverse proportion of power, ants speed and position changes.**
- based on verified position and ground information, adjust ground information that ants can exist on the ground.



< line used in projection determined to be parallel to polygon line and average normal direction >

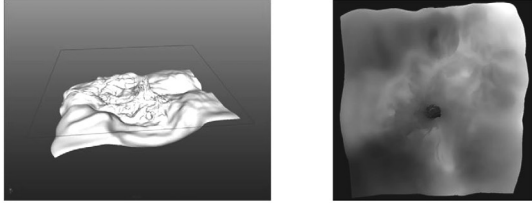


Project status

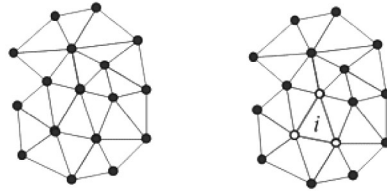
1. I.K technology based on auto ground recognition controller for myriapod creature movement

1-7. Crowd movement, partition based height field checking technique.

- Creating auto height field technology to temporary field data



- Creating close polygon set by field data
- Field size is way bigger than the ants, therefore simulation setting should be 1-ring
- Individual ant contains information about start point polygon.
- Every step can identify height field by simple line replacement test

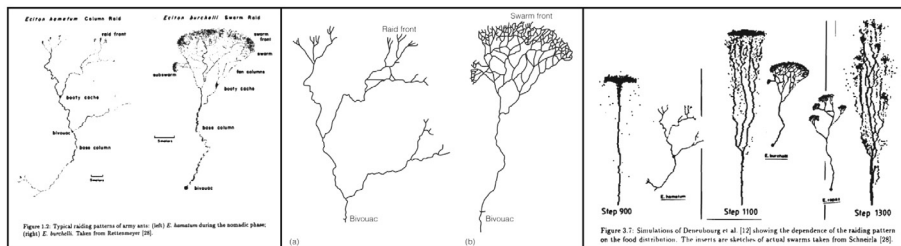


Project status

1. I.K technology based on auto ground recognition controller for myriapod creature movement

1-4. Applying technique before and after content analysis

Analyzing myriapod creature's path considering I.K technology



- Scene ambience and lighting color tone



Project status

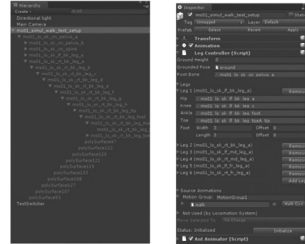
1. I.K technology based on auto ground recognition controller for myriapod creature movement

1-8. creature joint I.K specialized hierarchy bone optimized technique.

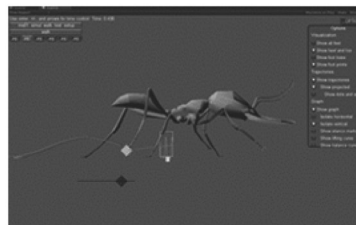
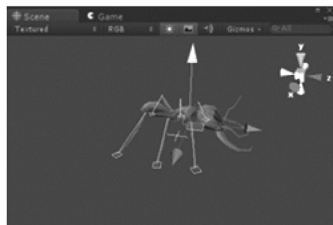
- I.K solver applied for suitable process speed



- Imaginary joint set up to I.K solver.



- Joint animation analysis by preset.



Project status

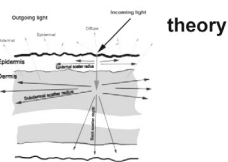
2. Realtime Visual graph shader editor expressing hyper-real texture, reflection, refraction and glow

2-1. shader analysis and development plan

- Analyzing ant textures by reference



- Shader analyze and development plan for chitinous substance



example

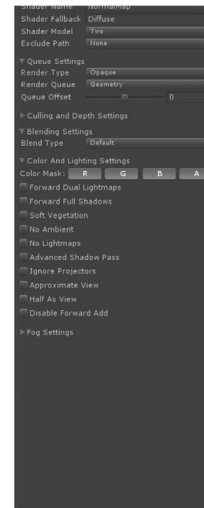
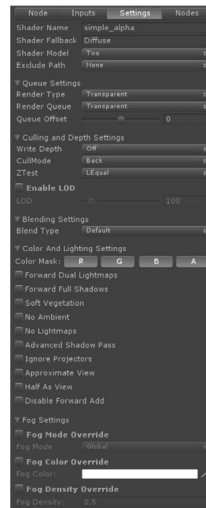


Project status

2. Realtime Visual graph shader editor expressing hyper-real texture, reflection, refraction and glow

2-2 Visual graph type shader editor setting interface development and asset technique.

- interface development for shader classification property.
- Currently only UI is developed, technical operation needs to be developed

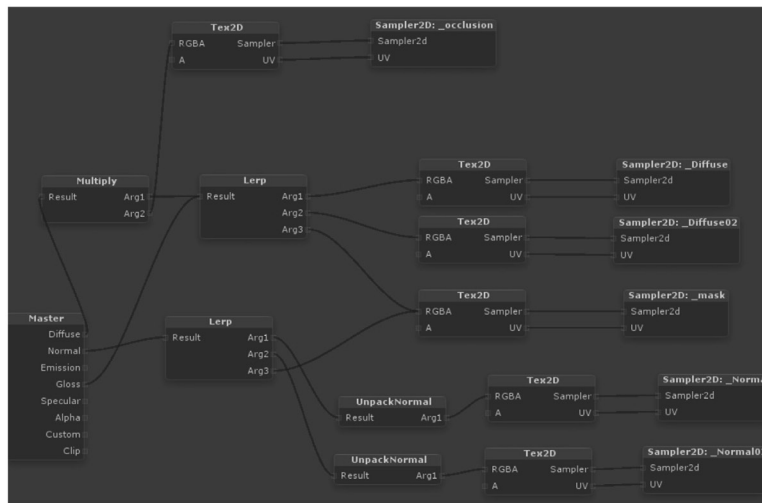


Project status

2. Realtime Visual graph shader editor expressing hyper-real texture, reflection, refraction and glow

2-3. visual graph type node connect shader GUI editor

- GUI Frame Work based node connection
- Currently only UI is developed, technical operation needs to be developed
- Not setting can create automatic shader code without shader programming(developing)



< node connection example >

```

// Shader Name: Simple Shader
// Shader Model: Diffuse
// Shader Path: /Assets/Shader/

// Queue Settings
Render Queue: Opaque
Queue Offset: 0

// Culling and Depth Settings
Write Depth: On
Cull Mode: Back
ZTest: LEqual

// Blending Settings
Blend Type: Default

// Color and Lighting Settings
Color Mask: R, G, B, A
Advanced Shadow Pass: On
Ignore Projectors: On
Approximate View: On
Half As View: On
Disable Forward Add: On

// Fog Settings
Fog Mode Override: Global
Fog Color Override: 0.5, 0.5, 0.5
Fog Density Override: 0.5
    
```

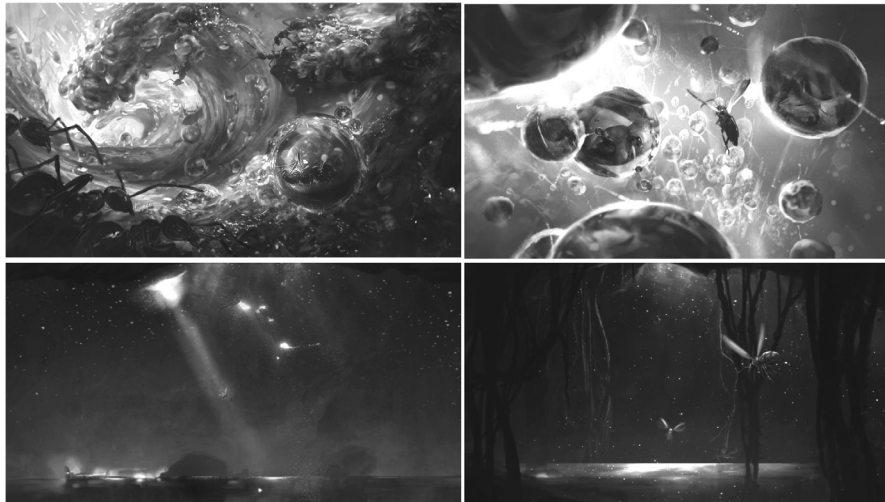
< shader program >

Project status

2. Realtime Visual graph shader editor expressing hyper-real texture, reflection, refraction and glow

2-4. Technical verification possible demonstration content

- Key shot image board applying shading technology



Thank you.

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Technology



2D 동영상의 고품질 3D 입체동영상 변환 자동화 기술

Developing Conversion solutions
for 2D to high quality 3D stereo

Daehyeon Wi

Researcher / KAIST

DEVELOPING CONVERSION SOLUTIONS FOR 2D TO HIGH QUALITY 3D STEREO

June 20, 2012
COEX
Conference Room
South

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Education

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Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea

B.S., Computer Science (2003. 3. ~ 2007. 2.)
Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea

Research Interests

Fluid simulation, stereoscopic imaging, automatic generation of depth information, and other related stereoimaging problems

DEVELOPING CONVERSION SOLUTIONS FOR 2D TO HIGH QUALITY 3D STEREO

Abstract

After the success of Avatar, many 3D movies are produced and succeed in commercial market. Audiences has become familiar to stereo movies. In spite of the popularity of stereo movies, not all movies are made as a form of stereo movies. Because the production cost of stereo movie is much higher than ordinary 2D movies. There are two ways to make stereo movies. The first is direct 3D shooting with stereo camera, another is conversion of 2D image into 3D. The former gives 3D movies with reality and high quality but takes too much cost. Conversion is, therefore, a good alternative to produce 3D movies with lower cost but it suffers from quality and its labor intensiveness. KAIST has been developing solutions for 2D to 3D conversion since 2010 with SBS, AR Vision and DreamSearch C&C. This project is funded by KOCCA. NAKiD, which is our solution in form of NUKE plugin package, is great result from this project. It has cool features which is inevitable to convert 2D to 3D. It is used to make some commercial movies. Some productions are using our solutions via technology transfer.

Developing Conversion solutions for 2D to high quality 3D stereo

2012. 6. 20. Global Culture Technology Forum 2012
Speaker: Daehyeon Wi (KAIST CT)

KAIST
SBS
AR Vision
DreamSearch C&C

Participating institutes

Administer



KOCCA (Korea Creative Content Agency)

Principal
institutes



KAIST   
(GSCT, CS, Dept. of Brain Engineering)

Collaborative
institutes



AR Vision



SBS



DreamSearch C&C

Project outline

title	Automation technology for the conversion of 2D movies to high quality 3D stereoscopic movies		
Overview	<ul style="list-style-type: none"> • Total solution for converting 2D movie to high quality 3D multi-view stereoscopic movie • Improve productivity within manual converting pipeline by partially automating the sub-steps of the process 		
Research objective	Solution development for conversion of high quality 2D movie to 4k 3D stereoscopic movie through the development of tools focusing on the user's comfort, human factors and the development and integration of automation techniques to the manual conversion pipeline.		
	2010	2011	2012
Annual objectives	automation technique of 2D→ 3D converting process	characteristic/example-based high quality 2D→3D converting automation technique	total solution for high quality/efficiency for 2D→3D converting

3

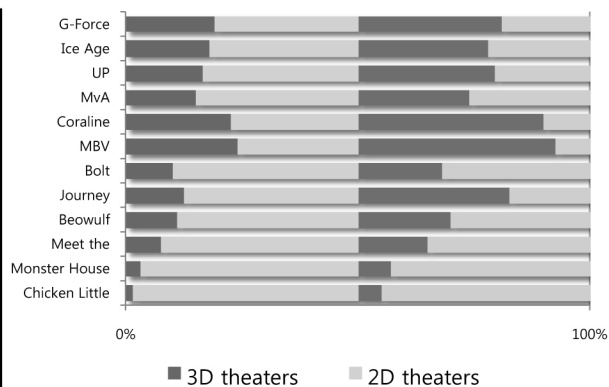
Project outline

3D stereoscopic movie getting on the general trends deniably

- Profits of 3D theater in U.S. in 2009 increased to 130 billion won which are 28.5 times increase with respect to 2005 (MPAA)
- More than 10% of Profits of all 3D theater in U.S. came from 3D stereoscopic movie excepting <avatar>(MPAA)
- Stereoscopic movie Korean market, estimated to 900 billion won. 20 released contents in 2010 doubling 2009 releases.

Movie title (production company)	2009 Box office	World box-office profits (\$ millions)
Avatar (20th fox)	1	2,604
UP (disney/ pixar)	6	723
Monster vs. alien (dreamworks)	14	382
G-force: Guinea Pig Warrior. (disney)	22	285
Cloudy with a Chance of Meatballs(sony)	25	227
Coraline(focus)	45	123

2009's box-office profits of stereoscopic movie



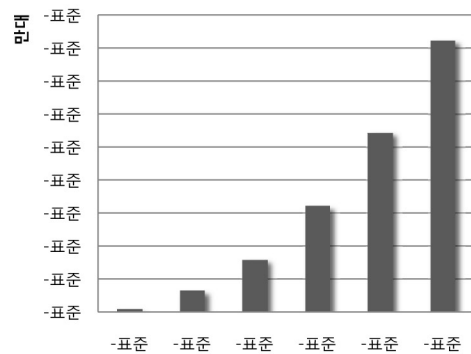
Comparison of box-office profits of 3D movie theatre to 2D movie (U.S.)

4

Project outline

Rapid expansion of hardware infra for 3D stereoscopic movie

- 1,000 times expansion of 3D theater during five years
 - 30 thousand theaters constructed throughout the world.
 - 20% in the U.S. (electronic paper 2010.5.27)
- In Korea, tripled number 3D theaters in the last year, i.e., 320 theaters.
- 3D TV Market grown by annual 40%, reaching 15 billion dollars in 2015. 70 millions Households with 3DTV (Inforna Telecoms & Media)
- At 2015, glasses-less multiple view point 3D TV will be supplied by companies like LG



Trends of 3D TV market of the world

Project outline

urgent needs for high quality 3D stereoscopic contents

- "There 3000 dollar 3D TV, without contents to watch" (Forrester Research)
- "Stereoscopic movie related stocks like KDC, jalman tech, hyundai IT, I-station, are in danger due to lack of 3D contents" (Daily economics2010.4.12)
- Stereoscopic content at SkyHD 24 hours 3D channel sums up to less than 5 hours in a day (electronic paper 2010.5.27)
- "We could watch all 3D contents in the world put together in only 3 days" (james cameron-SDF 2010.5.13)



Change of KDC's stock price

SKYHD

SKY3D채널 2월 1주차 주간편성표

2월 1일(월) ~ 2월 7일(일) 편성 시간

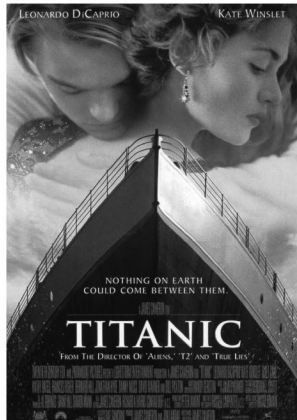
6:00	아름다운 시드니
6:15	사비의 꽃
6:30	두서핑(Do Surfing)
6:35	아기 고래 구출대작전
6:50	아임무비스트 1회(전우치, 시크릿 外)
7:10	3D커밍순 (슈렉4, 드래곤길들이기)
7:15	오기나와의 아름다운 바다
7:30	3D LifeStyle
7:45	3D 애니메이션의 세계 (Treasure 外)

Schedule of 3D contents of SKY

Project outline

3D stereoscopic converting technology can be the alternative for producing 3D stereoscopic contents

- Additional profits by converting previous contents
- Conversion of difficult scenes that cannot be photographed by stereoscopic camera or little efficiency
- Stereoscopic converting technique takes advantage of efficiency in the field, emphasis/control of stereoscopic impression at post-production stage and reflection of creator's intention
- Re-release of <toy-story> stereoscopic series. Including <Titanic>, <Matrix> and <300>, about 300 previous excellent contents are waiting stereoscopic conversion (GFX2010)
- Automated real-time stereoscopic converting techniques from Samsung, SKT, Phillips, Sony, JVC, etc., but insufficient quality
- With current automated stereoscopic converting techniques, "stereoscopic movie content can be devaluated in the eyes of consumers" (HuiWon Kwon LG vice-president, 2010.3)

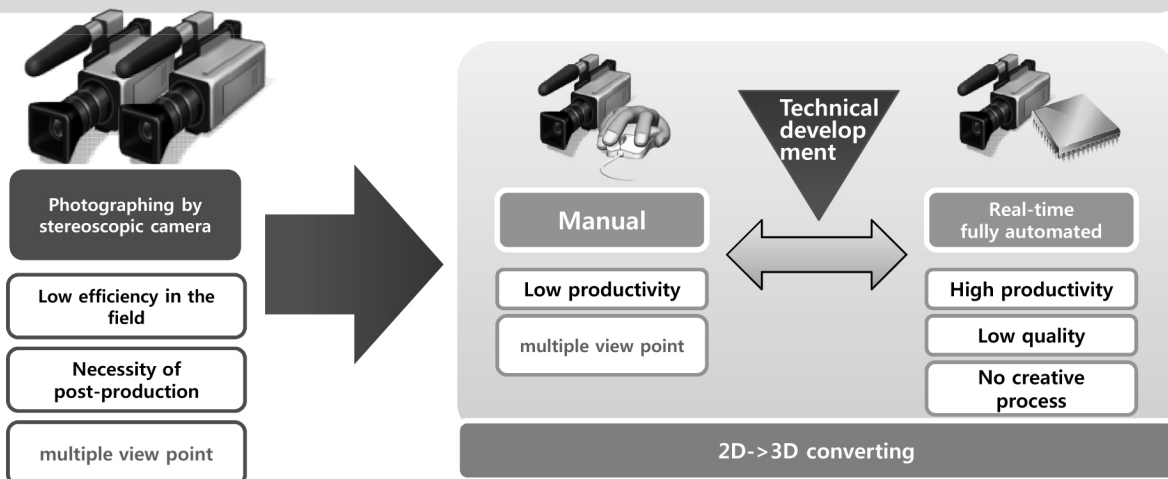


SKT가 실시간 3D 영상 변환 기술을 구현한 보드룸 공개했다. (사진=SK텔레콤)

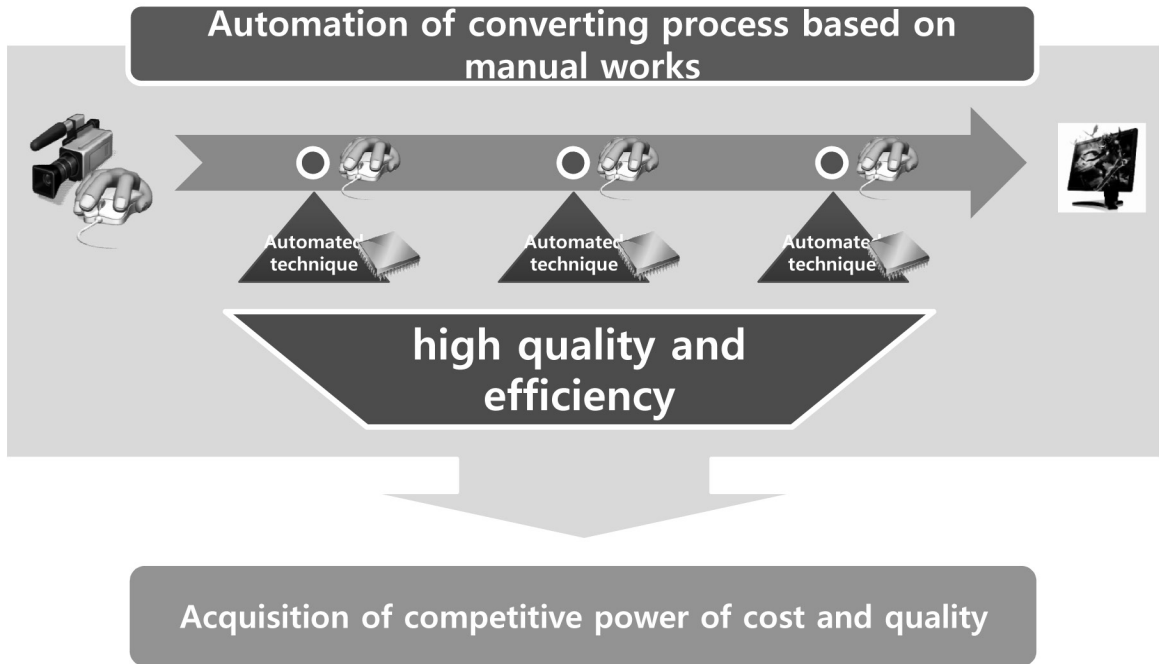
Project outline

Novel 3D stereoscopic converting techniques: quality, productivity, reliability

- Stereoscopic shooting and conversion can be complementary
- Manual conversion produce high quality but low productivity, (100 persons during 6 months for a full-length movie)
- Real-time full-automated converting techniques are highly productive, low quality, lack of storytelling
- Independent development of Manual and Fully automated techniques→ Interactive techniques for High quality/productivity
- In the case of <Titan>, it was subjected to severe criticism due to low quality (ZDNET KOREA 2010.5.13)

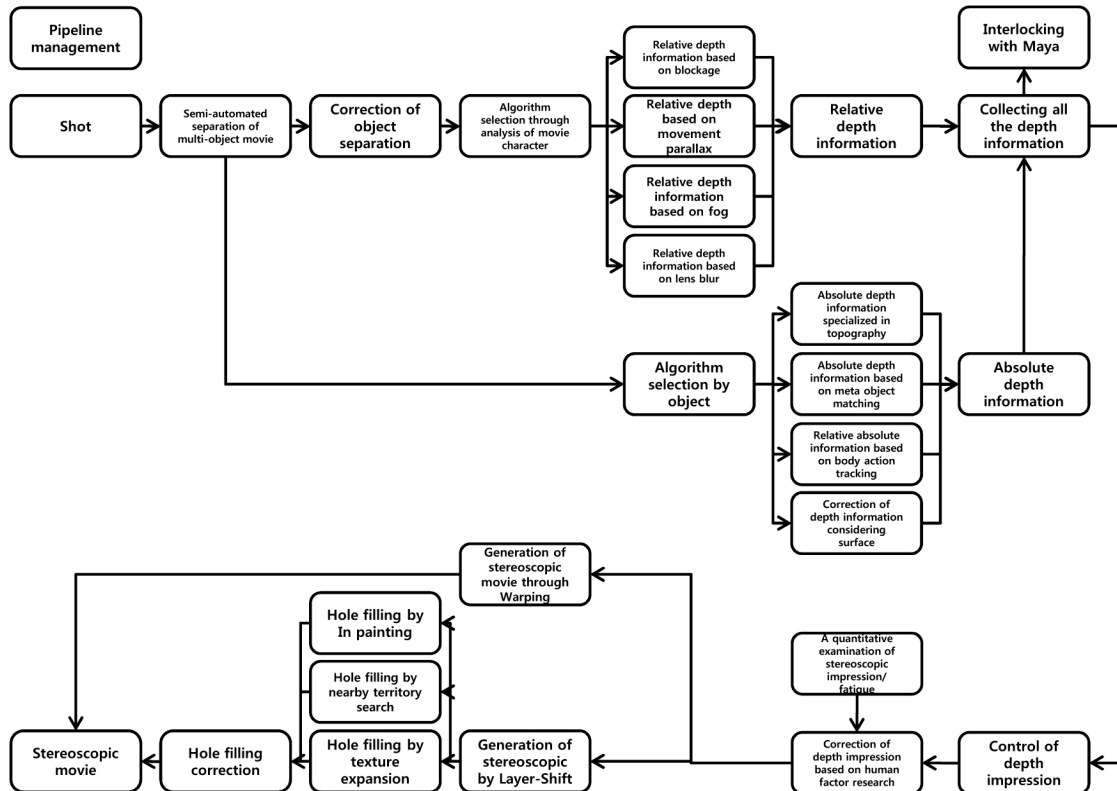


Technical overview



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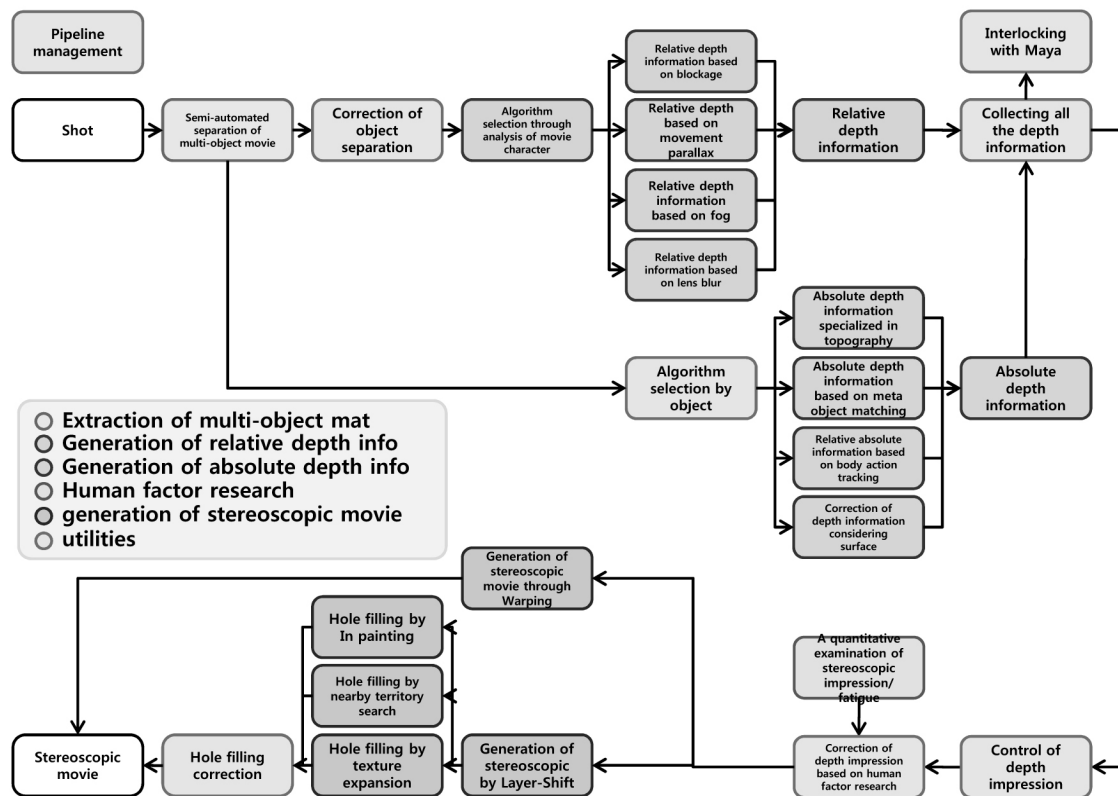
Research <work pipeline>



10

Research

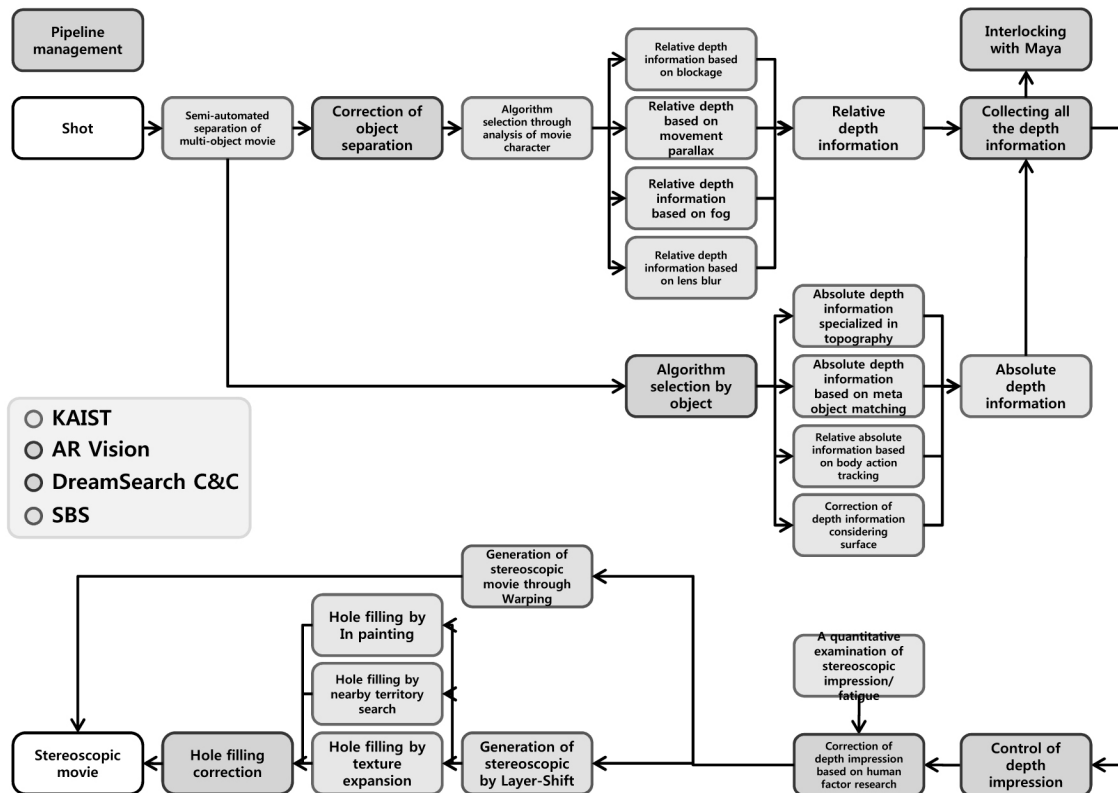
<work pipeline>



11

Research

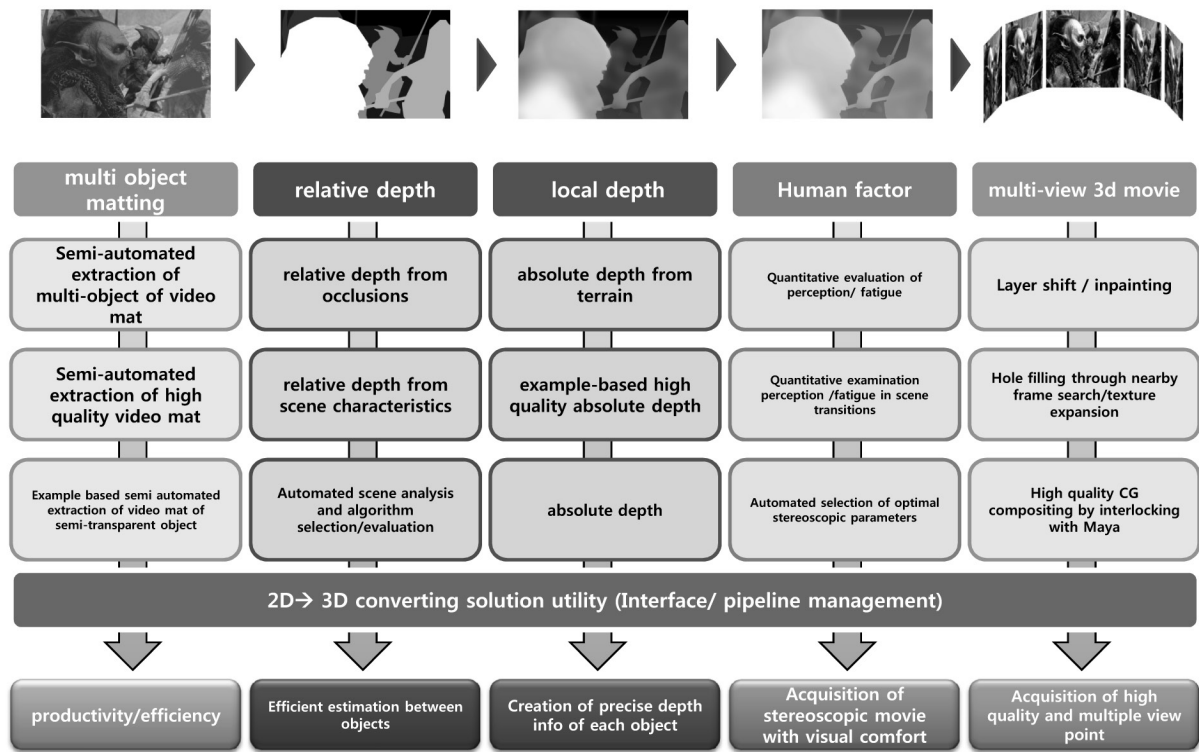
<work pipeline>



12

Research

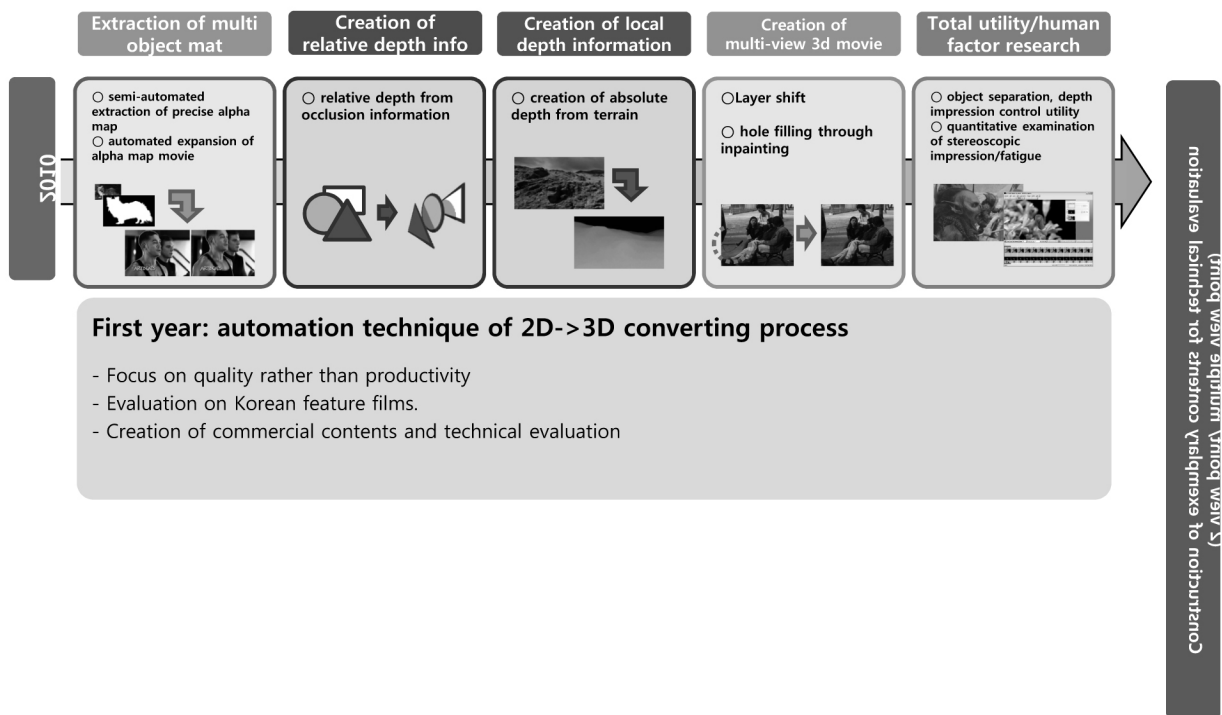
<developmental stage by each phase>



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Research

<yearly developmental stage>



14

Research

<yearly developmental stage>

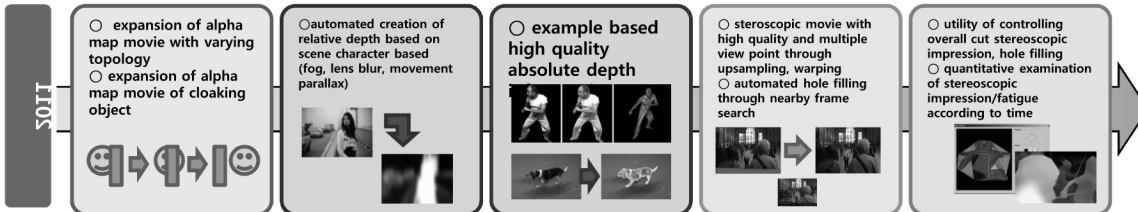
Extraction of multi object mat

Creation of relative depth info

Creation of local depth information

Creation of multi-view 3d movie

Total utility/human factor research



Second year: scene characteristics/example based automated high quality 2D→3D converting technique

- Productivity improvement through development of scene characteristics/example based algorithms
- Attainment of automation of high quality converting through improvement of accuracy of first year
- Creation of commercial contents and technical evaluation

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Research

<yearly developmental stage>

Extraction of multi object mat

Creation of relative depth info

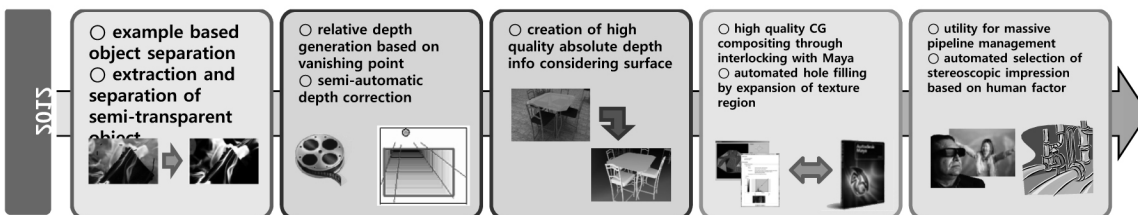
Creation of local depth information

Creation of multi-view 3d movie

Total utility/human factor research

Third year: total solution for 2D→3D converting with high quality/efficiency

- Specialized automation technique development with consideration of particular environment like CG compositing, VFX, etc.
- Virtual total solution development to be available at massive pipeline
- Creation of commercial contents and technical evaluation



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Result

<Nuke plugin package>



Nuke is widely used program, which has well-made UI and powerful extensibility via plugins. Many productions in Korea choose this as their main compositing tool. So it is very effective to make our techniques as a form of Nuke plugin.

> Nuke plugin development

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Result

<Nuke plugin package>

Definition

NAKiD v1.0

Nuke plugin package which implements frequently used techniques in the first and second year project

Objective

Maximize usability of our techniques by development Nuke plugins



Features

Multi-object matting

- Alpha matte extraction from hair/fur
- Trimap generation utility from splines

Extraction of relative depth

- Depth extraction from lens blur, motion parallax and fog

Extraction of absolute depth

- Depth extraction from terrain, face and template matching

Stereoscopic image generation

- Non linear warping and hole-filling by frame search



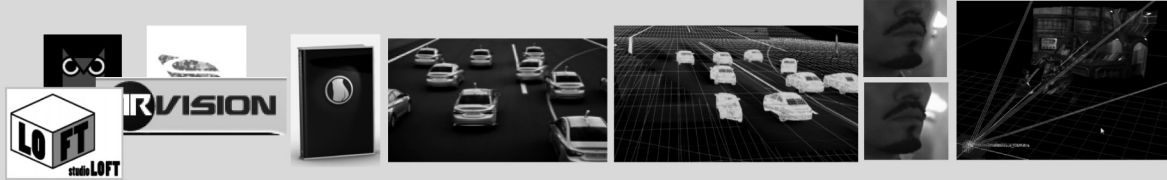
18

Technology transfer

Done

4 Technology transfers (\$180,000)

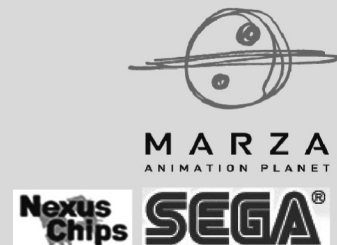
- KAISTUDIO
- AR Vision, DreamSearch C&C
- Studio LOFT



In progress

2 Technology transfers

- MARZA Animation Planet(SEGA)
- Nexus Chips
- Not only movie productions but also various companies contact us to get information about our technology



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Result

Business

Commercial 3D Movie <Tarbosaurus : Jumbagi>

- DreamSearch C&C 제작 / 2012.01.26
- Attended 2011 AFM (American Film Market)
- Nominated at 2012 I3DF Awards as representative Korea 3D content
- Co-product with EBS, funded by CJ E&C



<Sector 7>, the first 3D movie in Korea

- Our technology is applied to climax scene
- 2 millions people in Korea and greatly successful in China
- CJ E&M, the distributor, is considering release in France and Germany



20

Result

Business

3D Converter for iPad

- Apple appstore
- AR Vision
- Released at 2011. 4. 19. (price : 1.99\$)
- Drawing and depth control in object level
- Save the result image/ share on SNS



Exhibition

Advertise our technology at several exhibitions

- World IT Show 2011 (Seoul, 2011.5), KOBA 2011 (Seoul, 2011.6), SIGGRAPH 2011 (Vancouver, 2011.8), ACE Fair2011(Gwang-ju ,2011.9.21~24), DI Expo 2011 (Tokyo, 2011.10.20~22), AFM 2011, KES 2011 (Ilsan, 2011.10.12~15), SIGGRAPH ASIA 2011 (Hong kong, 2011.12)



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Thank you

22

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종합토론 (307호)
VFX 산업의 미래와 국제공동제작 기회
만들기 : 국제파트너 찾기

The Future of the Visual Effects Industry
and Finding Opportunities
for International Cooperation (#307)

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2012