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<td><strong>Author(s)</strong></td>
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AMIC SEMINAR ON DIGITAL ANIMATION FOR TV & FILM, SINGAPORE, NOV 19, 1998
This seminar provides a clear overview of the essential processes in digital animation, and of the mechanics to use technology and your creative skills to achieve better results. The programme includes concepts behind the computer animation process, budgeting, storyboard and creative process, live action filming, modeling, wiring, texturing, animating, dynamic systems, particle systems, lighting and rendering, compositing, and assembling the final product.
Asian Media Information & Communication Centre

Seminar on
Digital Animation for TV & Film
19 November 1998
Hotel Negara, Singapore
Asian Media Information & Communication Centre

Seminar on
Digital Animation for TV & Film
19 November 1998, Hotel Negara, Singapore

What?
• A one-day seminar dedicated to provide a clear overview of the essential processes in digital animation, and of the mechanics to use technology and your creative skills to achieve better results.
• The programme will include concepts behind the computer animation process, budgeting, storyboard and creative process, live action filming, modeling, wiring, texturing, animating, dynamic systems, particle systems, lighting and rendering, compositing, and assembling the final product.
• Examples of great computer animation in film and video will also be shown.

Who Should Attend?
• Graphics Professionals in Print, Web, Video Animation
• Managers involved in computer animation projects
• Creative Directors from Ad Agencies, Product Development, Marketing, Sales
• Students & Budding Animators

REGISTRATION FEE: S$200

How to register
Return the completed form on reverse side by fax/e-mail/post, or phone. Confirmation of reservation will be made upon receipt of registration & payment. Direct any enquiries to:
The Seminar Coordinator
AMIC, Jurong Point P.O. Box 360, Singapore 916412
tel: (65) 792 7570
fax (65) 7927129
e-mail: amicline@singnet.com.sg

Who's Presenting?
Tom Wujec is the author of several books:
• DIGITAL RHETORIC: UNDERSTANDING & USING THE NEW MEDIA
• PUMPING IONS: GAMES AND EXERCISES TO FLEX YOUR MIND
• FIVE STAR MIND: PUZZLES AND EXERCISES TO STIMULATE YOUR CREATIVITY AND IMAGINATION

Tom Wujec works as New Media Manager and Global Field Marketing Manager, Alias / WaveFront, Canada, the leading supplier of 3D computer graphics software
• He produces CD-ROM titles, internal & external websites, corporate presentations, demos and video to communicate, using interactive digital technology.
• He has worked in almost every aspect of digital design for over a decade, developing computer animation for television commercials, educational documentaries and IMAX movies.
• As Creative Director of the Royal Ontario Museum’s Digital Media services, Tom produced several award winning exhibitions, including a computer generated life-size animation of a Malasour dinosaur family, a reconstruction of a 2,500 year-old Chinese chariot and tomb complex, and visualization of the first computer called an Astrolabe.
• He has degrees in Astronomy and Psychology, a background in Mathematics and History of Science, and extensive technical background in multi-platform computer graphics, animation and multimedia development.
• He lectures internationally on the subjects of interface design and strategic planning of new media, and presents to Fortune 500 as well as cultural institutions in London & Washington.
Seminar Topics

Introduction to the Computer Animation
- Examples of great computer animation in film and video
- How computer animation has changed visual culture
- What you need to learn about animation

Overview of the Computer Animation Process
- There is no single process as each project has unique approaches
- There are (more or less) well-defined stages to developing animation
- People and roles in animation
- Types of computer animation projects: compositing, matching, real-time animation, character animation, flying logos, etc.

Concept and Budgeting
- Determining the need for Animation
- How to decide if CG adds value to the project
- Budgeting
- Resourcing

Storyboard and Creative
- Developing the creative brief
- Illustrating animation
- Planning for successive prototyping

Live Action Filming
- Recording backgrounds
- Compositing preparation

Modeling
- The process of building geometry
- Types of modeling tools and paradigms
- Examples of building up models
- Procedural Modeling
- Technical directors

Wiring
- Preparing characters for movement and life
- Building in Inverse Kinematics and Expressions
- Moving characters and objects through time

Texturing
- Adding surfaces to models
- The concept of Shaders
- The concept of bump and displacement maps

Animating
- The concept of key-framing
- Lip-synching
- Animation tools

Dynamic Systems
- Real-world simulation
- Gravity, Friction, Momentum
- New paradigms in Animation

Particle Systems
- The world of visual effects
- Explosions, Flames, Dust

Lighting and Rendering
- Converting Geometry, Animation and Dynamics to beautiful pictures
- The art of rendering

Compositing
- Combining computer animations with live action footage

Putting it all together
- Assembling all the pieces with sound to produce the finished product

Real-world Animation
- What really happens
- Deadlines and bottlenecks
- How to manage for change (and disaster)

SEMINAR SCHEDULE

<table>
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<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>0830-0900</td>
<td>Registration</td>
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<tr>
<td>0900-1030</td>
<td>Seminar Session</td>
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<tr>
<td>1030-1100</td>
<td>Tea Break</td>
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<tr>
<td>1100-1230</td>
<td>Seminar Session</td>
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<tr>
<td>1230-1400</td>
<td>Lunch</td>
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<td>1400-1530</td>
<td>Seminar Session</td>
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<td>1530-1600</td>
<td>Tea Break</td>
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<tr>
<td>1600-1730</td>
<td>Seminar Session</td>
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Registration Form

Registration Fee: S200 (Includes Lunch & 2 Teabreaks)

Name (De/Ms): [ ]

Position: [ ]

Organisation: [ ]

Address: [ ]

Tel: [ ]  Fax: [ ]

E-mail: [ ]

Mode of Payment:
- I enclose cheque / draft for to the order of "AMI Singapore".
- Telegraphic transfer to AMIC account 5-012538-057
  Citibank N A, Orchard Road Branch, Singapore.
  Kindly add SG$22 / US$15 towards bank charges.
- Please charge my Credit Card:
  - AMEX
  - VISA
  - Mastercard

Card Number: [ ]

Name on card: [ ]

Expire date: [ ]  Signature: [ ]

Date: [ ]

Cancellations received in writing before 8 Nov, 1998 will be refunded less S$20 administration fee. Thereafter, cancellations are not refundable.
Opening Speech by:

Param Singh Bal
Deputy Secretary-General
AMIC, Singapore
Good Morning, Ladies and Gentlemen

Welcome and thank you for joining us in this one day seminar on Digital Animation for TV & Film. We are delighted by the great response and, personally, I am happy to see so many of my colleagues from Caldecott Hill.

We’re in the midst of a Digital Revolution that may well surpass all previous revolutions in communications. The telecommunications, information-technology, and content-industries are converging very rapidly.

To discuss the meaning or context of how our lives may be changed, the only parallel we can draw is probably the discovery of Electricity. As Nicholas Negrophonte has observed: Being digital has three physiological effects on the shape of our world:

1. It decentralizes
2. It flattens
3. and it makes things bigger and smaller at the same time.

Today’s seminar will highlight the wonders and applications of Digital to Animation. I am sure Tom Wujec will thrill and enthral you on the topic of Digital Animation. He will share with you not only the harnessing of the technological aspects but also how creativity and imagination have found a new opportunity in Digital Animation. He will demonstrate, that while Technology is certainly an enabler, its the human creativity that will lead to the magical interactive experience.
We are fortunate to have a multi-dimensional and multi-channel Tom Wujec to present this seminar. He is not only the master of the New Technology but also possesses a keen interest in subjects ranging from astronomy to psychology besides computers.

I'm sure that at the end of the day you would have added a few more tricks to exploit Digital Animation in your respective areas of work.

In organizing this Seminar, AMIC is fulfilling its mission to spearhead the development of media & communication expertise in Asia-Pacific and help to foster socio-economic progress of the region.

The topic of today's Seminar is also in keeping with the growth of Singapore as a communication hub. Digital Animation is not only of interest to our local broadcasters/academic institutions but also to production houses and multi-media companies operating from Singapore.

We have given you our corporate brochure sharing AMIC's activities include publications, research, training, documentation & events-management all of them related to Communication and Media. We have been based in Singapore for the last 27 years now, but we serve the Asia Pacific region. We are looking forward to our growth and contributions in the next century. We hope that your organization or you'll consider joining AMIC as a member and assist us in furthering our mission.

In today's audience I am happy to note that we have a good mix of academics and industry practitioners.

Once again, our sincerest gratitude for your presence and I wish you a very productive and interesting seminar.

Thank you.
The Agenda

1. Introduction and Overview
2. Business - Concept, Budgeting, Resources
3. Storyboarding
4. Preproduction
5. The World of 3D
6. Modeling
7. Wiring
8. Texturing
9. Animating
10. Dynamic Systems
11. Particle Systems
12. Lighting and Rendering
13. Compositing & Matchmoving
14. Putting it all Together
15. Real World Animation
16. Summary

User Interface Demo
Modeling Demo
Wiring Demo
Shaders Demo
Animation Demos
Dynamics & Cloth Demo
Visual Effects Demo
Interactive Lighting Demo
Matchmoving Demo
Goals of the Seminar

- Communicate the essential steps of computer animation
- Demonstrate the current CG software
- Illustrate the workflow for simple and complex computer animation
- Encourage a deeper understanding of the world of 3D

Your Hosts

- **Tom Wujec**
  - New Media Manager, Alias | Wavefront, Toronto
  - 15 Years of Production Experience in Computer Animation, Multimedia Production, Content Creation

- **Amy Quek**
  - Application Engineer, Alias | Wavefront, Singapore
  - Over 6 Years of Production Experience Commercial Animation and Multimedia Development

Alias | Wavefront

- World's leading innovator of computer graphics technology
- Over 500 employees
- Worldwide Operation
  - Corporate Headquarters: Toronto
  - Development Sites: Toronto, Santa Barbara & Seattle
  - Worldwide Field Operations
- 10 years of experience in core markets
- Close relationships with industry leading accounts

The Agenda

**1. The World of CG**

The Evolution of Computer Graphics has dramatically changed visual culture and how people work and are entertained.

9:00
1. Introduction and Overview
2. Business • Concept, Budgeting, Resources
3. Storyboarding
4. Preproduction
5. The World of 3D
6. Modeling
7. Texturing
8. Animating
9. Lighting and Rendering
10. Dynamic Systems
11. Particle Systems
12. Compositing & Motion Tracking
13. Post Production
14. Final Work
15. Summary
The History of Computer Graphics

- 1960
- 1965
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000

Two Key Markets

- Industrial Design
- Entertainment

Entertainment Business Segments

- Feature Film
- Broadcast Video
- Games & Interactive Media

Entertainment Business Segments

Feature Film Market

- Character Animation
- Visual Effects
- Compositing
- Painting

Broadcast Video Market

- 3D computer graphic modeling, animation, visual effects and rendering
- Character animation
- Broadcast graphics and animated logos
- Post-production effects

Games & Interactive Media

- Real-time games
- Animated Sequences
- Character Design
- Real-time simulation
Design Business Segments

Transportation

Consumer Products

Design Firms

Technical Surfacing

Design Business Segments

Transportation Market

- Automotive Styling
- Industrial Equipment
- Tractors
- Aerospace
- Marine
- Trans

Product Design Market

- Consumer Electronics
- Housewares
- Hardware / Power Tools
- Appliances
- Medical Equipment
- Sporting Goods
- Furniture
- Fashion and Jewelry
- Toys
- Packaging

Core Technology

3D Modeling

- Animation
- Compositing
- Dynamics
- Materials
- Sculping
- Previsualizing
- Visual Effects
- Plugging
- User Interface

Entertainment Key Companies

- Alias I Wavefront
  - PowerAnimator, Maya, Composer, ZapIT
- Softimage
  - Softimage, Digital Studio
- Side Effects
  - Houdini
- Kinetix
  - 3DS Max
- Lightwave
  - Lightwave

Computer Animation Process

There is No Single Unique Process

- Each project has unique challenges and opportunities
- The tools are so powerful and flexible that there are many ways to produce animations
An Overview

2. The CG Business

Wide access to computer animation tools has created a wide range of successful business models, from small one-person shops to international CG production houses.

Range of Business Models

Business Success Factors

The Key Factors in Creating Business

- Relationships
  - Confidence, Track Record
- Quality of Work
  - Effective for Client’s Customers
- Production Management
  - On-Time, On-Budget, Speed of Production
- Cost
  - Competitively Priced
Clients

- Production Companies
  - Visual Effects
  - Character Animation
  - Television Effects
  - Episodic CG Animation

- Ad Agencies
  - Commercials
  - Broadcast Graphics

- Vertical Markets
  - Pharmaceutical
  - Publishing
  - Architectural
  - Theme Parks
  - Museums

Budgets & Schedules

<table>
<thead>
<tr>
<th>Flying Light</th>
<th>Flying Cutting Light</th>
<th>Character Animation</th>
<th>Feature Film Intro Effects</th>
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<tbody>
<tr>
<td>$500 - $1000 Second</td>
<td>$1000 - $2000 Second</td>
<td>$3000 - $5000 Second</td>
<td>Project Range: $10,000 - Multi-Million</td>
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1 to 3 days
3 to 15 days
5 to 20 days
2 weeks to several months

The Contract

- Creative Brief
- Characteristics of Animation
  - Duration
  - Action
  - Quality
- Schedule
- Type of Relationship
  - Input
  - Decision-making
  - Sign-off process

3. Storyboard

The storyboard provides the creative concept of the animation and guides the entire production process, from modeling, animation, camera moves, rendering and final work.

Stain-X Commercial

The Stain-X Storyboard
4. Pre-production

Pre-production includes the activity of obtaining and creating the raw media ingredients that contribute to your computer animation.

Pre (and Post) Production Elements
- Background Graphics
- Textures
- Voices
- Sound Effects
- Background Film

5. The 3D World

Being successful in the world of Three-Dimensional computer animation means being able to visualize and manipulate objects, lights, textures and movements in your imagination.

The User Interface
- Interface
- Viewer Window
- Select Object
- Create New Object
- Attribute Editor
- Render Settings
- Scene Editor
- Create Placeholders
- Placeholders
- Channel Box
- Maya Window

3D User Interface Demo

MAYA
6. Modeling

Modeling is the process of constructing, manipulating, deforming, combining and editing geometry - the surface structure of objects.

Types of Modeling

- Polygonal
- Spline
- Adaptive sub-division
- Fractal

Polygon Modeling

Polygon Modeling Tools

Spline Modeling

Non-Uniform B-Spline

Spline Modeling Tools
Ways to Model

- By Hand / Mouse / Tablet
- By importing Scanned Optical Data
- By Tracing
- By using Procedural Modeling
- By using advanced brush-based tools

Procedural Modeling

MEL Script

Maya Artisan

Sculpt Surfaces Tool

Modeling Demo

MEL's Chaps

Maya Artisan

Paint Select CV's Tool
Wiring is the process of preparing geometry to behave in well-defined ways. The two key activities are to build inverse kinematics and expressions.
Texturing is the process of creating and applying qualities to the geometry, such as colour, roughness, shininess, transparency among many other features.
9. Animating

Animating is the process of moving and manipulating geometry, textures, cameras and other scene elements through time.

Types of Animation

- Movement
  - Flying Logos, Spin
- Deformations
  - Twist, Shear, Bounce
- Character
  - Walk, Expressions, Emotional Reaction, Talking
- Procedural
  - Scientific Visualization, Legal Reconstruction,...
Procedural Animation

Animatable Construction History

Animation Demo

Demo 1: ROACH
Demo 2: COWBOY

Dynamic Systems

Dynamic systems provide the real-world simulations of physical systems, such as gravity, friction, momentum that add life to animation.

Rigid Dynamics
11. Particle Systems

Particle Systems provide the real-world simulation and creation of powerful visual effects, such as glows, explosions, dust, flames and sophisticated lighting effects.

Softbody Dynamics Demo

CLOTH

Particles, Softbodies

Particle Systems

Dynamics Systems Demo

Rocket Fire Demo
12. Lighting and Rendering

Rendering is the process of converting the geometry, textures, animations, dynamics and particles into a series of high-quality still images.

Lighting Models
- Iridescent, glinting, scabrous, sparkles on a surface
- Opponent process, masking, color, channel, camera, etc.
- Digital Light, light-glowing, shadowing, illumination, shadow, etc.
- Diffuse, glossy, reflective, shadow, direct, indirect
- Light mapping, texture, environment, etc.
- Linear, logarithmic, etc.
- Low dynamic range, high dynamic range
- Physically based, physically accurate

Rendering Quality
- Digital Output, color, color, color, color, color, color
- Glare, halo, lens flare, bloom, etc.
- Software Particle Rendering: particle cloud volume for smoke, dust, fire, etc.
- Selective Ray tracing
- Reflections and Refractions
- Transparent and A-buffer for soft shadows
- Advanced reconstruction: MIP to achieve softness
- Procedural backgrounds
- Adjustable 3D motion blur
- Fuzzy shadows

Hardware Rendering
- Hardware rendering: hardware-based lighting, reflection, shadow, etc.
- Interactive rendering: real-time rendering for games, animations, etc.
- Precomputed shading: precomputed shading for real-time rendering
- Global illumination: global illumination for realistic lighting
- Ray tracing: ray tracing for high-quality lighting
- Volume rendering: volume rendering for complex scenes
- Shadow mapping: shadow mapping for real-time shadows
- Anti-aliasing: anti-aliasing for smooth images
- Depth buffering: depth buffering for depth estimation
Types of Rendering Model

- All texture models integrated including mixing (2D, 3D, environment)
- All illumination models integrated (Phong, Blinn, Lambert, etc.) including texture channels
- Surface Materials: Blinn, Lambert, Phong
- Layered shaders
- Volume Materials: Environment Fog, Light Fog, Particle Cloud, Volume Shader
- Displacement Shader
- 3D Textures: File, Bulge, Checker, Fractal, Cloth, Mountain, Ramp, Water
- Environment Textures: Ball, Chrome, Cube, Sky, Spheres
- Convert Solid Textures
- Digital Oil F/X, shader glow

Shader Networks

13. Compositing

Compositing is the process of combining several layers of computer animation (and live action) to streamline the production process as well as to create new types of interesting visual effects.
14. Putting it all together

Delivering a full computer animation now can involve the use of a wide range of production tools.

Maya Product Family

Maya PowerModeler

Advanced Modeling Module

- Extends Maya's modeling tools to create precise complex geometry
- Rich modeling tools
  - Boolean
  - Align
  - N-Sided Surfaces
  - Replicate Surface
  - Curve Networks
  - Bevel
  - Smpli
  - Curve & Surface

Maya F/X

Particle Effects and Softbody Module

- Integrated Particle Effects
- Integrated Softbody Objects
- Forces
  - Gravity
  - Wind
  - Turbulence
  - Drag
  - Vertices

Maya Artisan

Advanced Sculpting Module

- Advanced Modeling and animation tool with revolutionary interface
- Provides intuitive control of traditional artist brush and sculpting tools
- Converts a time-consuming process into a simple process
15. Real-world Animation

What really happens
Deadlines and bottlenecks
How to manage for change and disaster.

16. Summary

Computer Animation is an exciting industry that will continue to evolve.