

Letter from the Director, Norm Badler

I wish you could have all joined us for our first ever CG@Penn Day in the Levine Lobby on April 29, 2011. Organized by Joe Kider, it featuring 56 posters describing CIS 497 DMD Senior Projects and course projects in Patrick Cozzi's CIS 565 GPU Programming, Joe Kider's CIS 563 Physics-Based Animation, and Steve Lane's CIS 660 Advanced Computer Graphics courses. We had judges from Zynga, Curious Pictures, and AGI; they awarded First Place to Kaikai Wang "Interactive Global Illumination of Indoor Scenes on the GPU" (CIS 497) <http://kaikaiwang.blogspot.com/>, Second Place to Igor Chiang and Raul Santos "Super Smash Pro" (CIS 563) <http://www.youtube.com/watch?v=SMOytsgZNQ>, and Third Place to Nathan Zeichner "Interactive Paper Origami Simulation" (CIS497) <http://origamisim.blogspot.com/>. We look forward to holding this event next year at the end of April. Consider yourself invited!

This issue of the Newsletter profiles some of our Alumni: Evan Goldberg at Disney Animation Studios, Dr. Liming Zhao at D. E. Shaw Research, and Patrick Cozzi of AGI who is our newest CG Lecturer teaching the GPU course. We also introduce other DMD 2011 award winners, recent published papers, and an exciting list of CG speakers and visitors over the past year. We also formalized the "Game Design Practicum" into a new course CIS 568, lead by PhD candidate Ben Sunshine-Hill. Ben also received nice recognition by being invited to speak in a Game AI session at the 2011 Game Developers Conference.

As we start the summer "break" it's really no break for the enterprise of CG@Penn. We're expecting at least 18 undergraduate and Masters students to be working in the SIG Center over the summer on a number of funded projects ranging from natural language interfaces for animation to a real-time populated "Marketplace" environment to a virtual reconstruction of the Inca site of Pachacamac. I look forward to telling you more about these projects in the next Newsletter. Meanwhile I hope you enjoy this one!

A handwritten signature in black ink, appearing to read 'Norm'.



CG@Penn
Computer Graphics at the
University of Pennsylvania

Check out the new CG@Penn website at cg.cis.upenn.edu, designed by DMD grads Brynn Shepherd and Nirav Sanghani, it features lots of photos, videos and information.

Where are They Now?

Evan Goldberg

Evan Goldberg is Manager of Animation Technology at Walt Disney Animation Studios, where he oversees a team of software engineers that develop technology for modeling, rigging, layout, animation, stereo, and drawing tools. He began his career at Disney in 2005 and has earned credit in the recent blockbuster *Tangled*, as well as *Bolt*, *Princess and the Frog*, *Prep and Landing*, and *Meet the Robinsons*. Throughout his tenure at Disney, Evan has been involved in several projects that were on the cutting edge of the computer graphics industry. He has two published SIGGRAPH talks: "Rhino-Palooza: Procedural Animation and Mesh Smoothing" which describes the algorithm of Rhino's rolling hamster ball in *Bolt* and "Medial Axis Techniques for Stereoscopic Extraction" which is a novel technique for converting flat images into stereoscopic content. A core member of the stereoscopic conversion R&D team at Disney, Evan is a named inventor on six filed patents and was a recipient of the International 3D Society's first annual Lumiere award for his contribution to stereoscopic pipelines.

Evan's technical influence often extends beyond the walls of Disney Animation. He was actively involved in the creation of Maya's camera sequencer, a collaboration project between Disney Animation and Autodesk, where Evan held a product owner role on the Disney side of development. Earlier this year, he chaired Autodesk's inter-studio workshop on file referencing. Venturing into the mobile world, Evan organized and taught a ten week course on iOS programming, which culminated in "Totally Tangled"—Disney Animation's first mobile game designed and coded by the same engineers who wrote software for the feature film *Tangled*. Download it free on iPhone, iPad, and iPod touch. Evan's roots at the University of Pennsylvania run deep. He is a 2005 graduate of the Digital Media Design program (with minors in Math, Fine Arts, and Theatre Arts) and is an alumni of the Center for Human Modeling and Simulation.

Patrick Cozzi

The SIG Center for Computer Graphics welcomes part-time Lecturer Patrick Cozzi, who is teaching CIS 565 GPU Programming and Architecture this spring. The course focuses on using the GPU for graphics development, using modern shader-based OpenGL and GLSL, and for general GPU Computing, using CUDA and OpenCL.

Patrick is a senior software developer on the 3D team at Analytical Graphics, Inc. (AGI) in Exton, PA, about 35 minutes from campus. At AGI, he develops 3D components for aerospace and GIS visualization.

Patrick is co-author of *3D Engine Design for Virtual Globes*, which will be published by A K Peters this summer, in time for SIGGRAPH 2011 in Vancouver. His book will be the first guide to engine design and rendering algorithms for virtual globe applications like Google Earth and NASA World Wind. Major topics include rendering globes, planet-sized terrain and vector data; multithreaded resource management; out-of-core algorithms; high-precision rendering; and shader-based renderer design.

Patrick is also a contributor to SIGGRAPH and the Game Engine Gems series; he wrote two chapters on OpenGL in *Game Engine Gems 2*, which was released at GDC 2011 in San Francisco.

Before joining AGI in 2004, Patrick worked on storage systems in IBM's Extreme Blue internship program at the Almaden Research Lab, interned with IBM's z/VM operating system team, and interned with the chipset validation group at Intel.

Patrick received a Master's degree in Computer and Information Science from the University of Pennsylvania in 2008 and a Bachelor's degree in Computer Science from Penn State in 2003. He worked with Norm Badler on his Master's thesis on out-of-core HLOD rendering.

Liming Zhao

Liming Zhao is a Research Scientist at D. E. Shaw Research, LLC (DESRES). Headquartered in New York City, DESRES conducts scientific research focusing primarily on molecular simulation involving proteins and biological macromolecules of potential interest from both a scientific and a pharmaceutical perspective. As a Research Scientist, Liming Zhao designs and develops computer software for computational chemistry and conducts scientific research in connection with efforts to fundamentally transform drug discovery.

Under the supervision of Prof. Alla Safanova and Prof. Norman Badler, Liming Zhao received his Ph.D. degree in Computer and Information Science from the University of Pennsylvania in 2009. His thesis titled "Constructing Good Quality Motion Graphs for Realistic Human Animation" presents a novel algorithm and data structure for efficiently generating realistic human animations from motion capture data. The algorithm produces motions that satisfy user input requirements such as preferred key motions, transition time limit between motions and controllability in an interactive environment.

Dr. Liming Zhao



Undergraduate Awards, 2011

Penn Engineering

Exceptional Service Award

Yiyi Zhou has been awarded the Penn Engineering Exceptional Service Award. This special award is given by the faculty of the School of Engineering and Applied Science to recognize and honor outstanding students for their service to the University. The faculty cited Yiyi's passion and dedication to serving her community through her work with student government, Women in Computer Science (WICS), her role as a freshman and peer advisor, and her efforts to create the first TEDx conference at Penn.

Ivy Day Awards

Along with winning the Penn Engineering Exceptional Service Award, Yiyi Zhou has been nominated for the Sol Feinstone award for her work in creating Penn's first TEDx conference. This award may be presented to the sophomore, junior and senior who have contributed to "orderly and constructive social and educational change within or outside the University community." Past recipients have included the undergraduate who established the first mental health student group in the nation; the creators of a Saturday African-centered enrichment program for local children; the organizers of a pre-orientation leadership program for first-year students; and the founders of the Speaking Across the University (SATU) program. A committee of students, faculty and staff makes the final selection from the list of candidates.

Yiyi's work with TEDxPenn was cited for bringing exciting and novel speakers to the Penn community, and for sharing the conference via live streaming video, video cache and through a beautifully designed web site. If you missed the conference, you can still catch the spirit by visiting: <http://www.tedx penn.com/>

DMD 2011 award winners Kaitlin Pollock, Yiyi Zhou, Lu Chen, and Ian Perera at the SEAS award ceremony.



Lu Chen with "Sulley" Sullivan from Monsters, Inc.

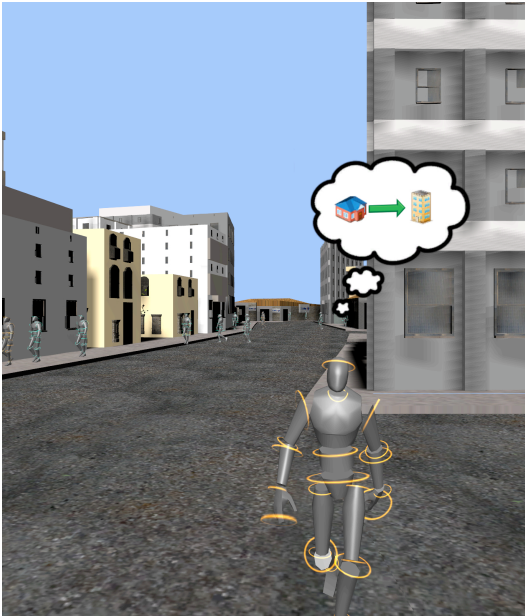
James Howard Weiss Memorial Award

Lu Chen has been nominated for the James Howard Weiss Memorial Award, which recognizes distinguished academic achievement (minimum G.P.A. of 3.7) and significant leadership in undergraduate activities by members of the senior class. Lu's commitment to students in computer science has been significant through her involvement in WICS, the Dining Philosophers, SIGGRAPH and as a teaching assistant to several CIS courses. Again, a committee of students, faculty and staff will make the final selection.

Welton and Dawn Becket Digital Media Design

Ian Perera is this year's winner of the Welton and Dawn Becket Digital Media Design Award. As the leader of the SIGGRAPH Games Division and of the Independent Game Developer Association's (IGDA) chapter on campus, Ian has provided countless hours of service and tutoring to his peers and the wider games community in Philadelphia. His ability to organize events, share information, and motivate his peers has made him a valued member of the graphics community at Penn.

According to Ian, he "originally applied to the Digital Media Design program with the aim of creating compelling virtual experiences through video game programming. However, I soon realized that the believability of these virtual worlds was not so much limited by graphics processing or other technical challenges, but rather from the difficulty in creating dynamic, believable characters that one could interact with using natural language. I then began to focus my studies on natural language processing and cognitive science in an effort to improve interactions with virtual characters through everyday language. I am now involved in research on natural language interfaces for virtual agents and I am pursuing a Ph.D. in Computer Science with a focus on natural language understanding and cognitive modeling to study how we might create virtual agents that behave and speak humanly." Congratulations to Ian!



Perceptually Realistic Behavior through Alibi Generation, published in AIIDE 2010

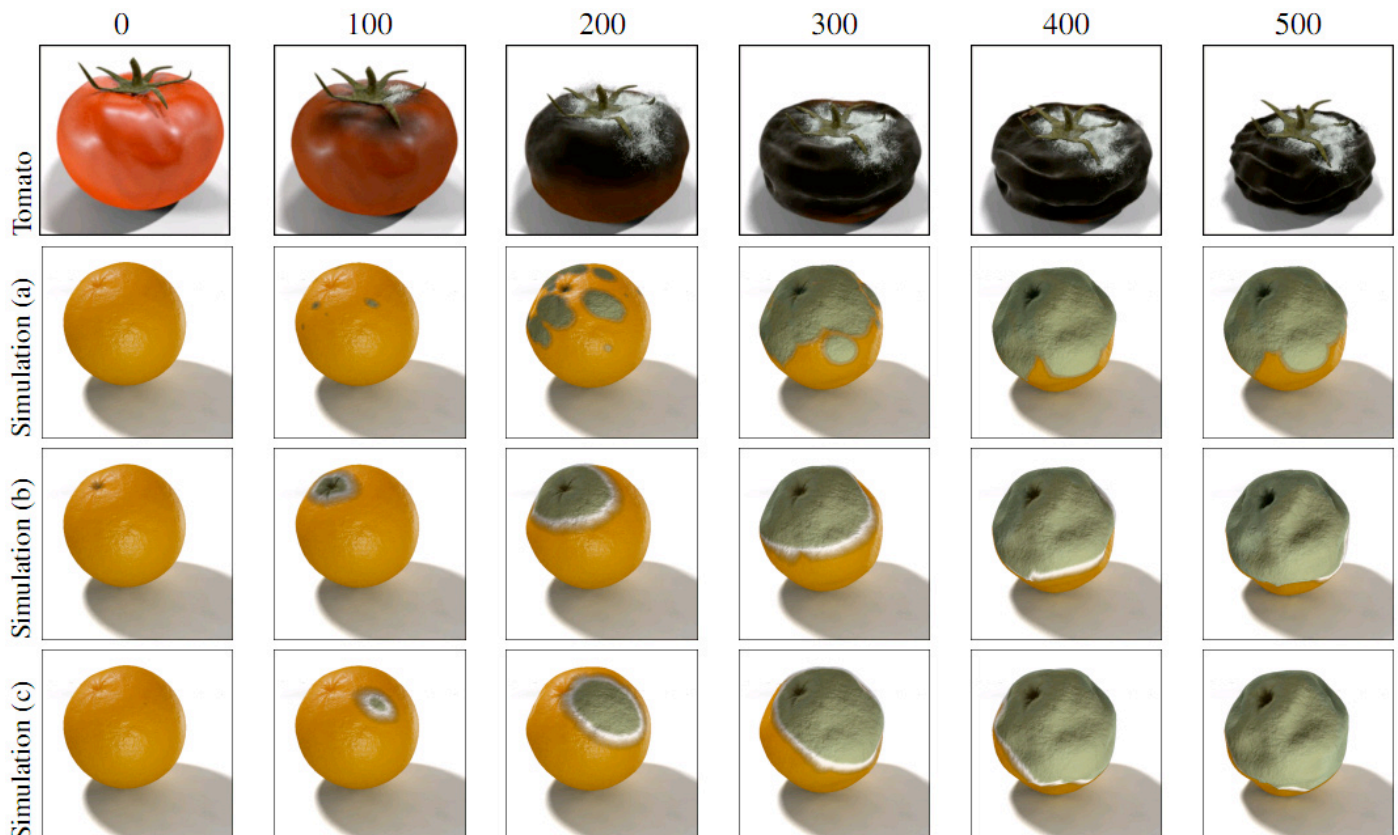
<http://repository.upenn.edu/cgi/viewcontent.cgi?article=1119&context=hms>

Real-time pedestrian simulation for open-world games involves aggressive behavior simplification and culling to keep computational cost under control, but it is difficult to predict whether these techniques will become unrealistic in certain situations. We propose a method of perceptually simulating highly realistic pedestrian behavior in virtual cities in realtime. Designers build a highly realistic simulation, from which a perceptually identical "perceptual simulation" is generated. Although the perceptual simulation simulates only a small portion of the world at a time, and does so with inexpensive approximations, it can be statistically guaranteed that the results are perceptually indistinguishable from those of the original simulation.

Fruit Decay, published in Eurographics 2011

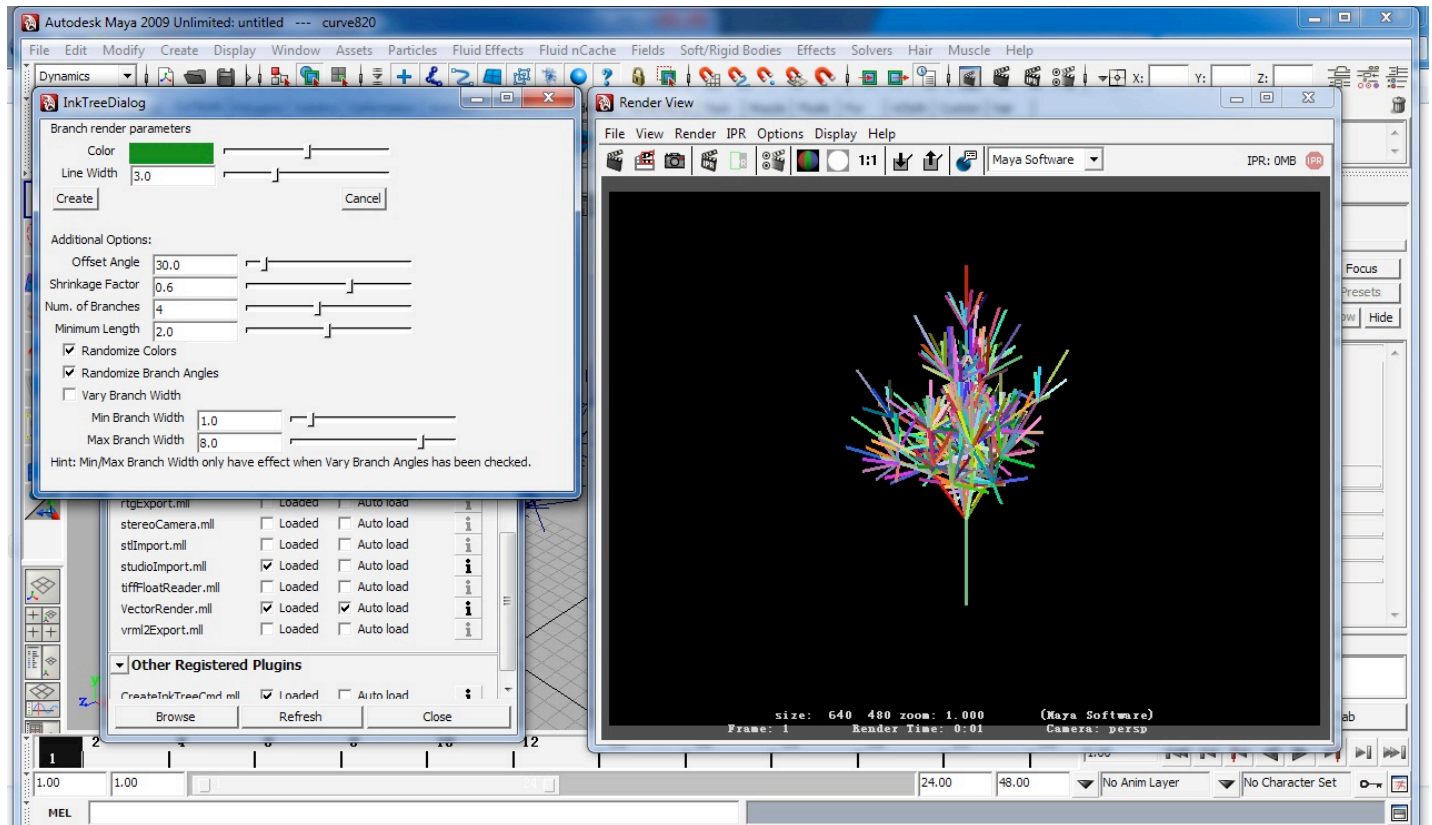
<http://cg.cis.upenn.edu/hms/research/FruitDecay/>

Aging and imperfections provide important visual cues for realism. We present a novel physically-based approach for simulating the biological aging and decay process in fruits. This method simulates interactions between multiple processes. Our biologically-derived, reaction-diffusion model generates growth patterns for areas of fungal and bacterial infection. Fungal colony spread and propagation is affected by both bacterial growth and nutrient depletion. This process changes the physical properties of the surface of the fruit as well as its internal volume substrate. The fruit is physically simulated with parameters such as skin thickness and porosity, water content, flesh rigidity, ambient temperature, humidity, and proximity to other surfaces. Our model produces a simulation that closely mirrors the progression of decay in real fruits under similar parameterized conditions. Additionally, we provide a tool that allows artists to customize the input of the program to produce generalized fruit simulations.



CIS 660: Advanced Topics in Graphics and Animation

Dr. Stephen Lane's course in advanced topics was created to help bring our students up to speed on the state-of-the-art in computer graphics and animation. The course accomplishes this goal through a series of student presentations of 52 recently published SIGGRAPH research papers. Students are also required to develop an authoring tool based on one of the papers presented. The two track nature of the course not only provides students with an opportunity to convert theory into practice by implementing the algorithms described in a SIGGRAPH research paper, but also requires them to think about how to package this technology in the form of an authoring tool for creative people to use. In addition, since the authoring tool must be developed as a Maya plug-in, students acquire a working knowledge of MEL scripting and the Maya C++ API, which prepares them well for work as Technical Directors in the graphics and animation industries. Industry recruiters have found the projects in this course to be of value and interest.



CIS 568: Game Design Practicum

CIS 568, the Game Design Practicum, has students collaborate to create short production-quality video games which are fun and engaging. First, students are given a quick orientation project, and are broken into teams of two. Students are asked to design and implement a physics-based marble manipulation game (along the lines of Marble Madness or Super Monkey Ball), followed by in-class play-testing of each game, and group discussion of each game's design. Students are then organized into groups of three. Each group proposes a set of high-level game concepts, which are refined and accepted during group discussions and in meetings with the instructor. Then each group produces a complete design document. Again, students are challenged to refine their design document and to eliminate all possible ambiguities (to uncover unexplored areas of the design). The project is implemented under an aggressive development schedule, with the first playable version available after only a few weeks, and weekly or twice-weekly meetings with the instructor. These meetings result in refined design plans and work schedules to determine the rate of progress needed to complete the game. Later in the project, students perform mutual play-testing of each other's projects, with strict secrecy maintained between play-testers to ensure varied, independent feedback. The result of such play-testing is used to refine the final game experience.

In addition to the game projects, the class includes several short lecture/demonstrations of useful tools for game design and prototyping, intended to orient students and accelerate self-directed learning. Discussions of topical overviews of subjects useful for game development, chosen based on industry demand and student interest. The course also includes invited speakers and industry professionals with significant practical experience in game development.



The Academic Year in Visitors

September

- 20th Penn hosted the IVA (Intelligent Virtual Agents) conference on campus. Conference chairs were: Jan Allbeck of George Mason University, Norman Badler of University of Pennsylvania, Timothy Bickmore of Northeastern University, Catherine Pelachaud of CNRS and Télécom ParisTech, France.

October

- 28th Electronic Arts came to campus for a tech talk with Calvin Crowner, whose previous game, Ultima Online, was the first game inducted into the Game Developer's Choice Hall of Fame. Calvin is currently with Mythic Studios. Joining Calvin was EA's Jacqueline Shuler (now at Zynga) from recruitment.

November

- 11th DreamWorks Animation joined us for a Tech Talk led by Technical Director Jon Shih, and a recruitment talk led by Outreach Supervisor, Jim Conrads.

February

- 3rd New York Times Graphics Department's Kevin Quealy joined David Comberg's "Information Visualization" class for a talk about the 25 member team of visual journalists at the nytimes.com.
- 22nd CIS Colloquium Speaker Huamin Wang from the Department of Electronic Engineering and Computer Sciences at the University of California at Berkeley gave a talk on "Data-Driven Physically-Based Animation."
- 23rd Ken Maruyama, VP for Recruiting and Academic Relations at Sony Pictures came to give a talk about working at Sony.
- 24th Pixar Animation Studios came to campus with DMD alumni Paul Kanyuk and Ariela Nurko giving tech talks about their work. They were joined by Tricia Green, Senior Recruiter, University Relations at Pixar who gave a talk about working at Pixar.

March

- 15th CIS Colloquium talk Toshiya Hachisuka of the Department of Computer Sciences and Engineering at the University of California, San Diego on "Efficient and Robust Lighting Simulation for Realistic Image Synthesis."
- 22nd Blue Sky Animation made their first visit to campus with Debra Blanchard, Director of Studio Recruiting, and Dylan Maxwell, Technical Director, giving an overview of life and work at Blue Sky, and of their latest film, Rio.
- 29th Jeff Horing, managing director at Insight Venture Partners, and Jamie King, founder and Chief Creative Officer of 4mm Games, and producer of award winning games such as Max Payne, Red Dead Revolver and the Grand Theft Auto franchise, came to campus to talk about careers in the gaming industry.
- 31st Taku Komura of the University of Edinburgh gave a CIS Colloquium talk on "Spatial Relationship based Representation for Humanoid Control."

April

- 6th Women in Computer Science High School Day – Penn Computer Science and the SIG lab hosted 90 high school girls with tours and demos, while the women of DMD made presentations of their work in graphics.
- 14th The CIS Colloquia series presented Petros Faloutsos from the Department of Computer Sciences at the University of California, Los Angeles. Dr. Faloutsos gave a talk on "Animating Virtual Humans."
- 28th Our first CG@Penn Day gave students, faculty and visitors a chance to see state-of-the-art work in computer graphics at Penn. We offered two events to showcase student work in computer graphics: the Senior Design Presentations, and a poster session with over 50 posters featuring our 4 spring Computer Graphics classes: CIS660: Advanced Topics in Computer Animation (Lane), CIS563: Physically Based Animation (Kider), CIS565: GPU Programming and Architecture (Cozzi), and CIS497: Senior Capstone Design (Kider+Badler). Judges included Yoni Lateiner and Ted Aronson of Zynga, Mike Lang of Curious Pictures and Michael Bartholomew of Analytic Graphics Inc (AGI).
- 29th Computer Graphics Colloquium Speaker Jassim Happa, a PhD student in the International Digital Laboratory at the University of Warwick, gave a talk on "High-Fidelity Rendering and Display of Cultural Heritage."

2011 Graduates

CGGT

Mateo Marinucci	Zynga
Krishnan Ramachandran	Bluy Sky Animation
Nadim Sinno	Pixar residency
Samantha Raja	Pixar internship
Igor Chiang	Pixar internship
Dan Garcia	SIG Lab research and Pixar residency in fall
Ramkrish Raja	Zynga
Shawn Doria	Software engineer at GE
Narendra Vadapalli	Electronic Arts internship
Eugenia Leong	Sony Computer Entertainment America (Sony PlayStation)
Bobby Wilkinson	Electronic Arts internship
Varun Talwar	DreamWorks Animation
Noe Martinez	DreamWorks Animation
Joe Weinoffer	Aberdeen Test Center Internship
Fran Menna	Edutainment Systems, LLC
Gabriel Leung	EA Mythic
Lukai Lan	Tencent Games
Eric Cheng	SAP US-HQ
Matt Jones	SIG Lab Research

DMD

Lu Chen	Facebook
Lillian Chou	Electronic Arts
Ben Chirlin	The Mechanism
Jeremy Cytryn	DreamWorks Animation
Malu Harten	Microsoft internship, then Master's Degree at Penn
Terry Kaleas	DreamWorks Animation
Jon McCaffrey	Nvidia
Ian Perera	PhD at University of Rochester
Damon Rocco	Electronic Arts
Nirav Sanghani	Twitter
Nathan Zeichner	Pixar internship, then Master's Degree at Penn
Kai Kai Wang	Microsoft
YiYi Zhou	Microsoft
Nicole Nelson	SIG lab research



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