



Letter from the Director, Norm Badler

Dear Friends:

I'm delighted to introduce our first ever Alumni Newsletter for the Computer Graphics graduates from Penn. Since we have degree programs from the undergraduate DMD, the CGGT Masters, to the PhD, we've coalesced the whole enterprise into the more euphonic "CG@Penn." Why are we writing to you now? Well, we have so much news that we just had to! Even if you just graduated, things are evolving here and I'd like to share with you our novelties, our excitement and the achievements of some of our Alumni.

A major milestone was achieved this Spring with the appointment of Alla Safonova (The accent is on the second syllable of her last name!) of CMU as a new Assistant Professor of Computer and Information Science. Alla joins us in the Fall 2007 term. She is an outstanding computer animation researcher with excellent SIGGRAPH papers to her credit. A brief profile is included in this Newsletter.

Most of you know the Center for Human Modeling and Simulation lab space; but we have a plan in place blessed by the School of Engineering and Applied Science to completely renovate and modernize the entire

area, including the neighboring hallways and the Moore entrance as well. The architectural plans are amazing, and will be finalized in the coming months.

We have a new addition to the CG@Penn staff, Jessica Marcus, whom we share with the Institute for Research in Cognitive Science (IRCS). Jessica does many things for us and we'll tell you more about her in this issue.

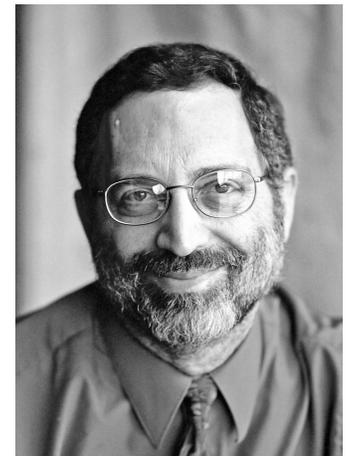
Our Alumni continue to dazzle us - especially in the reports back from their employers! We'd love to hear from you and start a regular feature of "what's happening." One new useful method for staying in touch is through our new alumni website created by Matt Roberts, DMD '05. Please be sure to check out and sign up for mentoring and info on the Alumni Website: <http://penncca.org>.

If you already contribute to Penn through Annual Giving, or are interested in supporting CG@Penn, you can help us by simply designating CG@Penn on your gift. In general, we use such gifts for direct student activity and educational support: we send students to conferences, bring in speakers from industry, and support student projects and internships within HMS. We gratefully acknowledge those Alumni and friends of

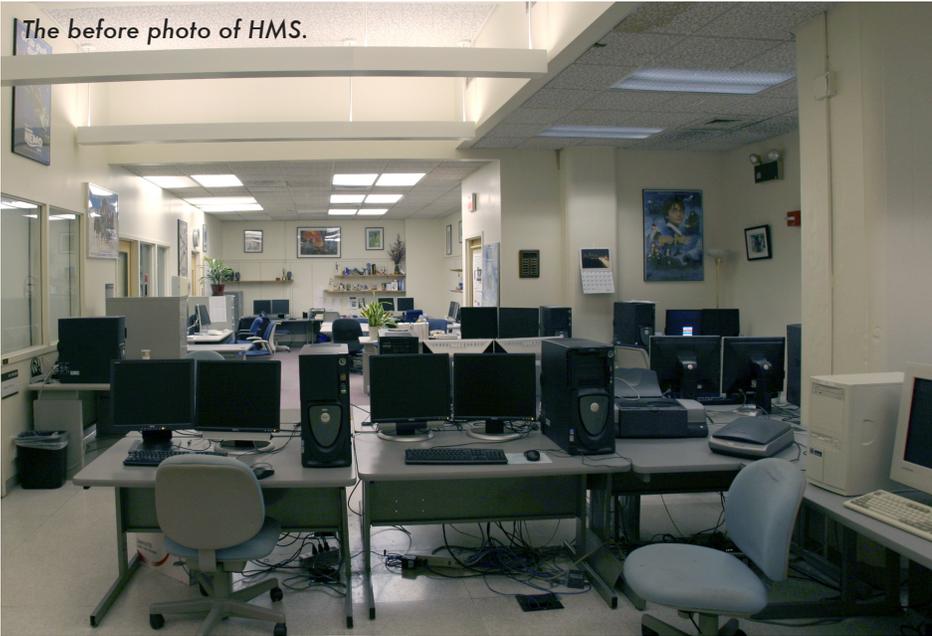
CG@Penn who have already graciously supported our enterprise.

We will be having an informal "reunion" at SIGGRAPH 2007 in San Diego this year. The announcement and details are in this Newsletter. Even if you don't register for SIGGRAPH we'd love to see you there for drinks and dessert!

Norman F. Badler



The before photo of HMS.



A New Look for HMS

We are looking forward to a major renovation of the HMS Center space in Rooms 103-109 of the Moore Building beginning in late spring 2008. The renovated area will also include the adjacent hallways and the entry and lobby areas at the entrance to the Moore Building at 33rd and Walnut Streets. The design is still in the planning phase, but we are excited about this "once in a lifetime" opportunity to recreate our space as a real showcase for the Engineering School.

Kennedy & Violich Architecture, Ltd., an architectural firm from Boston, has taken on the task of designing the new HMS Center space. The existing Center space will be entirely gutted and redesigned, from the entryway and vestibule on the north side, to the southern wall adjacent to Skirkanich Hall. The new HMS entrance will be on the east side of the lab, across the hall from the Department of Electrical and Systems Engineering's RCA lab. Access to the lab will be through a glass-walled meeting space, complete with computer-equipped tables. Plans for the lab's exterior include a projector that will cast images directly onto the eastern wall, a synthetic (virtual!) skylight that can reproduce the outside lighting conditions (or any other desired) with lights in the ceiling, and a "light ladder gallery" along the ramp which follows the northern wall that will highlight departmental project posters.

The interior of the Center will undergo a radical transformation. The new design will include a dramatically expanded motion capture space to accommodate our new computer graphics faculty member, Dr. Alla Safonova. New offices are planned as well as a new conference room with a projection wall and kitchenette. The interior has been redesigned to maximize workstation and collaboration space.

If you are interested in helping us realize this exciting project, please contact Norm Badler by emailing him at badler@seas.upenn.edu.

Welcome: Alla Safonova

We welcome Alla Safonova to Computer Graphics as our newest faculty member. Alla joins us from Carnegie Mellon University, where she was a Ph.D. student working with professor Jessica Hodgins, then a Postdoctoral Fellow in the Robotics Institute. Before CMU, Alla spent two years as a graduate student in the Computer Science department at The Georgia Institute of Technology, working with Professor Jarek Rossignac.

Alla's research interests are in computer animation and computer graphics, with a special interest in synthesizing motions for human characters, cartoons and animals. Her thesis work focused on algorithms that would enable naïve users to create animations of complex characters, such as humans and cartoons, in an easy and intuitive way. We are thrilled to have her join us!

HMS Changes at a Glance

1. From Many to One

The renovations will span rooms 103 to 109 (Amy's Office to the Motion Capture Room), reconfiguring the space into a brand new design. There will be an expanded motion-capture space, a larger conference room with movable dividers, kitchenette (with a sink!), a projection wall, and new workstations for better collaboration.

2. A New Entrance

The entry hallway across from the ENIAC computer lab will be renovated and incorporated into the new design for HMS. The new entrance for the lab will be on the East side of the lab, facing the Department of Electrical and Systems Engineering's RCA lab.

3. A Spectacular Ceiling

The synthetic ceiling is customizable from the inside, including various lighting scenarios to reflect the weather outside.

4. Meeting Space for Students

The current plan includes a glass-walled room outside the lab for students to use for group meetings.

5. New Windows

For the first time in a long time, the lab will have windows that face the Quain courtyard, letting in additional true light (and letting us see the weather!).



Newest member of the CG@Penn faculty,
Alla Safonova

Send Me the Next One!

Future newsletters will be electronic!

If you would like to receive a copy, please send your preferred email address to cginfo@seas.upenn.edu

PennCGA: Alumni Association

The Penn Computer Graphics Alumni Association is the homepage for news, events and communication for graduates and friends of the University of Pennsylvania Digital Media Design, Computer Graphics and Game Technology and Center for Human Modeling and Simulation programs at the School of Engineering and Applied Science in Philadelphia, Pennsylvania.

PennCGA's goals are to:

- ▶ Coordinate communication and networking between Penn Graphics alumni and friends around the world
- ▶ Organize local events
- ▶ Facilitate connections and networking between current students and graduates working in the film, game development, software, digital media, publishing, animation, internet and interactive industries
- ▶ Identify and develop scholarship and financial assistance opportunities for current graphics students

If you are interested in helping with these efforts, please register yourself as alumnus, alumna or friend today online at the PennCGA website, <http://www.penncga.org/register-yourself>. If you wish to help directly (by writing for the weblog, coordinating events in your area or mentoring current students), please write Matt Roberts directly (admin@penncga.org) with your interests or ideas. Thanks Matt!

Current Research Projects



Testing the accuracy of two motion capture suits simultaneously

US AF TACS: Untethered Motion Capture Evaluation for Flightline Maintenance

Our Air Force project explores the utility of novel motion capture technologies for the maintenance domain. We are looking at the potential of untethered motion capture with full scale physical props using new motion capture suit technologies. By obtaining real task motion data, we hope to better evaluate subsequent task performances for training and task validation.



Creating a human texture for an office building

PULSE: Populating the Urban Landscape with Simulated Entities

When creating a large scale simulation of many people living and working in an urban environment, many graphical, semantic, and functional elements must be created and brought together. Graphical models of the environment, objects and crowds of characters need to be created and annotated with information that enables them to be reasoned about and interacted with. The behaviors of the characters and environment need to be described in concert with the objective of the simulation. Ultimately the inhabitants must be doing things as well as simply navigating and locomoting about the space. When viewing a graphical simulation, this background "human texture" will give the scene authenticity and context.

US Army MURI: SUBTLE: Situation Understanding Bot Through Language and Environment

For effective human-bot communication to be possible, we must move from robust sentence processing to robust utterance understanding. The HMS role in this Army MURI is to explore the use of Parameterized Actions (PARs) to build cognitive models of each communicant's knowledge of the actions of the other. The PAR can be used to communicate actions for execution or description. In addition, these models can be used to interpret and disambiguate partially-specified questions and commands by filling in shared knowledge.

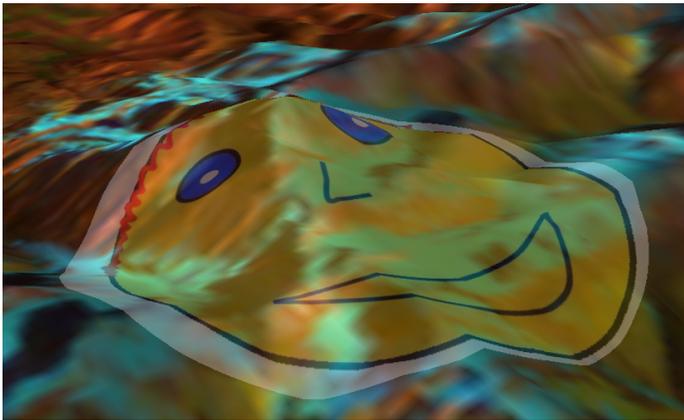
Curriculum Highlights

CIS665: GPU Programming and Architecture

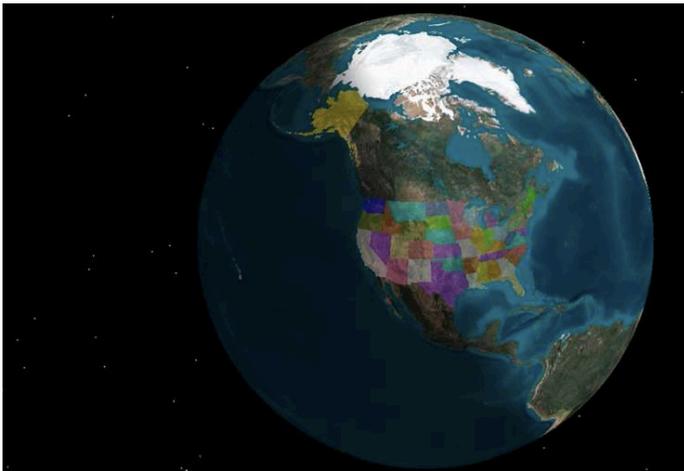
We have offered a course in GPU programming twice now. The course was initially taught in 2004 by Suresh Venkatasubramanian (who has moved to a faculty position at the University of Utah); this spring it was led by one of our CGGT graduates, Gary Katz, and HMS PhD student Joe Kider.

Students in the course not only gain an understanding of the current state of art in programmable graphics cards, but they learn how the graphics pipeline has developed over time and where programmable graphics will move in the future. The course requires students to learn to program the graphics pipeline using high level languages such as HLSL or Cg or CUDA. The goal is to provide the student with programming experience with streaming processor languages by filling the student's "toolbox" with techniques and to provide an understanding for the implementation of game rendering and animation algorithms being performed on GPUs. The course also provides an introduction into various graphics effects that are being performed on graphics cards for today's games.

One project in the course implemented a novel use of shadow volumes to fill arbitrary regions of terrain. The Blythe geometry-shader method is independent of the terrain rendering algorithm. Performing volume extrusion in a geometry-shader (GS) reduces pre-processing, main memory, and CPU-GPU bandwidth. Since pre-processing is kept minimal, the regions can be dynamic. Texture mapping was implemented using a fragment shader that dynamically assigns texture coordinates. The algorithm is demonstrated with a near production quality implementation in a commercial product. Two samples of this process are shown below.



Shadow volume fill algorithm by Patrick Cozzi,
The core terrain engine was written by Analytical Graphics Inc.



Fight scene between characters, by Priscilla Spencer and Matt Kuruc

CSE461/CIS561: Computer Modeling and Animation Applications

Thanks to a Provost's Distinguished International Scholars award, we were able to "import" Professor Karan Singh from the University of Toronto during spring 2007 to teach CSE461/CIS561: Computer Modeling and Animation Applications. Professor Singh taught a class of 8 undergraduates and 2 masters students. Working in teams of two, they learned advanced principles of 3D computer animation by writing software extensions to Maya to create their own "special effect" and used that software to animate a confrontation between two characters in a short one-minute vignette. Examples of coded additions include particle trails, rain, and breaking objects.

Professor Singh's experience both with the Maya software and with its production use was invaluable in creating a memorable learning environment and experience for our students. The course was supplemented by a generous donation to the DMD program from Harlan Stone, our largest benefactor. In addition to the instruction Professor Singh provided, we assigned a Teaching Assistant to help him, Warren Longmire, a DMD undergraduate. Warren, who has worked at Microsoft and Electronic Arts, brought his own invaluable personal experience into the classroom and was a full contributor to the students' educational insights.

CSE277: Computer Graphics Techniques

This spring we created a new graphics course for sophomores called CSE277, Introduction to Computer Graphics Techniques. The course focused on programming the essential geometric and mathematical concepts underlying modern computer graphics. Using primarily 2D implementations, it covers fundamental topics such as graphical user interface design, computational geometry, graphics algorithms, and image processing. The course was designed as a first course in programming computer graphics algorithms, bridging introductory programming and mathematics with the more advanced graphics topics covered in Computer Graphics (CSE460/CIS560) and Computer Animation (CSE462/CIS562). It is intended as a spring term sophomore course and is required for DMD majors. This is an intensive programming course, and fills the gap between what our students learn in basic programming and what they will need to begin to build a computational graphics and geometry software library. Software designs, testing, re-use, and code sharing are important characteristics of the programming assignments, and one class a week was devoted to a hands-on programming lab. The individual assignments were designed to be small enough to ensure completion, but to grow into a library of reusable C++ or Python code for other graphics projects or purposes. Dr. Badler led the course with significant assistance from Jan Allbeck and DMD junior Matt Kuruc; it was met with enthusiastic reviews from students!

Fun Facts

In the 2005-2006 academic year, 243 people took a graphics course at Penn.

Of the approximately 320 Ph.D.'s conferred by CIS since 1975, 25% were students affiliated with HMS.

HMS graduates have won 3 Motion Picture Academy Achievement Awards: Cary Phillips, Technical Achievement in 1999 and 2002; Nick Foster, Technical Achievement in 1999.

About 1/3 of the HMS Center's Ph.D recipients (since 1975) have been women.

In only two years, the CGGT program has exceeded the enrollment of several other SEAS professional master's degrees.

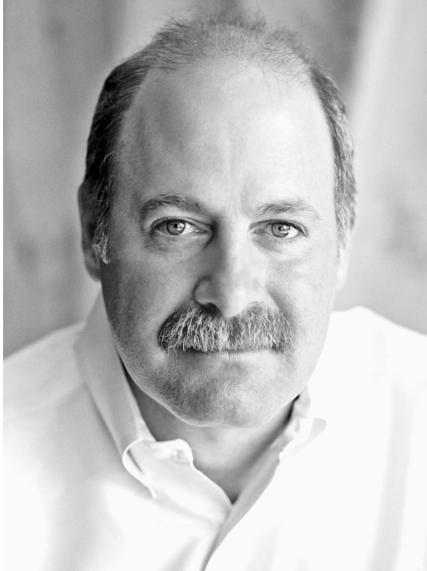
DMD was the first undergraduate interdisciplinary program in computer graphics in the United States.

DMD has one of the lowest admittance rates of any program at Penn, and has one of the highest matriculation rates of any program in the history of the University.

DMD students offer free tutorials in MAYA and Renderman to any student at Penn regardless of school or major.

CGGT doubled its enrollment from its first year to its second year (2005 to 2006).

Steve Lane, CGGT



Our Master's Program: CGGT

Beginning in the Fall of 2004, Penn's Department of Computer and Information Science admitted its first class to the Master's program in Computer Graphics and Game Technology (CGGT). The goal of the CGGT program is to expose recent graduates, as well as students returning from industry, to state-of-the-art graphics and animation technologies, as well as interactive media design principles, product development methodologies and engineering entrepreneurship. The CGGT program prepares students for positions requiring multi-disciplinary skills and talents such as designers, technical directors, technical animators, tool developers and game programmers. Opportunities for specialization are provided in such core areas as art and animation, creative design, animation and simulation technology, human/computer interfaces and production management. Upon

completion of the one year CGGT program students receive a Master of Science and Engineering degree.

The Director of the CGGT Masters program is Dr. Stephen H. Lane. Dr. Lane is an accomplished researcher, educator and entrepreneur with over 19 years of experience designing, developing and commercializing advanced 3D graphics and animation technology for use in interactive entertainment, computer games, virtual reality and distributed simulation and training applications. Dr. Lane joined the faculty of the CIS Dept. in 2001 and currently teaches courses in Computer Animation, Advanced Topics in Graphics and Animation, and Computer Game Design and Development. He also has an active research agenda with interests in the areas of robotics, physically-based character animation, artificial life and embodied intelligent agents: specifically, the intersection of where the fields of control theory, artificial intelligence and computer animation meet. After receiving his Ph.D. from Princeton University, Dr. Lane co-founded Katrinx, Inc. to develop advanced behavioral animation technology for use in interactive entertainment and computer animation markets. These efforts resulted in a series of game contracts and technology licenses with Hasbro Inc., AT&T, Microsoft, Disney, Intel, the US Army and others. In 1999, Dr. Lane founded soVoz, Inc. to commercialize the behavioral animation technology developed at Katrinx in the area of character-based intelligent agents. soVoz is currently developing a suite of high-level authoring tools, reusable content libraries and a runtime player, known as ProScena Studio™, that allows simulation-based training and education applications (i.e. "serious games") to be developed and deployed across a broad range of hardware and software platforms, from PC to game consoles.

Introducing: Jessica Marcus

Jessica Marcus is our new part-time Computer Graphics Events Coordinator. Her office is located in Moore 107, inside the HMS lab space. Jessica splits her time evenly between HMS and IRCS, the Institute for Research in Cognitive Science. At HMS, she performs a myriad of administrative duties, as well as serving as a liaison between students and faculty. Before joining HMS, Jessica held a position at Penn's Linguistic Data Consortium. She is also a Penn alum (COL '96). In her free time, Jessica enjoys challenging HMS students to a game of Guitar Hero. She usually wins...



Send us your updates!

If you have something you would like included in the next newsletter, please send an email to cginfo@seas.upenn.edu

Projects, Awards, and Accomplishments

Four DMD students have worked with Anthropology Professor Alexei Vranich on a series of projects including animations for a film for the Discovery Channel and models of the site for use by the History Channel. Three DMD students have traveled to the excavation of the archaeological site in Bolivia. DMD graduate Jean Tsong spent the summer of her senior year in Bolivia collecting laser scanned data of the site.

The following fall, students in Dr. Erickson's and Dr. Badler's Benjamin Franklin collaborative seminar CSE 106, *Visualizing the Past, Peopling the Past*, also contributed to the digital archives being created for this site.

In the summer of 2006, two DMD freshmen, Ariela Nurko and Calley Levine, went to Bolivia to continue work on the project. Through NSF funding (NSF-IIS-0431070), they were able to work on creating a digital recreation of this UNESCO World Heritage site. The 3D models that they created were featured in the documentary, *Digging for the Truth*, which aired on the History Channel on Monday, March 26th, 2007. The History Channel's blurb says: *In the Bolivian Andes, a sprawling ancient city rests 13,000 feet above sea level. With its giant, freestanding monoliths and grand design, Tiwanaku has long been compared to Stonehenge. The two sites were built on opposite sides of the globe, but they both share a design that pays tribute to the sun. What's the 'real' connection between Stonehenge and Tiwanaku? Flying out from La Paz, host Josh Bernstein tours Tiwanaku from both the air and ground. He harvests and transports the very stone used to build Tiwanaku and dives into Lake Titicaca to explore evidence of a lost civilization.*

In the spring of 2004, DMD freshman Michael Highland (<http://www.michaelhighland.com>) created a film in his Fine Arts film course, called *As Real as Your Life* (<http://www.asrealasyourlife.com>). As Michael describes it, the film is "part documentary, part narrative, and part animation. *As Real as Your Life* chronicles my own experiences as a video game addict, as I attempt to understand the effect video games have had on my real life." In the spring of 2005, the film was accepted to the Ivy League Film Festival and received rave reviews. Scot Rubin, a film and TV producer in Los Angeles, happened to read a DP article written about the festival, and contacted Michael about the film. That summer, Michael produced a longer version of the film with help from Scot. In the fall of 2005, game developer David Perry asked Michael if he could show the film at the exclusive TED Conference in Monterrey, CA. The film was well received and earned Michael a free ticket for the following year's conference. Now, in the spring of 2007, the film has been accepted to the Cannes Film Festival. While the film is not in the competition, it will be shown with the other short film entries at the



A still from Michael Highland's film, *As Real As Your Life*

Festival. Currently Michael is working on two new feature length screenplays as well as pursuing a possible career in video game design. He spent the Spring 2007 semester in Hong Kong, attending the Polytechnic University and working at MERECL, the University's digital media development laboratory. Michael won this year's Dawn and Walton Becket Digital Media Design Award.

The Dawn and Walton Becket Digital Media Design Achievement Award is awarded every year to a deserving DMD Senior. In 2008 the Becket Award will be made in honor of the memory of computer graphics PhD, friend, and colleague Dr. Tarek Alameldin, who passed away unexpectedly in November 2006.

Vanguard Internships

Once again, four DMD students have been accepted as Neil Braun Vanguard Animation Scholars. Our last group of students (Neil Chatterjee, Salim Zayat, Beau Roberts and Warren Longmire) went to London in 2004 to work on the animated film *Valiant* (which was nominated for a 2006 Young Artist award). The current students (Ariela Nurko, Mark Fickett, Michelle Rosenthal and Nick Lupinetti) are spending the summer in Vancouver, working on Vanguard's latest animated film, *Space Chimps*. We are very thankful to Neil Braun, Curtis Augspurger, Barb Dawson and all of the folks at Vanguard for helping our students to find such wonderful opportunities.

Other Internships and Positions

This summer, students from all three of the CG@Penn programs are engaged in internships, many of which came about due to the continuing and much appreciated efforts of our alumni. Current employers for internships and jobs for graduating seniors in DMD and CGGT include: Activision, Apple, Basikgroup, Bridger-Conway, Curious Pictures, Disney Animation, DreamWorks, Electronic Arts, Goldman Sachs, 321Launch, Lehman Brothers, Microsoft and Pixar. Our largest employers continue to be Disney and Electronic Arts. For more information on where our students work, please check out <http://cg.cis.upenn.edu/cggt/employment.php> for CGGT and <http://cg.cis.upenn.edu/dmd/internships.php> for DMD.

A "Full Service" Academy

CG@Penn opens its doors to a full range of students from High School via SAAST, through undergraduate DMD, graduate MSE CCGT, to the PhD.

The undergraduate students at Penn are enrolled in the Digital Media Design program, conferring a BSE degree at the end of 4 years. Currently, there are 64 students, 27 of whom are women.

The new CCGT Master's program has really taken off. With a rising enrollment and praise from the industry, the total count of students for the one year program is now up to 22 students.

There are also 8 students currently working on their CIS Ph.D. Their personal pages can be found on <http://cg.cis.upenn.edu/hms/people.html>.

These enrollments make CG@Penn one of the largest "non-departments" in SEAS. DMD represents fully 20% of the Computer Science BSE degrees and one third of the freshmen class. CCGT has 15% of the CIS graduate Masters students, and HMS comprises 10% of the CIS PhD students. You can see why we're so glad to have another faculty member joining us!

For more information and updates on all the CG@Penn programs, visit <http://cg.cis.upenn.edu>.



you're invited to a cg@penn reunion at siggraph

mingle with friends and alumni over dessert and drinks
tuesday, august 7th, 9pm to 11pm
san diego mariott hotel, 333 west harbor drive, san diego
point loma room, south tower
hope to see you there!

From the Staff:

To our current students and alumni: The nature of our hectic pace here prevents us from communicating with you as often as we'd like, so we're delighted to take this opportunity to tell all of you how very proud we are of you. You are some of the most talented, intelligent, hard working, and compassionate people we've ever met. We know the long hours that you have spent on your work and studies, and we appreciate the time that you take to help each other find meaningful work and to help make CG@Penn the best it can be. Thank you. It makes all of our efforts worthwhile.

To those of you who have donated funds to our programs (and there have been a number of kind, insightful people that have donated generously), thank you! It is particularly rewarding to know that others see the potential and special qualities in our students! We greatly appreciate you providing us with the means to help them to reach their goals and to have opportunities that might otherwise be unavailable to them. Thank you!

And, to our recruiters: Every year we have additional companies who express an interest in recruiting our students, which is wonderful, but can make scheduling a bit frenetic! As many of you know, the schedules of both the staff and students are rather crowded, so we appreciate your patience and understanding when we are scheduling

your visits. We strive to make sure that you have the opportunity to meet with the right students for your company, so scheduling in advanced is advised. Our goals include making sure that our students have the tools that they need to thrive in the careers that they choose, so we are indebted to you for providing us with an understanding of the state of the art in your fields, as well as future directions in graphics at your companies. We look forward to building these relationships with you! Thank you for all that you do for our students!

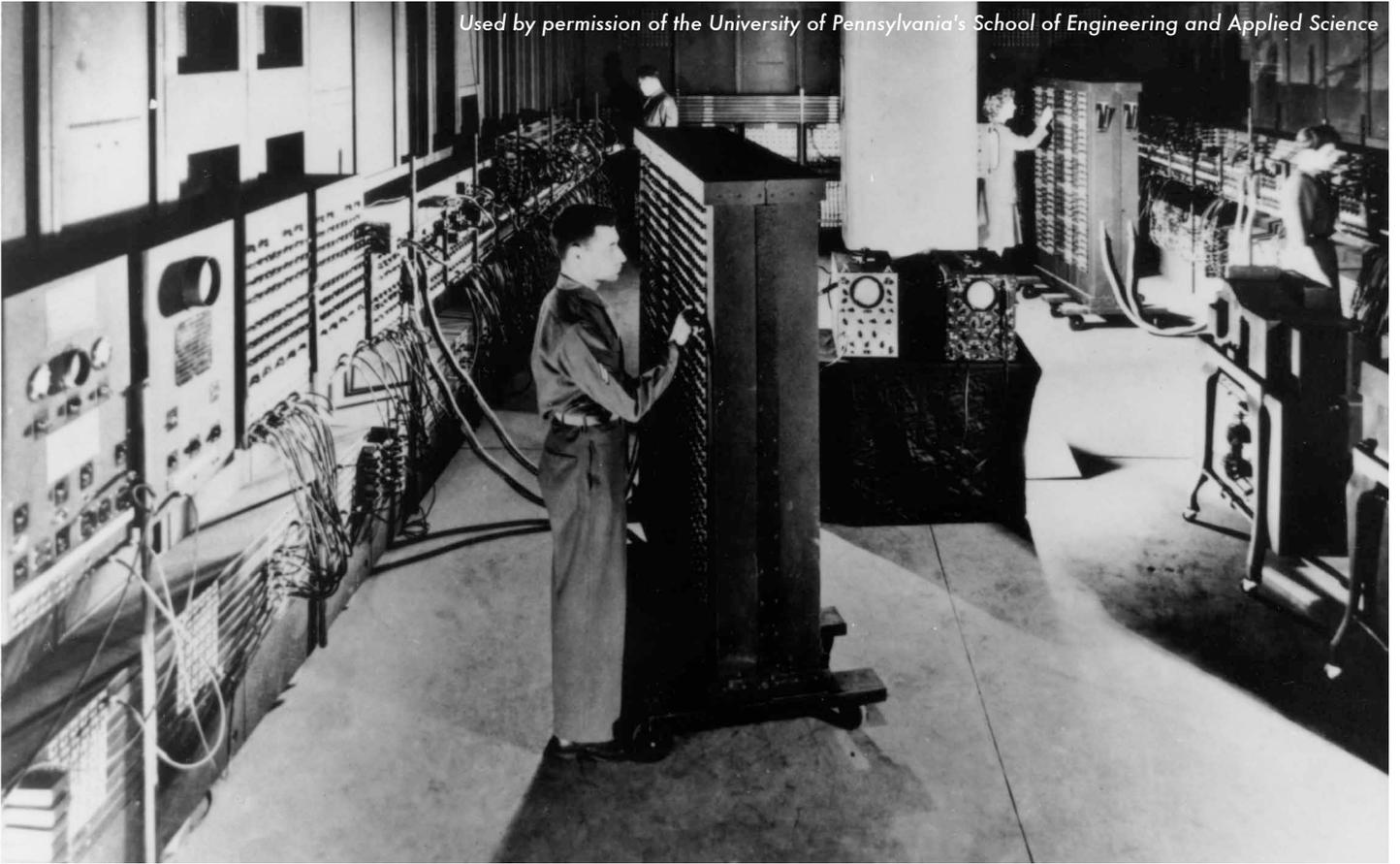
If you would like to hear more about talks, job and internship opportunities, etc. related to CG@Penn, please join our CG mailing list by visiting: <http://lists.seas.upenn.edu/mailman/listinfo/cg>

Please keep in touch - we may not answer emails right away, but we read them and love hearing from you!



PS: We'd like to give special thanks to Shruti Shah for the wonderful work she has done for CG@Penn for the last three years, and for designing and editing this newsletter! Best of luck at Microsoft, Shruti! We will miss you!

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Renovations (again) for HMS are pending - see inside!

cg@penn

200 S. 33RD ST
PHILADELPHIA, PA 19104-6389