PURDUE UNIVERSITY | Polytechnic Institute

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COMPUTER GRAPHICS TECHNOLOGY NEWS
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FROM THE DEPARTMENT HEAD

We are well into our spring semester here on campus, and our students and faculty are doing great things. Attending conferences. Participating in competitions. Being rewarded with funding for good research. And building students who are ready to change the world. As you may have heard, Purdue will be holding tuition levels in place for a ninth year in a row. This is truly a testament to one of our university's goals of providing the best possible education with the best value. We continue to receive large numbers of applications, both to the university and to the programs in CGT. As a department, we are working on a number of efforts to provide best-in-class education to our students – the first-year CGT core I mentioned previously; professional work experiences before graduation; a renewed capstone experience better aligned with student career goals; and additional horizontal and vertical integration opportunities across our curricula. We are also in the process of recruiting and hiring two new faculty members – one for our User Experience Design program and one for our Games Design and Development program. I look forward to being able to provide more details on our new colleagues in a future edition of the newsletter. As always, if you find yourself near campus, please stop in to say hello. Boiler Up and Hammer Down!

Nate

VIRTUAL REALITY CLIMBING

Dr. Christos Mousas is an assistant professor and director of Virtual Reality (VR) Lab in the Purdue Department of Computer Graphics Technology (CGT). One of his recent projects, completed with five others, explored a virtual reality version of climbing some of the most difficult and famous rock faces around the world. The project was called "Environment-Scale Fabrication: Replicating Outdoor Climbing Experiences."

Because travel is not realistic for everyone, having the replications of popular climbs available in a climbing gym eliminates the need for travel, and creates a solution for the climbers that are training for a competition, want to climb a specific route, or do not have the resources to travel. The method allows to automate the process, which can be repeated in a gym setting for any section of a climb.

At the time of the project, Mousas was located in New Hampshire, which is famous for mountains and the sport of rock climbing. He and five others wanted to replicate the best outdoor climbing experiences, but in the setting of a climbing gym. This new process of recreating sections of famous walls would help people to train and prepare for the sport.

To begin the process of reconstructing a rock wall, the team filmed a climber completing the section. Their input data were DSLR photographs, and the output was a 3D reconstruction. They used the skeletal data from the video of the climbers, who helped the researchers when they went to the sites for data collection.

For the climber pose reconstruction step, all the points of the wall that he used and the way that he used them were filmed, recorded, and replicated on a computer using photogrammetry to turn the images into exact geometry.

Then, they created 3D holds using 3D printing methods and foam cutting, creating the model and the casting the hold. They finalized the location reconstruction of the T-nuts, using T-nut optimization to find the best fit in the gym setting.

Lastly, the group tested the method to see if climbers climbed it the same way. A side by side comparison of the climber on the original wall outdoors versus

the reconstructed gym wall was shockingly similar. From space between holds, to exact footing and body placement, the climbers scaled the wall in the same fashion.

The technique used to build a realistic rock face inside a gym is a process that can be replicated by those that design the routes in climbing gyms. This indoor method of practice allows the climber practice on specific parts of a wall that are particularly hard. The purpose of replicating specific climbs is to help people train on realistic routes, without having to travel to the area. The experience of climbing famous routes within a gym is attainable for many more.

This semester, Professor Mousas is teaching CGT 515, a graduate level course on virtual reality, and CGT 445, about procedural games. His typical research is about how people can use computational tools to design virtual reality experiences and interfaces.

DR. GRAY AND THE UX STUDIO

A recent lab opening in the Computer Graphics Technology (CGT) department called the UX Studio is one of the first joint instructional and research labs in the Purdue Polytechnic Institute. Located in Wetherill Hall, the use of the lab is limited to user experience (UX) design undergraduate and graduate students, and students affiliated with one of the UX faculty labs. There are over 120 UX design students on campus, and this is their home base for studio coursework and after-hours collaboration.

"Our goal is to provide a welcoming space for student design and research efforts, allowing for active learning in a collaborative studio environment and for a range of research collaborations to take place. Design work spans the gamut—from whiteboarding, paper prototyping and affinity diagramming to physical prototyping, Arduino programming, and VR/AR, haptics, and voice user interface interactions," explained Dr. Gray.

As UX program lead, Dr. Gray manages the studio calendar and physical resources. However, all activities are closely coordinated with the other UX faculty, and the space is often reserved for student activities—particularly in association with the Purdue UX Student Club.

Research in the studio is conducted through four different labs led by four CGT UX faculty, ranging from work on community, identity, and relationships by Dr. Toombs, to design ethics and pedagogy by Dr. Gray, to enterprise software collaboration with Professor Rasche, to information visualization practice with Dr. Parsons. Across the four research labs, the department also has over 20 students in various research activities.

Dr. Gray is passionate about the importance of the studio for students. "We have wanted a physical home for our studio-based UX program since it was launched in 2015. This space provides continuity to our student experience and serves as a 24/7 resource for intensive collaborative work—spanning our UX design curriculum and our research labs."

PROFESSOR NANCY RASCHE

Professor Nancy Rasche is an Assistant Professor of Practice in the Department of Computer Graphics Technology (CGT) at Purdue. She leads the Experience Studios within the User Experience Design (UXD) major and does research in the area of enterprise software usability and design. Rasche was one of the faculty that helped to form the UXD major in Purdue's CGT department. When the Experience Studios started in 2015, she was tasked with leading the course. With an increasing number of students and industry sponsors getting involved each year, it has become a unique industry engagement course with 95 students and 12 industry sponsors. (http://www.ecn.purdue.edu/ExStudio/.)

The Experience Studios is a multi-level course with freshman through grad cohorts integrated in teams that are paired with an industry sponsor. The sponsors range from large corporations to small startup companies. The teams work directly with their sponsor on a semester-long project where they come up with goals, deliverables, and present on their progress. Rasche works as one of the managers, meeting with each team often to provide feedback to keep them moving forward. By the time the students graduate in the UXD major, they will have 3.5 years of industry experience and have served in a variety of leadership roles.

Along with her teaching at Purdue, Rasche works with Ford Motor Company. For the past four years, she has worked on a variety of research projects including the recent alliance project to help them evaluate and improve their integrated software system. The challenge is that there is so much data spread out over different systems and databases, that it makes finding a specific file or document hard. This is a common problem that many companies are dealing with today. "The problem is that there is so much data, the scope is overwhelming. It's like trying to find a specific drop of water in Lake Michigan," explained Rasche.

Her current Ford project included the evaluation of current engineering processes, development of a software solution to improve visibility and manipulation of data results, and creation of a design system to support future user interface design and development. Her final goal is to develop "a single point of reference" design system repository based on her work that the software designers and developers will use to apply consistent user interface design standards during development in a quicker, more effective process.The benefit of having a single design system for the whole company will be to allow the software system to be more accessible, allow work to move faster and be more collaborative, and the amount of data shown will be streamlined into user workflows that will improve the software usability for all stakeholders. Rasche is currently in the process of finishing this project.

CGT SPOTLIGHT - ALUMNA NICOLE GEBHARDT

Nicole Gebhardt, a 1993 technical graphics graduate, was in the "small but mighty" first graduating class of the technical graphics four-year degree from Purdue CGT. Her success in both corporate America and in entrepreneurship has provided valuable experience in the extremes of big and small business.

Nicole started her professional career working in public affairs and managing employee communications for Caterpillar. Starting as a college intern, she climbed the corporate ladder to the point she advised and was mentored by multiple Caterpillar vice presidents. "It was an incredible opportunity to spend sit at the table with some of the sharpest business minds in the world," says Nicole. That's where she says she fell in love with business and strategy; and where the diversity of her Purdue education began to fall into place.

"I wasn't using my degree in the way I'd expected," she adds. "But I knew how to interpret data, organize it, and share it in a way that people understood and that's what helped me advance."

Nicole is still grateful for CGT's visionary leadership, so she was excited to see her daughter enroll in UX Design at Purdue last fall. As a business owner, Nicole believes CGT's greatest asset is their culture of experience-focused curriculum. "They have a strong grasp of return on investment and what matters in business and for the student's overall development. I trust them to prepare her for the wide variety of opportunities she'll have in her career."

Today Nicole owns her own consulting and publishing company, Niche Pressworks, where she advises business leaders on marketing strategies and book publishing. Her company has helped over 150 people in five different countries write and publish a book for strategic reasons.

Ironically, publishing was one of the skills TG taught in the 90s. So was entrepreneurship, which is what gave her the edge when she decided to trade in her corporate career for the opportunity to work from home while raising her two daughters. "The business has evolved based on my time and priorities. Right now, we're in another major growth phase. Navigating all the business challenges of strategy, leadership, customer delivery, etc. keeps things fresh and exciting and my degree remains relevant to me to this day."

Her advice for her daughter and other CGT students: keep learning and growing. "I invest thousands of dollars annually in courses, conferences, and training to study what's working now. Business is evolving quickly. If I stopped, I'd be failing my business and my clients."

NEWS AND NOTES

The 2020 Digital Enterprise Center Spring meeting: Establishing the Digital Thread will take place on March 24, 2020 from 8:30 AM - 4:30 PM at the Indiana Manufacturing Institute. You can RSVP and view the agenda for the day at polytechnic.purdue.edu/digital-enterprise-center/center-meetings.

The IMI testbed ribbon cutting ceremony will follow on March 25th. Check the CGT website for more details.

STAY CONNECTED

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