Out of this World

Meet the NYIT scientists and alumni who amazed Silicon Valley, astonished Hollywood and engineered the 3-D computer animation universe.

By Joseph C. Panettieri (**alumni@nyit.edu**)

Buzz Lightyear wasn't born at NYIT, but his distant relatives were.

Whether you're watching Pixar's latest movie or playing Electronic Arts' hottest videogame, many of today's most sophisticated animation techniques descend from NYIT's Computer Graphics Lab (CGL). The famed research group, formed in 1974, pioneered 3-D computer animation for nearly two decades.

NYIT CGL's roster was a digital dream team. Prominent members included Pixar President Ed Catmull, Pixar co-founder Alvy Ray Smith (see interview, p. 21), Walt Disney Feature Animation Chief Scientist Lance Joseph Williams, Dreamworks Animator Hank Grebe, Netscape and Silicon Graphics founder Jim Clark, and dozens more.

"At the beginning of the computer graphics revolution, we went where the action was," recalls Smith. "And the action was at NYIT."

Even today, more than a decade after CGL disbanded, NYIT alumni and former CGL scientists are vanguards across Silicon Valley and Hollywood. Moreover, their work continues to influence students in NYIT's School of Arts, Sciences and Communication.

"NYIT's graphic design and 3-D computer animation courses rank among the finest in the country," notes NYIT President and CEO Edward Guiliano, Ph.D.

How did NYIT CGL get started? Flash back to 1974. Bill Gates was still a year away from launching Microsoft and only society's elite technologists had access to computers. Few people had heard of computer animation. Even fewer understood it.

Incredible Universe

All that began to change when a Big Bang occurred on NYIT's Old Westbury, N.Y., campus, giving rise to the modern computer animation universe.

NYIT founder Alexander Schure had a vision. Before retiring from the college (which he did in 1991), Schure wanted a research team to create a feature length computer animated film. The dream was about two decades ahead of its time, the equivalent of landing a person on the moon...in 1949.

NYIT's hunt for researchers began at the University of Utah, a hotbed for early computer graphics projects. The first recruits were Catmull (who had just completed his Ph.D. and taken a job at a computer-aided design company) and fellow Utah graduate Malcolm Blanchard. Xerox PARC (Palo Alto Research Center) veterans Smith and David DeFrancesco also joined the fun.

The new recruits set up camp at Gerry House, a pink mansion on the Old Westbury campus. NYIT equipped Gerry House with the world's most powerful hardware and software from Digital Equipment Corp. (DEC), including the very first commercial VAX, a robust "minicomputer" that was the size of a massive freezer.

Ironically, the VAX almost died before its installation. As Smith recalls, Digital's delivery truck and an NYIT truck were parked back-to-back outside of Gerry House. The prized

$250,000 computer was about to be pushed from one truck to the other when the unthinkable occurred.

"There was no driver in the NYIT truck and it started to roll slowly away from the Digital truck," says Smith. "I ran to the NYIT truck, leapt in and stomped on the brake pedal just in time to save the VAX from crashing into pieces."

As more and more technology moved into Gerry House, the building became a highly secure research area.

"Getting into the 'Forbidden Pink Building' was quite a big deal," quips Bruce T. Doll, who joined the lab in 1977 and now runs Images of Vision LLC, a computer services specialist. "We were on the cutting edge all the time."

Major breakthroughs at NYIT CGL seemingly became everyday events. For instance, researchers generated the first 24-bit RGB (red, green, blue) framebuffer-a type of memory that revolutionized how computers manage color images. Next up was the first computer-controlled video editing system; "paint" programs that paved the way for 2-D cartoons at Disney; and morphing and reflection mapping technologies that evolved into special effects seen in "Terminator 2" and "The Matrix" movies.

Creative Freedom

A flexible, unstructured working environment fueled creativity within the lab. "Our culture was bohemian," says Disney's Williams, a researcher at the lab from 1976 to 1986. "Members were both inspired and inspiring. We rocked around the clock." Often, that meant working in shifts. When former Bell Labs researcher David J. Struman joined CGL in 1983, he shared a desk with Michael Chou, an expert on reflection mapping-a technique that produces reflections within computer-generated images. "Mike used the desk all night and I used it during the day," says Struman, now VP of technology at Massive Incorporated, an online game specialist in Manhattan. "That arrangement lasted a month until I got a desk of my own." The crowded lab attracted plenty of visitors. Researchers from Cornell University and other prominent institutions descended on NYIT CGL to see "what's next" in computer animation.

Lucky visitors included future computer animator and NYIT Assistant Professor Paul Lipsky, who toured the lab in the early 1980s. "I had a family connection that got me in the lab's front door," says Lipsky. "The visit inspired me to pursue a career in computer graphics."

By the mid-1980s, computer graphics were spilling over into NYIT's classrooms. Assisted by CGL scientist Robert McDermott, NYIT developed highly competitive degree programs in computer graphics. Peter Voci, professor and chairperson of fine arts, drove the work with McDermott. The resulting programs quickly attracted talented students.

Just ask Matt Elson (M.A. '87), now an executive consultant at Walt Disney Feature Animation. "I had just graduated from Pratt Institute when I saw [CGL's] Lance Williams give a presentation on computer graphics in Manhattan in the early 1980s," he recalls. "The next thing I did was enroll at NYIT."

PC Parade

NYIT's computer graphics expertise, coupled with the PC revolution, prompted the college to open its first Academic Computer Lab (ACL) in 1983.

Today, the Academic Computing Department manages more than 40 PC labs across NYIT's primary campuses. The labs include traditional PCs as well as Apple Macintoshes and Dell workstations running specialized graphics software from Alias/Wavefront, Autodesk and Adobe Systems.

Undergraduate and graduate students use the systems to create architecture designs, computer-animated short films and images for their portfolios. Compared to CGL scientists in the 1970s and 1980s, today's NYIT students have about 1,000 to 1 million

times the computing power at their fingertips.

"The Works"
Still, CGL scientists never dwelled on technology's limitations. Like Captain Ahab's obsessive pursuit of the White Whale, CGL researchers spent 1979 through 1986 striving to develop the first feature-length 3-D computer animated movie, titled "The Works." Within that period, the original CGL leaders gradually gave way to a new generation of computer animation experts. "Star Wars" creator George Lucas recruited Catmull, DeFrancesco and Smith to lead computer animation research at Lucasfilm in 1979. (That effort would ultimately evolve into Pixar.)

Back at CGL, Williams wrote a screenplay for "The Works," and the CGL team grew to include audio and film experts who could complement the animation department.

A trailer for the film was a huge hit at the 1982 ACM SIGGRAPH (Association for Computing Machinery Special Interest Group in Computer Graphics) event. Impressed attendees wanted to know how NYIT CGL pulled off such digital wizardry. Early clips of the film demonstrated the first extensive use of texture mapping, environment mapping and 3-D character animation.

Despite the strong start, several factors-some technical, some skills-related, some financial-undermined "The Works." In retrospect, computers still needed another decade to mature before the first 90-minute computer-animated movie would debut. Faced with this realization, production on "The Works" was halted in 1986.

Gradually, many NYIT CGL scientists and NYIT alumni joined Silicon Valley startups, Hollywood special effects shops and New York media firms. Unlike nonprofit colleges, fledgling graphics companies had nearly limitless access to capital. NYIT therefore wound down CGL's operations in 1989, effectively passing the computer graphics research baton to Silicon Valley firms like Pixar.

Living Legacy
Still, the former NYIT CGL continues to influence NYIT and the broader computer graphics industry.

NYIT CGL's original vision for a feature-length computer animated movie was indirectly fulfilled by Catmull in 1995, with the release of Pixar's "Toy Story."

For his pioneering research and achievements, Catmull received an Oscar and NYIT's President's Medal in 2001. Clark, Smith, Williams and other NYIT CGL veterans have received similar industry honors.

Today, the relationship between NYIT and the computer graphics industry remains strong. Numerous NYIT faculty members-including Daniel Durning, Jane Grundy, Paul Lipsky, Lynn Pocock, Michael Rees, Robert Michael Smith and Peter Voci-have real-world experience managing digital animation and photography projects for Disney, ESPN, HBO, IBM and other prominent businesses.

Similarly, graduate students within NYIT's Motion Graphics Lab have designed 3-D animations for nonprofit organizations throughout the country.

On the flip side, executives from Pixar, Blue Sky Studios (producer of "Ice Age") and Disney lecture frequently at NYIT about the latest animation trends. Disney's Elson visited NYIT in November 2003 to discuss the relationship between communications and computer graphics. "If I had to give NYIT's current computer graphics students one piece of advice, I'd tell them to learn how to draw," says Elson.

NYIT has long heeded that advice. Although the college empowers students with the latest technologies, NYIT requires fine arts students to take courses in art history, drawing and two- and three-dimensional design. "Anyone can point-and-click with a mouse," notes Voci. "But if you don't learn the fundamentals of art and design, you

can't fulfill your potential in computer animation." That philosophy was born at NYIT CGL in 1974. "The lab was one of the first places to recognize and benefit from the tight coupling of art and science," says former NYIT CGL scientist Frederic I. Parke, now professor of visualization sciences at Texas A&M University. "CGL was an eclectic mix of artists, computer scientists, animators and musicians, all of whom were pushing the state of the art in computer graphics, animation and related topics."

Concludes Elson: "NYIT CGL was the flame that all the moths were drawn to. The computer graphics industry would not exist in its current form without NYIT's original commitment."

Now that's a lasting legacy.

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