

Video gaming has become one of the fastest-growing forms of entertainment. Georgia is well positioned to take economic advantage of that growth because Georgia Tech researchers are among the leaders in the area — and the Institute’s academic programs are among the nation’s leading producers of video game innovators.



Atlanta-based startup Persuasive Games, founded by assistant professor Ian Bogost, deals with such issues as airport security, nutrition and war.



# Not Your Dad’s Nintendo

Video games are a pervasive form of entertainment — and a lucrative industry that Georgia Tech is helping grow.

By T.J. Becker

The first video game debuted in 1958, but it wasn’t until the early 1970s that this new diversion began to catch on, emerging first in bowling-alley and bar arcades and then spreading to consumers’ homes via personal computers.

Fast-forward to today: Video gaming has become one of the fastest-growing forms of entertainment. According to a recent study sponsored by the Entertainment Software Association (ESA):

- Sales of video-game software in the United States totaled \$8.2 billion in 2004 — not far behind the music industry, which generated \$11.4 billion the same year.
- By 2010, U.S. sales of video games are expected to grow to \$15 billion.
- Video gaming is expected to generate more than 250,000 jobs by 2009, a 75 percent increase over the industry’s 144,000 full-time positions in 2004.

## The New Golf

What’s caused video games to evolve from a boutique market to

a bona fide industry? Experts point to a myriad of reasons, including more powerful central processing units (CPUs) and advanced technology for sound, video, 3-D art and motion in game play.

“Digital media lets you describe the world in ways that older media couldn’t,” observes Janet Murray, a professor and director of graduate studies at Georgia Tech’s School of Literature, Communication and Culture (LCC). “Technology allows us to create imaginary worlds that people can act in. We can set up games that are more challenging and have more variety because they are procedurally created by making up rules in the computer. In contrast to a traditional board game, like Monopoly, which can only do one thing, the computer is tireless.”

Michael Nitsche, an assistant professor at LCC, points out that Hollywood films and related video games are often released at the same time. “This blurring of boundaries between media is putting video games more into the limelight,” says Nitsche. “Plus, we have a longer history of video gaming now, which means a bigger, older and some-



Photo: Gary Meek

times more mature fan base.”

Stereotypes suggest that video gaming is primarily for adolescents, but ESA statistics show the market is much broader. According to the organization, 69 percent of American heads of household played video games in 2005. The average age of gamers was 33 years, and 25 percent of players were older than 50.

Celia Pearce, an LCC assistant professor who heads up the Experimental Game Lab, studies both female and older players. “There’s a popular misconception that older gamers, especially women, are only playing casual games,” she says. “It turns out that Baby Boomer gamers are hard core

players, though they have very different practices and preferences than the groups for which the industry typically develops and markets games. Plus, they are spending a lot more money.”

Pearce sees a demographic shift as gamers get older, and older people get into gaming. The Nintendo Wii machine is leading this shift with aggressive marketing to Baby Boomers and women. “They even had a booth at the American Association for Retired Persons (AARP) National Event and Expo, which is an all-time first for a game company,” Pearce notes.

Video games, it seems, have gone beyond mainstream and captured audiences

early developers never imagined.

“In many ways, video gaming is becoming the new golf,” says Christopher Klaus, founder and CEO of Kaneva, an Atlanta startup focused on building a 3-D virtual entertainment world. (Klaus also founded Internet Security Systems, which IBM purchased recently for \$1.3 billion.)

“While players are on a game quest, they’re also building friendships and bonds with other people – similar to golf,” explains Klaus. In addition to developing an innovative virtual entertainment world, Kaneva also plans to let subscribers use its platform to engineer their own virtual world or video games.



Sean MacDonald, CEO of SimCraft, demonstrates the company's full-motion simulator.



Assistant professor Ian Bogost is interested in how games can argue position. His avatar is shown at left.

Photo: Gary Meek

The term “video games” comes with a lot of baggage, Klaus continues: “Most people think video games are just for kids. Yet this technology is becoming part of our social fabric and culture. It goes beyond being just a game; it becomes part of your identity.”

### Beyond Entertainment

What’s more, gaming technology has transferred to other industries, ranging from health care to defense, where it is used for educational and training simulations.

Take Persuasive Games, an Atlanta startup launched by Ian Bogost, an assistant professor at Georgia Tech’s LCC. Among its products, Persuasive Games has developed a game for Cold Stone Creamery that teaches employees about portion sizes and how they affect profitability. Another game helps grade-school students learn about the science behind telecommunications technologies.

Bogost, who is interested in how games can argue position and attempt to convince people of a particular belief, has also created a number of public-policy games, such as “Take Back Illinois.” Sponsored by the Illinois Republican Party, this game challenges players to explore four issues tied to the 2004 state elections.

Sparking innovation in hardware, SimCraft – a member company of Georgia Tech’s Advanced Technology Development Center (ATDC) – is introducing a low-cost, military-grade, full-motion simu-

lator that provides a simulated G-force for SimRacing and FlightSim at home.

SimCraft’s system features a patent-pending chassis that rotates around three degrees of freedom. At its most advanced setup, the system allows the cockpit’s occupant to yaw up to 50 degrees to the left and right, pitch up to 30 degrees fore and aft, and roll up to 50 degrees port and starboard.

“Some experts believe that the physical, tactile element is the most significant factor affecting the realism of any vehicle simulation,” says Sean MacDonald, SimCraft’s CEO. “A sense of realism is particularly important if you’re using a simulator for training, because it makes learning more intuitive and fun – and consequently more efficient.”

Initially, the company is focusing on simulations for amateur race car drivers and general aviation pilots because they receive dual benefits in both training and entertainment at home.

“Since racing and flying are so expensive, a simulator allows enthusiasts in these hobbies to subsidize actual racing or flying with realistic simulation,” says MacDonald. “It is a safe, convenient and cost-effective way for them to enjoy their hobby and get better at it in the comfort of their home.”

SimCraft’s technology also has broad applications that include more generalized video gaming entertainment and military defense training.

### On the Upswing

Georgia’s video-gaming industry is relatively small but poised for growth, say observers.

“The overall gaming industry is experiencing tremendous growth and we believe that Georgia has the ingredients to be a hub of activity,” says Tony Antoniadis, general manager of the ATDC. “From the design industry in Savannah to the computing and visualization expertise in Atlanta, we expect to see more great gaming technologies over the next few years.”

Kaneva’s Klaus is also upbeat. “If there’s one industry that Atlanta could jump into, it’s video games. We can leverage the high-tech foundation that already exists here,” he says, noting that ISS alone employs some 300 engineers in the metro area. “If you look at where entertainment is going, it’s all about high tech. Today, entertainment is being driven by how good the technology is.”

For the Atlanta region, video gaming is a comeback story of sorts. For in the early 1990s, there were a number of game studios here, including divisions at IBM and Turner Broadcasting. “But then the market shifted from PCs to console gaming, and both IBM and Turner shut down their gaming groups,” says Marcus Matthews, CEO and co-founder of Blue Heat Games, an up-and-coming developer of wireless video games.

Matthews, a graduate of Georgia Tech’s

# GEORGIA TECH TAKES AN EXPERIMENTAL APPROACH TO DIGITAL MEDIA

Assistant professor Michael Nitsche is shown with a screen from Charbitat, an experimental game in which the 3-D world changes in response to players' actions.

**A**n experimental approach is one of the hallmarks of Georgia Tech's digital media programs.

"We not only do paper designs, but when we get an idea, we develop it and get a prototype up and running," says Michael Nitsche, an assistant professor in Georgia Tech's School of Literature, Communication and Culture (LCC). "Very few universities do that."

## A sampling of current projects includes:

**Interactive TV** – Students in Janet Murray's Experimental TV Lab ([www.etv.gatech.edu](http://www.etv.gatech.edu)) have recently created a prototype for a game based on a broadband version of the Cartoon Network's Ben 10 show, meant for broadband delivery through a game console like the Sony PS3. Players can select an episode and watch it with an active game controller targeting items in the video stream – such as a hat or a sword – and saving them to play in their own play space. This allows them to play a matching game, which intensifies their immersion in the show rather than distracting them from it.

**Characters and procedural game spaces** – Nitsche is developing an experimental video game called Charbitat ([www.egl.gatech.edu/charbitat/](http://www.egl.gatech.edu/charbitat/)) where the 3-D world changes based on the player's actions in the game. The project, funded by Turner Broadcasting, focuses on the idea of procedural space. "You create the world as you play in it, which is unique," Nitsche explains. "The game world is player dependent and constantly changing."


**Multiplayer gaming** – Georgia Tech's Emergent Game Group (EGG), headed by Celia Pearce, focuses on "designing for social emergence" in massively multi-player online games (MMOGs). The group is developing *Mermaids*, a multi-player game set in an underwater mermaid world. The first prototype has been shown at the Game Developers Conference, the Indie MMOG Conference, SIGGRAPH and the Austin Game Developers Conference.

**Moving beyond the joystick** – Graduate students Brian Schrank and Jeremy Rogers are designing software that would react with a standard keyboard in new ways. "For example, if players bang the keyboard, they could get a different result as opposed to just typing," says Ian Bogost, an assistant professor at LCC who is the project's adviser.

**Augmented reality** – Researchers are working on an augmented-reality version of *Façade*, a video game in which players visit a quarreling couple's apartment. In the augmented-reality version, players can physically walk through the couple's apartment and carry on conversations with the computer-animated characters, which are superimposed on the real world via a see-through head-worn display.

"Our experiment compares whether walking around in the space is more engaging and enjoyable than sitting at a desktop," says Blair MacIntyre, an associate professor in Georgia Tech's College of Computing (CoC). "Interestingly, we found that being immersed in the emotionally charged environment was too intense for some people and interfered with their ability to enjoy the experience as a game."

In addition to MacIntyre, the project's team includes Steven Dow and Manish Mehta, two CoC graduate students, and Michael Mateas, an assistant professor at the University of California-Santa Cruz who created the original *Façade* video game.

Video-game development is a multidisciplinary endeavor. "One of the great things about Georgia Tech is that interdisciplinary work is much easier here than other places," says Murray. "Granted, collaboration is always easier in an institute of technology because the engineering model is one of making things together. Yet at Georgia Tech, there's a particular climate of cooperation and mutuality of interests among the faculty in digital media which makes it much easier to collaborate." 



Professor Janet Murray and Ph.D. student Sergio Goldenberg pose with two projects of Murray's Experimental TV Research Group. One game is for the Cartoon Network; the other for MTV.

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**— Janet Murray, a professor and director of graduate studies at Georgia Tech’s School of Literature, Communication and Culture (LCC).**

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Stewart School of Industrial and Systems Engineering, was working for Turner at the time of the downturn. He relocated to San Francisco where he joined Sega of America and eventually ran its sports group, which generated about \$100 million in revenue.

Yet Matthews had an entrepreneurial itch that led him back to Georgia to launch Blue Heat in 2001. “I felt there was a lot of untapped talent in Atlanta – plus the cost of living was lower here,” he explains. Blue Heat, which counts 16 employees, has shipped more than 30 mobile games during the past four years including one on Jimmy Neutron, a movie and TV character that Nickelodeon is distributing.

Blue Heat is one of some 60 companies working in Georgia’s video-game arena, says Clinton Lowe, founder of the Georgia Game Developers Association, Inc. ([www.ggda.org](http://www.ggda.org)), a nonprofit trade organization focused

on growing the state’s gaming industry.

“I see video games as a new market for Georgia – one that, if we make some fundamental investments, will explode,” says Lowe. Among positive signs, the Georgia General Assembly recently passed tax credits aimed at game developers and film companies that base production activities, such as editing, animation and coding, in the state.

Why care about video gaming? For one thing, the industry provides high-paying jobs that could help ease the economic sting of Georgia’s eroding manufacturing base. According to ESA statistics, entry-level game developers earn \$67,000 per year.

Video-game development is high science, providing white-collar, intellectual jobs, Lowe notes. Today’s game development teams must have expertise in a wide range of skill sets, including 3-D graphics, architectural engineering, artificial intelligence, computer

networking, databases, mathematics, physics, digital sound and more.

**Educating the Next Generation**

Education is one advantage that the state already has in its favor, for Georgia Tech is a magnet school for video gaming.

“When game companies hire employees, Georgia Tech is one of three schools that they turn to,” says LCC’s Murray, noting the other two schools are Carnegie Mellon and the University of Southern California. “We’re supplying the next generation of game designers and we’re training them in a way that employers can’t get elsewhere.”

Georgia Tech has offered a master’s degree in digital media since 1993. In 2004, the school expanded its offerings by launching both a Ph.D. program in digital media and an undergraduate degree in computational media, the latter being a joint program between the College of Computing and

LCC. Currently there are about 40 graduate students and 200 undergraduate students in the three degree programs.

"More than half of the undergraduate students in computational media are interested in the video-game industry, which is difficult to get into," says Blair MacIntyre, an associate professor in Georgia Tech's School of Interactive Computing, which is part of the College of Computing.

"Our program sets students apart from other people," he adds. "The degree puts them in a position to bridge the gap between art and technology and get them into production management as opposed to being down in the trenches."

Strengthening Georgia's video-gaming industry would not only improve the state's economy, but also prevent brain drain. "If graduates are getting into video games, they're more than likely relocating to the West Coast," says GGDA's Lowe. "That's a tremendous loss of human capital for the state of Georgia. We're spending tax dollars to educate students and then letting them go."

To bolster gaming, Lowe would like to see more venture capital flowing toward

video-game startups. That's because the average cost of developing a video game today has soared from about \$40,000 to \$10 million during the last decade. "One of the things GGDA is doing is to help companies learn to speak the language of capital sources and learn how to approach venture capitalists," says Lowe.

Attracting a major video publishing company would also be a plus, Lowe adds. Publishers have muscle in managing intellectual property – an area where small design studios typically are weak.

On Matthews' wish list: recruiting more senior-level talent to Georgia. "We have a good pipeline school, but we also need seasoned people who can avoid making mistakes – and that's something that only comes from years of experience in an industry," he explains.

Still, Matthews remains optimistic. "We're starting to get a nucleus of companies and talent that are doing things," he says. "Georgia has the right pieces in place – state incentives, business and technical talent, the right cost structure – it's just a matter of time." **rh**

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Associate Professor Blair MacIntyre (right) and former professor Michael Mateas are interviewed about *Façade* – a game created by Mateas, who is now at the University of Southern California - Santa Cruz.

Photo: Gary Meek