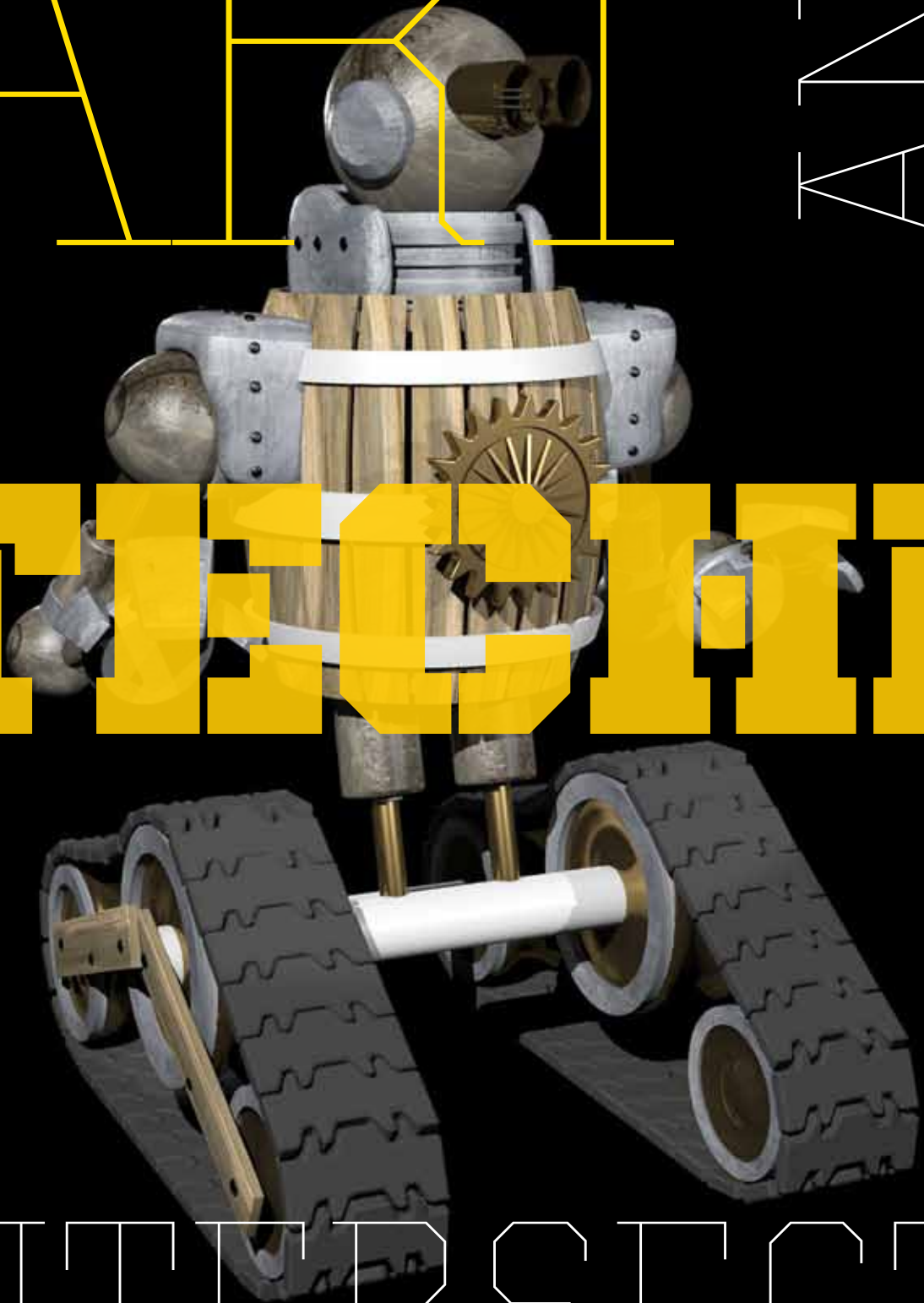


ART

AND

THEY



INTERSECT

***“His eyes, his fur, the rippling of his muscles and the skeleton beneath his skin, all of it is so perfectly rendered that you will swear that Richard Parker is real.”***

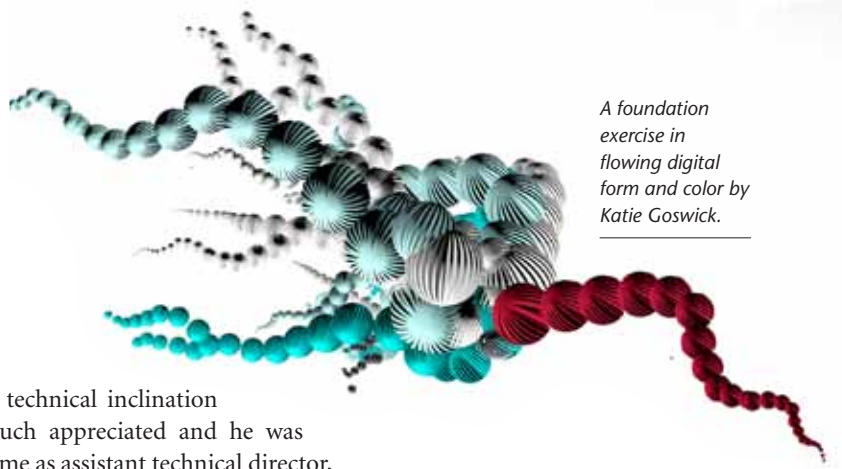
That’s what reviewer A. O. Scott wrote in *The New York Times* about the Bengal tiger named Richard Parker, a main character in the film *Life of Pi* brought to the screen solely with computer-generated imagery (CGI). It’s technology that has transformed visual media in recent years, along with other technological tools indispensable in the entertainment industry as well as for creating video games, theme park experiences, advertising, smartphone apps and fine art.

# TECHNOLOGY

*LEFT: Video games can be populated by an endless variety of digital denizens, such as this one imagined by Zachary Humbert.*

**FOR STUDENTS AT NJIT,** the 21st-century intersection between art and technology offers significant career possibilities in addition to the satisfaction of artistic expression. The industries that rely on creative and technically astute professionals are valued at many billions of dollars, and they are generating a growing number of jobs. NJIT students can prepare for these jobs through the new Theatre Arts and Technology bachelor’s program in the Humanities Department, College of Science and Liberal Arts, and the School of Art+Design’s Digital Design program.

[CONTINUED]



A foundation exercise in flowing digital form and color by Katie Goswick.

## ENGINEERS IN DEMAND

What does it take from a technical standpoint to create a stage production such as *War Horse*? It takes expertise in electrical, light and sound engineering, computing, communications, multimedia design and project management. For the film version, add assessing the environmental impact on location.

Such productions require the skills of experts like Joseph DiNardo '81, who recently led a panel discussion at NJIT titled "Behind the Scenes – The Secret Life of Entertainment Technology Engineers." The panelists were invited by Michele Rittenhouse, director of the Theatre Arts and Technology program. In addition to an engineer from DiNardo's company, participants represented the theatrical-design firm Fisher Dachs Associates and the entertainment-technology company Production Resource Group.

DiNardo, a lighting specialist, is Northeast regional manager for Electronic Theater Controls. An environmental studies major, he joined NJIT's theater group as an extracurricular

activity. His technical inclination was very much appreciated and he was hired part-time as assistant technical director, subsequently accepting the post full-time.

DiNardo found that he had a strong affinity for the technical side of the theater, and an avocation became a very satisfying career. The company where he's now employed designs and manufactures state-of-the-art lighting systems for stage and film productions, as well as for applications that include illuminating museums and houses of worship.

"After the names of actors in a theater program or at the end of a film, you'll see long lists of experts who make a production possible," DiNardo says. Their skills cover a very broad technical spectrum. These are professionals who have "a passion for art and an understanding of science."

## MAKE SOMETHING BLUE

Thanks to NJIT, DiNardo can communicate with both engineers and individuals grounded mainly in the arts. "People in the arts will say 'I need something to be blue.' How do you

get that across to an engineer who can make it happen on stage or in a film with all the right visual nuances?" It's done by experts who can translate artistic requirements into technical specifications. In the case of Electronic Theater Controls, it has involved introducing lighting systems that are easy to use without extensive technical

*NJIT stage productions engage students from NJIT and Rutgers-Newark. Students in the NJIT Theatre Arts and Technology program can work on these productions to prepare for technical and management careers in the multi-billion-dollar entertainment industry. From left in a recent presentation of *Rosencrantz and Guildenstern Are Dead* by Tom Stoppard are Allegra Hoffmaster (Rutgers), Daniel Ovalle (NJIT), Rafaella L. Danta (Rutgers) and Eric Holzer (NJIT).*



PHOTO: RODNEY REYES

knowledge, systems that can "make something blue" and provide a virtually infinite spectrum of other colors.

The Theatre Arts and Technology program offers a pathway to careers that support the public creative side of the entertainment industry with skills in engineering and other disciplines. Incidentally, Rittenhouse explains that the "re" ending for "theatre" in the name of the NJIT program denotes the knowledge and skills taught, with "theater" signifying the physical production space.

Students have the option of taking the Theatre Arts and Technology bachelor's or pursuing a dual major in combination with another discipline. Course work includes general university requirements, specialized theatre credits offered in association with Rutgers-Newark, and electives in an area applicable to the entertainment industry.

Speaking of her combined majors, Gretchen Von Koenig '15 says, "My experience at NJIT has been thoroughly enriched by the opportunity to double major in industrial design and theatre technology. There is such a crossover that virtually everything I learn in one major applies to the other. The artistic and technical sides of both majors complement each other, giving me a unique and thorough education.

"Theatre technology teaches me new approaches and broadens my perspective towards the designs I create in my studio courses. Studying the history of the theater and its conventions inspires me in my studios as well. I'm excited about this double major and look forward to the opportunities it can provide for artistic and professional endeavors."

Of his decision to work toward double bachelor's degrees, Daniel Ovalle '13 says that after "dipping my toes in the study of theatre it was clear that I needed to add this bachelor's to round out my undergraduate career." Ovalle, who came to NJIT as an electrical engineering student, goes on to say "My first degree is in Science, Technology and Society

“THE SKILLS THAT UNDERPIN A MOVIE, A PLAY, OR A THEME-PARK EXPERIENCE SPAN COMPUTER SCIENCE, ROBOTICS, MARKETING, ADVERTISING AND EXPERTISE IN SO MANY OTHER FIELDS.” – Michele Rittenhouse, director of Theatre Arts and Technology



An intriguing digital landscape created by Thanh Nguyen.

with a concentration in communication media and a specialization in music technology. My theatre arts and technology classes have given me the opportunity to utilize and build upon my STS and EE skills in a goal-orientated and fulfilling environment.

“The beauty of the program is that students can discover aspects of their other studies in a new light, no matter what their other studies involve. In no class is this more true than improvisation. It’s a class that fosters creativity and confidence, and I can’t think of a career path where creativity and confidence would not be valuable.”

The genesis of NJIT’s program goes back to the 1960s with construction of the theater later named in honor of English and drama professor Jim Wise. Rittenhouse says that William Hazell, who became president of the university in 1970, was an enthusiastic advocate of the program as a way of bringing students with very diverse educational interests together for a shared social experience.

With an endowment that puts it on a firm financial footing, the program still gives students from every NJIT school and department, and from Rutgers-Newark, the opportunity to audition for productions purely for personal enjoyment. But it is also a rigorous course of study that has evolved in parallel

with the technical needs of industries where there are growing employment opportunities.

“To make stage productions happen, to make films happen, a wide range of technical and managerial skills is needed,” Rittenhouse says. “The skills that underpin a movie, a play, or a theme-park experience span computer science, robotics, marketing, advertising and expertise in so many other fields. Our objective is to graduate students who know how to do theatre and something else.”

According to Rittenhouse, there’s even broader utility for double majors in disciplines as diverse as digital design, computer science, and electrical and mechanical engineering. “While animation requires knowing the software, it’s also essential to know how to communicate the full gamut of emotions in a host of situations. And understanding spontaneity and emotion is important in refining our interaction with computers and new generations of robots.”

### LEVERAGING TECHNOLOGY

The School of Art+Design, College of Architecture and Design, is another point of intersection for art and technology at NJIT. The Digital Design program leading to a bachelor of arts prepares students for careers in fields as varied as entertainment and marketing. A

new bachelor’s in fine arts affords students opportunities to explore more personal creative horizons. Leveraging technology to take artistic expression in new directions, these courses of study are two of the school’s four programs, which also include majors in industrial and interior design.

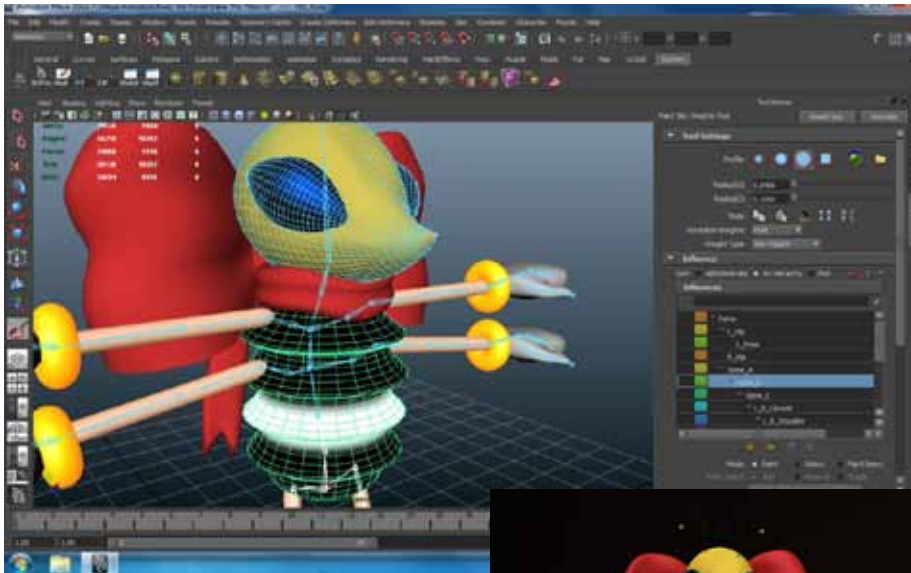
Professor Glenn Goldman, founding director of the School of Art+Design, was given a mission in 2007. It was to inaugurate a program within New Jersey School of Architecture for students with creative interests that were a good match for NJIT but which could not be accommodated as the course requirements for a professional degree in architecture expanded over the years. In response, Goldman helped to establish the Digital Design program, advancing NJIT’s evolution toward offering educational options in art and design that would appeal to students with diverse creative interests and talents.

Today, the program has two tracks, one focused on entertainment and the other weighted toward fields such as marketing and production. Students can learn to create virtual environments for video games, special effects and computer-generated imagery for television, motion pictures and Web-based video, smartphone apps, museum exhibits, book illustrations, advertising graphics, and more.

Rachel Corres ’13 is typical of the young people attracted to digital design at NJIT. “When I learned about NJIT’s program, I thought it offered the perfect combination of art and technology,” she says.

In Goldman’s estimation, this is what distinguishes NJIT with respect to teaching design. “Quite frankly, there’s prejudice at some schools regarding the integration of art and technology. There are individuals living in the 21st century who are really marching through the 19th century given their views on technology.”

When it comes to technology, NJIT students studying for the bachelor of fine arts are definitely part of the 21st century. Contemporary art is increasingly interactive and kinetic, and increasingly the product of digital tools. “These tools are the same ones that all our



*This sequence of game design images by Brandon Simms takes a digital character from an early conceptual stage to completion.*

design students learn to use,” Goldman says. “Our BFA program pushes the power of technology to make new and vital connections, to comment on society.” The program also educates students in economic reality, with learning how to market one’s art and about the income potential of activities such as art journalism and contributing to the work of arts-advocacy organizations.

### **A SOLID FOUNDATION**

While students in the Digital Design and BFA programs can pursue different professional goals, all begin with core courses that provide a solid foundation in digital creativity and science. They study physics, for example.

“We feel that it’s necessary to take the science courses because of our program’s depth and variety,” Goldman says. They also learn about the physical characteristics of buildings and other structures. “If you work in special effects, for instance, you need a real sense of how structures behave and fail in extreme conditions, such as they would in a storm.”

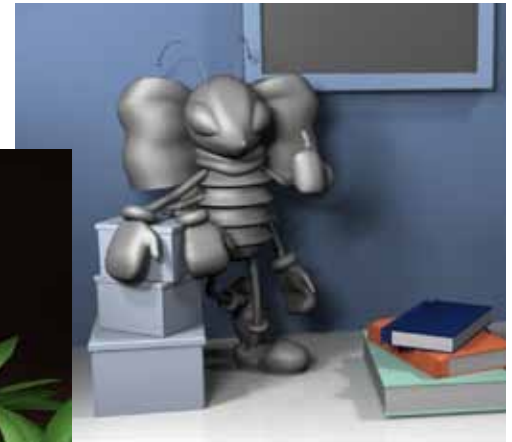
Foundation courses for all students, which include art history and traditional media



graphics, focus on basics that include manipulating form and light, evoking a certain mood, and connecting skills like drawing with technology. One assignment involves digitally modeling a familiar object, “deconstructing” it, and then using the pieces in compositions that visually express chaos, balance, static symmetry and other states.

### **INVITING ENVIRONMENTS**

Creating virtual environments is a major aspect of digital design, whether for a motion picture, an advertising campaign, or a video “game” designed to help stroke patients regain the use of their hands and arms. Augustus Wendell,



university lecturer and coordinator of the Digital Design program, teaches students about creative challenges that include using technology to bridge real-world and virtual environments.

In-depth understanding of how to translate physical design principles and abstract ideas into virtual space is fundamental to creating digital worlds, Wendell says. Speaking of the psychological considerations involved, he says that a virtual world must be consistently inviting or intriguing to motivate the person entering that world to stay and fully explore the experience presented.

Physical-computing techniques for connecting us more closely with digital environments have a prominent role in applications ranging from video games to advertising and fine art. Body motion can be tracked to make us part of virtual space for entertainment and exercise, or we can interact digitally with multimedia advertising displays and museum exhibits for a richer informational experience.

### **NEW REALITIES**

Assistant professor Andrzej Zarzycki shares Wendell’s interest in creating digital experiential spaces, and like Wendell he teaches courses in both the School of Art+Design and New Jersey School of Architecture. In his design classes, Zarzycki helps students develop visual narratives, imagery and animation for a wide



*Students like Rachel Corres are creating closer connections with digital environments through physical computing in a design studio taught by Assistant Professor Taro Narahara.*



*Digital technology can deliver more information about the world as it is or images of the world as it might be via apps like one shown, developed by Travis Flick, Michael Litus and Pawel Zawistowski for Andrzej Zarzycki's Designing for Augmented Reality course.*

range of applications, including games, and to enhance commercial and fine art with digital and kinetic technology.

"We know what the physical world is," Zarzycki says. "The challenge for the artist creating new and attractive environments is to envision what it could be, and to draw people into those environments."

Both Wendell and Zarzycki are also encouraging students to take multimedia creativity into the wider world through "augmented" reality. With powerful ubiquitous computing capability at one's fingertips, smartphones and other devices can be portals to experiencing the everyday world in new and very different ways.

Cued by GPS technology, a smartphone can display images linked to a specific location, and enhance the experience of being in that location with a complementary soundtrack – what Wendell calls "sound atmospheres." It's taking art into the street for individual enjoyment or to share with others.

Digitally augmented reality can serve advertising and marketing, providing more information about what's available at a nearby store. But it can also invite us into a world that could be, showing how a neighborhood or building might be transformed into something better through technology and art. ■

*Author: Dean L. Maskevich is editor of NJIT Magazine.*

<http://theater.njit.edu/major>

<http://art.njit.edu>

AMONG THE FIRST TO USE DIGITAL COMPUTERS IN THE VISUAL ARTS, NOLL'S CREATIONS HAVE BEEN EXHIBITED THROUGHOUT THE WORLD.

## NJIT ALUMNUS, DIGITAL ART PIONEER

A pioneer in digital computer art and animation, A. Michael Noll is professor emeritus of communication at the Annenberg School for Communication and Journalism at the University of Southern California. He is also a 1961 graduate of Newark College of Engineering. In 1994, NJIT recognized this distinguished graduate with an Alumni Achievement Award.

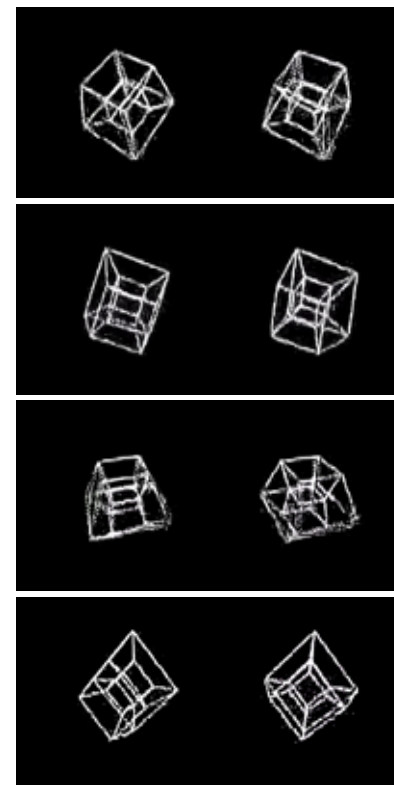
Among the first to use digital computers in the visual arts, Noll's creations have been exhibited throughout the world. He produced his earliest algorithmic digital computer art in 1962, and the exhibition of his work (along with Bela Julesz) at the Howard Wise Gallery in New York City in 1965 was the first to showcase such art in the United States. He also created the first computer-animated ballet. Noll's study of aesthetic preferences for a computer-generated pattern versus a painting by Mondrian has become a classic. In the late 1960s and early 1970s, he constructed interactive three-dimensional input devices and displays and a three-dimensional, tactile, force-feedback ("feelie") device that were the forerunners of today's virtual-reality systems.

Prior to joining the Annenberg School, where he was dean for two years, Noll spent nearly fifteen years at Bell Telephone Laboratories. His research included the effects of media on interpersonal communication, three-dimensional

computer graphics, human-machine tactile communication, speech signal processing, and cepstrum pitch determination.

In his varied career, in addition to his association with the Annenberg School and Bell Labs, Noll has been a staff member to the White House Science Advisor, AT&T manager and planner, author, columnist, classical music critic, archivist, and biographer.

For more about A. Michael Noll's many achievements and to see examples of his digital creativity: <http://noll.uscannenberg.org>



*Early computer-animated movie showing a four-dimensional hypercube done at Bell Telephone Laboratories at Murray Hill, New Jersey, in the mid-1960s.*