Tinkerer, Scholar, Hacker, Innovator

New initiatives aim to guide the creative energies of Rochester undergraduates in digital media and in engineering innovation.

By Scott Hauser

FOR MORE THAN A WEEK IN MAY, ANDREW TOMICH '14, JARED SURESKY '12, and other members of the Midnight Ramblers will hole up in makeshift recording booths in the basement of Spurrier Gym. There, over the course of back-to-back, 12- to 15-hour days, they will haul into the building their own microphones, their own portable recording system, computers loaded with professional software, and other equipment to record up to a dozen new songs.

At the end of the marathon sessions, the members of the a cappella group will emerge, bleary-eyed—maybe a little hoarse—but with a laptop containing the gist of their 10th "studio" album. The do-it-yourself method is how the Ramblers have recorded all nine of their albums over the last decade: on their own, late into the night, with their own equipment.

They have no faculty members to guide them, no tech support crew to trou-

bleshoot problems, and no formal training in how to record digital music. They have just their own desire to create a collection of music they can share with their fans.

"We keep teaching ourselves how to do it," says Tomich, a biomedical engineering major from Cleveland. "A lot of what we've learned is through experimentation, and through one generation of Ramblers handing off the knowledge to another generation.

"We kind of make do," he says.

And make do very well. With albums regularly selected as among the best in the collegiate a cappella world, the Ramblers are something of an ongoing digi-

tal media enterprise. In addition to recording their own tracks (they rely on a professional engineering company to mix the albums), they conceive, record, and produce their own videos, and they oversee their own advertising and communications effort. All done digitally on their own equipment.

As the tools—the cameras, computers, software—that used to be available to only the most sophisticated professional have become practically standard on introductory laptops, if not on smartphones, students at Rochester and across the country are teaching themselves how to create their own artistic, personal, and professional digital portfolios.

And they take on the projects because they want to, regardless of their majors or whether they've taken classes or been formally trained in digital media. It's not just for film geeks or photo mavens or computer jocks any more.

Couple that ubiquity with the 24/7, can-do, let's-make-something-cool spirit

ROLL 'TAPE': Setting up their own equipment in practice rooms in Spurrier Gym, Jared Suresky '12 (singing), Kevin Layden '13 (left), Noah Berg '12, Andrew Tomich '14, and the rest of the Midnight Ramblers have recorded nine CDs, teaching themselves how to use new technology.

Introducing Digital Media Studies

Rochester is the perfect place to explore the connections between digital technology, critical analysis, production, and innovation, says Tom DiPiero, dean for humanities and interdisciplinary studies.

With its collegial campus, Rochester is known for its interdisciplinary approach to the liberal arts. Couple that with a tradition of expertise in imaging and entrepreneurship and ties to George Eastman House International Museum of Photography and Film, and the time is right to focus on connections between digital technology and the arts.

"What we're doing is addressing the fact that digital media are going to represent the new literacy for the 21st century," says DiPiero. "That doesn't mean that everybody has to be a whiz-bang, whiz-kid Web designer. But it does mean that in future employment possibilities, in the future of academia, of writing, more and more of the kinds of language, the kinds of thinking that we produce is going to be tied to these forms of digital media.

"So what we're trying to do with this program is recognize the need to be a critical consumer of media as well as a savvy producer of media."

The newest major in the College, the program was approved by New York State early this year. Students will begin taking courses in the program this fall.

The major incorporates disciplines from the arts and humanities as well as from engineering. Majors are required to take at least 12.5 courses across a wide spectrum of analysis, history, production, and technology courses, including at least 5.5 courses based in the humanities and 7 courses based in the natural sciences and engineering, or vice versa.

During their final year in the program, students will work in small groups to complete a capstone project that combines the approaches, ideas, and skills that they learned throughout the major.

"It's one of very few majors that we have found across the country that combines the study, analysis, and interpretation of the media with its production," says DiPiero. "Something else that distinguishes it is that it has a year-long capstone project in which all of the students in the major—they form a cohort—will bring an idea for a digital media object from its conceptualization through its production to fruition."

DiPiero expects between 20 to 25 students a year to declare a major in the new program, but he admits the College won't have a clear idea of the interest for a few semesters.

While the major will take advantage of the computer, recording, and fabrication studios in a new building, which is expected to open in 2013, instruction for the major will mostly take place in other campus classrooms.

"The building is designed as lab space, not as classroom space," he says.

And while students who graduate as digital media majors may gravitate toward employment in communications, entertainment, and computers, DiPiero says the skills students learn in the program will give them the broad perspective of a grounding in liberal arts.

"Students will have the critical thinking and writing skills of liberal arts and the technical skills of engineering and production," he says. "You don't see these skills combined very often. We're excited about that."   —Scott Hauser

that's contagious among college students, and academic leaders say the University is poised not just to make advances in the world of digital media and art, but also to help rekindle a spirit of innovation.

Tom DiPiero, dean for humanities and interdisciplinary studies, says one of the hallmarks of students who have grown up in the Internet era is that they're immune to the notion that creativity is bound within individual disciplines. Riffing on the British scientist C. P. Snow's famous critique of academia and the danger of compartmentalization, DiPiero says students don't think in terms of "two cultures" any longer, if they ever did.

"Any of us who are older still think in terms of the divides—the arts and humanities side and the science and engineering side," says DiPiero. "That's not how kids think today. They might have a predilection toward one or the other side of things, but they don't think in those kinds of boxes."

In an effort to further strengthen the connections among intellectual interests, Arts, Sciences & Engineering is launching a multipronged initiative this spring with the goal of providing students with an academic and cocurricular home for their multidisciplinary interests.

THE CLEAREST MANIFESTATION IS A NEW BUILDING, WHICH campus planners hope to break ground on later this year, that will house state-of-the-art space for students to explore, create, and study digital media, including video and audio production, website technology, and mobile applications. Built to connect with Morey Hall, the new building will provide much of the technologically equipped studio space for two new majors designed to give students an academic structure to channel their interests in the arts, humanities, and digital technology. One major, in digital media studies, has begun enrolling students for the fall; the second, in audio and music engineering, is expected to be approved soon.

DiPiero says the new major in digital media is designed to give students a liberal arts grounding in perspectives about narrative, analysis, video production, film history, media, technology, and other humanistic approaches, complemented with production-oriented classes in video, audio, Web, and other technologies.

Such a program will not only improve the digital skills of students, but will also provide them with a broad perspective to think critically about the technology around them, he says.

"If you know the history, if you know the aesthetics, you are much more likely to be able to produce something that people will want to watch," says DiPiero. "But we also want to address the fact that every educated adult needs to be both a critical reader of media—that is, they need to know how to look at media, how to understand them historically, socially, and even aesthetically—and at the same time, they need to know something about how to produce these forms of media."

Tomich of the Ramblers says having a broader sense of the history and aesthetics of media production would only improve the quality of the group's productions. "As a non-major, I'm interested in those things; as a user I'm interested in those things," he says. "If it was a major, I'd still be interested in those things. Knowing where things have come from enables you to create better work.

"I would have no qualms about taking a history class to understand why we have what we have, and how it has progressed to this point. I think that's really cool."

The idea of channeling student inquisitiveness and innovation guides a second main component of the new building—a state-of-the-art "studio for engineers"—known as the fabrication center, or "fab lab," where students can fabricate prototypes and work with materials for shaping ideas into products.

Rob Clark, dean of the Hajim School of Engineering and Applied Sciences, says the design of the fab lab and its placement within the new building acknowledges that innovative ideas come from across the spectrum of students.

He, too, has seen a trend among students to bridge what traditionally have been seen as distinct disciplines. For example, last year, when a computer-aided design course required for mechanical engineering students was mistakenly listed in the course schedule as having no prerequisites, the first 25 to 30 seats were filled with arts and sciences students. The Hajim School had to offer a second section to accommodate the additional demand.

Clark attributes the enrollment to students' interest in the gaming industry and the growth of virtual online worlds, but he says it's a fitting example of how students approach new technologies.

"Students here and at other institutions are less driven by the requirements and constraints put on any particular discipline," Clark says. "They are interested in learning what they're curious about at the time. They're less interested in the boundaries between disciplines. I think this space creates an opportunity to say, 'We encourage that.'"

BRADLEY HALPERN '12, PRESIDENT OF THE STUdents' Association, says students have long been tinkering with media production, particularly campus performing groups who produce video and audio projects. Regardless of major, students think nothing of drawing on other disciplines to figure out how to solve a problem.

"People are starting to realize that you need cross-disciplinary study to solve the world's problems," says Halpern. "It's a way of thinking that makes us, as students, more capable and more likely to take that approach when we're in the workforce."

An engineer, Halpern is focusing his major on human-computer interaction, a field that explores the social, cultural, and psychological ways that people interact with technology and how to improve that experience. He draws on his interests in computers, political science, music, and other fields as he explores ways to make technology more user-friendly.

DESIGNING TIMES: Computer science professor Jeff Bigham says technologists have begun to recognize the contributions of humanists and social scientists in making technology more user-friendly.
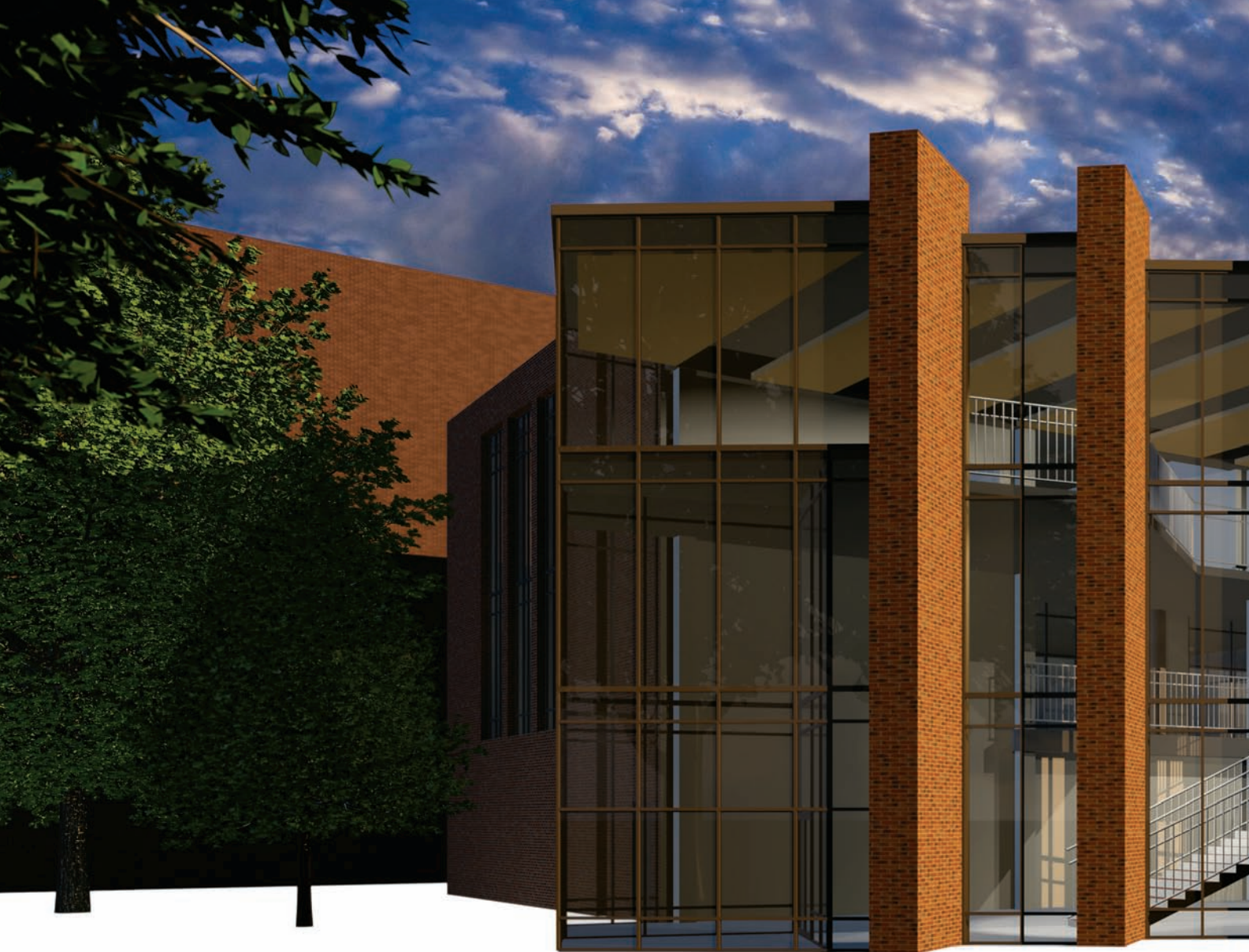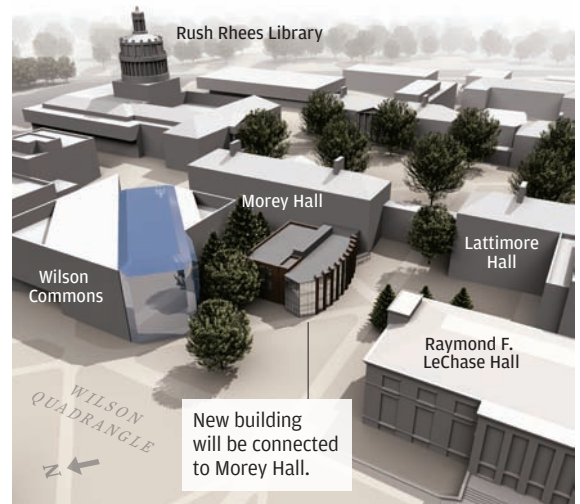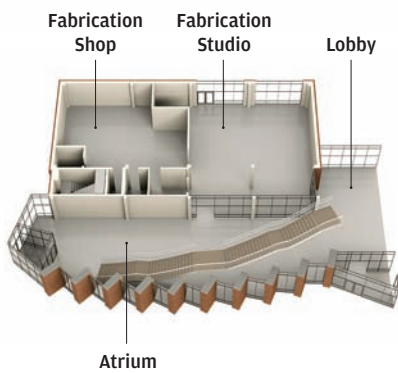
Designed for Collaboration

Much like its "embracing arm" that curves gently between Morey and Lattimore Halls, plans for a new campus building call for a welcoming, collaborative space where students from arts and sciences and from engineering can tinker with their ideas, explore their hunches, and work together in ways that foster an innovative and collaborative spirit.

Designed by the Boston-based architectural firm of Goody Clancy, the proposed 18,000-square-foot building would feature studio, production, fabrication, and small group meeting spaces over three floors, all connected by a glass-filled atrium.

Conceived as a space that would be open 24 hours a day, the building is designed with the understanding that inspiration—especially when it comes to creative and innovative projects—doesn't strike at regularly scheduled times.

Funding for the project will come from a combination of University resources and philanthropic gifts through *The Meliora Challenge:* The Campaign for the University of Rochester. For more information about the Campaign, visit http://campaign.rochester.edu.


Rush Rhees Library

Morey Hall

Wilson Commons

Lattimore Hall

Raymond F. LeChase Hall

WILSON QUADRANGLE

New building will be connected to Morey Hall.

Fabrication Shop | Fabrication Studio | Lobby

Atrium

Individual and Group Study Area | Lobby

Multipurpose Learning Studio | Video Recording | Audio Recording | Lobby

Play Area | Postproduction Studio | Control Booth

Fabrication Center

Home to the "Fab Lab," the ground floor would house an area filled with electrome-chanical tools and materials, prototyping tools, and other equipment for students to design and build physical products. The floor would also serve as a connection between the Residential and Eastman Quads.
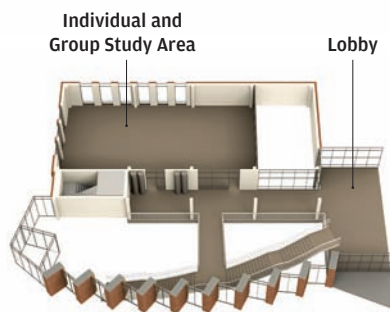
Collaborative Learning

Designed to provide plenty of collaborative opportunities, the second floor would feature high-end hardware and software for graphics, animation, 3-D printers, and other computer processing intensive tasks. The floor would also feature flexible spaces so small groups of students could configure areas to work together comfortably and efficiently.
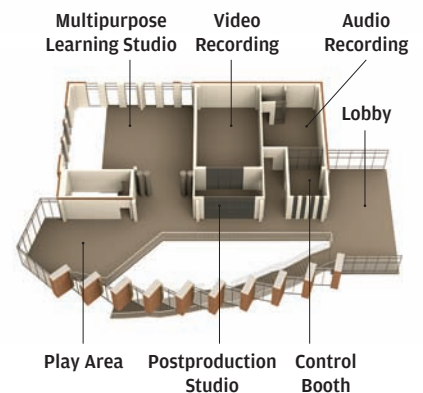
'Play Area' and Production

Overlooking the Wilson and Residential Quads, the third floor's "Play Area" would provide a casual lounge next to a learning studio where students could brainstorm ideas, map out plans, and discuss their projects. The floor would also feature state-of-the-art audio and video recording studios, editing rooms, and equipment.

Halpern works with Jeff Bigham, an assistant professor of computer science who helped draft the new major in digital media studies. Bigham says technological fields like computer engineering are just beginning to recognize how much artists, psychologists, and humanists can bring to the design of technology.

The new initiatives can only spark more collaboration among students, who, he agrees, no longer think in terms of "us" and "them" when it comes to digital culture.

"We older people might think that there are two groups," he says. "Younger people are just thinking, I'm a digital media person and I might sample from computer science or I might sample from art and art history. They're already doing it; why not just formalize it?"

Bigham notes that the willingness of students to explore the potential of technological tools is not new. Such creativity lies at the heart of what most people think of as "hacking," or the nonmalicious approach of taking a gadget apart, figuring out how it works, and using its concepts and parts to create something new. In that sense, the arts and humanities are particular hotspots right now, he says.

"It used to be the computer scientists who were going off and gluing together hardware, and they were writing their own software to do stuff that they thought was cool, to get stuff done," Bigham says.

"Now, we've matured as a discipline; we have all this stuff. Now it's the artists, who don't have formal training in computer science or in electrical engineering, who are taking whatever they can find, gluing it together in whatever way they want to be able to achieve whatever art they want to create. They are the ones who are doing the hacking that really started with computer programming."

FOR HIS PART, CLARK WOULDN'T MIND REKINDLING THE IDEA THAT BEING a good engineer means being a good tinkerer.

As do other engineering administrators around the country, Clark notes that the profession's success in making sure that students are mathematically prepared and comfortable working with computer technology has lessened the likelihood that incoming engineering students have experience in developing, producing, or improving physical products.

"Our students come in with great math and science skills," he says. "That's true across the field of engineering. It's generational. But part of education is always to find the components of the things that someone needs to learn to succeed in a particular career. In engineering part of what you need to succeed is to understand how things work. To do that, you need to be able to take things apart or put them together and to conceive design.
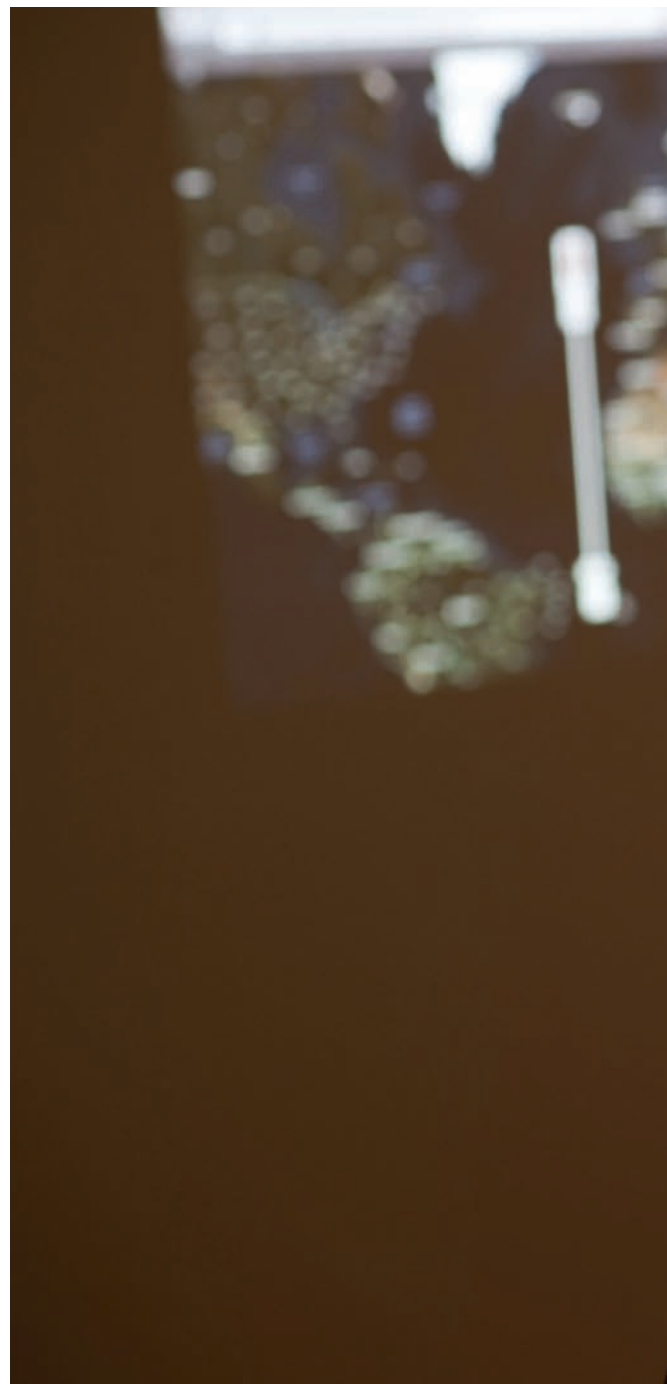
"I want to encourage engineering students to use the space as an art student would use an art studio. If you're a sophomore and you have an idea of some widget you want to build, then you should be able to figure out what tools you need to use to build the device and be able to go into the lab and build it."

Cary Peppermint, assistant professor of art and art history, says artists have traditionally been willing to do exactly that—go into a studio and use the tools at hand to pursue an artistic vision. What's new is that the technology is different and the approaches to art tend to be more collaborative and interactive than they've been in the past.

He's the founder of an artistic collective that uses technology such as GPS programs, Web interfaces, and social media to analyze and question modern society's connections with nature.

In his classes, he and his students explore ways to repurpose technologies to create new artistic works and to develop interactions between artists, viewers, and art.

"The collaborative and interdisciplinary component is different from an artist's perspective," he says. In contrast to the stereotypical image of the lone artist, most digital art requires a group of programmers, graphic designers, artists, digital video, and sound producers.

"No one can be an expert in all those things," Peppermint says. "It's a new way of working. That's very exciting."

One of the students in Peppermint's introduction to digital art class, Nicolette Howell '13, says she's used to tinkering as a studio arts major interested in photography. The brooding images in a recent portfolio of her work hide a menagerie of menacing shapes and shadows within swirls of computer-enhanced smoke. All created with imagination, vision—and software.

Like generations of photographers and artists before her, the junior from Dacula, Ga., is learning to experiment with her medium and her equipment to get the results she sees in her mind's eye.

She's already acquainted herself with Photoshop, After Effects, Illustrator, and other commercial-level image and design programs. In the course on digital art last winter, she used software to animate her images so that they moved as viewers clicked them on a computer screen.

The project was her first effort at interactive art, and it piqued her interest in improving her skills with increasingly advanced technology. She doesn't want to be a computer programmer, but she does want to know enough about software to help express her artistic ideas.

Says Howell: "I always think that learning about more things will make my work better." ℝ

STUDIO ARTIST: Nicolette Howell '13, a studio arts major from Dacula, Ga., says an introductory class on digital art piqued her interest in learning more about how she can use technology to broaden the range of artistic expression she can bring to her photographic work.