Geared for Greatness

That Spandex blur is Scott Burkholder ’02, speeding from engineering to oncology research.

To say that Scott Burkholder ’02 is on a roll would not only be a pretty bad pun, it would also be a gross understatement. The chemical and biomedical engineering double major—who now works as lab technician conducting oncology research at the Johns Hopkins School of Medicine—is also a nationally competitive bicyclist.

Basic science is not the traditional career path of a trained engineer. But then, Burkholder has never been much of a traditionalist. The Alexandria, Minnesota, native picked Hopkins in the first place because, as a high school student, he knew he wanted to go into some kind of medically related engineering. He just wasn’t sure which kind. “The fact is,” he says, “I could not decide between chemical and biomedical engineering.” Hopkins was one place he could do both in four years. “And at that point I wasn’t even aware of Hopkins’ reputation in biomedical engineering,” he says.

Then, as a freshman, he was looking for a job. “The best wage for my level of experience was in the Transgenic Core Laboratory” at the School of Medicine. As an animal technician there, “cleaning cages and stuff,” he got his first look at genetic research. “The Transgenic Core Laboratory is really a service lab,” Burkholder explains. Researchers involved in various genetic research projects contract with the lab, located in the Wood Basic Science Building in East Baltimore, to produce transgenic mice. Much of the genetic research supported by the lab is directed to the study of cancer.

During his second year helping at the lab, Burkholder started to do more technical work. The sophomore was also learning more about the oncology research in which many of the Hopkins scientists were engaged. “I have a keen interest in genetics,” he says, “and a big field that uses genetics is oncology.” That led to his decision to conduct basic science research after graduation.

Then, in his junior year, he got a mountain bike, and things really began getting interesting. For the busy undergraduate—whose time was now split between studying for a double major, working in a lab on the other side of town, and participating in campus ministry, not to mention chairing a committee for the Johns Hopkins Model United Nations Conference—biking became yet another passion. “The closest place to the Homewood campus for trail riding is at least four and a half miles away,” he explains. That means about 20 minutes riding each way, just to get to the single-track dirt paths and challenging courses that serious mountain bikers crave. “Summers weren’t so tough, because it stays light longer,” he says. But on some days, he’d have to ride straight to class, where he would grab his seat and start taking notes, still dressed in mud-spattered biking shoes, Spandex shorts, and bright riding jersey.

The bike also became a commuting machine. “My best time from Homewood to Wood Basic Science is 10 minutes, 18 seconds,” he boasts. “That’s faster than the shuttle.” His route down into the urban core of East Baltimore could be as challenging as the dirt tracks of Robert E. Lee Park in the northern part of the city, but the ride was exhilarating—and great exercise. When a security officer at Wood suggested Scott limit his riding to daylight hours, he decided he’d take the shuttle…sometimes. And it was on that shuttle that he met David Neil Watkins, an Australian researcher working at the School of Medicine. “I’m the kind of guy who likes to strike up a conversation,” says Burkholder. The two talked about genetics, oncology, and the Minnesota Vikings. They hit it off right away.

Through another fortunate turn of events, Watkins, who originally intended to return to his home country after completing a research project in Baltimore, was hired as a member of the Hopkins Medicine faculty. He’s now Burkholder’s boss at the cancer lab.

Burkholder views his engineering background as a boon to his new career in research. “As a basic scientist, you are geared toward absorbing knowledge,” he says. “As an engineer, you learn how to get the knowledge to solve problems. These problem-solving skills are extremely valuable in basic research. My path as an engineer is different from most, and I think in some ways it should be encouraged. The tools you gain as an engineer are so applicable and practical.”

As for bicycling? “I’d love to get to France to experience the Tour de France first-hand,” Burkholder says. He also intends to continue competitive cycling, as a secondary passion. “Right now, I’m just loving riding and learning how to ride. I would love to see how far I can go with it.” If experience is any indicator, he’ll go far.

—Bob Gray
Engineering Electrifies Art

In the wired worldview of Wesley Smith '02, the scientific method becomes the first step toward artistic expression.

Wesley Smith '02 creates the circuits to connect art and engineering; he's drawn more to the similarities between the disciplines than to their differences. The Dallas, Texas, native double-majored in electrical engineering and French. He received the John Boswell Whitehead Award for outstanding achievement in electrical engineering and was one of two Hopkins seniors to share the 2002 Louis Sudler Prize in the Arts, honoring his photography. His work garnered a $1,500 prize.

“I'm interested in the encroachment of perception through technological devices,” Smith says. Most people see the Internet is a tool for speeding and improving communications, but it can be more than that, he says, pointing to a perfect example he has seen: an installation that used the Internet to “transmit seismic waves from one place in the world to another.” The seismic wave signals were processed as audio signals and fed through big speakers and subwoofers “so that as a seismic event occurred in one part of the world, it could be experienced in another.

“For years, people have been using technology to influence art,” Smith continues. Now, he believes, there is an opportunity for the technologically minded to use art to transform how we use technology. This is one reason why he is now pursuing a master's in fine art at the Maryland Institute, College of Art (MICA) in Baltimore. While at Hopkins, he took a semester off to study photography in Paris at the École Nationale Supérieure des Arts Décoratifs, one of the most prominent French schools for studio arts; he found the works of Man Ray especially inspiring.

“I've always been doing things with art,” Smith observes, “and I've also always liked electrical engineering.” The more he thought about the possibilities of artistic expression, the more his interest in electrical engineering was piqued. As his artistic explorations incorporated more and more “time-based elements,” he began experimenting with electronic sensors. Using sensors, he explains, makes it possible to use “certain situations or actions to trigger events.”

Smith admits that it sometimes could be tough as a student of electrical engineering to keep focused on his art. During his junior year, he took an interdisciplinary course offered jointly through Hopkins, the Peabody Institute, and MICA. Called Intermedia Studio, the course provided the rare opportunity to collaborate with creative thinkers working across a wide range of disciplines. The idea of Intermedia Studio is to bring together “musicians from Peabody, visual artists from MICA, and engineers from the Whiting School” to create works that use technology in new forms of expression. During the show that capped the class experience, Smith unveiled a piece using “sensors that emit infrared signals to create a sound and visual landscape’ for a room.”

For his senior design piece, Smith created an installation that employed sensors connected to sound-generating devices. As an individual moved through the space, the sensors picked up the movement and “reacted to the movement with an auditory response.” Each person thus “created” a different auditory experience; in effect, each event was a unique work of art. Some might consider this kind of art “interactive,” but that is a word Smith uses rarely, and only with caution.

“You have to be careful with interaction,” he insists, as if to distance himself from any attempt to make art that depends upon the participation of the viewer. “I like using data from the real world. I try to make it possible to experience something that is not natural to the human being.”

Smith seems intent on bridging the gap between art and engineering, even in his approach to art projects. “The way I work is to pose a question using the scientific method,” he says, “and then look for an artistic way to solve it.” This leads to some interesting results. His senior exam show, for example, began an attempt to “express a perception of space, how that relates to a person's body, and how it changes in response to different modes.” It's all about the intersection between self and other—a very artistic question—mediated by technology.

Exploring the boundaries of engineering and art represents a challenging career path for a newly graduated engineer. But Smith is determined. At MICA, he is completing the coursework to make the leap from electrical engineering to fine art. “I'm taking a class on audio for installation pieces,” he says. He plans to use the experience to “continue the exploration of how art can illuminate lives dominated in so many ways by technology. Art serves as a pathway to understanding how to use technology for our benefit,” the ingenious artist notes. “I want to try to do this as a career. I'm not sure how, but things tend to work out when you keep focused on your goals.”

—Bob Gray