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CAREER FOCUS

Pursuing an Entrepreneurial Vision

Three professionals explain why starting an optics and photonics business is a viable and fulfilling career track.

Molly Moser

For some optics and photonics professionals, academia, which promises the opportunity to pursue research for research's sake, seems the logical career track. Other grads, after years locked away in ivory towers, choose to apply their hard-won Ph.D.s to industry as research scientists or product managers. But what about the road less traveled—entrepreneurship?

Starting a business can be intimidating. There's no clear-cut path to becoming an entrepreneur—it's a journey that can start fresh out of graduate school or after decades of labor in academia or in a large company. But starting an

optics and photonics business affords one way to merge an academic love of innovation with an industrial desire to commercialize disruptive technologies. OPN spoke with three scientists who followed very different paths on the entrepreneurial voyage.

Bridging the gap

Perhaps during a particularly discouraging conversation with a professor or manager, you've dreamed of being your own boss. The idea unquestionably has a romantic allure, especially for young researchers who typically

don't have the privilege of driving their own research agenda.

This scientific freedom, and passion for a practical impact, is exactly what led Vishal Shah to found his company, QuSpin Inc., Colo., USA, which develops hyper-precise atomic sensors for scientific, biomedical and defense applications. Having spent five years as a postdoc and then a research scientist before launching QuSpin, Shah noticed "a strong disconnect between academia and the real world." He was drawn to entrepreneurship "to fully bridge this gap" and help "laboratory research make an actual real-world impact."

The excitement of bringing a disruptive technology to market likewise drove OSA Fellow Jannick Rolland to spin-off her company LightTopTech in 2013, while maintaining her position as the Brian J. Thompson professor of optical engineering at the University of Rochester, N.Y., USA. After years of research, Rolland developed core technology for enabling optical biopsies. She decided to dive into the startup world to move the technology outside of the lab, recognizing the impact that her imaging technology could have in the medical field.

Over the past six years, she's maintained both her appointment at Rochester (albeit with two sabbatical semesters) and her CTO



Courtesy of Jannick Rolland

“ The combination of my appointment in academia while working as CTO for LightTopTech is a perfect one for me. ”

—Jannick Rolland

position at LightTopTech, finding "the combination to be a perfect one." "In academia, I focus on continuous innovation," says Rolland, "and some of the associated intellectual property created is being licensed to LightTopTech," where she can "guide emerging technology integration" and "bring innovation to the marketplace." Further, Rolland notes that her work at LightTopTech has given her a new perspective on academia. "It's all about partnerships," says Rolland, "and how we think of research within the context of the highest possible impact."

Jack of all trades

Like Shah, OSA member Matthew Weed, director of technology strategy at lidar company Luminar Technologies, Fla., USA, also noticed a rift between hard-sciences academia

and the rest of the world, one that he chalked up to the "systemic communication barrier that exists between technical and nontechnical people." So in 2013, when scouring job boards for industry positions post-graduation, he sought a position where he could bridge this divide on a personal level by combining business, marketing and technology. Yet an interesting role at an equally interesting company was elusive. "It's harder than you might think," says Weed, "to find both of those things at the same place."

So Weed turned to his mentor, OSA member Jason Eichenholz, who offered Weed a position supporting his venture Open Photonics, Inc., USA. Operating as a consulting business for companies that required product development and technology market analysis, Open Photonics gave Weed the opportunity to be "half entrepreneur, half intrapreneur." Getting in on the ground floor of a startup, he says, allowed ample opportunity to learn and grow on an accelerated timeline—even though he did not own the company. The sheer "number of different hats" that Weed has worn in six years working with three different startups (including his current stint at Luminar) has, he says, given him a "career's worth of perspective."



Courtesy of Vishal Shah

“ Despite a startup's inherent risks, I found the rewards of unlimited scientific and personal freedom too alluring. ”

—Vishal Shah

WAYS AND MEANS: Funding a STEM startup

For an aspiring entrepreneur, how to fund a venture can be a daunting question. Here are some common answers:

BOOTSTRAPPING

Funding your own business without outside investment can seem formidable, but the high personal stakes mean that you're in control of all decision-making. This model is ideal for entrepreneurs with low startup costs and established consumer interest.

VENTURE CAPITAL (VC)

Vcs provide start-up money in exchange for equity in a business. This funding option provides financial freedom and the opportunity to scale up a small business fast; however, entrepreneurs must sacrifice some control, and there is pressure to achieve a positive return on investment relatively quickly. Also, VCs expect to see a viable prototype and customers before they invest.

FEDERAL SEED MONEY

Many countries have government programs that provide grants to small businesses to support technological innovation if there is potential for commercialization. In the United States, there are three phases of these grants within the Small Business Innovation Research (SBIR) program. If successful during a Phase I grant, Phase II grant recipients can get over US\$1,000,000 in seed money.

While competitive, these federal programs cater to entrepreneurs who want to introduce groundbreaking technologies into the market but can't promise the high rate of return required for VCs to invest. Also, the terms and conditions tend to be more generous. Both QuSpin and LighTopTech were funded by SBIR grants (www.sbir.gov).

“ I have never found something that seemed more interesting than what I'm doing right now. And that's big. ”

—Matthew Weed



Courtesy of Matthew Weed

The perfect entrepreneur

While Shah, Rolland and Weed took different paths to entrepreneurship, they all agree that the career choice doesn't suit everyone. For example, those uncomfortable taking on substantial risk should look elsewhere. And a dose of passion helps, too; Weed notes that—especially in the early stages, with frequent 80-hour weeks and near-constant stress—the “working for vacation” mentality is not going to cut it. “It's a totally reasonable perspective to have,” he says, “but startups are probably not the right direction for you.”

The ideal entrepreneur, according to Shah, still has that academic love for learning, but is willing to shift focus from the technology to market need. Rolland also stresses the importance of keeping the actual impact of the technology in mind and cherishing that impact as a “guiding star,” letting your vision “propel you steadily into the storm.” This strength of vision is important because launching a startup is “a long hard battle,” warns Shah, and selling that vision to potential investors is paramount.

All three scientists had ideas on how to gear up for that long haul. Weed notes that working in the University of Central Florida tech-transfer office facilitating the

commercialization of research while completing his Ph.D. helped prepare him for the startup realm. When Shah was in graduate school, he practiced grant writing, his pitch to investors, as well as technical skills he knew he would need to launch QuSpin, such as computer-aided design and building ultra-low-noise analog and digital electronics. Rolland, launching LighTopTech as an established academic, leveraged her budgeting skills as the head of a university research lab.

Staying the course

Startups are not for the faint of heart; there are many hurdles, including raising capital, building a team and developing and licensing technology. However, with perseverance and a clear vision, entrepreneurship could be a fulfilling career track for those interested in pursuing academic freedom in an industrial atmosphere. Weed, for one, has “never found something that seemed more interesting” than what he's doing right now. “And that's big.” **OPN**

Interested in entrepreneurship? Check out the OSA Foundation's annual Innovation School. For more information see p. 49 or go online: www.osa.org/innovation.

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