



2013

Office of Technology Transfer
I M P A C T R E P O R T

tech transfer impact

University of Michigan researchers provided the fuel for another robust year of exciting inventions, patents, startups and industry agreements. In FY 2013 U-M researchers submitted a record number of new inventions, 421, and we again broke the “century mark” with 108 agreements with existing and new businesses. All of this is made possible with the commitment and investment of our University, matched by generous support from our state and community partners.

This report describes the impact of tech transfer with stories that illustrate the University’s contribution to our economic vitality and quality of life. We’re proud of our role in transforming the ideas of today into the opportunities for tomorrow.



ASSOCIATE VICE PRESIDENT
U-M Tech Transfer

The U-M Tech Transfer executive team (from left): Rick Brandon, Robin Rasor, Ken Nisbet and Jack Miner





“Innovation and entrepreneurship are central to the mission of our university. Our scientists and researchers are not only improving the world with their creativity, they are inspiring a generation of students who are eager to engage and contribute.”

MARY SUE COLEMAN | President, University of Michigan



“The research discoveries that arise from our \$1.3 billion research enterprise fuel hundreds of new concepts each year with potential for application in the marketplace. We are committed to working with our industry and venture partners not only to inspire exciting new products and services, but also to create jobs and improve our quality of life.”

STEPHEN R. FORREST | U-M Vice President for Research

innovation + entrepreneurship

Today’s university plays a vital role in fostering innovation and entrepreneurship. Innovation transforms the university’s discoveries and ideas into new products and services that enrich our lives and revitalize our economies. Entrepreneurship extends innovations into exciting new startup ventures that, along with our industry partners, create jobs and opportunity for our state and nation.

U-M Tech Transfer is a key player in our University’s drive to foster innovation and entrepreneurship. Our licensing professionals work with faculty to develop new inventions into opportunities for new and existing businesses. Our Venture Center acts as a one-stop “hub” for entrepreneurs and investors interested in U-M startup opportunities. Tech Transfer supports our faculty and students, increases our engagements with industry and venture partners, and supports our University’s commitment to economic development.

tech transfer

- + Transforms research discoveries into tangible benefits for the general public
- + Helps attract and retain the very best students, faculty and entrepreneurial partners
- + Improves the flow of research dollars and resources for our academic community
- + Enriches the educational experience through student internships and hands-on learning experiences
- + Leverages business and venture partnerships to stimulate regional and national economic development
- + Enhances the reputation and stature of the University

Crossbar

“We continue to be excited about the disruptive potential of Crossbar. The company has made excellent progress since our initial investment, and is now poised to bring a much-needed solution to the memory markets.”

—JOHN DENNISTON | Partner, Kleiner, Perkins, Caufield & Byers



Crossbar's revolutionary Resistive Random Access Memory (RRAM) technology promises to offer higher storage densities and faster speeds at lower prices than any devices currently available. Describing this as a watershed moment for the nonvolatile memory industry, company CEO George Minassian notes that the startup has “achieved all the major technical milestones that prove our RRAM technology is easy to manufacture and ready for commercialization.”

Imagine a smart phone able to store 250 hours of HD video. A thumb drive that contains 250,000 songs. An iPod battery that can hold a charge for a week.

These capabilities—and more—will soon be available, thanks to a transformational technology known as RRAM (Resistive Random Access Memory) developed at the University of Michigan.

The seeds of this disruptive technology were sown in 2006, when U-M College of Engineering Professor Wei Lu and his research team created a new form of non-volatile memory capable of outperforming conventional flash drives in storage volume, durability and power requirements. Used in tablets, digital cameras, solid-state drives and mobile phones, non-volatile memory stores information even when it's powered down.

Dr. Lu worked with U-M Tech Transfer to patent his new discoveries and help to model a new startup, Crossbar. John Denniston, a partner at Kleiner, Perkins, Caufield & Byers (KPCB) and a member of U-M Tech Transfer's National Advisory Board, took an interest in Crossbar, which led to KPCB's first investment in a U-M startup.

Crossbar was launched the following year. Today, under the leadership of CEO George Minassian, the California-based company is exploring partnership opportunities with major semiconductor manufacturers.

Amway

Amway Corporation, based in Ada, Michigan, is a multinational company selling products primarily in the health and beauty markets.

In 2011, Amway Corporation introduced ARTISTRY™ Intensive Skincare Anti-Wrinkle Firming Serum, a vitamin A-containing product proven to reduce wrinkles and other signs of aging with fewer unpleasant side effects. The basis for the serum—which is currently marketed in 22 countries—is a combination of vitamin A and naturally occurring epidermal growth factor receptor inhibitors developed by U-M School of Dermatology Chair John Voorhees and his colleague, Professor of Molecular Dermatology Gary Fisher.

The concept for this technology arose when Voorhees attended a presentation by the University of Pennsylvania research group headed by Dr. Albert Kligman, who had found that some patients treated with a vitamin A-based drug (Retin-A) for acne had fewer wrinkles. “I was interested in whether it might be possible to mitigate the negative side effects of vitamin A,” Voorhees recalls, “which include thickening, reddening and peeling of the skin.”

Voorhees and Fisher began to research new formulations that would mitigate these side effects, which cause most people to stop using vitamin A retinoids before obtaining benefits. After discovering the activity that caused the unwanted side effects, they looked for compounds that suppressed those effects while allowing the desired activity of vitamin A to occur. After many years of work, they had the answer: naturally occurring compounds that inhibit the epidermal growth factor receptor.

In 2010, Michigan-based Amway licensed the patent from U-M covering the combined use of the naturally occurring compounds, and employed it to help launch its new line of science-inspired treatment innovations.

Today, the ARTISTRY Intensive Anti-Wrinkle Serum is one of Amway’s top-selling products worldwide. And the Amway–University of Michigan partnership continues through research grants that support the work of Fisher, who also serves on the company’s Scientific Advisory Board.

“Collaborating with top researchers and academics goes a long way towards ensuring Amway distributors and our customers have exclusive access to highly competitive and differentiated products that provide them with the best-possible benefits and experience.” says David Groh, Amway’s manager of health and beauty, and new technology.

Using a combination of retinol and naturally occurring epidermal growth factor inhibitors, Drs. John Voorhees and Gary Fisher developed a combination treatment that reduces wrinkles and skin discoloration with less negative side effects. Their discovery was licensed by Amway in 2010.





An average mid-sized passenger car contains as many as 4,800 spot welds, each one a potential problem. Faulty welds cost American automotive manufacturers as much as \$400 million annually. SenSigma's Smart Optical Monitoring System (SOMS) can detect weld and material deposition problems in real-time. Able to analyze any weld that generates light, SOMS will help manufacturers reduce cycle time and waste, decrease vehicle weight and improve fuel efficiency.

SenSigma | SMART OPTICAL MONITORING SYSTEMS (SOMS)

Defect formation is a highly problematic part of the manufacturing process. Every year, faulty products cause billions of dollars in material costs and production delays.

U-M Mechanical Engineering and Materials Science Professor Jyoti Mazumder (pictured left above) first became interested in online detection of defects for car body fabrication more than 12 years ago during a research project for Aetna Industries and, subsequently, for Toyota. As he explains, "Most car companies rely on a spot lap welding technique that makes it difficult to perform online diagnostics of the weld quality. This is because the weld pool at the weld interface is between two layers, denying any direct access for inspection. The only way to check the quality of a weld is to stop the line, perform detailed tests and, if breaks are discovered, do a massive recall." Many car companies are now moving to laser welding for improved joint strength and lighter cars, since laser welding needs much less space compared to spot lap welding and thus a reduced amount of steel.

A specialist in laser materials processing and optics, Mazumder and his team developed Smart Optical Monitoring Systems (SOMS), which analyze the wavelengths of light emitted by laser-induced plasmas in real-time, during the welding process. Based on that information, SOMS can detect the defects, elements present and quality of each weld. When installed on a welding robot, the SOMS identifies and categorizes defects and also can be programmed to "teach" the host welding equipment to create stronger, more cost-effective welds and material depositions.

In 2010, Mazumder teamed up with U-M Tech Transfer staff to create a business model. SenSigma was launched in 2011, and by 2012 the company had set up shop in the U-M Venture Accelerator. Currently, Mazumder is negotiating with robotics companies to integrate SenSigma technology with welding robots. Given the size and unmet needs of the four-billion-dollar welding market, the future looks bright for the startup.

Quantum Signal

On a quiet residential street in the city of Saline, Michigan, in what was once the local high school, some amazing work is being done. Walk down hallways lined with bright blue lockers, and peer into renovated classrooms, and you'll see teams of engineers, programmers and artists solving problems for clients ranging from the U.S. Army and Secret Service to Sony and Panasonic.

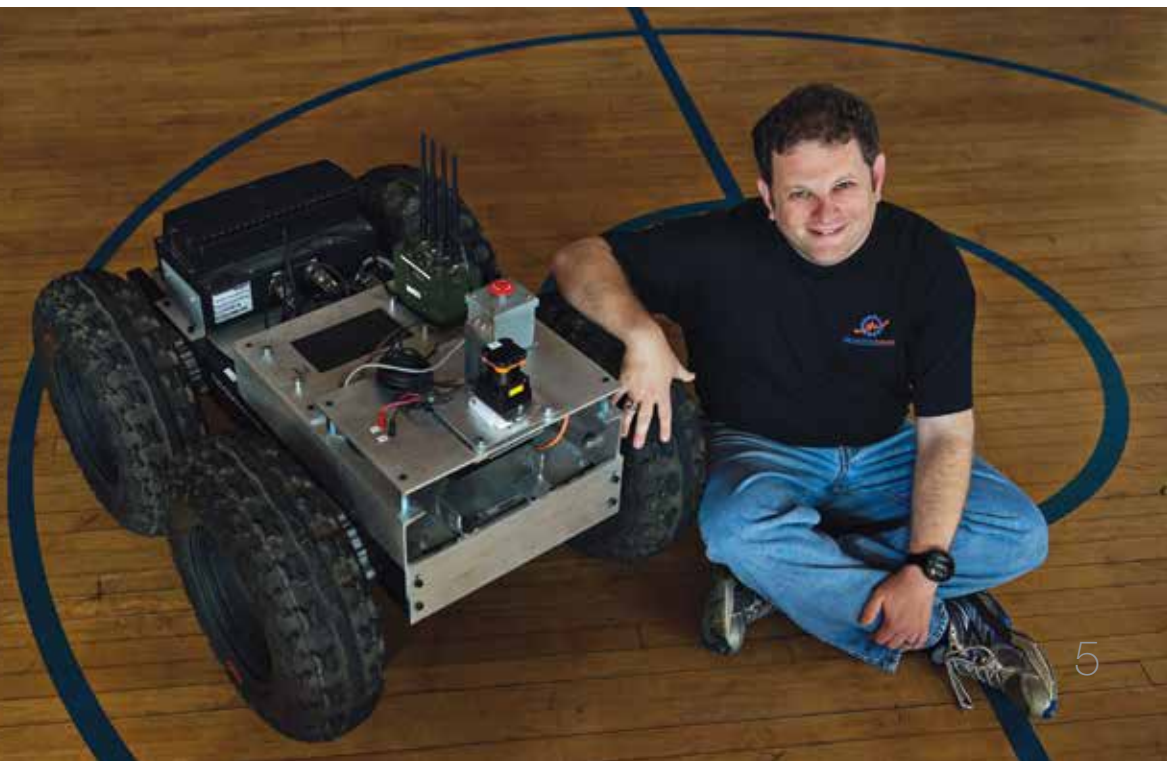
Welcome to the headquarters of Quantum Signal, a high-tech company that uses proprietary state-of-the-art algorithms and software to control robots, train staff in protective motorcades, plan and protect military bases, provide better biometric security, and drive the next generation of video games.

The company's roots date to the late 1990s when Biomedical Engineering post-doctoral fellow Mitch Rohde and graduate student Eugene Zalubas teamed up with Electrical Engineering Professor Bill Williams to develop cutting-edge signal processing algorithms and bring them to clients in automotive, defense and more.

Among its many current projects, Quantum Signal is working with the U.S. Secret Service to investigate, analyze and stop travel document fraud by creating new scanning technologies for forensic examiners. As CEO Mitch Rohde explains, "Many printers employed to create photo-IDs use special thermal ribbon media, and residual images remain afterward. We're building devices to recover the data from those used ribbons." A prototype has been in use at the Secret Service since December 2012, and a second version was delivered in August 2013.

In July 2010, Quantum Signal purchased the historic Union School building in Saline to serve as headquarters for its fast-growing operation. "This was one of the best investments we've ever made," says CEO Mitch Rohde. "And I like the fact that we're a part of the Saline community and its growth and success!"

While the company was launched in 1999, it began taking off in 2002 with the help of a \$2 million Advanced Technology Program (ATP) grant from the National Institute of Standards and Technology (NIST). The team soon grew to eight employees, and, by 2006, the company's portfolio of projects had expanded into a number of diverse application areas. Today Quantum Signal has expanded to 40 employees and has established an excellent reputation for developing and delivering new products and technologies for clients worldwide.





Based on the results with ATR-101, Atterocor co-founders Dr. Julia Owens and Dr. Gary Hammer (pictured at left) are optimistic that the company's proprietary compound may offer those afflicted with adrenocortical carcinoma an important new treatment option.

Atterocor

Adrenocortical carcinoma (ACC) is a cancer of the adrenal cortex that occurs when cancer cells form in the outer layer (cortex) of the adrenal gland. It is an aggressive, often fatal disease that affects roughly 1,000 patients in the United States. Each year, as many as 600 new ACC diagnoses are made, usually at an advanced stage when chances for survival are slim.

Because of the relatively small number of individuals affected by the disease, ACC has been largely neglected by life science researchers. As a result, treatment options have been limited to one highly toxic drug, supplemented by chemotherapy.

But in 2011, all that began to change when entrepreneur Raili Kerppola was diagnosed with stage IV ACC. After conferring with specialists at the University of Michigan Medical Center, Kerppola identified a drug candidate known as ATR-101. Animal studies undertaken in the lab of Kerppola's husband, Biological Chemistry Professor Tom Kerppola, suggested that the novel approach had promise, and work began on moving the project toward development.

In January 2012, Kerppola co-founded Atterocor, Inc. along with CEO Julia Owens, former senior vice president of corporate development and strategy at U-M spinoff Lycera, and Gary Hammer, Millie Schembechler Professor of Adrenal Cancer and director of U-M's Endocrine Oncology Program. By April 2012, the startup had received seed funding from Frazier Healthcare along with matching funds from the Michigan Pre-Seed Capital Fund.

In July 2012, Atterocor closed on \$16 million in Series A venture capital financing from Frazier Healthcare, Osage University Partners, 5AM Ventures and the U-M MINTS program. Atterocor has been granted Orphan Drug Designation from the U.S. FDA and the European Medicines Agency, which may help speed the drug approval process. The startup recently initiated a Phase I study in ACC patients at the University of Michigan and M.D. Anderson Cancer Center in Texas. As Owens points out, "It's quite remarkable to move from company founding to clinical studies in 18 months."

Innovation Evangelist | RICHARD DOUGLAS



Among the members of the U-M Tech Transfer National Advisory Board is Richard Douglas, who, until recently, served as the senior vice president of corporate development at the Boston-based life sciences company Genzyme. Having earned his undergraduate degree from the University of Michigan, a Ph.D. from UC Berkley, and with nearly 30 years in business, Douglas was eager to return to his alma mater to volunteer his expertise when the opportunity presented itself. “I felt as though I had a lot to offer in terms of experience, especially as relates to the commercialization of therapeutics,” says Douglas, “And, to be honest, I just really enjoyed having an opportunity to hear about the work that is being done by University researchers, which is among the most forward-looking in the world.”

To take advantage of his expertise, U-M Tech Transfer appointed him to the recently created position of Innovation Evangelist. Douglas travels to Michigan once a month from Boston, working with U-M researchers and Tech Transfer staff to identify fundable commercialization strategies, and provide connections to venture investors and industry leaders in his network.

“There’s really an incredible opportunity here,” says Douglas. “The quality of the work being done at Michigan rivals anything you’ll find in the world. The challenge is matching all of the great innovation with people and funding to get it on a path to commercialization. Right now, I’m acting as a bridge, helping to make those connections.”

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Partnerships



ECONOMIC | Ann Arbor SPARK, our regional economic development partner, provides microloan and pre-seed funding to many of our startups, and we partner on numerous business attraction, talent, marketing and infrastructure projects. Similarly, the statewide Michigan Economic Development Corporation (MEDC) provides generous financial support to a portfolio of funding, talent and business development programs that enhance our effectiveness. One recent example is MEDC's M-TRAC translational funding program, which is partnered with the Medical School on life science opportunities and the College of Engineering and the U-M Transportation Research Institute on transportation opportunities.

STUDENT ENTREPRENEURSHIP | U-M Tech Transfer provides case studies and mentoring support to a vast set of educational and venture creation activities for student entrepreneurs from the U-M Center for Entrepreneurship and the Zell-Lurie Institute for Entrepreneurial Studies. Our TechStart student internship program employs graduate students from Engineering, Business, the Health System, the School of Information and others to work on Tech Transfer projects in a hands-on learning environment.

UNIVERSITY | U-M Tech Transfer's relationships with premier venture capital firms provides opportunities for the U-M MINTS program to invest in U-M startups alongside qualified venture partners. We also partner on industry relationships with the U-M central Business Engagement Center and sister units in the Medical School and College of Engineering. Our MEDC-funded Tech Transfer Talent Network provides partnerships among six other Michigan universities to share and develop talent resources to enhance tech transfer performance for the benefit of our state.

COMMUNITY | U-M Tech Transfer staff play key roles in our community and in national organizations. We participate as board and committee members on Ann Arbor SPARK, the Chamber of Commerce and numerous non-profit organizations. We partner with the Michigan Venture Capital Association to host Entrepreneur's Engage, an "un-conference" designed for our region's entrepreneurs and investors and to improve our entrepreneurial capabilities. We also play major roles in AUTM (Association of University Technology Managers), an international professional organization, to promote best practices among university and business partners.

Contact Us!

The U-M Tech Transfer team is ready to introduce you to your next big opportunity. Contact us at 734.763.0614, techtransfer@umich.edu or www.techtransfer.umich.edu



U-M TECH TRANSFER STAFF (left to right): Carmen Atkins, Diane Rice, Elaina Zverina, Brian Copple, Brad Martin, Drew Bennett, Dan Chagnovich, Mark Maynard, Laura Charlick, Lisa Johnson, Megan Reichert, Nadine Wong, Jack Miner, Ken Nisbet, Rick Brandon, Robin Rasor, Tara Hartman, Sally Ingalls, Debbie Watkins, Jay Ellis, Dennis Linder, Katie Moynihan, Keith Hughes, Tiefei Dong, Steve Maser, Greg Choiniere, Wes Huffstutter, Jackie Borowski, Mutsumi Yoshida. Not pictured: Maryann Kostiuik.



University of Michigan
Office of Technology Transfer
1600 Huron Parkway, 2nd Floor
Ann Arbor, MI 48109-2590
tel 734.763.0614
techtransfer@umich.edu
www.techtransfer.umich.edu

EDITOR

Linda W. Fitzgerald

CONTRIBUTING EDITOR

Mark Maynard

PHOTOGRAPHY

Leisa Thompson
Martin Vloet
Doug Coombe
TRUMPF (cover image)
Tek Image/Science Source
(first page of insert)

DESIGN + PRODUCTION

Alicia Vazquez
Michigan Creative

PROJECT MANAGERS

Mark Maynard
Sarah Kennedy
Michigan Creative

THE REGENTS OF THE

UNIVERSITY OF MICHIGAN

Mark J. Bernstein, Ann Arbor
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