



BY JAMIE SWEDBERG

# the STATE OF INVENTION

*What makes Minnesota the land of overachievers in the world of new ideas?*

**B**eyond the realm of iconic consumer brands (think Post-its, Wheaties, and Rollerblades), Minnesota has established itself as an innovation leader, with a history of groundbreaking inventions anchored by a cluster of industry giants.

Intellectual property, a common barometer of innovation, abounds in the state, which claimed 3.5 percent of U.S. patents in 2011. It ranks ninth in the nation, edged out by more heavily populated states, according to the U.S. Patent and Trademark Office.

For many, Minnesota is synonymous with med-tech, and its history of invention is often traced to Fridley-based Medtronic. Founder Earl Bakken invented the transistorized, battery-operated pacemaker after a 1957 power outage rendered bulky, wall-plug devices useless. Implantable pacemakers followed in 1960, spawning an industry with Minnesota as its epicenter.

"It's sort of like restaurants," says Tony Zeuli, an IP attorney at Minneapolis law firm Merchant & Gould. "If you get a few really good restaurants, eventually they spawn other restaurants. One of the chefs decides, 'I've worked under this

master for a while, so I'm going to start one on my own.'"

Minneapolis-based medical device firm CVRx, Inc., which was founded in 2000, is one of myriad examples. Founder and Chief Technology Officer Robert Kieval, a Medtronic alum, holds 48 U.S. patents and half a dozen in other countries.

"Being granted a patent is an indication that after very close scrutiny, an observation or idea is deemed to be novel," Kieval says. "In my case, this suggests that my ideas could represent important advancements in patient care that could positively impact the lives of many, many people."

CVRx's implantable device is designed to treat high blood pressure and heart failure by triggering the body's natural blood-flow regulation. Its Barostim Neo product is approved in Europe for treatment of hypertension, and it's now conducting U.S. clinical trials.

"We came up with an idea for a whole new therapeutic category, the treatment of high blood pressure with a medical device," Kieval says, adding that high blood pressure affects about 70 million people in the United States. "We also had come up with a novel way of treating heart failure. Our

ability to protect that with patent filings really helped drive the value creation for the company," which has secured more than \$200 million in financing.

## Valuing 'Disruptive' Ideas

Industry experts say that Minnesota's med-tech giants have spawned countless startups through direct spinoffs or by indirect means.

"If you were to get the bio of every med-tech CEO in the state, many, if not most of them, would have worked in some role at the 'big four' in town: Medtronic, 3M, St. Jude, and Boston Scientific/Guidant," says Frank Jaskulke, member services director at LifeScience Alley, a Minnesota trade organization that counts large and small health technology firms among its members.

But those same giants remain on the forefront of innovation today.

"We make our own semiconductors, batteries, and capacitors," says Girma Wolde-Michael, deputy chief patent counsel and head of international IP operations at Medtronic. "That dimension of verticality, if you will, has given us a lot of platforms to be innovative."

About 9,000 of Medtronic's 45,000 employees are directly involved in R&D; another 2,000 or so support it through clinical research and other efforts. Improvements to existing systems are invaluable, but Medtronic urges researchers to

explore what Wolde-Michael calls "disruptive technology."

"There are ideas that are kind of way out there," he says. "Some of them are a little bit dreamy, but you have to let your engineers and inventors be dreamers. You want to make sure that someone is thinking about the impossibilities."

For example, when the implantable pacemaker was invented, attaching the lead (an electronic conductive wire) inside the heart was a challenge; if not secured, it was unable to function properly. Medtronic developed tines to attach the lead to tissue inside the heart.

The next disruptive technology may be on the horizon. Medtronic is already developing medical devices that are significantly smaller than existing ones and easier to implant. But Wolde-Michael foresees a day when nanotechnology could be used to make certain devices so tiny they are injectable by syringe.

## Nothing to Do but Think of Something New

Med-tech, of course, is but one facet of Minnesota's inventiveness. Consider: The state's top patent acquirers are IBM and 3M.

"By no means would I consider medical technology to be the 800-pound gorilla," says Zeuli. "There are so many other companies here that patent or innovate."

So why is Minnesota an inventors' haven? In keeping with the state's

One outlet where local inventors convene is the Minnesota Inventors Congress, the oldest continuous annual invention convention in the nation, which has been held each year in Redwood Falls since 1958. Read more about the event in this *Twin Cities Business* feature story: [bit.ly/Y3Dw1A](http://bit.ly/Y3Dw1A)





trademark modesty, some wave away the assertion with self-effacing humor.

"It gets so darn cold in the winter, there's nothing to do but sit around and think of something new to make," Matt Scholz says with a laugh; a 3M corporate scientist, he holds more than 120 patents assigned to the Maplewood-based company. "Things are moving fast, so you'd better be innovating or you're going to be left in the dust."

Scholz' best-known invention is Scotchcast Plus Casting Tape, a knitted fiberglass fabric containing a polyurethane resin that is wrapped around limbs to immobilize broken bones. The company's IP has paid off: 3M won a \$129 million judgment after suing Johnson & Johnson for infringement of four patents related to the product.

### The Silicon Valley of the North?

While working for a Texas firm, attorney Chaz De La Garza traveled to Minnesota to represent Medtronic in a trade secret case. Despite his distaste for cold, the IP amassed by Minnesota firms soon lured him north, and he later founded his namesake firm in Minneapolis.

"I think anyone who is knowledgeable has to come to the conclusion that [Minnesota is] a hotbed of innovation," he says. "This is the Silicon Valley of the north."

Others say Minnesota operates off the radar. This country "has innovation in a lot of places you might not always guess, but there are only a few known for it," says David Abrams, an IP expert and University of Pennsylvania Law School professor. "It presents an opportunity for places to promote themselves" as proponents of innovation.

Research-oriented institutions such as the University of Minnesota and Mayo Clinic bring a mass of creative, skilled people into the mix with scientists from Fortune 500s and startups. "They run into someone in a restaurant who's in a related field and works for another company, and you might end up with new ideas, new companies forming that way," says Abrams. But Minnesota should better incentivize graduates to remain in the state, he adds.

New business incubators and academic-business partnerships would encourage international students to stay after graduation, says Medtronic's Wolde-Michael. An exodus of talent, however, represents a national dilemma: "In the past, people from other countries would come here to be educated and then would stay here for the opportunities. Now it is the other way around: They leave because there are more opportunities elsewhere," he says.

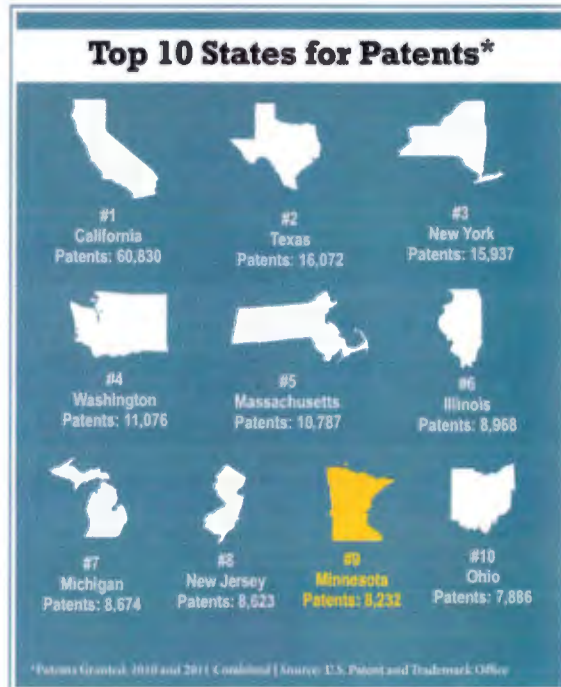
3M and others are looking to ignite the inventors' spark in younger generations. Scholz, for example, recently helped judge the Discovery Education 3M Young Scientist Challenge, an annual program that pairs U.S. middle school students with 3M scientists and awards the winner \$25,000.

### A Race to the Patent Office

The America Invents Act, signed into law in 2011, is on the minds of many Minnesota inventors. Come mid-March, patent rights will shift from the current "first-to-invent" system to a "first-to-file" method—meaning, basically, that if you want to own IP rights, be the first to show up at the patent office. Some say the move will whittle down an application backlog and streamline patenting; others fear small inventors will be disadvantaged.

"Our best guess is that this law is going to be worse for individuals relative to companies," says Abrams, who co-authored a study that examined a similar change in Canada. "The intuition is that companies are more likely to have patent lawyers on staff and more experience in turning inventions into patent applications."

The system could result in "gut-wrenching situations" where smaller inventors lose out on due recognition—and royalties, says Devan



Padmanabhan, a shareholder and patent litigator at Minneapolis-based Winthrop & Weinatine.

Others expect the change to have little effect. "I think it will cause companies to file earlier in their process," says Zeuli. "I see it as more of a timing issue, really, than anything else."

If nothing else, the law will prompt inventors to assess each new invention's potential as soon as it is conceived, according to CVRx's Kieval.

"We always come up with more ideas than we

can patent, because patent prosecution is a costly thing and we have to use our resources judiciously," he says. "We sometimes had the luxury of seeing which way our product development is going to go before we decided what patents to file. Now we don't have that luxury, so that changes our thought process." **TCB**

Jamie Swedberg is a freelance writer and a frequent contributor to Twin Cities Business.

## Helping Inventors Prosper

A pro bono legal program in Minnesota serves as a national model.

At a luncheon hosted by Minneapolis law firm Patterson Thunets IP, U.S. Patent and Trademark Office Director David Kappos discussed a national need for pro bono programs for inventors—something that had been attempted, unsuccessfully, in the past.

"Director, you're in the right place, because Minnesota has a strong history of pro bono," responded James Patterson, the firm's founder. He connected with Candee Goodman, a now-retired pro bono director at Minneapolis-based Lindquist & Vennum, to develop a game plan.

They tapped LegalCorps, a local nonprofit that provides free legal advice to small businesses, to administer the pilot program, dubbed the LegalCorps Inventor Assistance Program. Since its June 2011 launch, 50 local attorneys have been trained to participate, 16 inventors have tapped its services, and two participating inventors have obtained patents. (To be eligible for the program, inventors' income cannot exceed 300 percent of the poverty level.)

"It's been very well received," says Goodman. "Local patent lawyers are thrilled" to finally have pro bono opportunities within their field of expertise. Marketing the new service to eligible inventors has been the greatest challenge, and the group plans to send attorneys to spread the word to inventor groups and industry associations, she says.

To help streamline a national rollout, two of Patterson's colleagues recently published a best practices manual. Five other states have kick-started programs that mirror Minnesota's, and Patterson says five more are expected to launch next year. —*Jake Anderson*



# MINNESOTA'S TOP INVENTORS

*How the state's 500 leading innovators were selected for inclusion in the Top Inventors list.*

On the following pages, you'll find 500 of Minnesota's leading inventors, whose dreaming, tinkering, and old-fashioned hard work have propelled the state to the forefront of innovation.

The Top Inventors list was compiled by Patent Buddy, a Minneapolis company founded by attorneys from Minneapolis-based IP firm Schwegman, Lundberg & Woessner, along with help from California-based Gazelle Technologies and Minneapolis-based Contata Solutions, LLC. Patent Buddy extracted data from the U.S. Patent and Trademark Office (USPTO) and applied a proprietary formula that takes into account several factors. The total number of U.S. patents granted during the past five years, as well as the number of patent applications published, are included in the algorithm; other factors considered include the influence of issued patents as measured by forward citation count and the number of times an individual is listed as "lead inventor" in patent filings.

Inventors are broken down by industry and listed below the company with which they were associated according to USPTO records as of May 31, 2012. Companies with the most Top Inventors are listed first.

## Medical Technology

### Medtronic, Inc.

Bauer, Ryan  
Burnes, John  
Cho, Yong  
Christenson, Steven  
Cinbis, Can  
Davis, Jon  
Denison, Timothy  
Drake, Ronald  
Ellingson, Michael  
Falkner, Phillip  
Francischelli, David  
Gerber, Martin  
Ghanem, Raja  
Giese, Chad  
Giffakis, Jonathon  
Goetz, Steven  
Gunderson, Bruce  
Heruth, Kenneth  
Hetttrick, Douglas  
Kalpin, Scott  
Karamanoglu, Mustafa  
Kast, John  
King, Gary  
Kovalsky, Igor  
Kuhn, Jonathan  
Lee, Michael  
Markowitz, H. Toby  
Miesel, Keith  
Nelson, Brian  
Olsen, James  
Panken, Eric  
Rothstein, Paul

Ryan, Timothy  
Sahasrabudhe, Rajeev  
Scanlon, David  
Seifert, Kevin  
Sharma, Vinod  
Sheldon, Todd  
Skelton, Dennis  
Sommer, John  
Stadler, Robert  
Tabor, Charles  
Torgerson, Nathan  
Wahlstrand, Carl  
Waldhauser, Steven  
Warman, Eduardo  
Zhang, Shangqian  
Zhang, Xuaheng  
Zhou, Xiaohong

### Cardiac Pacemakers, Inc.

Ameri, Masoud  
Arcot-Krishnamurthy, Shantha  
Brockway, Marina  
Carlson, Gerrard  
Desai, Shrojalkumar  
Ding, Jiang  
Dong, Yanting  
Foster, Arthur  
Hartley, Jesse  
Hatlestad, John  
Kenknight, Bruce  
Kramer, Andrew  
Lee, Kent  
Linder, William  
Maile, Keith  
Manicka, Yatheendhar

Maskara, Barun  
Mazar, Scott  
McCabe, Aaron  
Patangay, Abhilaah  
Salo, Rodney  
Shuros, Allan  
Siejko, Krzysztof  
Stahmann, Jeffrey  
Stubbe, Scott  
Ternes, David  
Tockman, Bruce  
Von Arz, Jeffrey  
Yu, Yinghong  
Zaremba, Paul  
Zhang, Yongxing  
Zhang, Yunlong

### Boston Scientific, Inc.

Arcand, Benjamin  
Atanasoska, Liliana  
Brown, Brian  
Brucker, Gregory  
Edelman, Peter  
Fosa, Aaron  
Gregorich, Daniel  
Hastings, Roger  
Hill, Jason  
Holman, Thomas  
Jenson, Mark  
Kangas, Steven  
Kokate, Jaydeep  
Meyer, Michael  
Schoenle, Victor  
Sogard, David  
Stinson, Jonathan  
Warner, Robert



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A great business lets  
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Dean Hahn-Carlson,  
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**SYNCADA** from Visa



**3M Innovative Properties**

**Company**  
Cinader, David Jr.  
Dellaria, Joseph Jr.  
Kangas, Lani  
Karim, Naimul  
Kedl, Ross  
Miller, Richard  
Mitra, Sumita  
Nelson, Robert  
Ozman, Joel  
Scholz, Matthew  
Statham, Alexis  
Wieringa, Jeffrey

**St. Jude Medical, Inc.**

Alkhatib, Yousef  
Braido, Peter  
Kauphusman, James  
Kirschenman, Mark  
Paul, Saurev  
Tegg, Troy  
Wang, Huisun

**CVRx, Inc.**

Cates, Adam  
Keith, Peter  
Kleval, Robert  
Roasing, Martin

**Basis Science, Inc.**

Evans, Don  
Lucke, Lori

**Mayo Foundation for Medical Education and Research**

Burnett, John Jr.  
Friedman, Paul  
Levy, Michael

**Surmodics, Inc.**

Chappa, Ralph  
Chudzik, Stephen  
Slager, Joram

**Trans1, Inc.**

Assell, Robert  
Cragg, Andrew  
Dickhudt, Eugene

**University of Minnesota**

Krasutsky, Pavel  
Nelsaestuen, Gary  
Vaughan, Thomas

**Wilson Greatbatch, Ltd**

Brainard, Scott  
Fleigle, Jeff  
Ye, Qingshan (Sam)

**AMS Research Corporation**

Crank, Justin  
Vancelette, David

**Augustine Biomedical + Design**

Augustine, Ryan  
Augustine, Scott

**Coloplast A/S**

Deitch, Sarah  
Morningstar, Randy

**Ecolab, Inc.**

Kilawee, Patrick  
Tallman, Dan

**Mardil, Inc.**

Girard, Michael  
Walsh, Robert

**Tyco Healthcare Group, LP**

Adams, Daniel  
Kusleika, Richard

**Zimmer Spine, Inc.**

Dawson, John  
Hestad, Hugh

**Alexandria Research Technologies, LLC**

Johnson, Wesley

**Apnex Medical, Inc.**

Bolan, Stephen

**Arc Suppression Technologies, LLC**

Henke, Reinhold

**Bacoustics, LLC**

Babaev, Eilaz

**Baxter Healthcare S.A.**

Warior, Ramesh

**BioQuiddity, Inc.**

Kriesel, Marshall

**Bridgepoint Medical, Inc.**

Kugler, Chad

**Cardia, Inc.**

Corcoran, Michael

**Corventis, Inc.**

Libbus, Imad

**Cretec Orthopaedics, Inc.**

Biggs, James Jr.

**Entellus Medical, Inc.**

Resemann, Thomas

**EnteroMedics, Inc.**

Knudson, Mark

**Epitopix, LLC**

Emery, Daryll

**Gambro UF Solutions, Inc.**

O'Mahony, John

**GeoDigm Corporation**

Marshall, Michael

**Hon Hai Precision Industry Company, Ltd.**

Chen, Jun

**Inspire Medical Systems, Inc.**

Ni, Quan

**Intellect Medical, Inc.**

Swoyer, John

**Interrad Medical, Inc.**

Rosenberg, Michael

**InterValve, Inc.**

Drasler, William

**Ivantis, Inc.**

Eutemeuer, Charles

**McNeff Research Consultants, Inc.**

McNeff, Larry

**Medrad, Inc.**

Bonnette, Michael

**MetaModix, Inc.**

Thompson, Paul



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