

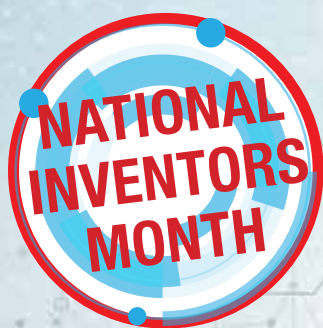
Inventors

MAY 2019 Volume 35 Issue 05

DIGEST

Auto Innovation

CURRENT BEST TECHNOLOGY
ALL-TIME TOP 10 INVENTIONS
PEDAL-POWERED RAHT RACER



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Of Auto-mation And Celebration

The last reported total of automobile-related patents was nearly a half million.

And that was in 2015.

Patsnap.com reported the following data regarding major auto manufacturers:

- They had 179,238 granted patents and 411,560 patent applications distributed into 375,242 patent families.
- In terms of countries of patent applications, the key markets were Japan, South Korea and Germany. (No indication of where the United States fit into this.)
- The top companies in the industry were Toyota, Hyundai Motor Co. and Honda.

Since then, we have learned that Google has more patents than most automakers on connected and self-driving cars.

It's little wonder that independent and corporate inventors keep racing, pun intended, to out-innovate one another: Not counting your home (and maybe your phone!), your car may be the most important product you own.

So it was inevitable that *Inventors Digest* would produce an automotive-themed issue. The package is anchored by a couple of Top 10 lists: one involving the latest auto innovation, and another listing our most important car-related inventions of all time.

This issue will arrive to you at the beginning of National Inventors Month, which was cofounded by *Inventors Digest* in 1998. Contrary to my erroneous assumption in this space exactly two years ago, this celebration initially was held every August until 2011. It was switched to May because it is a better fit with the academic calendar and gives innovation a bigger emphasis in schools; it also lines up with the annual National Inventors Hall of Fame induction ceremony.

As I finish my third full year as editor of this magazine, I welcome your comments and suggestions about future themed issues or story ideas in general. Your interest in inventing was the ignition that started *Inventors Digest* in 1985 and still keeps us going..

—Reid
(reid.creager@inventorsdigest.com)

American innovation needs to hit the gym



Weakened patent protections have reduced the value of American inventions. To strengthen American innovation, support the STRONGER Patents Act—legislation designed to restore strong Constitutional patent rights, limit unfair patent challenges, and end the diversion of USPTO fees.

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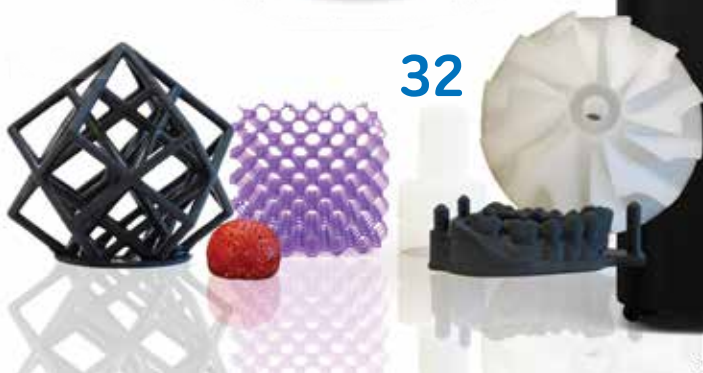
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Focus on the Fun and Fascinating

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Letters and emails in reaction to new and older **Inventors Digest** stories you read in print or online (responses may be edited for clarity and brevity):

"Spinning the Inventor Roulette Wheel"
(September 2018):

I was told some 20 years ago that my intellectual properties are my lottery tickets, but I like the casino metaphor more because "the house" can be intelligently beaten: See the MIT's counters and the other many guys/cheaters who made it rich (while only some of them made it on the casinos' black list).

It doesn't take a PhD in theoretical physics to realize that without the right connections and/or money it's close to impossible to promote and monetize an invention nowadays as an independent inventor.

They say that timing and Location, Location, Location are the essential ingredients for the success of a patent. I'm in the best location, the timing is almost perfect (this type of product is soon to be mandated by law) and I have the most reliable, affordable and versatile patented product in its class — and I'm still waiting for the ball to land in the right pocket of the wheel. —**DAM MIMIS**

"Making Instagram Work for You"
(February 2019):

Elizabeth (Breedlove), these are some great tactics for anyone looking to get the most out of Instagram. Thanks so much for the mention!

—**HELLO@LINKMYPHOTOS**

"Anatomy of an Invention" (November 2018):

Surveys are not a good predictor of future behavior. The true genius in marketing is understanding how many people would spend their money on things they don't need and maybe don't really want.

—**BENNY (BATTAR@AQUATRON.CO.IL)**



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ONE TIME TOO MANY? DELOREAN LAWSUIT TOSSED

The 1985 blockbuster movie "Back to the Future" introduced many then-impossible inventions that are now in use today. The film was so popular that it had two sequels, and until recently there had also been talk of a "Back to the Future IV."

But too much of something isn't always a good thing, as a U.S. District Court judge recently ruled while tossing a lawsuit filed by John DeLorean's widow over lost royalties from the movie. (DeLorean's DMC 12 car—a commercial flop—served as the time machine in the original movie, elevating it into a cult classic.)

DeLorean's widow, Sally, was suing over IP-related concerns for a second time. In 2014, she sued The Texan DeLorean Motor Co., an unaffiliated business that started out selling spare parts and doing restoration work for the 9,000 original DMC 12s. Her trademark suit alleged that the

company was illegally profiting from her husband's work through merchandise and replicas.

The parties arranged a settlement in 2015. She retained the rights to John's name and life story but agreed to let the company use the DeLorean name and logo on replicas and related products.

John DeLorean cut a deal with Universal Pictures in 1989 that gave him and his heirs 5 percent for promotions featuring his car and logo "as a key component."

The more recent suit was about royalties. Sally DeLorean claimed the Texas company had been illegally plundering her share of profits from ads and merchandise for the film series featuring the iconic car.

The 2015 settlement didn't mention the Universal agreement, so Sally DeLorean argued in her recent suit that the



royalties weren't part of the deal. Not so, ruled U.S. District Judge Jose Linares.

"As both agreements apply to the use of the word 'DeLorean' and the DMC logo, and relate to the DeLorean automobile's image, the Court concludes that the subject matter of the agreements overlap," he wrote in his opinion.

There has been no indication that an appeal is forthcoming, so the "Back to the Future" lawsuits may now be in the past.

BRIGHT IDEAS

Kailo

NANOTECH PATCH
FOR PAIN RELIEF

getkailo.com

Each Kailo patch contains billions of charged nanocapacitors that work as a bio antenna, helping the body in clear communication and reducing signals that cause pain.

The patches are also designed to help bodies recover faster; improve flexibility; and help recover a natural range of motion. Among other areas, Kailo works on knees, elbows, shoulders, the head, the upper and lower back, ankle, foot, hand and wrist. It is known to work in seconds when applied in the right spot.

Each Kailo comes with a soft carry case and three removable adhesives. The package will retail for \$95. It will be shipped to Rewards backers starting in July.



fromaggio

SMART, AUTOMATIC
HOME CHEESEMAKER

fromaggio.com

Fromaggio is a fully automated system that lets you make affordable cheese at home using simple steps.

Pour in milk, cultures and rennet; then choose from either a default cheese or customize your own via a mobile app. The system does the rest. It features a detachable cheese press, various-size curd cutters and pre-set cleaning mode.

The product's makers say the result is more authentic, natural and healthier than store-bought cheese.

Fromaggio's stainless steel version will retail for \$579 (about \$40 more for the copper version), with shipping for crowdfunding Rewards backers in May 2020.

MOREbot

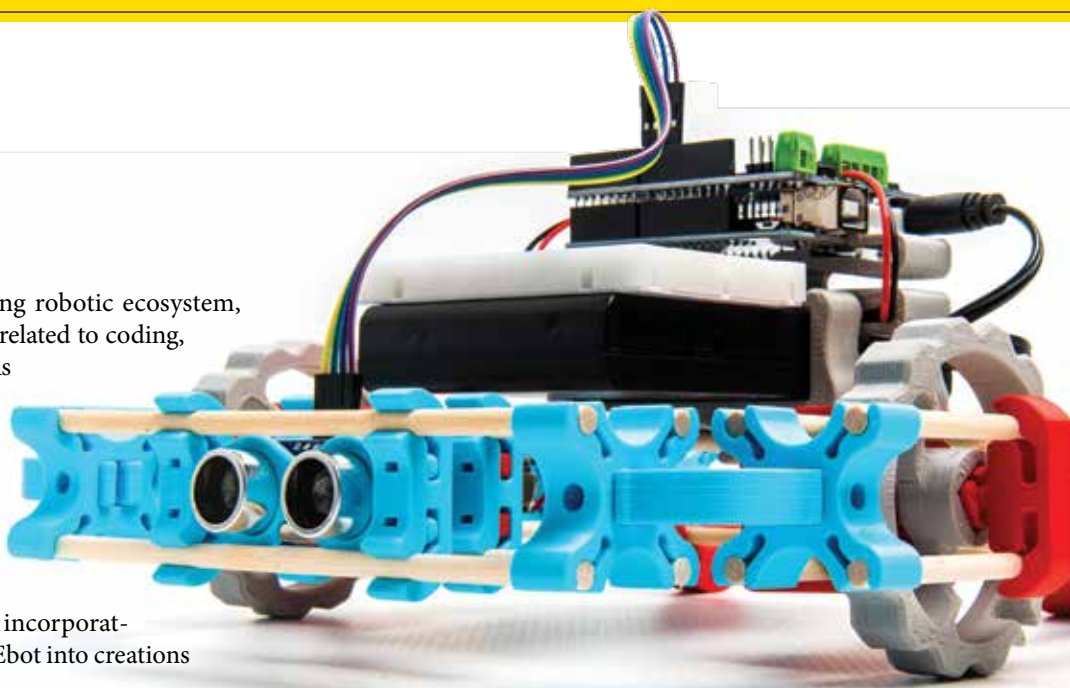
EXPANDING, 3D-PRINTED
ROBOT ECOSYSTEM

producthype.co/morebot

Billed as a modular STEM learning robotic ecosystem, MOREbot teaches invention skills related to coding, 3D printing, electronics and more. As users learn and grow, the ecosystem grows to accommodate different add-ons that help transform the robot into other things.

MOREbot starts with a Base Robot that users can build and control via mobile application. Creators can expand the robot by incorporating add-on kits to transform MOREbot into creations such as a catapult or a robotic arm.

The Base Robot contains one Bluetooth module, two motors, one Arduino Uno, one Arduino motor controller shield, more than 30 3D-printed parts, and more. The base robot set, which will retail for \$99, is to be sent to Rewards backers in August.



**“Whoever had invented long division
has a lot to answer for.”**—JOAN LINGARD



Kinflyte

HIGH-TECH ACTIVE BRA
AND UNDERWEAR CAPSULE

kinflyte.com

The Kinflyte set includes a wire-free bra, built-in bra top, and high-rise underwear.

The patent-pending system of hidden compression promotes improved body alignment and provides posture support for the bust, shoulders and back. It works with your body to help improve alignment.

Using the latest in technical performance knits, Kinflyte essentials are soft against the skin, comfortable and breathable. They feature moisture-wicking, anti-odor, antimicrobia and UPF50 UV protection, with hidden stash pockets, gold accent detailing and reinforced stitching.

The three-piece set will retail for \$307. Delivery for backers is set for August.

A Last Will for Peace

ALFRED NOBEL'S HISTORIC PRIZES MAY HAVE RESULTED FROM AN ERRONEOUS OBITUARY **BY REID CREAGER**

WHEN Alfred Nobel read his obituary, it could have killed him.

It was shocking enough to see the erroneous write-up in a French newspaper following the death of his brother, Ludvig, in 1888. But when the inventor of dynamite—who ultimately amassed 355 patents—saw how he was vilified as a destructive influence on society and referred to as “the merchant of death,” he was, well, blown away.

In fact, Alfred Nobel's reaction may have been the main impetus for the Nobel Prize.

Early hardships, triumphs

Nobel was one of eight children, born into poverty in Stockholm, Sweden, in 1833. The family business faltered; their home burned to the ground. Alfred was weak and fragile from birth and had health issues his entire life.

His father, Immanuel, left for Finland when Alfred was 4 to pursue business opportunities. He eventually formed a company that produced arms for the Russian military, and it flourished. The family reunited in St. Petersburg when Alfred was 9.

The young boy thrived under the direction of private tutors. He embraced writing, became a Shakespeare devotee and began writing poetry. But his father wanted him to join the family business, which he did at 19.

Not long after, the business suffered dramatically after Russia's 1856 defeat in the Crimean War. His father had experimented with a new explosive called nitroglycerin—produced by mixing glycerine

with sulfuric and nitric acid—but found its use to be unsafe.

Explosives always fascinated Alfred. He and his father knew it had great potential for industrial and commercial use. But their experiments proved exceedingly dangerous, and deadly.

In 1864, Alfred's younger brother Emil and several others were killed in an explosion at one of their factories in Sweden. Alfred's obsession with discovering a safer explosive intensified. Three years later, he discovered that mixing nitroglycerin with diatomaceous earth resulted in a stable paste that could be shaped into short sticks, which mining companies could use to blast through rock.

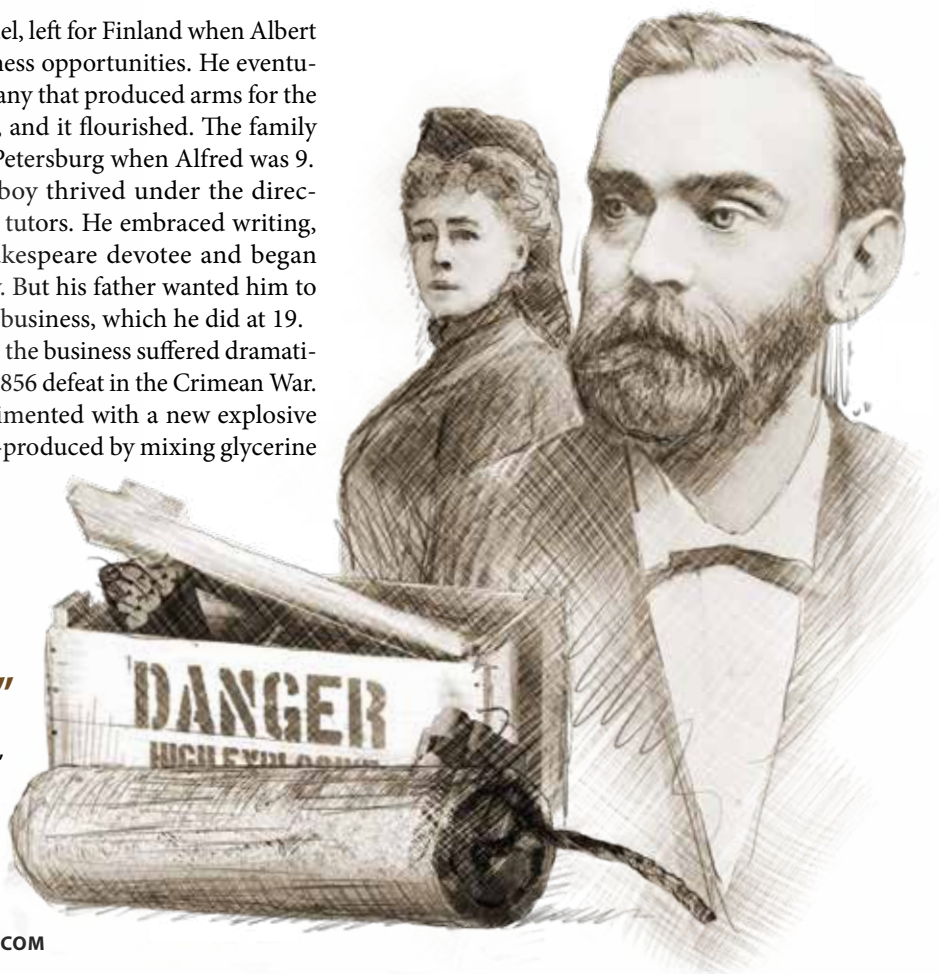
The results were dynamite. Its dramatic impact on the mining, construction and demolition industries made Alfred Nobel incredibly wealthy.

When Alfred Nobel wrote his last will in 1895, the year before he died, his estate was worth a lot of coin: about \$300 million in today's dollars.



“He received a psychic wound so deep, so mortal, that he could never recover from it.”

—FROM THE BOOK “ALFRED NOBEL: THE LONELIEST MILLIONAIRE”



Devastating surprise

Dynamite was also used for cannons in the Spanish-American War, which didn't comport with the soul of its inventor. Nobel was a shy, quiet writer of poetry who was devoted to nonviolent efforts. In fact, he supported those who spoke out against war.

He placed a newspaper ad seeking a "secretary and supervisor of household" that was answered by an Austrian woman named Bertha von Suttner. The two struck up a relationship. She was a strong advocate for disarmament.

In 1888, the year Nobel turned 55, his brother Ludvig died of a heart attack in France. His obituary appeared in a French newspaper, which confused Ludvig with Alfred. The decidedly disrespectful write-up referred to Alfred Nobel as the merchant of death for his invention of dynamite.

Reading the obit in his Sevrin laboratory, Nobel was devastated. According to the biography "Alfred Nobel: The Loneliest Millionaire" by Michael Evlanoff and Marjorie Fluor (1969), "He received a psychic wound so deep, so mortal, that he could never recover from it."

In "Alfred Nobel: A Biography" (1991), which drew on some of Nobel's vast collection of letters, author Kenne Fant went a step further.

"It pained him so much he never forgot it." He "became so obsessed with his posthumous reputation" that he would not rest until he had crafted "a cause upon which no future obituary writer would be able to cast aspersions."

Final, historic gesture

On Nov. 27, 1895, Nobel wrote his third and last will. It set aside most of his massive estate, estimated at \$300 million in today's dollars, to provide cash awards for five annual prizes in the fields of

chemistry, literature, physiology or medicine, physics—and peace. He died the following year, and the first prizes were awarded in 1901.

Historians seem divided as to whether the erroneous obit sparked Nobel's quest to establish the prizes. Nobelpeaceprize.org makes no mention of the obituary, saying only that "there is reason to believe that the establishment of the Nobel Peace Prize was principally inspired by (Bertha von Suttner)"—who, incidentally, won the peace prize in 1905.

Regardless, the notion that an obituary written for the wrong person may have led to the inception of perhaps the world's most iconic humanitarian prize is a stirring ironic element of the Nobel legacy. 🕒

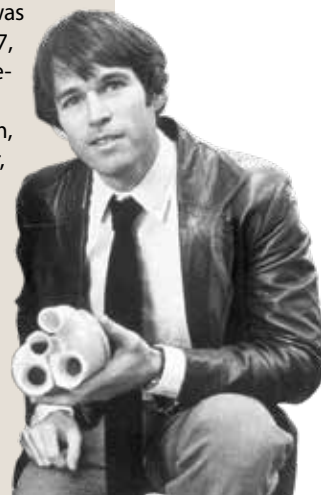
INVENTOR ARCHIVES: MAY

May 11, 1946: Robert Jarvik, a U.S. scientist who developed the Jarvik-7 heart with his mentor, Willem Kolff, was born in Midland, Michigan.

In 1982, Seattle dentist Dr. Barney Clark was the first person implanted with the Jarvik-7, the first artificial heart intended to last a lifetime. The patient survived 112 days.

According to the Lemelson-MIT Program, the Jarvik-7 is made of dacron polyester, plastic and aluminum with an internal power system that regulates the pump through a system of compressed air hoses entering the heart through the chest. The air hoses are connected to the chambers. The heart's power system drives the pumps, which pump blood through the patient's body.

The second patient to receive the Jarvik-7 lived for 620 days after implantation.



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Your 7-Step Social Media Plan

THINK CRITICALLY AND HONESTLY, USING THESE STRATEGIES TO MAX OUT YOUR MARKETING GOALS **BY ELIZABETH BREEDLOVE**

SOcial media campaigns can be a great way to promote your invention, so long as you have a strong campaign in place.

Making an impact on Facebook, Twitter, LinkedIn or Instagram isn't something you can "set and forget"; it takes intentional, regular activity if you want to find success.

Fortunately, it doesn't have to be difficult. Establishing a thoughtful plan is key to finding social media success without the stress.

Here are seven steps for creating and implementing an effective social media marketing campaign.

Step 1: Consider what you can dedicate to social media marketing. Managing social platforms requires a variety of resources, so think critically about what you have to offer to your social platforms:

- **Time:** How much time do you have to devote to social media per day? Per week? Consider the time you actually have, not what you wish you had. The idea is to set a reasonable goal for the amount of time you'll spend managing these accounts so that you can decide how to use that time.
- **Money:** Do you have room in your budget to cover expenses such as social media management software or social media advertisements? If so, how much can you spend? If not, are you willing to perhaps devote a little extra time to organic, manual management instead?
- **Expertise:** What experience do you have with social media or with marketing that you can draw from to create and implement your social media marketing campaign? What are your strengths, and how can you use them as you market your product using social media?

Step 2: Consider who your target market is and where they spend time online. If you're actively

trying to create, market and sell your invention, you likely already have the first part figured out. Once you know your target market, examine where your audience spends time online. Are they primarily on Facebook? Instagram? Twitter? LinkedIn? YouTube? Figuring out where those who like products like yours spend time online will help you zero in on where to focus your efforts, and what social networks to ignore.

Step 3: Consider how you want to use social media.

There are many different ways to use social media, so think critically about what works best given your skills, time, budget and where your audience spends their time.

Are paid advertisements the best approach to social media marketing for your invention? Do you want to use social media to build a community around your invention? Do you want your social platforms to serve as a customer service avenue for your business?

Note that you don't have to choose just one of these; you can use your social media profiles to run ads, build a community and handle customer service issues. However, before you can create an actual plan, you must first consider how you want to use social media to support your product or new business.

Step 4: Set your goals. At this point, you're ready to set your social media goals. Remember to set SMART goals—those that are specific, measurable, attainable, relevant and time-bound. This is important because it ensures that you are setting the types of goals that can be successfully executed. For example, instead of setting the goal to "get more Twitter followers," set a goal to "get 100 Twitter followers in the next 30 days." This is a goal that is clearly defined and has a clear ending point.



Consider the time you actually have to devote to social media, not what you wish you had.

Step 5: Develop a plan for your social media marketing campaign. By now, you likely have a fairly good idea of how you need to use social media to hit your goals, market your invention and make your business a success. This is your chance to fully build out your idea and create an actual, specific plan for how you'll use social media for your invention. This plan should include details such as:

- What social networks you'll use
- What types of content you'll post
- Where you'll source your content (photoshoot, stock photography, designed graphics, etc.)
- When and how often you'll post
- Who will handle posting
- Who will handle responding to comments and messages
- How often you'll check comments and messages
- What software, if any, you'll use to schedule posts, research hashtags or analyze performance

Step 6: Set benchmarks or Key Performance Indicators (KPIs) to help you reach your goal. Benchmarks or KPIs can be thought of as mini-goals that help you monitor your progress for your primary goal. For example, let's say your goal is to sell 12 units of your invention through social media in the first month. A benchmark or KPI might be to sell three units per week attributable to social media. You'll use these benchmarks and KPIs periodically to keep you on track as you implement your campaign, and to help you stay focused on meeting your goals.

Step 7: Analyze your progress and make changes regularly. Establishing a social media plan and implementing a campaign isn't enough if you want to hit your social media goals; you must also analyze what you've done and course correct as needed.

For example, using the previous example, suppose you are two weeks into your campaign and you have only sold two units each week through social media. This is indicative that something needs to change.

Perhaps you need to post more frequently. Maybe you're focusing on the wrong social networks. Maybe your customer service efforts are lacking and you need to respond to comments and messages in a more timely manner. Take a hard look at what you're doing, what's working and what isn't, and then decide what you can improve.

In other words, don't be afraid to shift your efforts mid-campaign if that's what it takes to reach your goal. If you want to sell three products per week, for example, and you've gotten two sales from Facebook but not from Twitter, it may be a good idea to focus more on Facebook and less on Twitter. 📱

Elizabeth Breedlove is content marketing manager at Enventys Partners, a product development, crowdfunding and inbound marketing agency. She has helped start-ups and small businesses launch new products and inventions via social media, blogging, email marketing and more.



A Sell Sheet Primer

THOSE SEEKING A LICENSING DEAL SHOULD KEEP IT SIMPLE,
SHOW THE BIG BENEFIT **BY HOWIE BUSCH**

I F YOU'RE associated with inventing, I'm sure you've heard the term "sell sheet." More than likely, you've put together a sell sheet for one of your products.

And if you're in the licensing game more specifically—or looking to get into it—you should learn as much as you can about making a great sell sheet. Because if you're looking to license, you'll definitely need one (and/or video sell sheet).

I'm here to help demystify sell sheets for you with some tips and tricks that will help you make them better and hopefully, license more products.

The truth is that most sell sheets aren't that good. I've seen thousands of them over the years, and I would say that 90 percent of them don't do the product any favors.

I think part of the reason so many sell sheets aren't effective is that most Inventors don't really understand the goal, which is far simpler than most Inventors think.

The goal is not to tell share every single thing there is to know about the product. The goal is simply to intrigue potential licensees enough so that they want to learn more about it.

That's right; no one has ever licensed a product from a sell sheet alone (well, as far as I know, at least). You just want to encourage questions and a conversation.

How do you do that? Instead of telling them everything there is to know about your product, just show the big benefit. And they'll get it.

So, what makes a killer sell sheet? I've broken it down into four easily digestible elements. Nail these, and you'll be one step closer to that licensing deal.

Product name: You really don't need to come up with a product name (I've seen plenty of people sign licensing deals without coming up with a name, based solely on the strength of the product or the benefit it provides). That said, I like to come up with a good name. It's part of the creative process for me.

But I also have to keep in mind that even if I come up with a name I love, the company I license

the product to may not like it as much. And when I do come up with a name, I try to come up with something that's descriptive of the product and helps the potential licensor visualize what the product is or does.

A specific example comes to mind with someone I was coaching. Her product was a window seat for your pet.

At first, she was manufacturing herself and selling it online and in local pet retailers. At a certain point, she decided she didn't want to manufacture and sell, so she wanted to try the licensing route.

The product was called "Lucinda's Lookout (name changed to protect the innocent ... feline)." She had a cat named Lucinda so wanted to honor her cat with that name. That's a nice thought, but when trying to license, nobody knows or cares who Lucinda is.

So we changed the product's name to something more easily understandable. We called it the "Pet Window Seat."

One-sentence benefit statement or tagline: I spend a lot of time on this because it's really important. Sometimes it comes to me quickly, and sometimes it takes a while.

So, what makes a strong one-sentence benefit statement? For me, it's a phrase that nails the key benefit of the product and can't be used for any other product on the market. Plus, the best ones tend to put an image in the reader's/viewer's mind, so they can actually visualize the product and benefit.

Let's go back to Lucinda and the newly named Pet Window Seat. Her original benefit statement was, "designed for savvy dogs and cats who appreciate the finest in comfort, style and a fantastic view!"

That's a mouthful. We needed to make it pop a little more and make it a little more visual.

We changed it to "Give your pet the best seat in the house." Together with the name, you get what the product is. Now throw in the killer images she had, and you can see why she was able to license the product much quicker with this new wording.



I've seen thousands of sell sheets over the years, and I would say that 90 percent of them don't do the product any favors.

The copy: As much as possible, try to focus on the product benefits. You can also talk about any great features here, but generally speaking, saying something is machine washable isn't something that needs to be said (unless it's really unique or surprising).

If there's more than one benefit, here's where you would add that. This can be accomplished via bullet points, or as text scattered throughout the document. There's no one formula for this.

Remember, you're not looking to tell them how many come in a carton, what it weighs, or that they may come in packs of two. Don't talk to them in your copy like they're a manufacturer or a retailer; if you're trying to license to them, speak to them like they're the customer.

They know what will get their customer excited. So if it would get their customer excited, it will get them excited.

One thing to keep in mind for the copy: Less is more. So many inventors want to tell everything.

Don't feel the need to add things because you think you don't have enough text. If the product benefit(s) is clear and they get it without too much text, go with that.

The best sell sheets are like a great advertisement, so tons of copy is not always necessary.

Images: They are important. But to be honest, this one's a little tricky.

There are so many image options. You may stress over getting the perfect image or images with your prototype.

But that may not always be the best option, especially if the prototype is kind of rough. In that

case, you might be better off getting something Photoshopped—or in some cases, using a line drawing (like those in a patent) might be the best option.

With images, sometimes you won't know until you see it. That's often how it works for me. I might think something will look good, and then I see it and have to change it up.

It's a process. I'm very much of a "I'll know it when I see it" type of person.

But if you can show the product being used and the benefit in action, that is always the goal. Sometimes you can't, and you have to figure out how to make the images and the words work well together to tell the story.

Also, try to show credibility. If you have a particular reason for inventing the product—such as you're an emergency room nurse and you've developed something that stops bleeding twice as fast—that's relevant and will get the potential licensee to take you even more seriously. So make sure you indicate that in the sell sheet.

Look at your sell sheet. If inventing is a movie, the sell sheet is the trailer. It gives you just enough to whet your appetite and after seeing it, you get it ... and you'll know if you want to see the whole movie. 🎬

Howie Busch is an inventor, entrepreneur and attorney who helps people get products to market through licensing, manufacturing or crowdfunding. Possibly the world's least handy inventor, he has licensed many products, run a successful Kickstarter campaign and appeared on "Shark Tank."



It's All Downhill From Here

POCKET-SIZED TOTE WITH A WHEEL LETS SKIERS ROLL THEIR SKIS INSTEAD OF CARRYING THEM **BY EDITH G. TOLCHIN**

I HAVE NEVER attempted skiing or had any inclination to do so. But many years ago I wrote one of my first newspaper columns from high atop Belleayre Mountain in New York state, safely ensconced inside the ski lodge, content with just a laptop and a hot chocolate.

The views were gorgeous, and I never had to worry about falling flat on my bum. And even if I never plan on skiing or snowboarding, I do know good inventions. Here is one that was “bitten” by “Shark Tank” star Barbara Corcoran.

Edith G. Tolchin (EGT): What is your background, and have you invented anything before this product?

Kyle Allen (KA): I was born and raised in the south. My wife and I currently split our time between our home in Lafayette, Louisiana, and Snowmass, Colorado.

I have been an entrepreneur all my life. I have started and sold several companies, mostly involving the oil and gas industry. Ski-Z® is the first invention I have created for retail.

EGT: What is Ski-Z, and how does it work?

KA: Ski-Z is a pocket-sized ski tote designed with a wheel, so skiers of all ages can easily roll their skis instead of having to carry them. The Ski-Z simply attaches to the front of your skis with a handy Velcro strap. You can push it, pull it and turn it on a dime!

EGT: What is Ski-Z made of?

KA: The Ski-Z is a nylon injection mold that fits on the front of your skis and tightens with a Velcro (hook and loop) strap. The skis are carried by a super high rebound wheel that allows your skis to roll on any surface.

EGT: What are the color choices? How is the product packaged?

KA: Ski-Z comes in four dynamic colors: red, green, gray and pink. The packaging is small and colorful and made with recycled cardboard.

EGT: Tell us about your “Shark Tank” experience.

KA: Last July, my wife Tanya and I were at a restaurant in Denver having dinner. Tanya asked me what project we should focus on next. I told her my dream was to get Ski-Z on “Shark Tank.” It had been on my mind for eight years.

Tanya immediately reached for her phone and looked up “Shark Tank” audition dates and locations. We were shocked to find out that the last auditions for the year were in one week from that day, and they were going to be held right there in Denver! We quickly called our friend and business partner Nick Palermo. He was onboard to be on the show, and the next five months were crazy.

The live filming of the show was at Sony Studios in Culver City, California. The filming was very intense. It was like being in combat! They filmed us live and uninterrupted for 45 minutes. The editing team cut it down to 10 minutes for the airing of the show. It was an amazing experience. We ended up making a deal with Barbara Corcoran for \$50,000 and 15 percent of our company.

EGT: Your website says that Ski-Z is made in the USA. How were you able to keep costs down low enough to keep from manufacturing overseas?

KA: Our labor force in the United States is far more superior when it comes to quality than in many other countries. Understanding manufacturing and how to utilize the labor force in the United States is the cornerstone to Ski-Z’s success.

EGT: What is the retail price? Where are you selling?

KA: The original cost is \$24.95. However, it has sold for as low \$18.95 during specific sale promotions. It



“Once you have a thought, take that idea and reverse engineer it. Set goals based on what outcome you would like to obtain.” —KYLE ALLEN

is currently sold on our website SkiJunk.com and also on Amazon. It will be sold through local retailers in the near future.

EGT: Please tell us about your patent experience.

KA: It was a difficult and timely process. During that time, there were several companies in the United States and overseas that were attempting to infringe on our product. Our utility patent took two years to process and was finalized in 2013. The name Ski-Z is trademarked.

EGT: Who handles your PR?

KA: Our PR is handled in-house.

EGT: Any plans to add items to your product line?

KA: Other products are being discussed, but our main focus right now is Ski-Z.

EGT: Can you share any advice for novice inventors?

KA: Never let an invention be a dream ... make it reality! There will be many setbacks, but I believe that setbacks are made to be set-ups. Don't let the valleys discourage you. With risk comes reward!

There is always so much excitement on the front end of an invention, and sometimes you lose sight of the result. My advice is once you have a thought, take that idea and reverse engineer it. Set goals based on what outcome you would like to obtain. Evaluate your idea and transform it into a business plan. Ask yourself the important questions, not the imaginary ones. In the early stages, it's easy to make poor decisions based on emotion—such as: taking on partnerships, inviting in friends or family, giving away too much equity, or mortgaging something that is already paid off.

An invention is a long-term goal. It can take years for it to transpire. You have to have good planning and patience.



Think of your invention as a seed. You have to nurture it before it reaches its full potential. During the period of incubation, it would be wise to study the risk, market size and associated cost in marketing.

At this point, a comprehensive study by a third party could be very valuable in your business plan. These types of companies can offer you analytics that can assist you in setting realistic goals and expectations.

In everyday life, traffic signals we're accustomed to are in the order of green, yellow and red. To an inventor, or in a successful business, it should be the opposite. You should reverse the color order to: red (stop and evaluate), yellow (caution and research), and then green (proceed). 🚦

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Books by **Edie Tolchin** (egt@edietolchin.com) include "Fanny on Fire" (fannyonfire.com) and "Secrets of Successful Inventing." She has written for *Inventors Digest* since 2000. Edie has owned EGT Global Trading since 1997, assisting inventors with product safety issues and China manufacturing.



Above: "Shark Tank" star Barbara Corcoran was so impressed with Kyle Allen's Ski-Z that she made a deal with his company for \$50,000 and 15 percent of the company.

A Novel Game of Cat and Mouse

VERSATILE ROBOTIC TOY USES RODENT'S REACTIVITY TO KEEP FELINES CAPTIVATED **BY JEREMY LOSAW**

FINDING A TOY that will sustain a cat's interest can be so difficult that three PhD candidates set out on the challenge.

They used their findings to create the Mousr robotic toy, which is shaped and sized to look roughly like a mouse. Utilizing cats' ancestral heritage as hunters, they programmed the toy to drive around the floor and tempt felines into play with its erratic drive motion and motorized tail.

Mousr can sense when a cat is about to pounce and will attempt to escape to keep cats captivated. It has relatively large drive wheels to navigate a variety of indoor surfaces and is designed so that it will still drive even if it gets flipped upside-down during play.

The toy has three different pre-programmed drive styles that can be modified to suit the play styles of different cats via a free app. A compatible iOS or Android device is required.

Mousr includes a rechargeable battery that lasts for 40 minutes on a charge, and its tail can be easily changed with different designs to help maintain interest for the cat.

Prototype surprise

Cat owners David Jun, Michael Friedman and Dave Cohen, students at the University of Illinois, were all studying electrical engineering and signal processing. Their cats would often be used as test subjects when the team was developing sensors for their studies.

The team began musing about what a robotic cat toy might look like.

"If you watch a cat with a real mouse, it never loses attention," Cohen said. "If you could have the reactivity that a mouse has, it would sustain a play session longer."

To test the idea, the three spent a weekend building a prototype. They used a 3pi developer robotics kit and some motion sensors, and programmed it to react to an approaching cat.

The first prototype was encouraging but nowhere near good enough for production. On a whim, the team entered the prototype into the pitch competition at the university. There were no expectations.

At the competition the students met other hardware start-ups, one of which introduced them to the hardware accelerator program HAX (then called HAXL8TR). They spoke with Cyril Ebersweiler, one of the partners, and were offered an opportunity to

"If you watch a cat with a real mouse, it never loses attention."

—DAVE COHEN

University of Illinois students (from left) David Jun, Michael Friedman and Dave Cohen used their cats as test subjects while developing sensors for their studies.





join the program and go to Shenzhen, China, to continue development of Moursr.

“We were super early at the time. The opportunity for electrical engineers to go to the electronics playground of the world ... was a pretty special opportunity,” Cohen said.

They accepted the offer and took a leave of absence from their PhD studies to pursue Moursr full time.

Design challenges

In a few months, the three had a prototype that was ready to launch. They founded their company, Petronics, in 2014, and put Moursr on Kickstarter at the end of the year. It raised more than \$100,000.

But it was another four years before they delivered to crowdfunding backers. The product had some difficult design challenges, as the team was essentially creating a miniature autonomous vehicle. It needed to be tough, appeal to cats, be priced correctly, and work reliably in the home environment.

“We inadvertently picked a really hard product to introduce,” Cohen said. “It involved making a lot of tough trade-offs along the way.”

It took a lot of iteration and exploration to find a balance that would work in the market. They had to eliminate a camera-based pounce prediction sensor due to size constraints and ended up having to create custom drive components to ensure it would be tough enough.

Solid strategies

The IP strategy was a balance between the team’s resources, time and protection. The trio filed a utility patent early and have followed up with additional filings based on ongoing innovation. They also filed

trademarks, which they found to be very valuable because they protect against inferior products using the same name.

They admit that building an IP portfolio has helped build credibility for a product that is in a whimsical category, even though the product is very innovative.

Cohen and the team were able to find manufacturing sources through the HAX network. They found a right-sized factory solution overseas and since they had so many custom parts, they had to develop their own quality assurance protocols. In 2018, they were finally able to deliver to Kickstarter backers and fulfill pre-orders. They kept in close communication with their early users and made some key changes to the app and the UX/UI from the early feedback.

The Petronics team and Moursr have had positive customer and industry feedback. Moursr was named the APPA Best New Cat Product for 2018 and was honored at the 2018 Global Pet Expo with the Best Cat Enrichment Product.

The three are continuing to build on the momentum of their launch to build sales channels and customer following, while working on adding to their line of tail accessories for the product. 🐾

Details: petronics.io



The Moursr robotic toy, which can sense when cats are about to pounce, has a free app and requires a compatible iOS or Android device.

Jeremy Losaw is a freelance writer and engineering manager for Enventys. He was the 1994 Searles Middle School Geography Bee Champion. He blogs at blog.edisonnation.com/category/prototyping/.





AUTO INNOVATION 2019

BY REID CREAGER

Parkopedia, GasBuddy and Waze help you find parking spots, the best gas deals, and provide real-time traffic info.

FOR the better part of a century, this exasperating scene has played out in cold-weather locales throughout the world: Following a night of freezing drizzle, you step haltingly to your car in the driveway to warm it up for the morning commute. Your heart sinks and your blood pressure soars as you see that the door lock is frozen shut.

No more.

Thanks to connected mobile apps, you can remotely lock and unlock the doors from inside your home, and start your car with your

smartphone without risking life and limb on your glasslike steps and pavement.

Connected mobile apps are changing the automotive experience before we even reach for the car door. They offer more than convenience; they provide real-time information and safety (you can even check fuel and tire pressure now).

These apps are among the most noteworthy innovations in automotive technology in the past few years. Here are our top 10 newest inventions and services, in no particular order, that would have gotten Karl Benz all revved up.

Connected mobile apps

Want the latest real-time warnings about accidents, traffic, speed traps, construction delays—even natural disasters? Waze, a live traffic app, becomes more useful as more people in the area are using it.

GasBuddy helps your dollar go farther as your car sits idling in said traffic. Like Waze, it relies on crowdsourced data via users who report gas price information through its app or website.

There are two kinds of drivers: those who hate looking for a parking spot, and those who despise looking for a parking spot. Parkopedia has an index of 60 million parking spaces in more than 8,000 cities worldwide.



You can also buy a car or rent one through certain connected mobile apps. Whichever app you select, don't forget to check whether there is a monthly or yearly subscription fee connected to them.

Teen driver technology

You may have heard of some cars with teenage driver controls. Chevrolet's teen driver feature notifies you if the car is driven beyond a certain speed, and (gasp!) disables the stereo if seat belts aren't used.

Other safety technologies include a Side Blind Zone Alert, Forward Collision Alert and Forward Automatic Braking.

The feature also allows you to track your teen's driving performance via the industry's first in-vehicle report card. It tells parents whether safety systems like ABS or forward collision alert were activated while the teen was driving.

The goal is to give parents the tools to discuss and correct some possible mistakes their teens make behind the wheel.

Stolen vehicle tracking software

The numbers are catching up to the crooks. Experts estimate that nearly 46 percent of the 750,000-plus motor vehicles projected to be stolen this year will be recovered. Credit automakers with technology that they are building into their vehicles.

Technology such as BMW's Connected Drive or GM's OnStar protect drivers in two ways. They allow effortless diagnostics, concierge, and post-crash notification for summoning rescue services, and also can be used by police to pinpoint the exact location of a vehicle that is no longer in the owner's possession.

OnStar's Theft Alarm Notification can inform you if your car alarm goes off. Once you report your stolen vehicle to OnStar, advisers can use GPS technology to locate your vehicle, alert authorities and, in some cases, remotely slow your vehicle so thieves won't get far.

With its trademarked Remote Ignition Block system, OnStar can also remotely prevent a thief from restarting your vehicle. If your vehicle is stolen, advisers work with local authorities.

Adaptive cruise control

This technology improves on the decades-old concept of cruise control to further ease the commuting experience. By using sensors built into the car, adaptive cruise control can match the speed of the car in front of you, meaning you don't need to constantly hit the gas and brake in highway traffic.

Even the frustration of stop-and-go traffic can disappear via systems that allow the car to be brought to a complete stop and then resume automatically. (If you're thinking this is a precursor to a driverless car world, you advance to the bonus round.)

Once an expensive option that was reserved for luxury cars, ACC is now standard equipment in a number of models that retail for less than \$25,000. A late 2018 study by U.S. News & World Report said that the 2019 Honda Fit is "the most affordable vehicle with adaptive cruise control available today." It was also named one of the best new cars for teens.



Top left: Chevrolet's teen driver feature gives notifications if the car is driven beyond a certain speed, and disables the stereo if seat belts aren't used.

Top right: Honda's adaptive cruise control can match the speed of the car in front of you.

Above: OnStar's Theft Alarm Notification can, in some cases, remotely slow your vehicle so thieves won't get far.



Top left: GM's front pedestrian braking uses sensors to determine whether an accident is imminent and automatically applies the brakes.

Top right: The GMC Acadia Rear Seat Reminder tells drivers to check the back seat before leaving the vehicle. Hyundai's system, on certain models, monitors the rear seat for motion after the car is parked and all doors are locked.

Above: BMW's pilot program in the United States is developing a wireless charging plan for electric vehicles.

Automatic emergency braking

AEB uses sensors to determine whether a forward collision crash is imminent and automatically applies the brakes to diminish the severity, or avoid a crash entirely.

This feature is so important that the auto industry agreed to make AEB standard in cars by 2022. One caveat: Don't routinely rely on AEB to stop you because it's designed to be a last resort when the driver is distracted. It can be very alarming when the system engages.

The feature comes in two forms. In city automatic emergency braking (CAEB), brakes are automatically applied to prevent a collision or reduce collision severity when traveling at city speed. In highway automatic emergency braking (HAEB), brakes are automatically applied when the car is traveling at highway speed.

U.S. News & World Report has a recent list of dozens of models costing less than \$25,000 and including AEB.

Rear occupant alert

For most cars with this feature, it entails reminding drivers that the rear door is open before the trip. But Hyundai's system on certain models uses sensors to keep monitoring the rear seat for motion after the car is parked and all doors are locked.

Hyundai's version defaults to "on," rather than relying on parents to activate it. If the vehicle is locked and the ultrasonic sensor detects movement in the rear seat, the horn honks on and off for about 25 seconds—a potentially important warning to prevent child heat-related injury or death.

If the alert is not disabled by unlocking the vehicle and opening the rear door and the sensor detects movement again, the horn will sound for another 25 seconds. This sequence runs up to eight times.

Wireless electric car charging

Even your electric toothbrush has wireless charging. So why hasn't this technology spread to electric vehicles?

That's about to change. BMW's pilot program in the United States is developing a wireless charging pad for electric vehicles. No more pulling into your garage, getting out and plugging in a cord. You just drive over the top of the charging pad.

In late March, Reuters reported that Norway's capital city of Oslo will be the world's first metropolitan area to install wireless, induction-based charging stations for electric taxis, in an effort to make a zero-emission cab system by as early as 2023. Further, Norway is mandating that all new cars sold in the country be all-electric by 2025.

But don't get your hopes up for a similar situation in the United States anytime soon. Norway has only 5.3 million people, making it easy for the government to make large-scale, holistic changes to its infrastructure. Also, Norway doesn't have any automotive company that would fight taxes and other legislation aiming to motivate citizens to use electric vehicles.

Distraction mitigation systems

As tech gadgets including the smartphone add greatly to the risk of distracted driving accidents, car makers are racing to add features to help reduce the soaring number of these incidents.

In a highly positive overall review, Forbes cited the Subaru Forester's DriverFocus technology, which uses facial recognition software to warn drivers showing signs of fatigue or distraction behind the wheel. It also allows drivers to pre-program their driving positions.

The car uses a dashboard-mounted facial recognition camera to scan a driver's face and automatically adjust seats, mirrors, and air-conditioning preferences to that driver.

Deluxe truck tailgate features

For some truck buyers, convenience is as important as safety. The six-way, adjustable, GMC Sierra MultiPro tailgate showcases the latest in versatile features at the rear of the vehicle.

MultiPro's design includes the primary gate, hinged like a conventional tailgate, and a smaller inner gate that is hinged within the primary gate panel itself. Raising and lowering these two tailgate panels in different combinations allows MultiPro to assume several different roles: a bed extender, an entry step, and many other functions.

If you want to run the stereo but not have the truck running, the 100-watt, exterior Kicker MultiPro Sound System is integrated within MultiPro's inner gate panel. The system incorporates two 4-inch coaxial drivers, a compact amplifier and controls, a USB port for device charging and flash memory playback, and full Bluetooth streaming compatibility.

Zero-emission trucks

Toyota and Kenworth are working together to develop zero-emission trucks. At this year's Consumer Electronics Show in January, Kenworth Truck Co. showcased a T680 converted to fuel cell electric power by Toyota Motor North America.

Kenworth and Toyota are collaborating to develop 10 zero-emission Kenworth T680s powered by Toyota hydrogen fuel

cell electric powertrains. It's part of a \$41 million Zero and Near-Zero Emissions Freight Facilities grant preliminarily awarded by the California Air Resources Board, with the Port of Los Angeles as the prime applicant.

The grant money is part of a larger \$82 million program that will put fuel cell electric tractors, hydrogen fueling infrastructure, and zero-emissions cargo handling equipment into operation in the ports and Los Angeles basin next year.

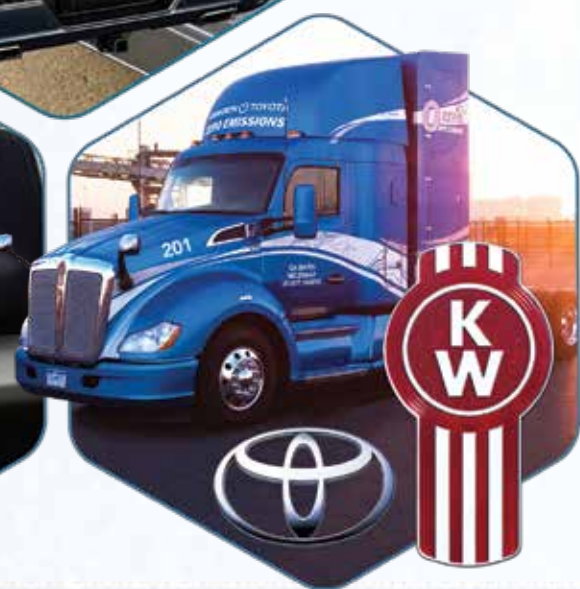
The Kenworth T680s will transport cargo across the Los Angeles basin and to inland cities while generating zero emissions other than water vapor, because of their fully electric hydrogen fuel cell powertrain integrations. 🚚



Left: GMC Sierra's MultiPro tailgate can assume many different roles.



Below left: Subaru Forester's DriverFocus technology fights distracted driving by letting the driver know if he or she is doing any potentially harmful things while behind the wheel.



Below right: Toyota and Kenworth are developing zero-emission trucks.



All-Time AUTO INVENTIONS

FROM THE STEAM ENGINE TO HIGH-TECH SAFETY, COMFORT

MOST, if not all, of the most impactful auto-related inventions listed here are obvious selections. What isn't as obvious is who invented the automobile itself.

That distinction generally comes down to either Karl Benz or Gottlieb Daimler.

Benz invented the first practical, modern automobile. It used a gasoline-powered internal-combustion engine and worked like today's cars.

Daimler was a pioneer of internal-combustion engines and automobile

development. He invented the high-speed, liquid petroleum-fueled engine, which is also the foundation of today's cars.

But the most important car-related inventions of all time transcend engine technology. They include milestone safety and convenience factors that have ensured the automobile remains as popular and essential as ever in our lives.

Steam engine

The car basically starts here.

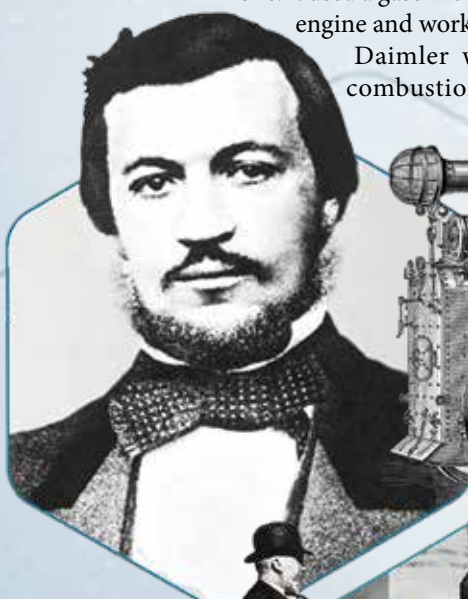
The steam engine is the flagship innovation in automobile engineering, as well as one of the most significant byproducts of the Industrial Revolution. The engine uses force produced by steam pressure to push a piston back and forth inside a cylinder.

In 1698, Thomas Savery patented a machine that could effectively draw water from flooded coal mines using steam pressure. Fourteen years later, Thomas Newcomen designed and installed the first practical and successful steam engine. In 1775, James Watt developed a reliable engine that was a refinement of Newcomen's work.

At first, steam engines led to the development of locomotives and ship propulsion before being refined for use in cars in the late 1800s. The car engine evolved further when it was replaced by the less-expensive internal combustion engine.

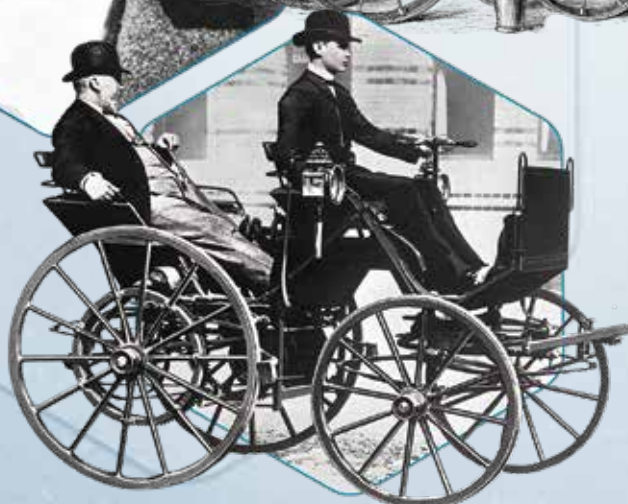
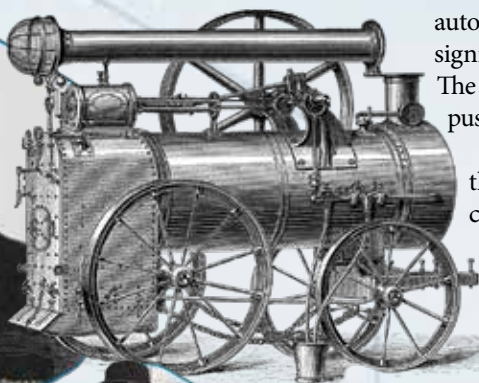
Internal-combustion engine

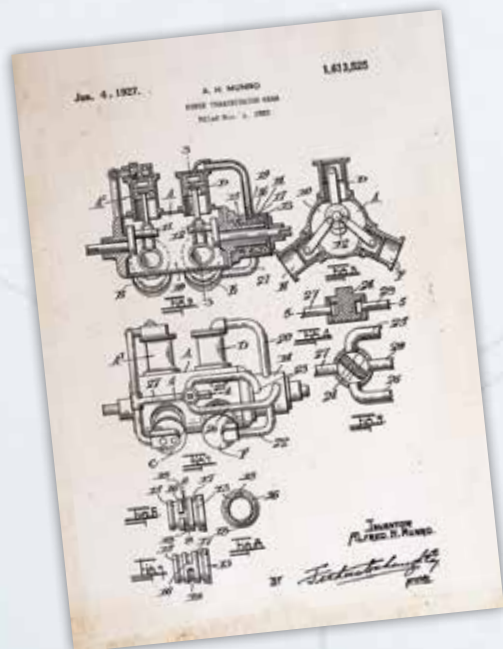
Contrary to what some believe, Henry Ford did not invent the internal-combustion engine. In fact, thehenryford.org credits Nikolaus Otto for the early 1860s innovation, which burns a mixture of fuel and air. (Some sources say that Etienne Lenior produced the first reliable one in 1859.)



Above: The Henry Ford website credits Nikolaus Otto with inventing the internal-combustion engine.

Right: Gottlieb Daimler rides in his "horseless carriage" driven by his son, Wilhelm, through the streets of Berlin in 1885.





These engines—which originally used coal gas, not gasoline—were a major success because they did not need a boiler or licensed operators. Plus, they could be started quickly, with no waiting period to raise steam.

The main advantage of the internal-combustion engine was its superior weight-to-power ratio. This allowed the engine to be used to drive motor vehicles, aircraft, tractors, submarines and tanks. Motor vehicles replaced railways as the principal means of land transport in the 20th century.

Ford did not receive a patent for his internal-combustion engine until 1935. His most historic accomplishment was installing the first moving assembly line for the mass production of automobiles.

Automatic transmission

More precisely called self-shifting transmission, this prevents drivers from having to change gears manually as the vehicle is moving. Besides being a plus for people with disabilities, it facilitates driving with two hands more often.

The story of the automatic transmission tells of a lost opportunity for Alfred Horner Munro, a Canadian. He originally developed it in 1921, patented his design in 1923 and received UK and U.S. patents in 1924 and 1927, respectively.

Munro's early design used compressed air rather than hydraulic fluid, as used by modern systems. But he was unable to find a commercial application for his invention.

In 1932, Brazilian engineers José Braz Araripe and Fernando Lely Lemos developed a hydraulic fluid version. They sold their design to General Motors in 1940, and driving was changed forever.

Catalytic converter

It could be argued that in terms of benefiting humankind, the catalytic converter is the most important automotive invention ever developed. It converts toxins and other pollutants into less hazardous forms, improving air quality.

Mounting concerns about the ecology in the early 1970s led to the Environmental Protection Agency drawing up stricter regulations on exhaust emissions in 1975. The catalytic converter concept came from French engineer Eugene Houdry, who was concerned about smog and air pollution in Los Angeles.

His catalytic muffler was patented in 1962. The first production converter, which refined Houdry's design, was produced in 1973.

Antilock brakes

Maybe we should have saved this amazing nugget for our monthly Inventiveness page at the back of the magazine: Antilock braking dates as far back as 1908, when we developed the system for trains. The concept was introduced in the aerospace industry in the 1950s before catching on in cars in the 1970s and motorcycles in the 1990s.

(The first patented antilock braking system was developed in 1928 by German engineer Karl Wessel, but a working product never materialized.)

In 1971, Chrysler introduced "Four-Wheel Sure



Top left: Alfred Horner Munro's patent for an automatic transmission design did not result in a commercial application for his invention.

Top right: Eugene Houdry, who conceived the pollution-reducing catalytic converter, holds a small version in 1953.

Above: The 1971 Chrysler Imperial featured the first computer-operated, four-wheel anti-skid braking system.

Right: Volvo engineer Nils Bohlin developed the first 3-point safety belt.

Below left: Roger L. Easton is shown with one of the first working NAVSTAR GPS satellites.

Below right: The flashing turn signal dates to the early 1900s.



air that was triggered using a spring, bumper contact or manually by the driver.

The technology was widely adopted in the 1960s, aided by the development of crash sensors. Several automakers included them in their 1970s models, but airbags didn't become standard equipment until the 1990s.

Even today, the explosive force of an airbag deploying can cause friction and power burns, detached retinas, suffocation and even death, especially in children. However, the National Highway Traffic Safety Administration reports that frontal air bags saved 44,869 lives in the United States from 1987 to 2015.

3-point seat belt

It is not clear who invented the 2-point seat belt. Edward J. Claghorn was issued the first U.S. patent for something like a seat belt in 1885, although in the patent application he describes it as having nothing to do with automobiles.

The belts appeared sporadically in cars afterward; some sources suggest they may have been used in racing activities and airplanes before the 1930s. What is clear is that these lap belts were incomplete from a safety standpoint because the upper torso would often fly forward, unprotected, in a crash.

Volvo engineer Nils Bohlin took the seat belt into safer territory by developing the 3-point belt, which is designed to dissipate deceleration energy during a collision over the chest/pelvis and shoulders of the passenger. Bohlin's belt was introduced by Volvo in 1959 and first appeared in the Volvo PV 544. Volvo later made the patent open in the interest of safety for the general public.

The NHTSA says seat belts save about 11,000 lives annually.

Flashing turn signal

Efforts to display an intention to turn have taken many interesting turns. According to secondchancegarage.com, Percy Douglas-Hamilton applied for a patent in 1907 (received in 1909) for a device "indicating the intended movements of vehicles." The lights were shaped like hands so other drivers, accustomed to reading hand signals, would understand their meaning.

In 1914, silent-film star Florence Lawrence designed a mechanical signaling arm but failed to patent it. (She also designed the first mechanical brake signal.) As the driver pushed a button, a sign

Brake," the first computer-operated, four-wheel anti-skid braking system to be offered on an American car. It was standard equipment on the '71 Imperial.

Electronic stability control, also referred to as electronic stability program or dynamic stability control, is an updated version of antilock brakes. This computerized technology improves a vehicle's stability by detecting and reducing loss of traction or skidding.

Airbags

The first patent for this life-saving invention was a race to the finish line between American John Hetrick (the generally acknowledged inventor) and Germany's Walter Linderer in 1951. Their systems used compressed



The first airbag patents came in 1951.

on the rear bumper came up telling others which way the driver would turn.

According to the December 1985 Popular Mechanics, the Protex Safety Signal Co. introduced flashing turn signals in 1920. The first modern turn signal came from Edgar A. Walz Jr., who in 1925 got a patent for one and tried to market it to major car manufacturers. They weren't interested, and the patent expired 14 years later.

The first flashing electric turn signal was patented in 1938 and offered on the Buick.

GPS

GPS has revolutionized the way almost all of us navigate. It not only takes the guesswork out of finding your driving destination, it's also helping to make maps a lot more rare and valuable!

Global Positioning System was originally developed by the U.S. government for use by its armed forces. It launched in 1973.

The first system used 24 satellites and became fully operational in 1995. Roger L. Easton of the Naval Research Laboratory, Ivan A. Getting of the Aerospace Corp. and Bradford Parkinson of the Applied Physics Laboratory are most often credited with inventing GPS.

Civilians have been allowed to use GPS since the 1980s, leading to its more universal uses. The systems are now integrated into many modern technologies.

Cruise control

We saved perhaps the most interesting capsule for last, one that is at the root of a future and possibly permanent trend. Cruise control was developed by inventor and Automotive Hall of Famer Ralph Teetor—who never drove because he was completely blind.

Teetor conceived of cruise control because he believed that uneven speeds were a big factor in accidents. While riding with his lawyer in the 1940s, he noticed the attorney had a tendency to slow down while talking and speed up while listening as he drove.

The system is based on a servomechanism to help maintain a car's speed by taking control of the throttle from the driver. It was first included on U.S. models in the 1958 Chrysler Imperial, New Yorker and Windsor. By 1960, cruise control was a standard feature on all Cadillacs. It further gained popularity as a fuel-saving feature during the oil crisis of the 1970s.

Radar was added to cruise control in the early 2000s—another milestone in a system that has paved the way for driverless cars. 🚗

—Reid Creager



DRIVERLESS CARS? This Much, We Know

No treatment of automotive invention can be complete without a discussion of driverless cars. When it comes to autonomous vehicles, it's easy to be optimistic—and pessimistic—about it happening soon.

You could spend weeks online reading the latest cheerleading and doomsaying about AVs and come away more confused than ever. Join the club.

So we'll stick to a few facts regarding why this might happen soon, and why it might not. But it seems there are more reasons to think the mainstream use of driverless cars is still decades away than reasons to think it will happen within a few years.

- **SOONER:** Because about 94 percent of vehicle crashes are caused by driver error, there is reason to get the technology on the road as soon as possible in order to save an estimated tens of thousands of lives each year.
- **LATER:** General Motors' rollout for its self-driving car division, Cruise Automation, is years behind schedule. Theweek.com reported in November that "prototypes by Ford, Tesla, and the Google affiliate Waymo would still flunk driver's ed."
- **SOONER:** Early this year, Britain's government said driverless cars will be on the country's roads by 2021.
- **LATER:** In March 2018, an Uber-owned AV going 40 mph in Tempe, Arizona, fatally struck a 49-year-old pedestrian crossing the street in the dark when the vehicle's perception system got confused by the bicycle she was wheeling. Uber suspended testing nationwide. Per Theweek.com, "AVs sometimes react to parked cars as if they're moving, and they get overwhelmed passing through construction zones. They're shaky at challenging maneuvers like turning left against oncoming traffic."
- **SOONER:** An article in Forbes magazine two years ago predicted that there will be 10 million self-driving cars on the road by 2020, with one in four cars self-driving by 2030. (The key words above are "two years ago.")
- **LATER:** Heavy snow, rain, fog and sandstorms can obstruct the view of cameras. Light beams sent out by laser sensors can bounce off snowflakes and not recognize them as obstacles—all while many companies are still trying to master the difficult task of driving on a clear day with steady traction. Roadway and lane lines aren't standardized around the world, so vehicles have to learn how to drive differently in each city.
- **SOONER:** Driverless vehicles are a common occurrence in Las Vegas—which last year had the 25,000th passenger trip provided by a collaboration between Aptiv and Lyft. The system uses several autonomous vehicles to ferry riders around the city.
- **LATER:** Public infrastructure such as stoplights, street signs and buildings will need to be equipped with advanced sensors to help driverless cars interact with their environment. This will require close collaboration between automotive companies and government agencies, which is potentially rife with problems. State and national safety regulations will have to be changed. And how long will it take for agreement on revamped insurance regulations?

CURMUDGEON VS. MILLENNIAL

NEWER CAR TECHNOLOGY IS KING OF THE ROAD, WITH EVEN GREATER POTENTIAL—AND QUESTIONS—AHEAD **BY JACK LANDER**

Old curmudgeon: “The Model A Ford—now, there was a car! It was simple, dependable, and you could repair it yourself.”

Millennial: “Right. But you had to disassemble the engine every 30,000 miles or so and replace the piston rings. The good news was that you had an automatic warning device known as the rearview mirror. You looked in it, and when the car behind you was obscured in a cloud of blue-gray smoke, you knew it was time for a ‘ring job.’ When the rings were worn, the oil got past them and into the combustion chambers, where it burned.

“And if you ignored the smoke, you’d soon hear what was called a rod knock. The bottom bearing on the piston crank arm had worn out due to lack of oil, and it slapped the crank shaft twice with each cycle of the engine. Ignore the rod knock and you’d fracture the crank arm, tearing the engine apart.”

Old curmudgeon: “OK, the old cars had problems. But the newer cars are too damned complicated. I don’t even know how to change the spark plugs anymore.”

Millennial: “I hear you. But spark plugs used to be replaced every 25,000 miles or so. Some drivers cleaned them on a sand blaster and re-gapped them. But that was even more trouble than installing new plugs. Nowadays, plugs last for more than 100,000 miles. So, don’t complain. Have a mechanic replace them when you find your gas mileage drop off a bit, or your car hesitate intermittently when climbing a hill.”

Old curmudgeon: “Say, young fella, how come you know so much about old cars?”

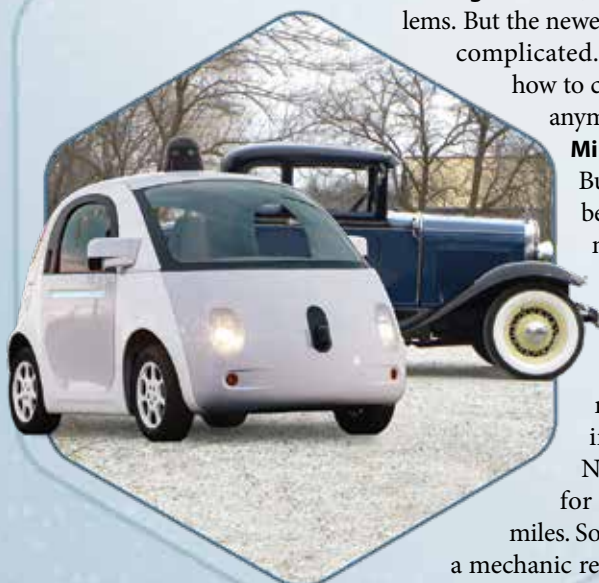
Millennial: My grandfather taught me. He has restored a number of them from the late ‘40s and ‘50s. I’m helping him with one right now.”

Old curmudgeon: “Well, the new cars are great, but we always knew how to troubleshoot when a car wouldn’t start. You can’t do that these days. It was either carburation or spark. Mostly, it was spark. So, we’d replace the distributor points and the condenser. Simple. But to be fair, sometimes we had to rebuild the carburetor.”

Millennial: “I’ll give you that. It was simple enough. But how often have you had a problem starting your ten-year-old Ford? Unless your battery is seven or eight years old and balks at cranking in very cold weather, I’ll bet you’ve never had a problem starting. And you’ve never had to replace your distributor points because there aren’t any. Modern ignition timing is solid state, and I’ve never known anyone to have a problem with it. Same with carburetion; it’s controlled by the computer, which is how you’re able to average 25 to 30 miles to the gallon around town.”

Old curmudgeon: “Well, yeah, I gotta admit that the mileage is great. But look at what we’ve lost. Those old Chrysler Imperials and Buick Roadmasters rode as smooth as silk, because they had the steel to hold them to the road. Some of those cars weighed close to 5,000 pounds. My new Camry weighs around 3,300 pounds.”

Millennial: “You’ve got a point. We’ve improved the ride a lot with modern suspension and shock-absorber design, but it isn’t quite the same as those old ‘battleships.’ Another point I’ll make on your side is that of the poor design of present-day car seating. Many years ago, cars had coil springs in the seats, and you could drive for hours without pressure points that put your butt to sleep. The resistance to pressure was even all across the entire surface of the seat.



“The springs in modern seats are the cheap, snake-like springs that anchor at the front and rear of the seat frame. And the resistance at the rear of the seat is substantially higher than in the middle.”

The millennial wins

Enough dialog. The old curmudgeon lost.

Today's cars may look essentially like those of 60 or 70 years ago. (Who wouldn't love to own a like-new '56 Chevy Bel Air today?) But today's cars are marvels of dependability and safety.

The main thing we've given up is weight—the absence of which is one of the main contributions to the excellent miles per gallon we get with all cars that have sensible engine displacement, such as 2.0 to 3.0 liters.

Antilock braking systems (ABS) provide increased control and reduce stopping distance in wet, snowy or icy weather. And “fishtailing” in a skid is reduced by computer-driven traction control.

Most of us have grown up with seat belts and use them habitually. But those who don't use them risk serious injury or death.

Safety has been recently increased with radar-like “eyes” that keep us from sideswiping due to drifting into the lane alongside us or keep us from colliding with a car in front of us. These may be rare events, and the benefit-versus-cost equation may tell us to hold off until the price comes down. But we can't deny that the added safety might be priceless.

The next major step in safety is said to be the self-driving car. But its introduction may face challenges.

In late December last year, media outlets reported that people in Chandler, Arizona, attacked self-driving cars. Angry and fearful, people slashed tires, threw rocks, tried to run the cars off the road, and threatened drivers by waving pipes at them.

I don't plan to be hostile to those cars or the persons driving them. But I'm sufficiently skeptical, at least for a few more years.

However, when I think of the difficulty of finding parking places in crowded towns and cities, it would be welcome to tell my car to scout out a place, go park itself, and then call it to have it pick me up when I'm ready.

A question of trust

The age of artificial intelligence, robots, and self-driving trucks and cars is not likely to be a fad that eventually goes the way of hood ornaments and curb scrapers. It's not only here to stay, it's bound to proliferate.

The most difficult maneuver a car can perform, I imagine, is parking itself in a tight, parallel parking spot. The engineers seem to have mastered that. So



It would be welcome to tell my car to scout out a place, go park itself, and then call it to have it pick me up when I'm ready.

I don't doubt that a driverless 75-foot semi can wait out the traffic, swing into the opposing lane, and turn into a narrow alley without running over a curb or scraping paint.

The big question: When will we trust them to drive without a human on board? Certainly there is no software with more potential for multiple human tragedy than the software that self flies our aircraft. And yet, the recent crashes of the Boeing 727 Max 8 planes demonstrate that the most seemingly qualified programs are not always failsafe. Will we have to learn from mistakes, or will self-driving be goof-proof from the start?

And where in this radical new era of highway traffic is there opportunity for inventors? Most likely it won't be in the high-technology arena but in service to a new kind of assistant to the vehicle's computer, a human being with time on his or her hands.

What will occupy the time of the “driver” who is no longer compelled to focus his or her eyes on the road, and continually be alert for the unexpected? That's for our fertile and creative minds to dwell on and provide a response. 🤖

Jack Lander, a near legend in the inventing community, has been writing for *Inventors Digest* for 23 years. His latest book is *Marketing Your Invention—A Complete Guide to Licensing, Producing and Selling Your Invention*. You can reach him at jack@inventor-mentor.com.





AUTO ALTERNATIVE?

RAHT RACER DEFIES SKEPTICS, RUNS ON PEDAL POWER
AND AN ELECTRIC-ASSIST MOTOR **BY REID CREAGER**

RICH KRONFELD is a subversive, and he likes it.

More accurately, he likes his human-powered velomobile—such “a subversive idea” and totally new product category that some people doubt it is real.

The Minneapolis-based inventor wants to provide an innovative alternative to cars via his Raht Racer, a gas-saving, electric-assist vehicle that amplifies the rider’s pedaling power. From its outward appearance—a sleek shell that provides protection from the elements as well as an aerodynamic advantage over bicycles—to its lofty goal of moving as fast as traditional cars, the Raht Racer is so unconventional that some people have a hard time taking it seriously. At least, at first.

“There were people who said that it couldn’t be done and that it made no sense at all,” he said.

“I even had a guy call me once who liked it so much, he thought he could be a distributor. But first he asked me: ‘Is this is a joke? This isn’t technologically possible, is it? It can’t be real.’

“I told him the technology was not far-fetched and had to convince him it was not a joke, that I was not an actor and that the prototype was not being pulled by an invisible rope in the videos when it’s driving.”

Revolutionary basics

The Raht Racer’s pedals do not directly drive the wheels. Instead, they are connected to a unique flywheel generator that powers the vehicle’s motor located in the rear wheel hub. The system senses the torque being applied to the pedals by the rider, then uses the motor to amplify it.

Some of the pedaling power also charges the 13-kWh lithium-ion battery pack, helping to extend its range. The battery’s full charge comes from a wall outlet between rides.

If used in throttle-only (no-pedal) mode, it has a range of approximately 100 miles (city/highway). Full-out, throttle mode will take the vehicle to a top speed of 100 mph (160 km/h). (The prototype has different specs: a range about 40 miles, battery 4.3-kWh.)

The two-seater Raht Racer itself, weighing about 600 lbs., has a carbon fiber body with an aluminum roll cage. With an estimated \$24,000 price tag, it includes features such as headlights, tail lights, seat belts, air bag, trunk space and full suspension.

Most velomobiles feature a recumbent tricycle body, enclosed by a full aerodynamic fairing. Some have an electric-assist motor, although the top possible speed with these has been about 20 mph. If they



"I even had a guy call me once ... he asked me: 'Is this is a joke? This isn't technologically possible, is it?'" —RICH KRONFELD

were faster, they would need to be registered and insured as motor vehicles.

When news about the Raht Racer began hitting the internet about five years ago, the lack of speed was said to be its main drawback. Its use has been relegated to the side of the road.

Much has changed. "We got our first patent in 2016 and another one in 2017," Kronfeld said. "They are both utility patents pertaining to our unique drivetrain, which allows for highway speed pedaling, with programmable fitness profiles—literally a 'drivable fitness machine.' The amount of boost the system gives the rider is variable and all power generated by the rider goes back into the system to extend range.

Asked how much leg "oomph" is needed to power the vehicle to top speeds, Kronfeld said: "That is up to the rider. You can set it so a light amount of effort gets you going fast, or hard effort.

"Think of it like a guitar amp. With volume low, you strum and there's not much volume. You turn it up all the way to 11 and with same strumming effort, it's so loud you wake up neighbors down the block and the cops come."

Momentum revving

The cops haven't come, but people are noticing. The Raht Racer was a finalist in the Clean Energy

Trust Challenge 2015 in Chicago, semi-finalist in the Minnesota Cup 2015, and finalist in the 2017 Cleantech Open in Minnesota.

In 2016, the vehicle's owners were invited into the Bakken Museum of Electricity (founded by Earl Bakken, inventor of the pacemaker and founder of Medtronic), where the Raht was displayed and included in summer educational programs for kids.

"Perhaps the most beneficial entrepreneurial experience I've ever had was the NMotion accelerator 2017, in Lincoln, Nebraska," he said. "That's where I was part of a small cohort of start-up companies that were put through an incredibly intensive 12-week start-up program.

"They told us that it was like taking a three-year MBA and cramming it into 12 weeks. After NMotion, I had a proven business model, business plan and paying customers.

The future is exciting, even if funding remains an issue—possibly due to the vehicle's wildly revolutionary nature. Kronfeld said he and his lead engineer, working on the racer's drivetrain technology, have developed two more intriguing tech concepts that may also be patentable pending funding and further development.

Meanwhile, Kronfeld says he gets supportive emails from all over the world about the Raht Racer. Embracing a revolution can take time. 🚲

Inventor Rich Kronfeld (pictured on opposite page) says that in full-out, throttle mode, the Raht Racer can reach a top speed of 100 mph. Its pedals do not directly drive the wheels. Instead, they are connected to a unique flywheel generator that powers the vehicle's motor located in the rear wheel hub.

Hottest 3D Trends

NEW MATERIALS AND TECHNIQUES
MAKE PROTOTYPING FASTER
AND EASIER **BY JEREMY LOSAW**

ONE OF THE MOST important tools for product development is the 3D printer. It helps prototypers build parts in a matter of hours, when machining or molding can take days or weeks.

3D printing (often called additive manufacturing) has been around for decades, but the machines, materials and techniques are constantly evolving. There have been some exciting improvements in the last couple of years. Here are some of my favorite trends from the 3D printing world.

High-performance filaments

Most people who own a 3D printer at home have what is called a fusion deposition modeling (FDM) style of printer, which draws each layer of the print with a string of plastic material.

The two most popular materials are ABS and PLA, which are easy to print but are middle of the road in terms of their material properties. Manufacturers realized this and have been creating filament spools of some high-performance materials to help 3D printers more closely match molded parts.

The biggest player in this space is DuPont, which has released its branded performance plastics Hytrel, Surlyn and Zytel in filament form. Hytrel is a tough yet flexible, Surlyn is tough and transparent, and Zytel is a high-performance nylon.

In a similar vein, Igus, the maker of flexible chain and motion systems for industrial machines, has released its Drylin material in filament form. Branded as iglide, this material is low friction and has superior abrasion resistance—perfect for printing bearings or other parts that require low friction.



The Markforged system uses a base material called Onyx that is thermoplastic mixed with carbon fiber, which is stronger than standard filaments by itself.

Multi-material printing

Printing parts in a single material works for many parts, but there are some instances when a part needs added strength. However, printing an entire part with premium material can be expensive. Multi-material printing allows engineers and designers to choose where in the print to add strength with the benefit of minimum added cost.

A great example of high-performance, multi-material printing is the Markforged system. It uses a base material called Onyx that is thermoplastic mixed with carbon fiber, which is stronger than standard filaments by itself. It then has print heads that can lay down areas of engineered fiber such as Kevlar, fiberglass, and carbon fiber for added strength where needed. The result is light and strong parts that are relatively inexpensive.

High speed

Although 3D printing is considered a very fast technique for prototyping, it is very slow for production parts. For example, a part that is 1 inch long in every dimension may take 1-3 hours to print depending on the machine, whereas an injection-molded part of the same geometry takes just seconds.

However, new 3D printing technology is becoming available that is shrinking this gap.



DuPont's Zytel® nylon 3D printing filaments bring together excellent stiffness and strength with outstanding heat, chemical and hydrolysis resistance.





Multi-material printing allows engineers and designers to choose where in the print to add strength with the benefit of minimum added cost.

Some of the biggest speed gains are happening with stereolithography forms of 3D printing where light is used to cure photosensitive resin. Traditional stereolithography uses a laser beam that traces each layer. While fast, it still has to trace every area of the build layer, and it takes a couple of hours to print a 1-inch-high part.

Nexa3D has developed a new light management technology that allows a full layer to be cured at once, which drastically speeds the printing. It boasts 1 cm-per-minute build height speed, which makes it fast enough to be viable for some mass manufacturing environments. Nexa3D also has a non-stick technology for the build plate, which makes it much faster to post process the printed parts.

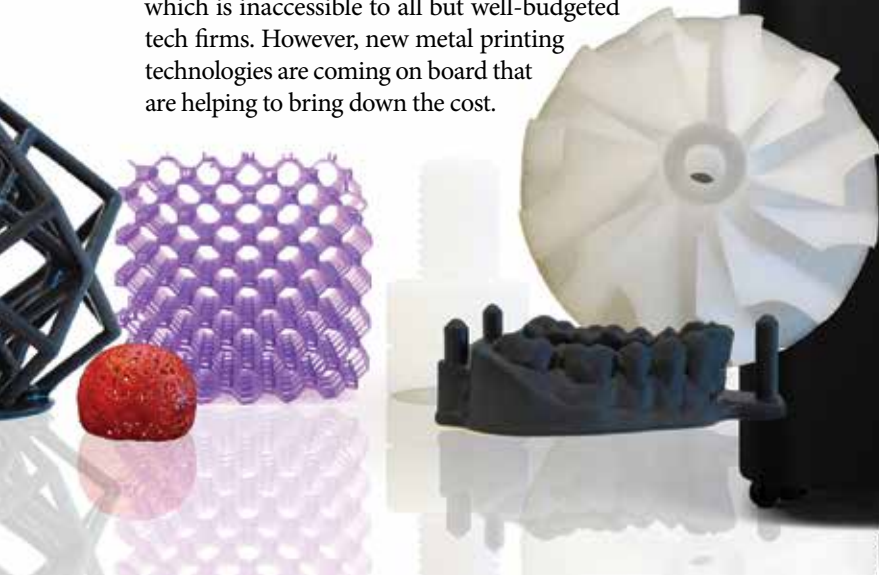
Metal

Metal printing is amazing technology, but until recently it was very expensive and tricky to implement.

The most common type of metal printing technique is direct metal laser sintering (DMLS), which uses a higher power laser that sinters layers of fine metal powder to form parts. These machines cost half a million to a million dollars to get up and running, which is inaccessible to all but well-budgeted tech firms. However, new metal printing technologies are coming on board that are helping to bring down the cost.



Nexa3D is making ultra-fast, industrial-grade stereolithography 3D printers affordable to professionals and businesses of all sizes.





DMG Mori's LASERTEC 65 uses a laser deposition head to lay down layers of metal and then uses a CNC head to mill the part.

One of the most intriguing metal printing technologies is bound metal deposition.

In this system, metal is embedded into a plastic substrate. Once the part is printed, it is placed in a furnace where the plastic is melted out of the part, leaving only the metal behind. Desktop Metal is the company leading the charge in this arena. Its entry-level system is about 20 percent of the cost of a DMLS setup.

Another interesting metal 3D print technology is the evolution of the hybrid 3D printer and CNC machine. DMG Mori's LASERTEC 65 uses a laser deposition head to lay down layers of metal and then uses a CNC head to mill the part to a tight tolerance. This technique is squarely in the industrial sector but will continue to be an emerging trend as 3D printing moves toward manufacture-ready parts.

Mass customization

Since the beginning of 3D printing, customized mass-produced items have been one of the holy grails of the technique, and it is just starting to come to fruition.

Shoe insert maker Dr. Scholl's is now offering custom insoles. Users can take pictures of their feet with their smartphone, and Dr. Scholl's can then print perfect-fitting insoles.

Similarly, Gillette has teamed with Formlabs to create a service called Razor Maker. Users can design and customize their own razor handles, and Formlabs custom-prints each design. As print speeds and materials continue to improve, more manufacturers will be turning to 3D printing to create customized consumer products. 📱

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3D Printing? Try the Library

WEB SEARCH SHOWS MAPS WITH LOCATIONS BEING ADDED AT A RAPID RATE **BY DON DEBELAK**

INVENTORS have a significant advantage if they own the often-expensive equipment that allows them to make 3D models for their initial models or prototypes.

But did you know that many libraries have added 3D printers that you can use?

There are about 800 3D printers in libraries worldwide (and there could be a lot more). The easiest way to get the list of those libraries is to do a web search for “library locations 3D printers Google Maps.”

Next to the map is a list of libraries with 3D printers. But call your local library, even if it is not listed as one of the libraries on the site; after all, libraries are adding 3D printers at a rapid rate.

Libraries’ 3D printers are typically lower-cost FFF fused filament fabrication printers that are easy to use for beginners.

3D printing advantages

Models and prototypes used to be made with a variety of manufacturing methods, which often increased the time required to put together a prototype. Speed is probably the biggest benefit of 3D printing.

But another factor that is just as important is the number of materials you can use with 3D printing. Most libraries will only use plastic, but the range of plastics can be wide—from high-strength ABS (Acrylonitrile butadiene styrene) and flexible nylon to a host of other standard, lower-strength plastic resins. This range of material allows you to choose which one works best in your application.

The final important benefit is cost. It used to be that making a model or prototype required using many different manufacturing vendors or a higher-priced prototype vendor. Even if you use a vendor who sells 3D printing services the cost of a prototype is less expensive than traditional methods, but prototype production at the library offers the lowest-cost option.

CAD/CAM drawings

Many inventors are reluctant to use 3D printers because they typically need CAD/CAM (computer-aided design/computer-aided manufacturing) drawings. But that shouldn’t be a deterrent.

Free CAD/CAM software packages are easy to use for beginners. My experience is that Sketchbook and Tinkercad are probably the easiest to use. An excellent source for information about free or low-cost CAD/CAM software for 3D printing—and for all issues related to 3D printing—is all3dp.com.

Another option is using 3D scanners. These can view your part or product and produce instructions for the 3D printers to reproduce the part. They are available at many but not all libraries with 3D printers.

This is a popular method when you are making a replacement part that has been broken or damaged.

What to prepare

3D printing works by depositing layers, one after another, until the part or product’s final shape is formed. One description might be that a 3D printer produces many 2D pieces that are merged one to another.

This means you can’t print in one piece a part with two sections that fold or unfold around a hinge. You might need to produce two or three separate parts that then will go together.

Another consideration is the size of parts that can be made by the 3D printer at your library. You might need to adjust the size of your model, or turn certain parts into two or three pieces to accommodate the printer’s size.

Make a list of all parts that are in your product. Check with your patent drawings if you have them to be sure you have every part. Then do a 3D CAD/CAM drawing for each part you need produced with 3D printing. 📄

Don Debelak is the founder of One Stop Invention Shop, which offers marketing and patenting assistance to inventors. He is also the author of several marketing books, including Entrepreneur magazine’s *Bringing Your Product to Market*. Debelak can be reached at (612) 414-4118 or dondebelak34@msn.com.





Back to Square One?

AFTER PROGRESS ON DETERMINING PATENT-ELIGIBLE SUBJECT MATTER, 2 RECENT RULINGS MUDDY THE WATERS

BY LOUIS CARBONNEAU

MAYBE IT WAS JUST TOO GOOD TO BE TRUE.

After years of being on the receiving end of a patent system stacked against them, U.S. inventors were finally starting to see signs of improvement. Under United States Patent and Trademark Office Director Andrei Iancu's tireless crusade to restore faith in the patent environment, we recently witnessed major changes at the Patent Trial and Appeal Board and with the USPTO itself.

Several measures were taken to swing the pendulum back a bit more in favor of patent owners and remove some of the uncertainty that has plagued patents as an asset class. The most recent was a new set of official guidelines dealing with patent subject-matter eligibility, in which Mr. Iancu told his army of examiners and PTAB judges that they need to apply a more flexible test when determining whether an invention is patent eligible.

I commented a few months ago that this long-awaited move, although positive, could end up making things worse for inventors if the courts did not align themselves with the new guidelines. Basically, we would then cycle back to a broken system in which the USPTO would issue new patents using one test—which the courts would then invalidate using another test.

Alas, this is precisely what just happened with two back-to-back decisions (*Cleveland Clinic v. True Health Diagnostics* and *ChargePoint v. Semaconnect*) from the United States Court of Appeals for the Federal Circuit that have sent everyone back to the drawing board.

The first case dealt with medical diagnostic methods; the second pertained to an electric charger. These two domains would seem (to most readers) as falling clearly outside the concept of a simple “law of nature” or “abstract idea.”

Although these two cases are described as “non-precedential,” meaning each ruling is not meant to become the new rule of law in subsequent cases, they have already caused a frantic reaction in the industry and were broadly decried as discouraging innovators from investing in further R&D activities.

These two cases have the merit of making clear that the only way to resolve this imbroglio is for the U.S. Congress to intervene directly, and legislate in order to explain once and for all what is and what is not eligible subject matter. Until then, uncertainty remains and the smart money continues moving overseas.

One has to be quite optimistic to pin one's hope on Congress achieving anything concrete—especially in the current environment, where IP is not exactly at the forefront of politicians' minds. However, this may actually play to the favor of patent owners because for the first time, according to former Federal Circuit Chief Judge Paul Michel, we have a newly resurrected, mostly competent and so far bipartisan Senate sub-committee on Intellectual Property.

On the House side, the new chairman is a former judge who is quite knowledgeable and interested in patents based on some recent hearings on the topic. In short, this could be a breath of fresh air after the reign of former Congressman Darren Issa, who was well known for his obsession with the patent troll narrative.

It will take this new blood, a lot of elbow grease and a great dose of bipartisan luck to get anything done before we enter the next election cycle. Still, rumor has it that a new bill could be brought to the floor as early as May or June, which would address specifically the subject-matter eligibility issue in a series of recently published Guiding Principles.

Let's hope this is the case, because there is no one else to turn to after that!

Buyers and sellers

In the last column, I shared some interesting statistics regarding the price per patent (or families) in the current market based on confidential data collected over hundreds of transactions. Defensive clearing house Allied Security Trust just released its own data that, while consistent with earlier findings about the market growing at a healthy rate (by number of deals), also point to the near disappearance of non-practicing entities whose acquisitions have dropped by a whopping 80 percent—a direct reflection of how hard it has become to monetize patents via assertion. ...



The cases caused a frantic reaction in the industry and were broadly decried as discouraging innovators from investing in further R&D activities.

Some recent business misfortunes triggered a series of interesting patent-related transactions. **Apple**, a rare buyer, bought the patent portfolio of security camera company **Lighthouse** after it recently closed its doors. Lighthouse's patents mostly pertained to artificial intelligence and facial recognition. ...

In a similar scenario, augmented reality hardware maker **Magic Leap** reportedly acquired (via a shell company) the patent assets of competitor **Osterhout Design Group**, which recently went out of business. Finally, **SunLink**, a manufacturer of solar trackers and fixed-tilt ground mounts, is auctioning 11 patents and intellectual properties in an attempt toward payment on a defaulted loan. ...

Taiwanese chipmaker **Media Tek** reportedly made its first third-party acquisition in five years, picking up a portfolio related to speech recognition and audio processing from **Philips**. ...

While some people are selling off their patents, other prefer to donate them: Japanese car manufacturer **Toyota** made a splashy announcement that it was making available, royalty free, more than 24,000 of its patents covering hybrid and electric car technology. Some pundits saw the move as a way for Toyota to encourage others to keep innovating around hybrid cars (like the popular Prius), as the industry appears to be moving to all electric plug-in vehicles.

In the same vein, **Microsoft** announced that it will donate an additional 500 patents with an expansion to its patent protection program Azure IP Advantage first announced last year.

Winners and losers

And the overall winner is... **Samsung**, which now owns 25,000 more U.S.-granted patents than that of runner-ups Canon and IBM. Samsung has 61,608 active patent families, with Canon in second position with 34,905 and IBM at 34,376.

Up North, Canadian-based **Blackberry** surprised many by announcing a huge surge in IP licensing revenues in Q4 of 2018, while it looks to hire a new director of licensing. Although, perhaps, it should leave things just as they are. ...

Qualcomm scored a pyrrhic victory over **Apple** in which the latter was found liable of infringing several Qualcomm patents. The price for their transgression: a paltry \$31 million, which Apple probably makes in less than a day. This is not the kind of decision that will incite Apple to come to the table and resolve its other ongoing disputes with Qualcomm. ...

Similarly, R&D powerhouse **SRI** won its case against U.S. switch manufacturer **Cisco** but saw the damages it sought slashed from \$55 million to about \$30 million in hard-fought litigation over network



security technology. Once more, there will be little left once all of their legal fees have been paid. ...

Back to **Apple's** good fortune, a separate Delaware federal jury also found that it did not infringe two patents related to LTE wireless broadband communication technology, ending **Evolved Wireless's** bid to recover up to \$30 million in royalties from the tech giant. ...

At the federal level, the International Trade Commission issued a rare decision involving two foreign companies (its primary role is to protect U.S. companies against illegal imports) that found **Fujifilm** infringing some of fellow Japanese company **Sony's** magnetic tape patents. ... Chip maker **Intel** dodged a bullet when it was able to convince a federal court to dismiss allegations that it willfully infringed four semiconductor patents owned by patent holding company **VLSI Technology**.

Handshakes

Most licensing agreements, whether they take place voluntarily or subsequent to litigation, are kept confidential. This gives the impression that there is lots of war and very little peace around.



I'LL SEE YOU IN COURT

With 6,000 new patent cases per year in the United States only and increasingly more abroad, it becomes rapidly impossible to monitor them all. Therefore, we try to focus on the few that stand out.

In what is surely a sign that the automotive industry is upping its strategy against the looming patent threat coming from large technology companies, **Daimler** recently asked EU antitrust regulators to probe **Nokia** around its patents essential to car communications. The move underscores tensions between tech companies and the car industry on the use of key technologies. ...

Coming off recent settlements with ASUSTek, Huawei and ZTE, **Maxell** (a subsidiary of Hitachi) has sued **Apple** for alleged patent infringement of 10 of its patents related to various Apple devices. The patents asserted against Apple also include several that were at issue in a June 2018 trial against ZTE, which culminated in a \$43.3 million damages award. ...

Baccone, a Delaware-based company, filed suit against **LG** and **Samsung**, alleging that the two Korean companies infringed two of its patents involving facial recognition technology and processes and another one covering technology and approaches for image sharing. Facial recognition technology has been in the news lately because of its Orwellian attributes, but it is now also becoming a hotbed for patent litigation. ...

Finally, patent disputes can affect all sectors of the economy, right down to one's dinner plate. **Arista Cereal Technologies** alleged that **Arcadia Biosciences** infringes six patents covering high-fiber wheat.

But I have found at least one piece of good news, even if it comes with an asterisk: The PTAB said it won't review the validity of a pair of geolocation patents after the owner struck an agreement with **Google** and **LG Electronics**, thus putting an end to their dispute. What we do not know, however, is whether the patent owner was simply forced to settle at no or very low cost, given the prospects of a long and expensive battle against two deep-pocketed companies.

Legislative

USPTO Director Iancu is considering the next steps after the U.S. Department of Justice's antitrust division withdrew from a joint policy statement on standard-essential patents last year. Some large simplified employee pension holders such as **Qualcomm** and **Ericsson** are asking Director Iancu to revisit policy and adopt a more favorable stance toward SEP owners. ...

A recent interview with U.S. Rep. Steve Stivers (R-Ohio), who co-sponsored the **STRONGER Patent Act** a year ago in Congress, suggests that the bill will get its day sooner rather than later and that restoring a fairer patent system, along with injunctive relief, is still a priority for those who support the act. ... On the pharmaceutical side, Democratic presidential candidate **Bernie Sanders** has vowed to cut the price of patent prescription drugs by half should he be elected. ...

Finally, the House IP subcommittee hearing of the 116th Congress recently convened its first meeting. It focused on addressing ways to increase female inventorship in the country, which still lacks greatly despite some improvements in the past few decades.

Around the world

The latest World Intellectual Property Organization data continue to show a surge in worldwide patent applications originating from **Asia**, which accounted for more than half of those. In the main category—the Patent Cooperation Treaty—the United States led the way with 56,142 applications, followed by China (53,345) and Japan (49,702). ☞

Louis Carboneau is the founder & CEO of Tangible IP, a leading IP strategic advisory and patent brokerage firm, with more than 2,500 patents sold. He is also an attorney who has been voted as one of the world's leading IP strategists for the past seven years. He writes a regular column read by more than 12,000 IP professionals.





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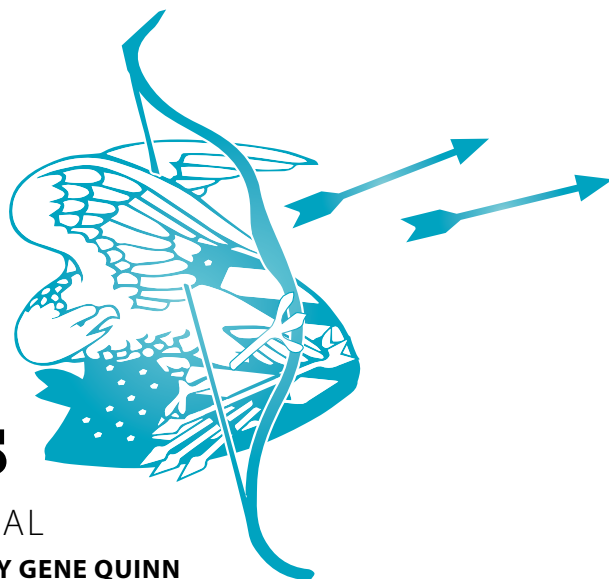


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Put Down Your Weapons

SENATORS ASK IANCU TO STOP SERIAL ATTACKS ON PATENT PORTFOLIOS **BY GENE QUINN**



SENATORS Thom Tillis (R-N.C.) and Chris Coons (D-Del.) have written U.S. Patent and Trademark Office Director Andrei Iancu, raising a concern about what can be characterized as the weaponization of the Patent Trial and Appeal Board (PTAB).

Although the USPTO has vehemently disagreed that there is a problem over the years, everyone in the industry familiar with post-grant challenges knows there is a very serious problem with serial challenges. There appears to be a concerted effort—perhaps even collusion—to repeatedly challenge the patents of certain patent owners.

The problem is real

“We continue to hear from patent stakeholders about abuse of the inter partes review process in the form of ‘serial’ petitions,” the senators wrote. (IPR is a mini-trial before the PTAB to cancel specific claims of a patent on the grounds of invalidity.) “We have heard from both large companies with tremendous innovation pipelines as well as small companies and patent-intensive start-ups that they are facing extensive serial attacks on their patent portfolios.”

Despite the USPTO dismissing complaints of serial challenges through the years, we know that they happen. In fact, anyone who is interested can verify the existence of serial challenges by noticing that the same patent owners have their patents challenged over and over again.

One of the more egregious cases was the 125 IPR petitions filed against the patent portfolio owned by Zond Inc., which makes plasma generators, during a seven-month period from February 2014 to September 2014. Per PTAB statistics, the institution rate for the Zond patents was 88.6 percent (1,377 claims challenged, 1,220 instituted).

An 88.6 percent institution rate is obviously a high number. But look at the same data from Zond’s perspective.

Before the 2011 America Invents Act, Zond owned 371 claims. By the end of the 125 IPRs filed against it, Zond owned no claims. Every claim ended up dead. But that can’t be particularly surprising, given that it had to defend 125 IPR petitions.

When will persecution end?

Senators Tillis and Coons have asked Director Iancu to answer five specific questions. One asks whether he will adopt a presumption that once the PTAB has refused to institute on a particular patent, it will not institute a challenge on that patent unless there are compelling circumstances.

Other questions ask whether he will consider affiliates of a prior petition to be the same petitioner, and whether a sworn affidavit will be required to identify all parties a petitioning entity has collaborated with—both directly and indirectly—regarding an IPR filing.

The senators also want to know whether Director Iancu intends to make precedential *Valve Corp. v. Electronic Scripting Products, Inc.* (an April PTAB ruling). *Valve Corp.* held that “serial and repetitive attacks, even by different petitioners, weigh against institution.

The questions asked by the senators are very good. They could have, and probably should have, specifically encouraged Director Iancu to do something to adopt the federal circuit view (which is supposed to be binding on the PTAB anyway) of who is a real-party-in-interest, as defined by the federal circuit last year in *Applications in Internet Time, LLC v. RPX Corp.*

It was an embarrassment when the PTAB ruled that Alphabet was not a real-party-in-interest with Google—which, while all too predictable from the PTAB, is nonetheless tragically comical. Although on the surface this is not a serial IPR issue, once the layers of the onion are peeled and those who are funding challenges by third-party providers are known, it may well be that the benefactors of these



Serial challenges are a very real and extraordinarily harassing problem for which there appears to be no remedy.

third-party providers have been behaving in ways the law prohibits.

Of course, it is impossible to know, which is precisely why the real party is supposed to be identified.

More arrows in the quiver

What Director Iancu has done in little more than one year on the job is remarkable. Still, there is much left.

He has only scratched the surface with respect to what it is that he has the authority to do—particularly given the establishment of a Precedential Opinion Panel, which has the authority to review PTAB decisions and make them precedential and binding on the entirety of the PTAB.

Though the USPTO believes serial challenges are not a real concern, the only reason it has been able to reach such a clearly erroneous conclusion is by ignoring the fact that the overwhelming majority of patents challenged to date have fallen.

Either the claims have been lost, or patent owners have capitulated and settled by giving challengers no-cost licenses. When a challenger prevails so frequently on the first petition, there has been limited need to resort to second, third, fourth, or even eighth, ninth or 10th petitions—or in the case of Zond, many dozens more. But for those patent owners that have been subject to repeated challenges, serial challenges are a very real and extraordinarily harassing problem for which there appears to be no remedy. These patent owners are helpless.

Director Iancu and the USPTO should not convince themselves that serial challenges are not a significant problem because they only happen to a handful of patent owners. Many of these patent owners now have thoroughly vetted patent portfolios, yet the challenges never stop.

What message does that send to those with lesser resources? Any patent that is commercially relevant can and will be challenged, and courtesy of a coordinated effort, the patent owner will be mercilessly harassed until he or she capitulates, finds a panel that finally agrees with the challenger, or he or she runs out of money and goes bankrupt.

Is that really the American Dream? Is that really what the American patent system is supposed to foster and encourage—the harassment of innovators until they capitulate or go bankrupt?

There are many arrows left in the quiver worn by Director Iancu. Hopefully prodding by the leaders of the Senate IP Committee, and the political cover they can no doubt provide, will lead to swift action on these and perhaps other action items. 🏹

Gene Quinn is a patent attorney, founder of IPWatchdog.com and a principal lecturer in the top patent bar review course in the nation. Strategic patent consulting, patent application drafting and patent prosecution are his specialties. Quinn also works with independent inventors and start-up businesses in the technology field.





'Leaving Talent Behind'

CONGRESSIONAL PANELS ON IP SEEK TO IMPROVE RATES OF FEMALE INVENTORSHIP **BY STEVE BRACHMANN**

THE HISTORY of the U.S. patent system shows that it has played a role in enabling marginalized but ambitious and inventive people to participate in the country's innovation economy. But it could do better these days, particularly as it pertains to women.

On April 3, the Senate Subcommittee on Intellectual Property held a hearing titled "Trailblazers and Lost Einsteins: Women Inventors and the Future of American Innovation" —a topic that also was considered on March 27 by the House Committee on the Judiciary's Subcommittee on Courts, Intellectual Property, and the Internet in its first hearing of the term.

The House hearing was titled "Lost Einsteins: Lack of Diversity in Patent Inventorship and the Impact on America's Innovation Economy."

Like the Senate hearing, it focused on a recent report on female inventorship

released by the U.S. Patent and Trademark Office and featured testimony on how to improve rates of female inventorship from a collection of women in fields having strong ties to the U.S. patent system.

Parity is far away

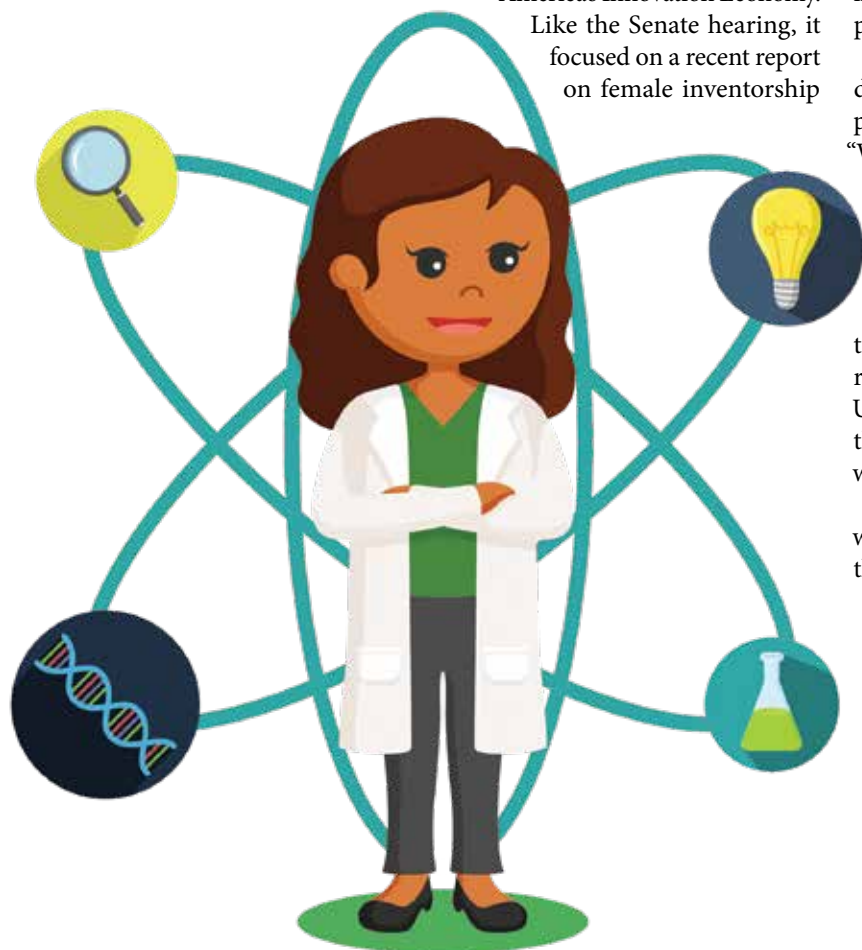
Rep. Hank Johnson (D-Ga.), chairman of the House IP Subcommittee, acknowledged in his opening remarks that this was the first hearing held by the IP Subcommittee for the 116th Congress. He noted that the first patent awarded by the U.S. government to an African-American was to Thomas L. Jennings in 1821, decades before slavery was ended. In 1793, more than a century before women earned the right to vote in America, Hannah Wilkinson Slater was awarded a patent for a method of producing cotton sewing thread.

However, the recent USPTO report on gender diversity indicated that there has been no substantial progress made in patents earned by female inventors. "When women and minorities are not in the innovation pipeline or if they leave because they don't feel welcome, we are losing sources for increased innovation," Johnson said. "We are leaving talent on the table and, frankly, we are leaving talent behind."

The first person on the witness panel to offer testimony was Michelle K. Lee, former undersecretary of commerce for intellectual property and USPTO director. She said one recent study showed that at the current rate, gender parity in patenting won't be achieved for 118 years.

Lee noted that there are typically two ways in which corporations solicit invention disclosures from their employees: through voluntary submissions or

One recent study showed that at the current rate, gender parity in patenting won't be achieved for 118 years.



through manager-initiated brainstorming sessions. The latter approach tends to be more productive in getting disclosures from female inventors, Lee said.

She discussed initiatives led by the USPTO during her tenure as the first female director of that agency, including the creation of the Girl Scout IP Patch. She added that a focus on the disparate ways that boys and girls were raised in our society, from the toys they play with to the activities they pursue, could help answer disparity issues in the innovation economy.

What research has found

Following Lee's testimony was Lisa Cook, associate professor of economics and international relations, and the director of the American Economic Association Summer Training Program at Michigan State University. Cook learned at an early age that the U.S. patent system could be more inclusive by looking at the example of her cousin, Percy Lavon Julian, the inventor of cortisone. His home in Oak Park, Illinois, was twice firebombed by racists who opposed his family's move to the suburb.

Cook's research showed that the nation's economy could be 3 percent to 4 percent larger if women and underrepresented minorities were included in the innovation system to a greater degree. She also produced research showing that, among scientists and engineers, African-American unemployment was 4.7 percent compared to a 2.9 percent unemployment for whites.

Increasing efforts to include women in research and development teams could result in greater productivity, as research has also found that co-ed R&D teams are more productive than single-gender teams.

Susie Armstrong, senior vice president of engineering for Qualcomm, Inc., said that for companies like hers that are trying to take the lead in 5G mobile networks and other areas of innovation, more great tech minds from underrepresented communities are needed.

An inventor who helped create single-packet data communications that allowed cell phones to access the internet for the first time, Armstrong said Qualcomm produced educational initiatives such as the Thinkabit Lab, which partners with school districts and libraries to encourage students to innovate in the Internet of Things (IoT) sector. 📱

Steve Brachmann is a freelance writer located in Buffalo, N.Y., and is a consistent contributor to the intellectual property law blog IPWatchdog. He has also covered local government in the Western New York region for The Buffalo News and The Hamburg Sun.



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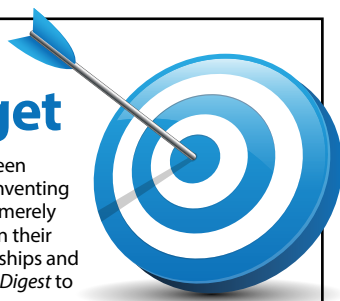
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IoT Corner

The immense data needed to accurately forecast weather have typically been the domain of government agencies. Now, Boston and Tel Aviv-based start-up **ClimaCell** is using IoT to help capture many more climate data points than traditional weather stations in order to improve forecast accuracy.

It does this by leveraging sensors from deployed connected devices to aggregate climate data. It also has developed a technology that can provide atmospheric conditions from how cellular signals travel between phones and cell towers.

With all of this data at hand, ClimaCell has launched a flood warning service for 500 cities and is launching its own consumer weather app in May. Its localized weather forecasting ability has drawn the attention of firms whose success relies on accurate forecasts—such as airlines, agriculture companies, even sports teams. —Jeremy Losaw



Wunderkinds

Hannah Herbst was 15 when she was inspired by her 9-year-old Ethiopian pen pal, who had no access to electricity. The Florida teen came up with the Beacon (Bringing Electricity Access to Countries through Ocean Energy), which captures energy directly from ocean waves, based on the fact

that about 40 percent of the world's population lives within 62 miles of the coast of a significant waterway. Her invention consists of a hollow plastic tube, with a propeller at one end and a hydro-electric generator at the other. As tidal energy drives the propeller, it's converted into useable energy by the generator.



What IS that?

The makers of **LEX** want you to have an exoskeleton in your closet. The backpack weighs less than 1 kilogram (2.2 lbs.) and protects your shoulders. In a few steps, it turns into a "bionic chair built to enhance posture, comfort and life." It holds 264 lbs. of weight (120 kg).

2.5 billion

The number of **online images stolen** every day, according to Copytrack's Global Infringement Report.

WHAT DO YOU KNOW?

1 What is the percentage of written work that can legally be copied without it being infringement?

- A)** 10 percent **B)** 15 percent
- C)** 20 percent **D)** None of the above

2 In which century was the swivel chair invented—1700s, 1800s, or 1900s?

3 **True or false:** The comb has no known inventor.

4 **True or false:** Machine-spun cotton candy was invented by a dentist.

5 The estimated revenue generated by the trademarked catchphrase "Let's Get Ready to Rumble" is:

- A)** \$50 million **B)** \$200 million
- C)** \$400 million **D)** \$1 billion

ANSWERS: 1. D. There is no set figure or percentage. Each case is judged on its own merit. 2. Thomas Jefferson invented the swivel chair and was purportedly sitting on one when he drafted the Declaration of Independence in 1776. 3. True. Combs have been found throughout history by archaeologists. Their origins date back as many as 5,000 years, in Persia. 4. True—in 1897, by William Morrison and confectioner John C. Wharton. 5. C. According to ABC News, the registered service mark of boxing ring announcer Michael Buffer is so successful that he makes more money via music, video games and merchandise than announcing in the ring.

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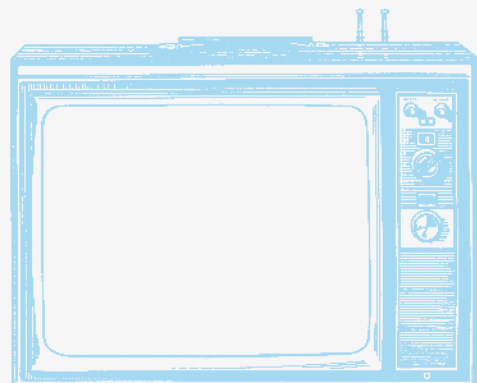
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