CASE STUDY:

ARX PAX, LLC
LOS GATOS, CA (USA)

THE FLOATING FUTURE OF DESIGN

Greg and Jill Henderson wanted to ride a real, honest-to-goodness hoverboard in their lifetimes—an innovation that Hollywood predicted would exist by 2015 in the "Back to the Future" movie trilogy. But as the prophesized date got closer, this dream still seemed far out of reach. That's when the Hendersons realized that if an airborne skateboard was ever going to exist, they would have to create it themselves, which they eventually did using a groundbreaking technology known as Magnetic Field Architecture (MFA™). The resulting fantastical creation is called the Hendo Hoverboard. And while there are perhaps few things more exciting than a real-life levitating board, this husband and wife team view the technology behind their futuristic marvel as just the beginning of a scientific revolution that will change how cities are planned forever.

> “Whenever you change the status quo as an architect, the real challenge is overcoming the human resistance to change.”
>
> - Greg Henderson

“People, even family members, told me that if Magnetic Field Architecture was a good idea, someone else would already be doing it,” Greg says. “But innovators, by their very nature, have to be misunderstood.” And an innovator is just what Greg Henderson is. His firm, Arx Pax, LLC, the parent company of Hendo Hover, makers of the Hendo Hoverboard, is pioneering MFA technology to levitate more than just skaters. Greg envisions his creation being used to hover everything from people and cars to even buildings themselves.

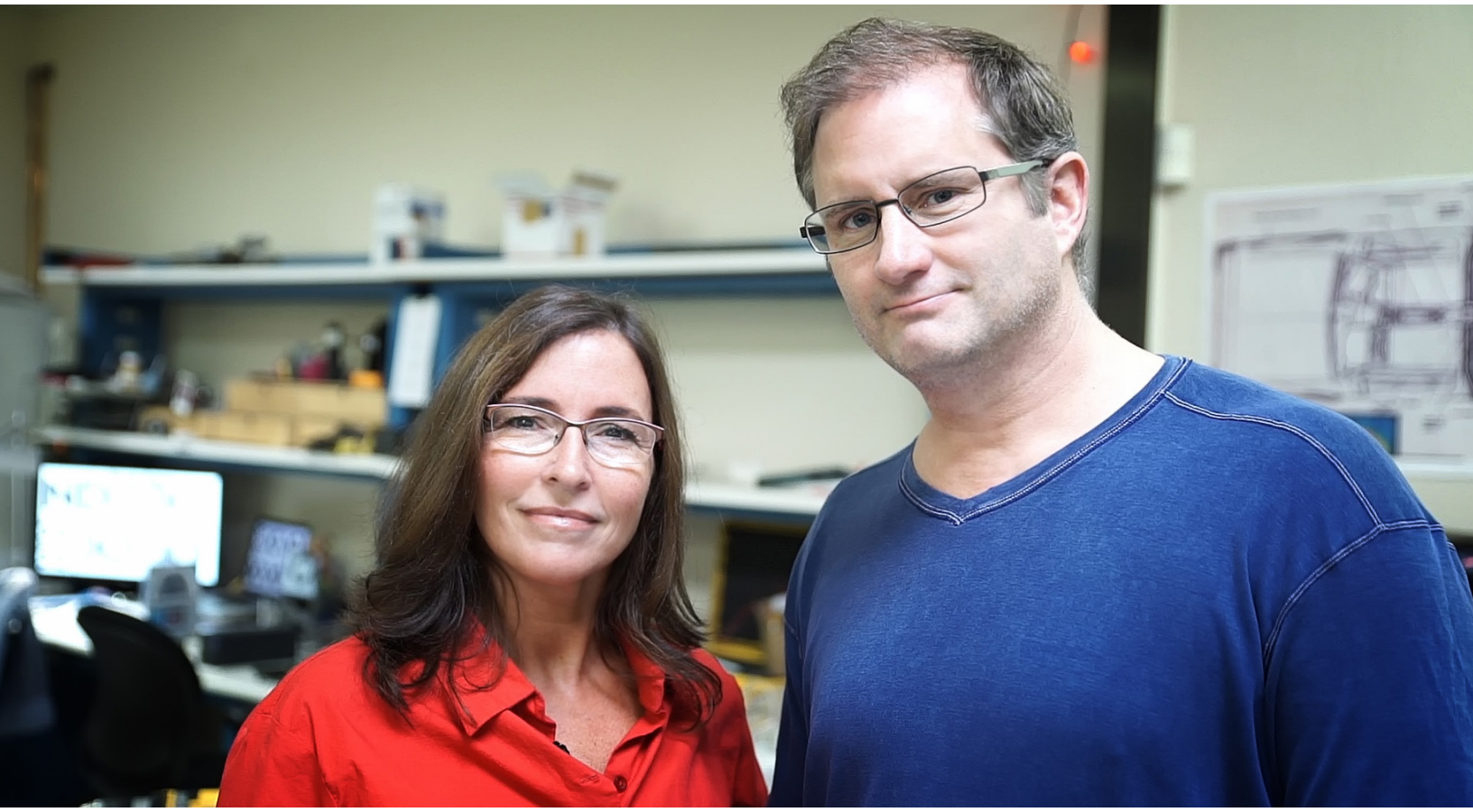
Achieving this lofty goal of a floating world takes vision, skill, and, of course, money. That’s where Hendo Hover emerged — as part of a successful crowdfunding campaign that both raised money for MFA research and revealed the Henderson’s vision to the world.

“The Hoverboard is a perfect proof of concept for MFA technology,” Jill says. “It’s a delightful way to launch our ideas that everyone can relate to, as well as show the world that something always thought to be impossible is now reality. This is a great start, and we’re very excited for where we’re taking MFA technology next.”

Thanks to the help of their intrigued supporters, Hendo Hover and Arx Pax are able to maintain a level of financial independence, ensuring that they can focus on Greg’s goal of “solving real world problems — the bigger, the better!”

ARCHITECTURAL ALTRUISM

Arx Pax may be an independent lab producing innovative technology, but Greg is admittedly not a scientist. He's a licensed architect, and he uses his knowledge of structural design and CAD technology to inform his work on MFA. Greg's interest in technology stems solely from a personal desire to do what others thought impossible and maybe save the world, too. "The relationship between electricity and magnetism and light isn't well understood, but I wanted to keep examining it because I think we can form a new understanding of this energy within our lifetimes and use it to do incredible things," he says. "You couldn't hover a dynamic payload in a stationary position until now. And while the hoverboard is a logical application of our research, the technology itself is a new tool for humanity. We know we have a way of protecting lives, families, and communities, and we need to get it into the hands of the people who can use it."



The premise of this life-saving technology is simple — work in harmony with Mother Nature rather than fight against her. The Henderson's patented, three-part foundation system is based on the concept of decoupling structures from the earth with a fluid or gas, allowing for the energy from natural disasters to gradually impact a building rather than strike all at once. For example, with advanced knowledge of a pending earthquake, one could activate the hover technology to lift homes up off the ground for the duration of the tremors, allowing the seismic energy to dissipate through the air. Similarly, if a hurricane threatens flooding in a coastal community, use the existing water on site to float the buildings in the flood zone out of harm's way, creating a liquid buffer from the violent storm surges. "Our heart and soul is about trying to design architecture that helps deal with earthquakes, tornados, and Mother Nature's bad days," Greg says. "With MFA technology, you could build homes in a flood zone without having to worry about the flood levees breaking, or design an office near a fault line without fearing earthquake damage."

Using MFA as a core part of our urban infrastructure may take years of development, but it has many short-term applications that will transform our world, as well. "When you talk about hovering buildings, that's not where we're going to start," Greg says. "Think about an operating table in a hospital or a rack of very expensive wine — things that could be damaged, as well as cost lives and property during a natural disaster unless they were hovering." To help realize this idea, Arx Pax wants to multiply the engines from the hoverboard and put them underneath such valuable objects, and then use the California Institute of Technology's early-warning system for earthquakes to let them know when it's time to lift objects off the ground. Arx Pax even has a seismograph in its front office to help prepare team members for this next step in achieving their goals.

Beyond the threat of Mother Nature, hover technology has other practical applications. Greg points to the potential for computer servers to be lifted inches off the ground to help prevent overheating, and then there's the exciting potential for hovering automobiles.

"We're now receiving interest in our company from very diverse industries," Greg says. "Transportation, industrial automation, structural, education, and recreation firms are among the types of companies that have all reached out to us. They know we have the ability to change how they do business." Named one of *TIME* magazine's Best Inventions of 2014, MFA technology is based on a patented, low-tech system, which has gained the notice of everyone from professional skateboarder Tony Hawk to writers at *Forbes* magazine. And Greg, a longtime Vectorworks® software user, says the design platform played an integral role in modeling his first hoverboard.

THE SCIENCE OF DESIGN

"Vectorworks is the first design program that I learned, and it's still my go-to software," Greg says. "I see Vectorworks as useful to my scientific work because, just like how you don't fully understand a building until you draw it, being able to model something like magnetic flux in 3D space helps me to understand it better, as well as better communicate my ideas to others." Though Greg's architectural work — consisting of multi- and single-family residences and home remodels — is how he initially gained his experience with design software, his in-depth knowledge of Vectorworks Architect gives him a creative edge in all facets of his career. "The thing I love about Vectorworks is that I can put all my focus on the work because the tool is so intuitive. Since I'm dedicated to the platform, I can use it almost like an extension of my thought process, letting me build anything I can think of without having to worry about not being able to accurately express my ideas."

The software's interoperability is also important to the team's workflow at Hendo Hover. Many of Greg's employees use varying design platforms, and exchanging information between these different programs quickly and efficiently is crucial to advancing their research. "I don't know other programs like I know Vectorworks, so being able to use a program that I'm comfortable with and still work with all of the great people that I've found for my team is definitely a huge benefit."

Another important technology that the designers at Hendo Hover utilize is 3D printing, and Vectorworks software's ability to export STL files makes it easy for them to express their models both virtually and physically. "Exporting to STL files allows us to create things in a very short amount of time, which means we never have to wait to move forward with our research."

HOVERING ONWARD AND UPWARD

Realizing the dream of a hovering world is still a work in progress. "I've had to cannibalize a lot prototypes," Greg laughs, adding, that he's "discovered many, many ways how not to hover something." But even when facing the long road ahead, Greg is bolstered by the knowledge that he is helping to transform the world. "I realize that these are grandiose ideas, but MFA technology can do a lot of things and hovering is just one of them. Right now it's not about fortune or fame; rather, it's about our responsibility to others." That's why Arx Pax has only patented MFA technology in the United States while making it freely available in low lying areas around the world at real risk for floods and tsunamis. "Our technology can save lives, so we're making it available to people in places like Micronesia and Bangladesh where tsunamis are devastating communities; we'll even help them get started," Greg promises.

And how does design software fit into this journey forward? "I'm redesigning the Arx Pax office, so of course I have Vectorworks open on my screen right now," Greg says proudly. "The software allows me to think in three dimensions more effectively, which is worth a great deal in everything I do — from imagining technological innovations to creating spaces where my team transforms those ideas into reality."

BE INSPIRED

Read about more designers who transform the world with Vectorworks Architect software at vectorworks.net/success-stories.

ACKNOWLEDGMENTS

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Courtesy of Arx Pax, LLC

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