Jeri Ellsworth: The Challenge of Doing

QST magazine sat down with this self-taught engineer and queen of the Makersphere shortly after she earned her Amateur Radio license, to find out what led her to ham radio and what Makers can do with ham technology.

Becky R. Schoenfeld, W1BXY
***QST* Managing Editor**

"Electronics hacker, chip maker, race car builder, pin ball machine maker, blowing-stuff-up'er..." is how **lifehacker.com** described Jeri Ellsworth when they named her "MacGyver of the Day" on February 25, 2010, but anyone in the Maker or gamer communities who's familiar with Jeri's work knows those varied and colorful descriptors only begin to cover everything she does.[1]

Jeri, who started taking things apart at a young age, found her way to radio while still a child in rural Oregon. A transmitter project she worked on as part of a multi-project electronics kit led her to start building transmitters at age 10 or 11, using an old record player as an audio source. She'd start a record ("Old country western songs — not exactly my kind of music, but it was an audio source.") and then run across the neighboring field to see how far the transmission went. Jeri eventually met a boy who lived up the road, and who was also interested in electronics. They began what Jeri described as an "arms race."

"We'd ride our bikes and we'd count the number of phone poles from our homes. We'd measure how much power we were outputting by how far we could receive our signals," she recalled. "We were trying to outtransmit each other, which was super fun. I had a trick. I would take my long-wire antenna and wrap it around the phone cables going into our home, and couple the RF energy into the phone lines, which were above ground on telephone poles, so I got a little extra boost."

The two young radio pirates frequented garage sales to buy gear and parts. They turned five- and six-tube AM receivers into AM transmitters, and progressed to FM transmitters, increasing their broadcast range to the extent where they couldn't ride their bikes far enough to lose their signal.

Learning to be Fearless

In addition to scavenging at garage sales, Jeri and her friend also scoured their local library for books about electronics. It was there that Jeri met two local ham radio operators who were among her first mentors. The ham do-it-yourself mentality clicked with her natural curiosity.

Jeri (at right) and Amy Herndon got licensed at Pacificon in October 2016. Jeri took all three exams, earned her Amateur Extra license, and received AI6TK a couple of weeks later. Amy took the first two exams, earned her General class license, and received KM6FZE. [Bob Inderbitzen, NQ1R, photo]

"The ham operators were all about failing," recalled Jeri, whose 2010 YouTube video about failure being part of learning has over 300,000 views.[2] "I remember...trying to make a crystal set…[my mentor] was taking toilet paper tubes and wire and wrapping things…doing no math. And he was like, 'My instinct says I have to wrap it this much and then cut the wires off to the crystal set. Well, that didn't work!' So we unwound some and added some. I think…that really helped me be fearless. Even though you don't understand something…just go and try and fail. Good things will come out of it. Don't be afraid of the failure."

Jeri's ham mentors encouraged her to get licensed, but her interests in computing and other types of science — not to mention the commitment required for learning Morse code, which was necessary for obtaining a ham radio license at that time (the code requirement was dropped in 2007) — left her little time to pursue licensing.

Jeri kept tinkering and building throughout her teens, eventually spending several years building race cars. Her passion for vintage pinball machines has led to her amassing a collection of more than 80 that she has repaired or modified. After owning several computer stores in the 1990s, Jeri got into chip design and landed several freelance projects.

The project that put her on the map was

At the Bay-Net Amateur Radio Club booth at the 2016 Maker Faire Bay Area, Tara Witkowski, WQHS432, helps Jeri decorate her attendee badge with zip-ties. [Photo courtesy of Bay-Net Amateur Radio Club]

a joystick with 30 games pre-loaded onto it — the item was a hot seller in the 2004 Christmas season.[3] Other toys and entertainment products followed, to the point where Jeri caught the attention of Valve Software, who courted her aggressively and eventually hired her to put together a department for video game design. The research and development work Jeri and her team did for Valve led to her creating her own company, CastAR, with her business partner Rick Johnson.

A New Reality

The "AR" in the company's name stands for "augmented reality," a mode of entertainment and game play that's similar to virtual reality. Virtual reality involves wearing headgear and/or gloves that allow you to interact with an invented world that replaces the world around you — imagine standing in your living room and putting on a set of goggles that gives you a view of the Grand Canyon, no matter which way you look. The view would be amazing, but if you took a step to one side, you might trip over your coffee table.

As Jeri explained, augmented reality involves "adding things to the world. Our experience is magic happening on a table top within arm's reach, and you don't have to hang [virtual reality] sensors on the wall; you don't have to have a killer $2,000 PC to run the [system]."

The system consists of a set of augmented reality glasses on which two micro-projectors project an image onto a sheet of "retroreflector" material — a material that's also used for license plates and road signs. The retroreflector bounces the images back to the user. The glasses also contain a tracking system that uses infrared LEDs to keep track of the position of the user's head. Move in any direction, on any axis, and the glasses will track your movement. And wherever the retroreflector is placed — laid on a table, hung on a wall — the user will see a stereoscopic, 3D display that's right in the middle of the "real world," hence the term "augmented reality."

CastAR expects to ship the system in the fourth quarter of this year, at a price point that's competitive with most game consoles.

Back to the Hams

In the middle of all this activity, Jeri's finally gotten her ham radio license — her call sign is AI6TK — and has been setting up her first ham radio station. She's excited about digital modes and moonbounce — leading-edge stuff that can be done with an entry-level Technician class ham license — and is looking forward to applying her skills as a chip designer and FPGA designer to expand upon the ham radio technology that fascinated her when she as a kid, as a way of giving something back to the community that encouraged her in those early days.

When asked about where the Maker and ham radio worlds might intersect, Jeri mentioned what she described as "the challenge of doing."

"Makers do things for the sake of doing them," she said, and suggested that Makers and hams might find common ground in challenges such as: "Yes, you can go on the air and talk to people all around the world, but can you do it with 100 milliwatts and a wire that you threw in your back yard?"

Jeri credits the hams who mentored her in childhood as encouraging her to try new things, even if it meant failing, and learning from those failures. In addition to giving Jeri gear, books, knowledge, and advice, hams gave her another thing that was hard to come by for a tech-geek girl in rural Oregon — a sense of community that helped keep her on her chosen path. We're excited that Jeri's path has led her back to ham radio, and we can't wait to see what her curiosity and skill will make of it.

Notes

[1] **http://lifehacker.com/5480199/macgyver-of-the-day-electronics-hacker-jeri-ellsworth**

[2] "Secret to Learning Electronics — Fail and Fail Often," **https://www.youtube.com/watch?v=xhQ7d3BK3KQ**.

[3] "A Toy With a Story," John Markoff, The New York Times, Dec. 20, 2004.