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Cultural Contemplations

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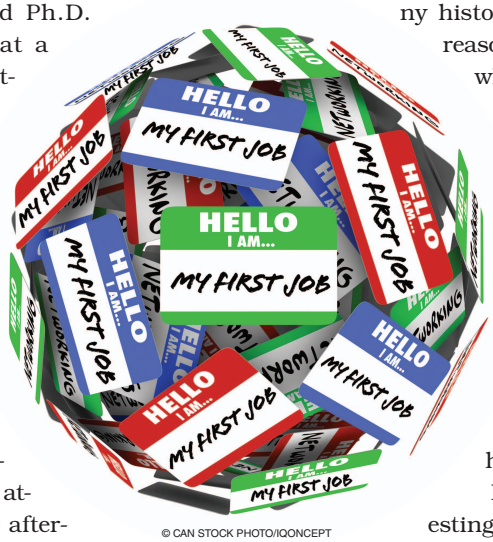
The learning continues...

by Brock J. LaMeres

My career began in the late 1990s after earning my B.S. degree in electrical engineering from Montana State University (MSU). Two weeks after graduation, I went to work for Hewlett Packard (HP) in Colorado Springs, Colorado, as a hardware design engineer. In the 16 years since starting my first job, my career has been filled with exciting twists and turns including designing electronic test equipment, making international customer visits, getting my M.S and Ph.D. degrees, teaching night classes at a university, cofounding a tech start-up company, and ultimately becoming a professor, where I have been researching future computer architectures.

It is fun to look back at my career path from the start of my first job, where I sat down in a cubicle with a lab notebook and began learning how to design digital systems, until today. In my first year, I fully anticipated to be doing what I was doing at that moment for the next 40 years. When I attended retirement parties on Friday afternoons in the HP cafeteria, I just knew that would be me someday.



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To my surprise, my career now is nothing like what I had anticipated. The projects I work on now are light years away from the work I did on my first job. In the fall of 2014, I launched a new computer technology into space aboard a sounding rocket. In the summer of 2016, I will be sending a new computer technology to the International Space Station for a six-month demonstration. I was also notified by NASA that my computer was selected for a stand-alone satellite mission. If you had told me, on that first day of my first job, everything that was to come in the first 16 years of my career, I don't think I would have believed you.

The interview

When I approached the end of my degree in electrical engineering in the late 1990s, I knew that I wanted to work for HP. This wasn't because I had researched the types of engineering jobs that they had, the company history, or even the pay structure. The reason was that it was the company for which nearly all graduating students in the electrical engineering department at MSU wanted to work. Every engineering college has a set of big companies that recruit there. In the late 1990s at MSU, those companies were HP, Boeing, and Micron. Everyone wanted to work for one of the big three. I knew that if I could land a job at HP, I would be one of the success stories that I had heard about.

Looking back at that time, it's interesting that my desire to work for a specific company was based solely on the culture I was immersed in and had nothing to do with any substantive details about the company. Nonetheless, knowing a specific company that I wanted to work for was a tremendous advantage in my job hunt because I was able to learn about the types of interviews that HP conducted. At the time, HP's interviews were technical with a capital "T." There were no questions about how you felt today or where you saw yourself in five years; it was about sitting down in front of an HP engineer and working circuit problems. It was stomach-turning having to walk into the interviewing room and seeing the interviewer sitting at a table with nothing but a pad of engineering paper and a calculator on it.

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The level of technical rigor of the HP interviews increased at each level. After passing a 30-min interview on the MSU campus with a recruiter, I earned a 1-h phone interview with a lab engineer. I recall trying to verbally describe how I was using the Laplace transform to solve a resistor–capacitor circuit over the phone. My roommates couldn't believe what they were hearing. I ended up getting four different on-site interviews with HP at various campuses in Colorado. Each interview consisted of 4–5 h of technical interviewing with a short break for lunch. I was turned down on my first two interviews but received offers on my last two and ended up taking the final offer at the Colorado Springs site.

Brock J. LaMeres.

In 2014, LaMeres and his graduate students launched a new computer technology into space on a NASA-sponsored sounding rocket. From left: LaMeres, Ray Weber, Sam Harkness, and Justin Hogan.

Get in style

It was immensely helpful in getting my first job to know the style of interview that I would face. First of all, knowing that it would be technical allowed me to prepare. A technical interview is very similar to an oral exam, and to succeed at any exam requires studying. I prepared by asking students that had prior interviews what type of questions they were getting and working those problems over and over. I also visited with professors who were familiar with the company and the interviewers (usually former MSU alumni) to learn what to expect and what level of detail the interviewer wanted to see. Finally, I tried to interview with as many companies as possible during on-campus recruiting events.

One of the pivotal skills that helped solidify a position with HP was being able to solve transmission line problems in the interview. In the mid-1990s, the computer industry was battling the 50-MHz clock speed barrier. At this speed, the wiring in computers begins looking like transmission lines, and the electrical signals have to be treated as propagating waves instead of just negligible interconnections. While all electrical engineering students study electromagnetics and transmission lines in their junior year, there were few around at that time that knew how to apply the theory to real-world problems. It turned out that the engineers at HP were also battling with how to apply transmission line theory to digital systems, and thus it represented a large part of the interviews.

I was able to understand this need early in my job hunt, and I studied all possible types of interviewing questions that could be asked on transmission lines. I remember numerous interviewers saying, "Wow, usually students don't know this stuff." One interviewer asked me how I had learned this, to which I replied, "I just studied it on my own." To this day, I attribute landing my first job with HP on how I prepared for their style of interviewing and the time I spent practicing my interviewing skills.

The first year on the job

Starting a new engineering job as a freshly minted graduate is like drinking from a fire hose—you're trying to cope with all of the information being thrown at you. All of the theory covered during a B.S.E.E. degree is designed to give a student a broad foundation across many electrical engineering areas. Once a graduate starts working, he/she is asked to narrow his/her focus and start building depth in one area. Furthermore, companies need to make money, so the technical depth must be coupled with actually getting a product out the door.

LaMeres uses weather balloons to fly research experiments to the edge of space. These types of flights provide his students with hands-on experience building science payloads.

In 2010, LaMeres' robotics team won the national championship at NASA's Lunabotics Mining competition.

This meant that I needed to gain a tremendous amount of new technical skills in addition to knowledge on how to design a useful product. In my first year on the job at HP, I was given a mentor that helped me navigate all of the new challenges I was facing. I was fortunate to be assigned one of the rock stars of the R&D lab as my mentor (Steve Draving). I recall one of the things he had me do was buy a book on digital signaling and read a section each night. I was reading the textbook one night before going to bed thinking to myself, "I can't believe I'm being assigned homework at this job." This was the beginning of my realization that learning doesn't stop at graduation. I came to understand that learning had to become part of the job of an engineer to stay relevant and contribute to solving the day's problems. My first year involved many trials and errors, a few successes, but overall a positive experience working with highly intelligent colleagues and learning about how the technical industry operates.

As I look back at how my first job led to my current position, I think about a saying that many of my mentors have shared with me, "There is no *job security* anymore, there is only *career security*."

Lifelong learning

After eight years at HP and acquiring my M.S. and Ph.D. degrees part time at the University of Colorado, I decided that I wanted to try a slightly different career path. I was thrilled by my experience teaching a night class on microcontrollers at the local university and wanted to see if teaching could become a larger part of my career, so I decided to take a faculty position at Montana State University. Again, this new challenge involved learning how to teach a wide range of courses, how to write research proposals, and how to manage research projects.

As I look back at how my first job led to my current position, I think about a saying that many of my mentors have shared with me, "There is no *job security* anymore, there is only *career security*." To me, this means that to have a successful engineering career, one must continually improve by investing in the skills that are needed at the time. I feel like I'm working at my dream job now, and I am getting to do amazing things all because I committed to continual education and seized opportunities in which there was a need for which my skill set could contribute. I'm confident that as long as I continue to do these things, I will still be having a blast during the next 16 years of my career. And it may very well be in a job that I never dreamed I would be doing!

About the author

Brock J. LaMeres (lameres@ece.montana.edu) completed his bachelor's degree in electrical engineering from Montana State University in 1998 and his master's and Ph.D. degrees in electrical engineering from the University of Colorado in 2001 and 2005. After spending eight years as an R&D engineer at Hewlett-Packard (Agilent), he joined the faculty at Montana State University in 2006 as a professor in the Electrical and Computer Engineering Department. His teaching and research focus is in the area of digital systems. He has published over 70 papers and two textbooks in the area of digital systems. He holds 13 U.S. patents and is a registered professional engineer in the states of Montana and Colorado. He is an IEEE Senior Member and serves as the advisor to the IEEE Student Chapter at MSU.

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