

Ivett Leyva: An Experimentalist with International Flair

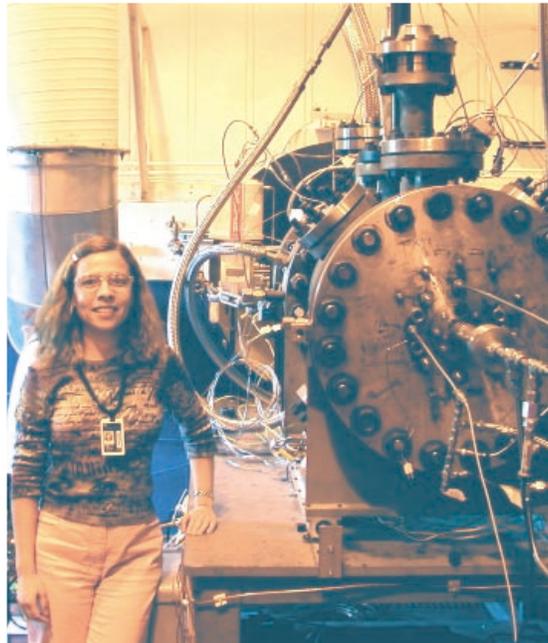
Aeronautics, PhD '99

With this issue we are beginning our practice of offering two alumni profiles—one of a “neophyte” (an alum who has recently graduated), complemented by a second profile of an established Caltech “ex-pat.”

Ivett Leyva graduated from Caltech in 1999 after spending, she declares, “seven great years” in residence, first as an undergraduate (transferring from Whitman College), then as a graduate student working with Professor Hans Hornung. Her PhD was in Aeronautics, her thesis on the shock detachment process on cones in hypervelocity flows.

Upon graduation, she left southern California for upstate New York, joining the General Electric Global Research Center as a mechanical engineer. She has been involved in a wide spectrum of technologies in her first three years at GE, including cycle analysis of microturbines, experimental testing of fuel cells, and currently, design of domestic gas burners and pulse detonation engines (PDEs).

“Working on PDEs is absolutely fascinating,” Leyva explains. “They promise to be a crucial step in the ever-harder fight for higher cycle efficiency for aircraft engines.” In a PDE, energy from the fuel/air mixture is released through a detonation (a supersonic shock wave coupled with a chemi-



cal-reaction zone). “I am involved in the conception of ideas, transformation of ideas to manufacturing drawings—including the minutiae involved with making an idea easily manufacturable—and testing resulting prototypes.” The final step is analyzing results, then presenting and discussing them with program managers and VPs. “I have been very fortunate to travel twice to Russia and work very closely with Russian researchers. I have created joint programs with them, negotiated the scope and schedule of projects, and made sure that the schedule of deliverables was met.” Leyva has had opportunities to

publish and present PDE work at several conferences. And in 2002, she had six patents filed.

Leyva is also involved in design and testing of next-generation domestic gas burners. “I am the liaison between the manufacturing facility in Mexico (where I can practice my native language) and our research facility here. What I like most about this project is my exposure to this very short business cycle, very different from that of aircraft engines. It is also gratifying to see the very fundamental research we do get applied to such familiar products as domestic gas burners.”

“One of the things Caltech best prepared me to do is be a very careful planner of my experiments,” Leyva observes. “From my advisor [Hornung] I also learned the power of back-of-the-envelope calculations and the great value of doing CFD [computational fluid dynamics] and lab experiments hand-in-hand to strengthen and best use the results of both. Professor Paul Dimotakis taught me that a good experimenter really knows all the ins and outs of her experiment, and I try to abide by that philosophy.”

She also fondly remembers her friends on campus, “who made me a very happy student.”

“At GE I have learned to merge analytical and academic knowledge I gained at Caltech with more practical and experience-based knowledge gained through my first few years here. Perhaps the only thing I wish I

had had more experience with while at Caltech is more exposure to the practical considerations of manufacturing, such as making successful and safe aircraft engines. I have had to learn many of these things as I go.”

Leyva feels the years she spent at Caltech “are some of the best in

my life. I’m grateful to the GAL-CIT community who made me feel like a family member. I hope that through my work and citizenship I make them proud.”   

Eric Garen: Education at the Fore

Electrical Engineering, BS '68

What are the pivotal experiences that shape a person’s life, that lead him or her down one path rather than another? We spoke to Eric Garen in his Los Angeles home about these experiences, about his Caltech education, about the formation of his company, Learning Tree International, and about his current projects. What emerged is a picture of someone who has successfully applied a rigorous, analytical approach to problem solving, whether it be of complex business problems, or of social problems that plague inner-city youth trying to make their way to college.

We begin in the early 1970s, on the eve of the advent of the personal computer. Intel was manufacturing their early microprocessors (the 4004 and the 8008), and engineers were struggling with how to use these new devices. Eric Garen was one of those engineers.

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fter graduating from Caltech in 1968, I went to work at Technology Service Corporation, a small think tank in Santa Monica that was an offshoot of Rand. After a few years, I began to incorporate minicomputers and then microprocessors in the real-time radar simulators we were designing and building. But learning how to use the early minicomputers and Intel’s first microprocessors was basically a trial-and-error process. You made a lot of mistakes and did things the wrong way. It became clear that that wasn’t the best way to learn. So I joined with fellow engineer and Stanford graduate Dr. David Collins to form a company

that would train other engineers like ourselves on new technology. In 1974 we formed Learning Tree International.

We went into business in Dave’s spare bedroom. We used his garage to store our course materials. We were an upscale start-up—we had a bedroom in addition to the traditional garage! We put 20,000 or so flyers describing our first microprocessor course into the mail and sure enough, people started sending us enrollment forms and checks. Initially I was the course developer and instructor, and Dave was the operations department and marketing department. We packed boxes with our course materials (and a few stray autumn leaves) out in the driveway, and

