Leda Lunardi—Her Journey and Words of Motivation for Women in Science and Engineering

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My journey: In my wildest dreams, I could never imagined to have the career I have today even if I have tried. In my family, I am the first generation not only to attend college but also to obtain advanced degrees: first a M.Sc. in Physics from University of São Paulo, Brazil, and then a PhD in Electrical Engineering from Cornell University, New York. At the time I finished my PhD, it was the first thesis in the USA on the topic of AlGaAs/GaAs Heterojunction Bipolar Transistors for microwave operation, giving me a few opportunities to start a professional career in the USA.

As a member of the technical staff in AT&T (then Bell Labs) in Murray Hill, I joined the heterojunction high mobility transistors' group. Achievements of this group were then among the best results in the digital circuits domain. The goal was to develop HBT-based digital circuits for telecommunication applications. The work started almost from scratch. With talented collaborators, we published the first demonstration of GaAs-based HBTs decision circuits along novel transistor structures facilitating the circuit manufacturing. At the same time, other groups started reporting advanced progress in different InP-based HBTs because of the compatibility with the optical wavelength.

Next, I moved to another group in Holmdel that was doing research on InP-based HBT integrated receivers. There we demonstrated the first InP-based monolithically integrated photoreceiver operating at 10 Gb/s and 20 Gb/s followed by multichannel wavelength division multiplexing (WDM) photoreceivers. The photoreceiver operating at 10 Gb/s was outstanding, yet these results were even more significant because it was the first time that a monolithically integrated photoreceiver outperformed hybrid versions by more than 6 dB in signal-to-noise ratio.

Since then, after more efficient modulation formats and new optical fibers had emerged, my research interest has changed considerably. Some of the important results obtained with students and collaborators as at NC State are: integrated circuits with amorphous Indium Gallium Zinc Oxide (IGZO) thin film transistors made by pulsed laser deposition, compact modeling of InAs–based Tunneling Field Effect Transistor, and the polymer-based dielectric mirrors able to regulate the light intensity and to tune incident wavelengths for display applications.

Future research: There are several opportunities already happening in devices' research, which is a rich field and maintains solid since the invention of the bipolar junction transistor almost 70 years ago. Today the difference is that digital technology permeates every bit of the infrastructure of the human life in our society, with electronic devices embedded into everything.

No matter what applications are needed: new advances in materials, new developments on processes, new improvements on design tools, new architectures and new manufacturing techniques to overcome power dissipation, improve energy efficiency, or increase switching speed, new devices will be invented.

Words of Motivation for Women EDS Student Members to pursue Science and Engineering

Looking at my career in Science and Engineering, I wish I could translate the satisfaction in working in Science and Engineering. The constant learning and challenges that I faced made me learn and grow. I enjoyed all discussions, the profound knowledge of my colleagues and all the professionals I met.

For women in particular, engineering is a liberating profession because you can have a well-paid job and be independent. As an electrical engineer, there are many areas for specializations with the option to be multidisciplinary. The further you educate yourself the greater your job responsibility will be. You have the ability to improve yourself, and see how far you can advance in your career. As an engineer, you can change and influence our society.

Still there is some progress to make in gender diversity in Science and Engineering. In the USA, women make up less than 30% of the science and engineering college educated workforce. It is changing though. Before the pandemic started in 2020, some universities like USC and NC

State reported that their colleges of engineering enrollment included a larger percentage of women in their first year classes.

Leda Lunardi has been a professor since 2003 at the Electrical and Computer Engineering Department at North Carolina State University in Raleigh, NC. She holds a Ph.D. degree in electrical engineering from Cornell University in Ithaca, NY. Her research areas are in fabrication and modeling of electronic and optoelectronic devices, and microelectromechanical devices. Before joining academia, she spent several years doing R&D at AT&T (then Bell Labs), and JDS Uniphase. In addition to her research, Dr. Lunardi has managed several NSF grants for STEM research and education to encourage women and underrepresented minority students to graduate in engineering and science and pursue graduate degrees. Dr. Lunardi has been a volunteer for more than three decades in professional organizations. She has served on numerous IEEE executive and technical committee conferences, editorial board of journals, and national and international governments' ad-hoc committees for grants and projects reviews. Among her present activities, she is the chair for the 2021 IEEE Fellow Committee, chair of the 2021 IEEE Jun-ichi Nishizawa Medal Committee, and member of the 2021 IEEE Cledo Brunetti Award and the 2021 IEEE EDS Lester Eastman Award committees. She has authored and co-authored more than 100 publications and conference proceedings, been granted 5 patents, and given invited talks, plenary addresses, and short courses at conferences. She is an IEEE Fellow and co-shared the IEEE Photonics Society Engineering Achievement Award.