Success Story

North Carolina State University Prepares Students for Industry Challenges Through Hands-On Design Course

NC STATE UNIVERSITY

"NI AWR software has been an invaluable part of my RF/microwave curriculum. Thanks to the tool's intuitiveness and ease of use that my students can quickly learn and practically apply the basic concepts of RF circuit and system design in a single semester."

Dr. David Ricketts, North Carolina State University

Company

North Carolina (NC) State University is a public research university located in Raleigh. It began as a land-grant institution grounded in agriculture and engineering but has since grown into a pre-eminent research enterprise that excels across disciplines. With more than 34,000 undergraduate and graduate students, these students learn by doing. They pursue original research and start new companies. They forge connections with top employers and serve communities local and global. Through it all, they enjoy an outstanding return on investment.

At-A-Glance

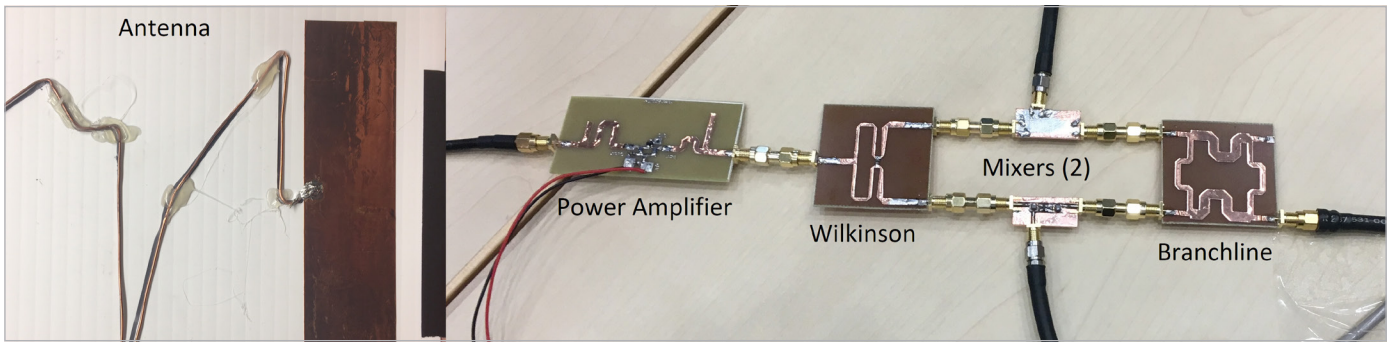
Application
- RF/Microwave Curriculum
- Radio Components

Software
- NI AWR Design Environment
- Microwave Office
- AXIEM

Benefits
- Self-service licensing for student
- Quick learning course
- Cost effective for academia

Challenge

The NC State Department of Electrical and Computer Engineering has as its mission the accumulation, generation, and dissemination of knowledge in electrical and computer engineering. Dr. David Ricketts, a primary faculty professor specializing in teaching RF/ microwave design, wanted to develop a hand-on learning program that would prepare electrical engineering students for real-world employment with leading RF/microwave firms that provide cutting-edge communications and aerospace/defense products. In addition to the challenge of teaching students the complex concepts of RF/ microwave design, Prof. Ricketts was finding that it took as long to teach the students how to use the complicated high-frequency design software—an entire semester—as it did to teach the design concepts.

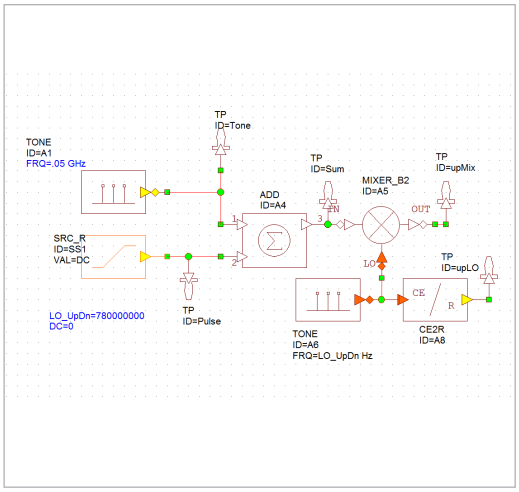


Solution

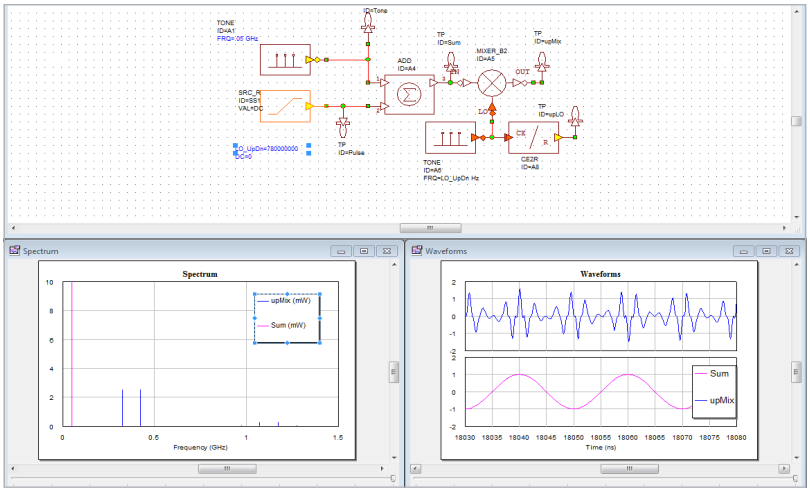
Prof. Ricketts replaced the previous software in his classroom with NI AWR Design Environment, which is available to NC State students and professors free of charge through the AWR University Program. Because the software is so intuitive and easy to use, Prof. Ricketts has succeeded in developing a unique hands-on, interactive training program that quickly teaches his students how to leverage the software to design the basic building blocks of RF circuits in a single semester.

In the class, students learn the basic theory of modern digital radios as well as the RF circuits and systems used to build them. After an introduction on digital radios, students select an RF building block to design and build. There are short mini-classes on each component: double balanced mixer, microstrip filters, low noise amplifiers, power amplifiers, baluns, and more, after which the students design an RF component using NI AWR software, specifically Microwave Office circuit design software. The designs are then transferred to a printed circuit board (PCB) and each component is built and tested using a vector network analyzer (VNA).

As a note of interest, this NC State course has been so successful that Dr. Ricketts has enhanced his RF/microwave class materials and combined them with NI AWR software into the interactive Bits to Waves: Building a Modern Digital Radio in One Day workshop for IEEE professionals that is offered at conferences throughout the world.



AM upconverting modulator system diagram as per course material.



NI AWR Design Environment schematics and associated results.

Conclusion

Dr. Ricketts chose NI AWR Design Environment for his class because the previous software was taking an entire semester to learn before any design work could be tackled. NI AWR software is so intuitive and easy to use that students are able to begin practically applying the software in design concepts almost immediately. Dr. Ricketts feels that students who have completed his course are now well prepared to compete for jobs in the RF/microwave industry.