Thinking Outside the Box - July 2021

For this edition of *Thinking Outside the Box*, I have three questions. #1: Do you regularly incorporate software-based activities in your undergrad ECE courses? If so, what languages do you use? For a long time, I have been a big believer in developing activities that require my students to do at least some Matlab programming. I still believe that students should not graduate with a BS in electrical or computer engineering without knowing how to solve real engineering problems using Matlab. Unfortunately, universal access to this extraordinarily useful tool is not provided at all engineering schools. I did a quick check for the 18 ECE programs that make up IEC and found half have a site license and half do not. The ones with licenses do not necessarily provide access for faculty. Fortunately, there is a free alternative that works for nearly everything we need to do in at least core undergraduate courses. Octave works with nearly all m-files, although some require a little modification. I have been using the browser-based version at https://octave-online.net/ and find it works great. I encourage you to consider it. To get started, look at this simple intro from the Howard Math Department. http://www.cetla.howard.edu/workshops/docs/Introduction%20to%20MATLAB%202017.pdf

Those of us who have enjoyed working with Analog Discovery and ADALM2000 boards know that they can be programmed using Python. It is really quite easy to write a simple program that enables even first year students to build a basic control system like a night light. Python is definitely the up-and-coming language that I would say also has to be learned by all ECE undergraduates. Recently, I had a fascinating discussion with the head of engineering at a large telecom conglomerate who provided mandatory Python training for all of their engineers, which shows the value it has in industry these days. Our colleague Petru Andrei at FAMU provided me with two very important lists of the most popular programming languages. The first is the TIOBE Index https://www.tiobe.com/tiobe-index/, which is based on the number of skilled engineers world-wide, courses and third party vendors. The second is the PYPL PopularitY of Programming Language https://pypl.github.io/PYPL.html Index, created by analyzing how often language tutorials are searched on Google. The combination of these two lists make a very strong case for learning Python. I think that Petru has convinced me that we should be using Python in student learning activities, not just Matlab.

As Vincent Roche, CEO of Analog Devices has stated, semiconductors and software are the future. We have to be sure our students are prepared for it. If you have some good examples of software-based tasks for students, please share them with me and I will make sure that all of our colleagues in IEC know about them. My email is connor@rpi.edu.

I would also like you to send me your answers to two additional questions that relate, in part, to the online meeting IEC is organizing for September. #2: What company makes a product that most closely relates to your personal research and teaching interests? #3: Is there someone at another university that you have hoped to work with on research or teaching, but have not been able to make it happen? If so, who are they and what is the topic? I very much encourage you to expand on all three of these questions if you wish.