International Journal of Advance Innovations, Thoughts & Ideas

Picovici et al., Int J Adv Innovat Thoughts Ideas 2014, 3:1
DOI: 10.4172/2277-1891.1000158

Opinion Open Access

What is Happening to Electronic Engineer?

Dorel Picovici

Department of Electronic Engineering, Institute of Technology Carlow, Ireland

***Corresponding author**: Dr. Dorel Picovici, Department of Electronic Engineering, Institute of Technology Carlow, Ireland, Tel: +353-59-9175438; fax: +353-59-9175401; E-mail: Dorel.Picovici@itcarlow.ie

Date received: 18 June, 2014 **Date Accepted**: July 16, 2014 **Date Published**: 25 July, 2014

Opinion

Once upon a time there was an electronic engineer career path much different than the one many of us are taking today. Let's go back approximately two decades. When I trained as an electronic engineer, I was learning about vacuum tubes. They were easy enough to understand and were doing what was "written on the box". No hidden functionality and it was easy to debug the circuits that were built with them. Actually, at that time a good electronic engineer needed just a screwdriver and personal skills to debug such circuits. The screwdriver was used to open the enclosure while the personal skills were used to debug the circuits. Those skills were based on vision, sound and smell. Vision: good visual inspection of the circuit would reveal possible problems such as too much current through a device, broken circuit tracks, swollen capacitors, burned out fuses and in case of vacuum tubes, no light indicating that the tube is not powered or it is faulty. A good electronic engineer would have a spare set of tubes and used them as a quick replacement. Given the accepted tolerances for the voltage and currents in most of the cases there was no need to measure voltage or currents. Sound: being familiar with some circuits one would quickly learn the sound of them. In some cases, a common circuit fault was predicted at power up stage before even visually inspecting the circuit. Again a good electronic engineer would have developed a "feel" for circuits based on sounds: too much current through a device would trigger a specific sound; something that is recognisable only after some considerable time of practice. Smell: Although these may sound strange to some readers, but some components have their own smell when they are faulty. We all recognise the smell of acid from leaking batteries. Some electrolytic capacitors smell like cabbage when are faulty.

Transistors replaced the vacuum tubes. The new technology used at that time had a tremendous advantage in terms of space and circuit's complexities. Bipolar junction transistors (BJTs) came first followed by Metal Oxide Semiconductor Field Effect Transistors (MOSFETs). Bundle them together with other electronic components and you have a chip. That's all good, but now to debug these circuits our electronic engineer needs to have a multimeter and a solder iron to replace the faulty ones. Again after years of experience one would recognise standard components failures. At the beginning of a career, a lot of electronic engineers were expecting very complicate circuits failures. A lot of times they were quite simple and in average more than 50% were caused by a power supply failure. And there was personal luck in this too. One could be lucky to work on circuits where similar failures were repeated quite often. And with the skills mentioned above an electronic engineer could have had a job and retire after 30 years of service working on the same technology.

Once the digital electronic systems imposed theirs superiority, the electronic engineer skills had to be upgraded to include the knowledge of working with microcontrollers. In addition to the standard toolkit now we need access to a computer to program the microcontrollers. Our electronic engineer needs to know programming. He looked over the shoulders to his software engineer colleagues for which all these languages make so much sense. To learn a programming language (C or assembly) was not always an easy thing to do and once mastered they were used (and still are) for a good number of years. Again, our electronic engineer needed a digital multimeter to measure voltages and currents to identify the faulty parts of the circuits.

If we revert to nowadays, I am sure that some of the readers would not know or came across anything described above. The use of bipolar junction transistors is out-of-date. Some chip designers would never use them. Nowadays it all about saving space, having more components on the chip, making everything faster and smarter. Our ordinary electronic engineer does not need his toolkit anymore because most equipment have self testing and in some cases they are able to display the problems encountered. This a great advantage in the auto-motto industry. Instead of using the standard tools now we could use our smart phones to "talk" with these circuits (Intel Galileo, Raspberry Pi or Arduino boards, to name only a few). We do not have programming limitations any more. No need to know everything either. One could program a microcontroller or an embedded circuit without knowing too much about its electronic circuit. They are designed to serve a purpose and a new version will be released even before you can test all available functions. In addition to their huge variety of applications, they also are very affordable. There is no need to replace a broken chip. It could be more expensive to buy a replacement than buying a new board. There are good things and bad things about this. The good thing is that the new technology is price affordable, much easier to understand and work with. It is quite common to see on YouTube 10-12 year old kids talking about embedded systems and their home projects. The major drawback is the speed that the technology is changing. By the time this article is published, a new embedded board is probably released. Now you have to update yourself all the time. Most electronic circuits can be programmed with different functions depending of the application needed. It is quite common to buy a box with electronic components that can be remotely programmed and managed from the cloud. This is something completely different from the skills required for an electronic engineer years ago. Over two decades ago an electronic engineer was able to have a job for 30 years working on a technology studied during a university degree. Today this is an unrealistic dream.