

Charles Nader

The True Value of a PhD in the Eyes of Industry



When I was asked to write about how my PhD affected my professional life, I was initially hesitant, thinking I might be considered a show off. However, my students' appreciation and respect for my work, combined with my passion to support them and guide them to investigate and reach deeper understanding of nature and problem solving, have triggered me to write this article.

Charles

By definition, Doctor of Philosophy (PhD) in Engineering, independent of its branches, is a postgraduate degree awarded to an engineer who spends a few years researching and specializing in a defined field. In reality, PhD in Engineering is a way of professional life and wisdom. The following lines summarize the author's experience and are generalized for a wide audience.

The Beginning

I started my PhD in Telecommunication with the dream of developing my own ideas in a company of my own. My master's degree studies had already introduced me to the challenges in the field. I wanted to understand their root-cause(s) and to solve them. I already knew that being involved in an industrial company would probably limit the time needed to take the one-step beyond the norm and the freedom of unbiased thinking.

Five Years for Five Packages

The road to graduation is long. Five years of hard work and studies beyond the norm can be exhausting. However, with each year a skill is developed; a package for professionalism is earned.

Novelty and Advanced Knowledge

What differentiates a researcher from a regular engineer is the skill to identify and systematically develop novel solutions for complex problems using advanced theoretical knowledge. Such theoretical knowledge cannot be obtained without the help of advanced courses taken during the PhD studies. These courses offer the researcher the ability to

simplify complex problems using transformations in a variant of domains and to derive realizable solutions which are not seen by others.

Reasoning and Self-Criticism

The PhD student gains two key characteristics during his research studies: the methods of reasoning and self-criticism. It is not enough to acknowledge the presence of a problem, but it is a requirement to identify and understand its root cause(s). To achieve such a goal, the researcher needs to investigate all aspects that could lead to the problem, including his own methodology. By self-criticizing his own methodology of work, the researcher is able to identify systematic and chaotic errors and gain trust in his unbiased aspect of work. Such ways of reasoning and criticism can be generalized to cover all functionalities implemented in a system. This approach will lead to better trust in the system operation. Such characteristics are key differentiators in industry and are a requirement every system lead architect needs to have to maintain large-scale systems in operation by or above the standards.

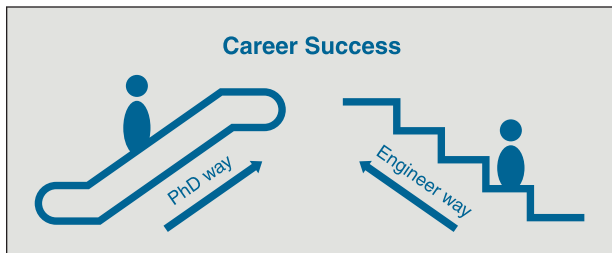
Scientific Writings

A key requirement for granting a researcher the PhD degree is to write a number of novel scientific documents including conference papers, journal articles, and the PhD thesis. These documents should describe the researcher's ideas in a smooth and clear fashion, allowing both the highly specialized and general audience to understand these new concepts. Such gained skill is a requirement for writing specification documents and project descriptions in a multi-disciplinary environment.

Expressing, Convincing and Leading

One of the tasks a PhD student does during his research studies is to teach at postgraduate levels. To be a successful teacher is simply not to tell the students what to do, but to have the passion to convince them, using clear and smooth explanations, of why and how to do it. The art of information sharing is the main characteristic of a team player.

Another task a PhD student has is to present and defend his research findings in front of international scientists during international conferences and seminars; what is known in PhD



students' language by *the moment of truth*. No matter the experience and confidence level, nor the audience size, the heart will beat fast. However, with every heartbeat, an ability to look into a stranger's eyes, communicate, discuss, debate, and convince is gained. Such ability is a key characteristic that defines a leader profile.

Curiosity and Imagination

Not every engineer has the curiosity to learn, investigate, and research new topics in his field or beyond, which might turn out to be the next big thing. Inherent in his way of work, the researcher tends to have curiosity and interests in ideas from other fields of applications which might have relevant impact on his field of work. His growing passion in always finding optimal solutions and his broad imagination for novel ideas are the fuel behind many of today's and tomorrow's creative advances in technology and life.

Life in Industry

No matter if it is a startup or a large-scale company, the challenges are similar at different scales. Joining a company with a PhD title puts the holder directly under the pressure of showing leadership skills, criticizing, and investigating current systems, offering differentiating ideas, and stepping into new directions where others might object for the sake of the change. With the five skill packages gained during the PhD studies, it is much easier to discuss, debate, convince and pass information to technical colleagues and project/program managers about new ideas, solutions, and implementations which can be key differentiators in products to be delivered within a highly dynamic market.

Summary from Life

What in the beginning started as a will to develop my own solutions in my own company has also developed my view and way in professional life. The PhD in Engineering is not a degree to study. It is a way to grow in wisdom, develop skills, broaden imagination, and perceive problems with novelty.

I end this article by a quote from a wise man which summarizes the life of many PhDs:

I prefer to be a dreamer among the humblest, with visions to be realized, than lord among those without dreams and desires.

Khalil Gibran.

Charles Nader (charles.nader@nsn.com) (IEEE S'08, M'12) received and M.E. in electrical engineering from the Lebanese University ULFG2-Lebanon and a M. Sc. in EE/Telecommunication from the University of Gävle-Sweden in 2006. Between 2008 and 2012, he was researcher at the University of Gävle-Sweden center for RF measurement technology, working with digital signal processing for RF systems applications. In 2012, he received double PhD degrees in Telecommunication from the Royal Institute of Technology, Stockholm-Sweden, and the Vrije Universiteit Brussels-Belgium. In 2012, he joined focubeam GmbH in Ulm-Germany, as a systems architect for iAAS wideband Radio Modules. In mid-2013, he was a system architect consultant for NXP Gratkorn-Austria, dealing with NFC applications. Starting November 2013, he has been a senior BTS system engineer at the system and architecture design team for mobile broadband radio platforms at Nokia Solutions & Networks NSN in Ulm-Germany. Dr. Nader's main interests cover RF systems, software defined radio, advanced sampling and measurement techniques, Dirty RF, linearization and efficiency enhancement techniques for wide-band RF transmitters, and radion platform architectures. He is an active member of the IEEE Instrumentation and Measurement Society, the IEEE Microwave Theory and Techniques society, and the IEEE Signal Processing Society. Starting 2014, he is an editorial board member of the *IEEE Instrumentation and Measurement Magazine*.