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## **Engineering and Philosophy: The Universal Man**

As my academic journey at AUC was coming to a close, a series of sequential contemplations began to occur in the quest to answer different questions that come to mind when one steps on to a new milestone in life or ends a previous chapter. One of these questions was if (and more importantly how) the more intense study of humanities in general and philosophy in particular could make for better engineers. Before beginning to dive into that question, I must first explain what brought upon such an inquiry that became a passion and cause close and dear to my heart.

As a graduating senior studying mechanical engineering in my final semester, I began to find my interest had peaked in the areas of knowledge outside my major, specifically the humanities. I had always been interested in understanding how the human brain works and receives knowledge and how it is interconnected together. More importantly, I began to wonder what the best disciplines are that one could acquire to achieve a specific task based on their line of work/respective fields. I also used to ask myself at what point in history did academic curriculums become so demarcated and distinguishable from each other, when only centuries ago the great thinkers were described as the ‘universal man’. When did engineering be divided into the multiple variations that it is today: chemical, mechanical, electrical? Even under one specialization, there have become multiple endless concentrations. The universal man alone is a concept where one must stop their track of thought and dwell on quite a bit.

The universal man is an idea relative to human nature that was born, raised and saw its passing slowly yet impactfully in history. They are known for having an endless amount of curiosity and interest in a multitude of subjects. This curiosity lends them to achieve knowledge

in several subjects with expertise in a few. The universal man has many other alternative titles better known in common literature, such as renaissance man, or more specifically “polymath”. They embodied a philosophy of universal knowledge that was broad and knew limitless bounds (“What Is a Universal Man?”). Examples of universal men are Leonardo Da Vinci, Aristotle and more modern examples such as Richard Feynman. The universal man in my opinion is more of a mindset and lifestyle than it is a set of qualities. It is a method of thinking which enables the possessor to achieve what has now been known as the qualities of universal men.

Returning to the source of my contemplation, I had recently taken my first philosophy course: “Philosophical Thinking” and realized that many well renowned names in philosophy were mainly mathematicians and scientists, with ground breaking revolutions in their respective fields. To mention a few (and some of my personal favorites) Galileo, Isaac Newton and Rene Descartes. I began to question then, when did philosophy become a branch of humanities completely different from the sciences. The desire for an answer grew bigger, as I realized that in attempting to decipher complex philosophical ideas throughout the course, I was using the same strategy and way of thinking that I would if I were breaking down an engineering problem. In attempt to understand William James’ thoughts on free will, I was using the same mental tactics to solve, let’s say, a problem in thermodynamics. The task at hand differed in context, but not in nature.

I decided to take another philosophy class during my last semester which was a graduate course, titled “Philosophical Logic: The Critique and Analysis of Arguments”. By the end of the first month, we were learning Aristotle’s view on logic from “Organon”. Part of determining the validity of the argument was done by drawing Venn diagrams, where each circle in the Venn diagram represented a premise in the argument. Depending on the intersections of the premises

and the conclusion, the validity of the argument could be determined. I recalled the last time I had drawn Venn Diagrams was in my Probability and Statistics class. I developed a sincere interest in finding out where philosophy and the sciences, mainly engineering met, and when over the course of history did they diverge. More importantly, I wanted to look at the benefits, if there were any, for the study of philosophy for an engineer.

To understand how combining philosophy and engineering together could be useful, there must be a basic understanding of the fundamental differences between the two disciplines. Philosophy is the study of knowledge, the nature of things, metaphysics and logic. Engineering is the study of developing, generating and making use of ideas to innovate and transform them in a way to increase the benefit for others. Philosophy can therefore be described as the study of why, with engineering being the study of how (Mitcham). Based on these primitive descriptions of both areas of knowledge, one can begin to discuss how they can complement each other.

Engineering, aside it being a process of applying theoretical principles in a practical environment, is at the end of the day is a way of thought. Equal importance is placed on how to break down a problem and the solution itself so far as it is sound. It is a method or an approach. This method, often described colloquially through engineering hallways and corridors as the “engineering method” is a way of thinking and mainly a way of acquiring and applying knowledge. Engineering, when witnessed as a way of thought becomes susceptible to analysis through philosophical terms and techniques; since one of the branches of philosophy is understanding the nature of “thought” and acquiring knowledge (Boyd). Philosophy can therefore aid in understanding not the theoretical principles of engineering itself, but how we engineer, the “engineering method” perhaps, so engineers can perform better.

Philosophy aids in promoting doubt and reflection, both of which can be useful in any profession particularly engineering. Rene Descartes (a universal man himself) was a revolutionary philosopher, and in his journey to find what can be classified as the truth, suggested that one must doubt everything, and begin from a blank slate where he assumes nothing about any matter of inquiry or suspicion. From there and only there, can he begin to make claims, structure his thought process and develop opinions about the world around him. For Descartes, he used this method to reach his own personal conclusion that God exists, however this method of thinking can even be used in a more versatile manner.

Philosophy promotes doubt but more importantly it promotes reflection. To reflect is to consider the events of the past, present and future in a critical light in hopes of yielding better perspectives and results. There is a general belief among many scholars that being a reflective engineer in a philosophical sense will provide for a better practicing engineer. Reflection is a process that is not necessarily always ongoing, but should be done often and when reaching a significant milestone or step within a project (Bulleit). The effects of reflection can be witnessed first-hand even when working on several university level engineering projects with different subtasks. In some cases, when the task leaders are switched and asked to solve each other's respective problems, their tactics are better and yield more positive results. This is because more often than not when one is immersed in a problem the basic obvious answers become invisible to them but clear as day to one who has no in depth experience in the subject. This is of course provided that he has enough knowledge to understand the fundamentals.

Another interface between philosophy and engineering is the relatively new area of study known as the philosophy of engineering. It deals with ethical concerns and dilemmas, but also with the why versus how dichotomy that was mentioned earlier. It mainly attempts to answer

questions such as: If I reach an engineering solution that is feasible, why is it that I approached it the manner that I did, and is it the best approach when it comes to the society and the good will of humanity? (McCarthy). This falls in line perfectly with engineering codes of ethics that any professional engineer must abide by, which revolve mainly around the impact of an engineer's work on the society. Examples of such codes are ABET and ASME codes of ethics.

Michael Davis in "A Plea for Judgment" argues that judgment is one of the most important aspects to becoming a good engineer. He mentions: "One who otherwise knows what engineers know but lacks 'engineering judgment' may be an expert of sorts, a handy resource much like a reference book or database, but cannot be a competent engineer" (Davis). This corroborates many notions that have been mentioned. It supports the idea that engineering is a way of thought, not simply practices and execution. It also promotes judgment, an extension to the notion of reflection, and most importantly this judgment should be extended not only to the quality of the engineering work, but to the ethics associated with engineering practice.

The current trend has now been to reincorporate liberal arts back into engineering learning and profession, as is practically done at AUC. I believe that studying the interface between not only engineering and philosophy, but the quantitative and the qualitative, the sciences and the humanities, could help us develop a universal flexible thinking method. It enables developing even various methods of thinking, ones which can be adopted based on the task at hand, and use ethical and philosophical abilities to determine what the best thinking approach is in a certain situation, in hopes of bringing us closer and less further away from the concept of the universal man.

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