What is an ethical engineer?

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Who is an Ethical Engineer?

An ethical engineer outshines a professional who only lives up to technical standards and follows basic guidelines or rules. He promises his decisions will contribute to societal good and connect with professional standards to mirror his moral values. Today, more than in the past, engineers are confronted with environmental, social, and especially technologically-based ethical issues that significantly demand the engineer's need to have a sense of belief and firm character. Understanding the moral foundation on which engineers' decisions are based and how this comes about is essential. We will discuss three major ethical theories, consequentialism, deontology, and virtue ethics, taught during class to explain different insights into how engineer should carry out their responsibilities.

We will also discuss in this essay how much such theories apply to engineering practice before outlining three critical character traits that stand above all others for an ethical engineer: a sense of responsibility, integrity, and empathy. The mentioned characteristics are fundamental to the decision-making processes in engineering and shaping a trustful future for society.

Ethical Ideas and Engineering

Consequentialism in Engineering

Consequentialism stresses that the righteousness of an action depends on the consequences of the action. When translated into an engineering context, the consequences of decisions are placed on all stakeholders. In other words, product engineers must consider the end-user and the long-term environmental and societal effects. An ethical engineer who adopts consequentialist principles will move forward with an action that generates more good while reducing harm. A consequentialist mindset makes engineers take an entirely logical approach without emotional context, which may or may not be beneficial depending on the situation.

For instance, an electric car engineer must be concerned with human safety, operation efficiency, and environmental impact. The ideal consequentialist would want to minimize the rate of accidents or fuel consumption while balancing safety and sustainability (Van De Poel et al.). However, we noticed in the Moral Machines activity that simple decisions may hide unexpected biases that can have significant impacts. For example, we were saving humans over animals or saving younger individuals over older individuals without much thought or conscious thinking. That reflects a particular layer of complexity of outcome-based thinking that may be hard to

overcome since our ability to change the subconscious part of our brains is difficult. Furthermore, this disallows us to evaluate rationally as engineers because it is difficult to put aside our personal biases.

Deontology in Engineering

While consequentialism may consider other aspects, deontological ethics are strictly a matter of duty and following the rules. Engineers would be more loyal to professional codes like the IEEE Code of Ethics discussed in our classes. These lay a solid foundation for safety, truthfulness, and respect for users as imperatives (*IEEE Engineering Ethics Cases: Introduction | Online Ethics*). A deontological engineer would find this the most moral way of dealing with issues, even if this calls for minor sacrifice in the name of efficiency, cost, and sometimes morals. One such example was when the reflection of one of the readings talked about cybersecurity and how important it was to keep user data safe. Safeguarding this data would fall directly under a deontological theory because one considers it their duty to protect the users' information despite the pressure of financial interests by the company (*Cybersecurity Ethics: Everything You Need to Know*). Besides, the companies are usually ethically sound since they maintain some sense of reputation because severe implications might be incurred if they are discovered leveraging user details without consent for financial benefits. This mentality of being a deontological individual is essential when it involves the lives of others, such as when companies work on projects that may have disastrous repercussions if there is even a slight degree of negligence.

Conducting such a deontological mentality signifies that no room is given to compromise on ethical grounds, no matter the pressure or personal cost. However, while adopting a deontological mindset can sometimes be beneficial, it has its risks in particular situations where all other factors also play a part and where being entirely rule-based cannot prevail.

Virtue Ethics and Personal Character in Engineering

Virtue ethics places less emphasis on obedience to rules or the consequences of an action or its outcomes and instead stresses that a person develops good character. The engineer's approach, driven by virtue ethics to any situation, would focus on honesty, fairness, and

consistent determination. This, in turn, means that the notion of a "good engineer" does not end with merely being good at your job; it introduces elements of being a good person into the mix. As discovered from the reading, "The Good Engineer" proves that technical skills are not enough (Harris et al.). An engineer needs to maintain a certain level of professionalism, meaning there needs to be a sense of belonging and a higher calling to ensure that the duties and tasks demanded of the engineer are taken care of.

The engineer has virtues such as perseverance, which helps him set high standards even when working on project tasks that are not easy. An engineer facing, for example, a failing project may try again and again to find new ways out rather than compromise working standards or give up. In this way, he will be able to demonstrate his character strength as an engineer and the exemplary behavior that distinguishes good, sound engineers from mediocre ones who can only meet the minimum standards and lead their lives without a trace of guilt. This is to say that just being "good enough" does not imply that one is a "good" engineer (Harris et al.). Many more requirements and unspoken rules also dictate whether one qualifies as a "good" engineer.

Requirements for a Moral and Ethical Engineer.

Responsibility: Accountability and Consequences

One of the most essential qualities an engineer has to have is that of responsibility for their actions. Most of the decisions in engineering are left at the engineers' discretion because they are treated as capable adults. In most matters, the impacts involve those related to the public's safety, effects on the environment, and development of society, which can be categorized as high-risk and high-reward due to the chance of it going sideways at any moment. It involves taking responsibility for those consequences in engineering and minimizing adverse effects to the best of their ability.

In class, we learned how seemingly insignificant design decisions could have massive repercussions in reflecting on the discussion by Lloyd and Busby on everyday micro-ethical decisions. It is a snowball effect where the tiniest actions can lead to tremendous consequences, good or bad. An ethical engineer's job is to account for many ways things might go poorly and make their work as close-looped and bulletproof as possible. This attribute is important because even a slight miscalculation in engineering may be a terrible disaster. For example, when poorly designed bridges collapse and medical devices malfunction, the blame

will fall upon those things as the neglect of the engineers and their inability to predict and prevent such things. Responsibility makes engineers look ahead and plan with concern for the consequences of what they will do.

Integrity: Adhering to Professional and Moral Standards

Besides the virtues mentioned above, integrity is another essential virtue that should form part of an engineer's ethics portfolio. Integrity denotes adherence to moral values and professional calmness under pressure or temptation. Conventionally, this ought to be suggested by integrity; that is, the seriousness an engineer attaches to honesty, transparency, and accountability values core to building and securing public confidence.

As emphasized in the reflections on deontological ethics, the employer or client usually pressures engineers to prioritize cost or efficiency over meeting ethical standards. However, in resisting such pressures to the best of one's ability, the integrity of engineers is dedicated to ensuring that professional codes, safety, and ethical boundaries are adhered to, regardless of repercussions. Such adherence must be noted to protect the engineer and society from hazardous shortcuts or poor-quality products due to unethical behavior.

Integrity in engineers is one of, if not the most critical qualities. With this quality, engineers could garner society's trust and spiral well out of control. Ethical and moral duties dictate that an engineer has the integrity to stand firm on their beliefs and personal moral values to avoid being taken advantage of by the system.

Empathy: Listening to Stakeholder Needs

Empathy is one of those aspects that, unfortunately, does not get the significance it deserves when discussing engineering ethics. However, it is one of the finest character traits a practicing engineer should possess. Every design solution an engineer creates affects several stakeholders, including direct users, coworkers, and the public. An empathetic engineer considers their design and its impact on the human aspect and experience to ensure it is user-friendly and accessible. In doing so, he ensures that the product can maintain and uphold a good image of engineers.

Being an empathetic engineer may involve changing the mentality of an engineer who has been asked to design medical devices by making him put himself into the patient's shoes and

consider problems one may face due to his disabilities. The involvement of feedback from users of such experiences will enable the engineers to develop a product that not only meets the technical standards but also helps increase the quality of life for the users. It also goes above and beyond for the users because it aids the engineers in considering the environmental and social impacts of their work and decision-making on a higher sense of responsibility. Looking at it from a bird's eye point of view, engineers who can master being empathetic towards their users make strides in product design that set a "good" impression.

Importance of Ethical Engineering to Society and the Profession

As mindful and ethical engineers, we need to be dedicated to the principles of responsibility, integrity, and concern for others and as the engineering profession in service to society. Ethical engineers earn the public's trust with technology because the systems and structures we set our lives upon will be safe, reliable, and serve the public good.

Ethical engineering favors the well-being of society by undertaking development with minimal harm. It has been proved throughout history that the extent to which an engineer could create or save a disaster is endless.

Engineers build the world, from bridges to buildings to connecting the world through social media applications. Ethical decision-making helps engineers avoid disasters that can take place when planning and implementing things that will change the world and its dynamics. Additionally, engineers make these world-changing events with a strategic and mindful concern for the safety of individuals and well-being in the long term rather than immediate benefits. In solving crucial global problems such as climate change and resource depletion, engineers form part of the major stakeholders who make considerable contributions towards finding a sustainable solution; ethical consideration plays a key role here. While engineers may not save lives or create innovations to help the world move forward daily, our actions as engineers add up incrementally and form massive changes in the future.

Our behavior as moral engineers creates a point of credibility and respect for the profession of engineering. In such a case, when the engineers become responsible show integrity, and compassion, they raise the bar for other aspiring and current engineers. This also shows that we, as engineers, value the well-being of humanity. All in all, this builds a healthy level of trust and sensitizes future generations to pursue the field with the same moral commitment.

Conclusion: Engineering the Future through Ethics

Being an ethical engineer is much more than just abiding by codes and regulations; an ethical engineer needs to be virtuous, responsible in decision-making, and with some consequence. Consequentialism, deontology, and virtue ethics are moral theories that provide unparalleled insight into how engineers perform their tasks on a day-to-day basis.

A "good" engineer has an ethical duty to incorporate a sense of responsibility, integrity, and empathetic consideration in reassuring themselves that their work shall add to society while keeping it within professional and moral bounds. This enables engineers to keep moving forward with these thoughts in mind, knowing that they are adding to society in a meaningful and considerate manner. Additionally, it allows them to find purpose in why they do what they do, whether it be for their loved ones, coworkers, or society in general.

These qualities are essential not only in the personal development of an engineer but also in the interest of moving other engineers forward and protecting the general public's confidence. Ethical engineers will play a role as the world moves toward technological changes. Moving the world forward without such engineers will hinder technological advancement and disrupt the public's image of engineers.

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