*Ethics Within Engineering: An Introduction*, by Wade L. Robison. 2nd ed. London, New York, and Dublin: Bloomsbury Academic (2024). xviii + 238 pp. ISBN: 978-1-3503-4044-2 (hardback), 978-1-3503-4043-5 (paperback), 978-1-3503-4046-6 (PDF), 978-1-3503-4045-9 (epub & Mobi). US$90.00 (hardback), US$29.95 (paperback), US$26.95 (eBook formats).

The central argument of Robison’s book is that ethics is a core competency of engineering. He describes the “intellectual core” of engineering as “working through various possible design solutions and settling on a particular design that solves the original problem and pushes the envelope of design.” That design process is necessarily “an ethical enterprise,” since any given design solution will have ethical implications (x). Much of the book expounds on the thesis that engineers are always already engaged in ethical reasoning, whether they realize it or not.

Chapter 1 introduces the design process and how solutions to design problems require at least implicitly about values. As Robison illustrates, even the design of something as simple as a toothpick necessitates normative decisions: Should a toothpick be double-ended, allowing more uses for the same amount of material, and thereby promoting sustainability? Or should it have a blunt end that can be snapped off, to indicate that the pick has been used and to give it a place to rest above the surface of the table, thereby promoting public health? The answer depends on which values one considers most important, and the choice requires justification.

Chapter 2 provides a conceptual framework for analyzing accidents that involve designed artifacts. Robison argues that we must identify the operator, relevant circumstantial factors, and relevant features of the artifact itself. Each could have contributed to the accident’s occurrence, and Robison urges us to avoid the all-too-common temptation to blame the operator when the design itself may be the source of the problem.

Chapter 3 expands on the idea that designs themselves can cause accidents by introducing Robison’s concept of error-provocative designs. He notes that any design problem allows for many different possible solutions, and that the engineer should choose a design in part by considering what it communicates to the operator. He illustrates with a four-burner, four-knob stovetop design, an example commonly used in engineering design courses. There are many different ways that the four knobs might be connected to each of the burners, and both the knobs and burners can be arranged in patterns that suggest how those connections are set up. When done poorly, the design may instead mislead the operator into turning the wrong knob every time. When a design actively frustrates the operator’s attempts to use the artifact safely and effectively, that design doesn’t just encourage mistakes: it provokes error.

Chapter 4 discusses two more cases of error-provocative design, focusing on aerospace disasters. In particular, Robison analyzes the 1995 crash of American Airlines 965 in Colombia, and the crashes of the Boeing 737 MAX-8 flights Lion Air 610 in 2018 and Ethiopian Airlines 302 in 2019. Each example highlights ways in which software, hardware, operator training, management decisions, breakdowns in communication between engineering teams, and other factors contributed to these losses of life.

Chapter 5 considers the conditions under which an engineer might be blameworthy for the kinds of accidents discussed so far. Robison argues against an intuitive view of moral responsibility, which holds that intention to do harm is a necessary condition for blameworthiness. Instead, he leans more heavily on an epistemic condition: if the agent knows (or should know) that they are doing something wrong, then they are to blame for the harm they cause. Intent to cause harm is one way of fulfilling the epistemic condition, but incompetence, recklessness, and various other factors can suffice. The overall lesson is that engineers can, through their designs, be blameworthy for accidents in numerous ways.

In Chapter 6, Robison discusses why it is important to make the ethical reasoning in which engineers are already engaged more explicit. He gives three examples: a car trunk that will break if slammed all the way shut, an X-ray scanner that may crush anyone on the examination table when shut down, and a defibrillator implant that fails because of deterioration caused by the wet environment of the heart. These show that when specifying the design problem, engineers need to consider the ways in which the artifact could cause harm in the actual context of use.

Chapter 7 highlights further ways design solutions can produce harm. One problem is that if the operator population is incorrectly imagined, the design may produce bias in the distribution of harm across social identities. An example is the design of early airbags, which protected the average male driver but put most female drivers at greater risk of injury. Another problem is when the ways in which an artifact or system communicates with the operator are unhelpful or misleading, as when a computer application tells us that an “unknown error” has occurred. Finally, problems can arise at any point in an artifact’s life cycle, not just in its use but also in its manufacture and disposal, as when mercury, a toxic bioaccumulant, is used in electric switches.

Chapter 8 introduces the concept of role morality, and explains why engineering is considered a profession. Robison highlights four aspects of professions that distinguish them from other lines of work: specialized knowledge, specialized skills, certification, and special moral relations to clients. Robison relies heavily on analogies to law and medicine in this chapter.

Chapter 9 continues the discussion of professions, noting that they also come with “forms of life,” or perhaps mindsets, which their members adopt. Robison uses the decision-making process which contributed to the loss of the *Challenger* space shuttle to illustrate how business managers and engineers take very different approaches to solving problems, and that it takes a special kind of awareness to notice when it is best to consider a problem like an engineer or like a businessperson.

Chapter 10 discusses ethical considerations of working in teams and organizations. While Robison argues that these issues are “external” to engineering ethics *per se*—i.e., they are ethical issues that could arise for almost anyone, rather than ethical considerations distinctive to engineering—the connections between breakdowns in organizational dynamics and problematic design necessitate engineers’ attention to these matters. The middle sections of this chapter drift off-topic somewhat in order to showcase a framework developed by Robison and several of his colleagues for determining whether a design solution is feasible.

The final chapter summarizes the main points of the book and answers several objections engineers and philosophers may have. Of particular interest to philosophers teaching ethics to engineers is Robison’s insistence, here and elsewhere in the book, that teaching the major ethical theories can be distracting and unhelpful in an engineering context. If Robison’s central thesis is right, then engineers are already engaged in ethical reasoning, and don’t need ethical theories to understand how to do so. Moreover, engineers do not need to appreciate the finer points of the debates between, say, consequentialists and Kantians in order to understand ethical value. What they need is a reminder that they already accept the principle that design solutions should minimize unnecessary harm, as well as discussion of the wide variety of ways in which faulty designs can cause harm.

This last chapter illustrates a concern I have with Robison’s book: I frequently found myself wondering whom he considers his audience. At times, the book seems written for an undergraduate engineering student. At other times, Robison is more interested in convincing engineering educators that to think of engineering as separate from ethics is to misunderstand engineering itself. And finally, sometimes he seems to be addressing philosophers who have found themselves responsible for teaching ethics to engineering students, and who may be tempted to run a standard Ethics 101 syllabus with technology-focused examples. These rhetorical shifts make me uncertain as to the book’s value as an assigned text for an engineering ethics course.

Additionally, some philosophers may find the lack of engagement with ethical theories a little frustrating given other aspects of Robison’s book. In particular, while Robison claims to be drawing not from ethical theory but from “what engineers already do as they work through design solutions” (13), his approach to ethical evaluation is fundamentally consequentialist. As noted, he frequently appeals to the negative utilitarian principle that we should minimize unnecessary harm. Philosophers committed to deontological ethics may find it concerning that the text can thus appear to reduce what they may consider foundational ethical concepts—autonomy, respect, dignity, and so forth—to the analysis of harms. Indeed, in my own view, one of the most important deontological ideas is that there can be moral wrongs that cause no harm. But this and other insights are closed off by Robison’s tacit consequentialism. Perhaps engineers have a tendency towards consequentialist thinking because of the various other frameworks they use to evaluate costs and benefits of possible design solutions. But in keeping with the spirit of Robison’s general thesis, that way of thinking should at least be made explicit and open to question.

By contrast, an approach that I have found helpful in introducing engineering students to insights from various ethical theories is to present these theories as analogous to physical models. This idea comes from Charles Edwin Harris, Jr.,and is articulated in a textbook he and several others wrote, *Engineering Ethics: Concepts and Cases*, which is now in its 6th edition. They observe that engineers are used to applying different, sometimes mutually incompatible models to describe physical phenomena, choosing the most appropriate model based on the specifics of the case. Hooke’s Law, for example, models the approximate elasticity of a material, typically illustrated with the behavior of a metal spring. While a useful rule of thumb for many materials in many applications, applying Hooke’s Law is not appropriate if a spring is extended or compressed too far, or if it is made of materials with special elastic properties, or if a highly precise measurement is needed, or if other factors, such as temperature variation, become significant.

Harris *et al.* argue that we can think of the ethical theories as models of morality. Each describes a way of thinking about ethical problems that is valid in a wide range of contexts and cases, and each calls our attention to different ethically important aspects of a situation. But each also fails when applied to some cases or in certain extreme situations. Utilitarianism fails to capture why lying is usually wrong (it’s not about the consequences; it’s about respect for others) and Kantian deontology fails to capture why lying can be morally justified (the axe murderer at the door deserves a little disrespect when he asks where to find the person one is hiding from him). Just as, in engineering design, there is no need to find the most general valid physical model that describes elasticity before we can go about designing a spring, so too, in engineering ethics, there is no need to settle philosophical questions about the merits of particular ethical theories as general theories of moral value before reasoning about the ethics of a proposed design solution. In either case, we can use the models and theories that are most appropriate to the case at hand.

Returning to Robison’s book, its value, I think, will be greater for educators than for students. I found Robison’s arguments very helpful in organizing some of my own thoughts regarding engineering ethics teaching. The book contains rich examples and useful conceptual frameworks, especially around the ethical nature of engineering problems, the notion of error-provocative design, and the nature of engineering as a profession. But I suspect I will be using the book as a resource for instructional design rather than as a primary source for my students to read.

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