Iron Ring

I distinctly recall sitting in my third-year undergraduate aerospace engineering class at the University of Toronto when I first heard about the *Challenger* accident 30 years ago today (it is January 28, 2016 as I am writing this). Many emotions followed, including, of course, sadness for the lost astronauts and their families and friends; shock and surprise that this could happen since, from my perspective, the NASA launches had become almost routine; and then, perhaps a bit selfishly, some concern for the future in terms of the potential impact on future spaceflight and research.

Of course, much has been learned since then regarding the O-ring design and its failings, the decision-making process and the pressures of making the launch schedule, and the conflicts between engineering data and management judgment [1], [2]. Even now, more information continues to be discovered about the accident [3], and it has become the topic of numerous case studies and lessons learned [4].

The following year, just before graduation, the University of Toronto held the "iron ring" ceremony for my class. Called the *Ritual of the Calling of an Engineer*, the ceremony, which dates back to 1922, was originally authored by Rudyard Kipling. The ceremony "was instituted with the simple end of directing newly qualified Canadian engineers toward a consciousness of their profession and its social significance, and indicating to more experienced engineers their responsibilities in welcoming and supporting the newer engineers when they are ready to enter the profession" [5]. While mostly a Canadian engineering tradition, there are several American universities that participate in a similar ceremony, called the *Order of the Engineer,* that was started in 1970 [6].

The ceremony involves the students taking an obligation that states the duties and responsibilities of an engineer. This is followed by placing an iron ring on the little finger of the working hand. The ring was designed to symbolize the pride that engineers have in their profession, while simultaneously reminding them of the engineer's obligation to live by a high standard of professional conduct.

Given the hectic schedule at that time of a final year (class project, undergraduate thesis, and course finals looming), I will be the first to admit that I didn't really appreciate the full significance of that ceremony or the ring. But over time I have developed a much better appreciation for its meaning. Of course, for a professor, the obligations have more to do with the ethics of doing research and publishing—such as doing original work, appropriately acknowledging others' work, and making fair evaluations—than actually building devices. But this obligation also includes developing, and then instilling, a culture of honesty in research into the next generation of researchers. So now I wear the ring every day (unfortunately they are easy to lose, so this is my third)—for pride in the profession as well as a reminder of the obligation taken and the associated responsibility.

I can imagine that not all would feel the need to have a daily reminder of this obligation, but the passing of the 30th anniversary of the *Challenger*


Jonathan How's iron ring.

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accident might be a good time for all engineers to reflect on the responsibilities associated with this profession. This reflection might be especially important for members of the IEEE Control Systems Society, given the importance of feedback control and autonomy in ensuring the performance and safety of the critical infrastructure and systems that are used routinely.

For others in the field, this obligation might just simply be a reminder to do our job well and correctly, check your work and the work of others, speak up if there is a problem, and consider that just because we can do something, it doesn't mean we should. These issues are becoming increasingly important given the complexity of systems that are being created, the mixtures of hardware and embedded software with numerous possible hidden modes/behaviors, and the competitive environment in which many engineers work.

Something to consider is that when an application crashes on your phone, you might have to reboot, but there is usually not much harm done. But if a safety-critical system is rolled out too early to meet deadlines without sufficient testing, then the results of a failure could be much more catastrophic. Thus, it is the duty and responsibility of all practicing engineers to recognize the importance of these consequences and to uphold these standards.

REFERENCES

[1] Rogers Commission, "Report of the Presidential Commission on the Space Shuttle Challenger accident, chapter V: The contributing cause of the accident," June 6, 1986.

[2] 99th Congress, 2nd Session, "U.S. Congress, House, Committee on Science and Technology, investigation of the Challenger accident, report," Washington, U.S. Government Printing Office, House Report 99-1016, Oct. 1986.

[3] 30 Years After Explosion, Challenger Engineer Still Blames Himself – Second Interview with Bob Ebeling, [Online]. Available: http://www.npr.org/sections/thetwo-way/2016/01/28/464744781/30-years-after-disaster-challenger-engineer-still-blames-himself (accessed Jan. 30, 2016)

[4] Lessons from the Challenger Launch Decision Additional Resources. [Online]. Available: http://www.nasa.gov/centers/goddard/pdf/574228main_GSFC-1041R-1-Challenger(072211).pdf (accessed Jan. 30, 2016)

[5] The Calling of an Engineer [Online]. Available: http://www.ironring.ca/

[6] Order of the Engineer [Online]. Available: http://www.order-of-the-engineer.org/?page_id=6

Jonathan P. How

A Controlling Invention

This invention relates to new and improved control apparatus and to a new and improved control method for controlling the position of a body, the direction of movement of a body, and for other purposes. The improved apparatus and method utilize radiated energy, and one or more detectors of radiated energy. The radiated energy is preferably of the ionizing type, such as gamma rays. The detectors are preferably Geiger-Müller tubes, also designated as counter tubes. The counter tubes may be of the quenching or non-quenching type. The source of radiated energy .is preferably radium or other radio-active material which emits ionizing rays. … Some of the purposes of the invention are to control the direction of movement of a ship, an airplane, a torpedo, a rocket and other jet-propelled moving objects. The invention is also generally useful for all control purposes, particularly remote control, as the control of a movable valve or other control part of an engine, etc.

—Winston Wells, "Radioactive Detector Means in Automatic Steering Systems,"
U.S. Patent #2,662,208, December 1953