

WIP: Pledging to be an Ethical Computing Professional

Venu G. Dasigi
Department of Computer Science
Bowling Green State University
Bowling Green, Ohio, USA
vdasigi@bgsu.edu

John K. Estell
Electrical and Computer Engineering &
Computer Science Department
Ohio Northern University
Ada, Ohio, USA
j-estell@onu.edu

Ken Christensen
Department of Computer Science and
Engineering
University of South Florida
Tampa, Florida, USA
christen@cse.usf.edu

Abstract—This innovative practice WIP paper describes the “Pledge of the Computing Professional” (the Pledge), its need, its relationship to two major codes of ethics, and its role in inspiring computing students to act ethically and professionally. Professional ethics are the heart and soul of any profession. In developing products and services, professionals are to conduct themselves ethically, focusing on the public good. ACM has developed the Code of Ethics and Professional Conduct, and ACM and IEEE Computer Society have together published the Software Engineering Code of Ethics and Professional Practice. ACM considers ethics a core topic in curricular recommendations. In 2011, a team of computing professionals developed the Pledge of the Computing Professional. The purpose of the Pledge is to acknowledge the impact of computing and the attendant responsibilities and to nurture a desire to promote the public good. The Pledge has now been adopted by over 75 institutions in the US. This paper clarifies the relationship between the Pledge and the codes of ethics. It is hoped that emphasizing this connection and promoting a culture surrounding the Pledge can be instrumental in producing graduates with a well-rounded sense of ethics and professionalism, who become responsible citizens that can shape the profession's future. The Pledge may be viewed as both an introduction for the students to the profound impact and responsibilities they would have in society and a means to inspire them to reflect on its meaning as computing ethics become the center of public discourse. Future work includes making the Pledge international in scope.

Keywords—*Ethics, social responsibility, oath, higher education, computing profession, workplace culture*

I. INTRODUCTION

Professional ethics capture the heart and soul of any profession and can be important in guiding the conduct and decision-making of the members of a profession, even in the absence of a legal code to cover many situations. Indeed, many professions, e.g., medicine, nursing, law, engineering, etc., attempt to express the “conscience of the profession” [1] by adopting respective codes of ethics. As professionals impact the world through their work, e.g., by creating products and services, they are expected to conduct themselves ethically in conformance with, or exceeding, reasonable expectations. When such considerations appear to conflict, they are expected to be guided by an ultimate focus on the public good.

ACM has developed a Code of Ethics and Professional Conduct. The code was first adopted in 1966 and has since gone

through revisions, with the current code, adopted in 2018, being the fourth version [2]. Over the different versions, the Code has included principles relevant to different constituencies and principles associated with various professional roles. ACM and IEEE Computer Society have together also published the Software Engineering Code of Ethics and Professional Practice in 1997 [3]. This latter code focuses further on the software engineering profession and covers a range of constituencies affecting and affected by the profession.

Ethics and professionalism are important and have been a core topic in ACM's curricular recommendations. The ACM Computing Curricula for Computer Science formally recognized the need to include ethics in 1991 [4] and included ethics under the social and professional practice category through updates made in 2001, 2008, 2013, and 2023 [5]. The Computing Curricula CC2020 report encompasses undergraduate programs in a range of computing disciplines, such as computer engineering, computer science, cybersecurity, information systems, information technology, and software engineering (including data science), and argues that “professionalism and ethics should be a permanent element of any computing curriculum” [6].

ABET also recognized the importance of ethical considerations. It adopted a relevant student outcome (“Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles”) in the accreditation criteria for computing programs [7]. This student outcome is part of the general criteria, i.e., those covering all computing disciplines represented under the computing accreditation commission. Related disciplines, such as computer engineering and software engineering, represented under the Engineering Accreditation Commission, also have a very similarly worded student outcome in their general criteria. All the undergraduate programs mentioned in the previous paragraph, as covered by CC2020, are thus also represented under ABET.

In 2011, a team of computing professionals developed the Pledge of the Computing Professional (“the Pledge”), as documented at <http://www.pledge-of-the-computing-professional.org> [8, 9]. The organization that manages and promotes the Pledge has also been known by the same name. The purpose of the Pledge is to recognize the profound impact of computing on society, along with the attendant

responsibilities, and nurture integrity and desire to promote the public good. For almost a decade and a half, many students at over 70 higher education institutions in the US have taken the pledge as a graduation rite of passage [10]. This includes some of the largest universities, including Arizona State University, University of Central Florida, and University of Illinois at Urbana-Champaign. The number of institutions has kept growing yearly (except in 2021), with as many as a dozen new institutions joining the Pledge in 2023 alone.

In the US, graduation from a degree program typically entails a formal “cap and gown” ceremony. This university-wide ceremony is often held in a stadium or large auditorium with friends and families of graduates in attendance. Engineering and computing degree programs usually have a smaller college-wide (or even degree-focused) ceremony before or after the large cap and gown ceremony. This smaller ceremony may be called an “Induction to the Profession” ceremony and may include both the Order of the Engineer ceremony [8] for engineering graduates and the Pledge of the Computing Professional ceremony for computing graduates. The Induction to the Profession ceremony entails graduates reciting the respective oaths of the Order of the Engineer and/or the Pledge of the Computing Professional.

II. THE PLEDGE AND CODES OF ETHICS

The “Pledge of the Computing Professional” is as follows [10]:

1. I am a Computing Professional.
2. My work as a Computing Professional affects people’s lives, both now and into the future.
3. As a result, I bear moral and ethical responsibilities to society.
4. As a Computing Professional, I pledge to practice my profession with the highest level of integrity and competence.
5. I shall always use my skills for the public good.
6. I shall be honest about my limitations, continuously seeking to improve my skills through lifelong learning.
7. I shall engage only in honorable and upstanding endeavors.
8. By my actions, I pledge to honor my chosen profession.

The numbers are not part of the Pledge but are included here to make it convenient to refer to each statement in the rest of the paper. We will refer to each statement in the above oath simply as a line.

There are several desirable characteristics of such an oath. An oath should generally be short to be practical. Since it is intended as a graduation rite of passage, it should inspire graduates about to enter the professional landscape. It should capture the essence of professional disposition commonly accepted in the profession, usually done through articulating a code of ethics. Thus, the Pledge oath should capture the essence of the code of ethics while remaining consistent with it.

The Pledge, as stated above, is clearly short. It inspires graduates by highlighting what the profession values and provides a flavor of their responsibilities and expectations as productive members of the profession. In the following two

sections, we consider two ethical codes specific to the computing community and explain how the Pledge attempts to capture their essence and how it is consistent with them.

III. THE PLEDGE AND THE ACM CODE OF ETHICS

As mentioned in Section 1, ACM adopted an initial version of the Code in 1966 and has updated the Code through four versions. The first two versions differed substantially, but the final two are very similar in structure and content. All the versions had a preamble, and the final two versions included principles (referred to as “imperatives” in the initial versions) in four categories covering general conduct, specific professional responsibilities, leadership conduct, and the very need for compliance with the code. In the following paragraphs, we will refer to the Code simply as the ACM Code (or just the Code) or by its full name, the ACM Code of Ethics and Professional Conduct.

The preamble of the latest (2018) version of the ACM Code takes the view that the Code expresses the “conscience of the profession” [1]. The preamble highlights the need to support the public good, given that computing professionals’ actions change the world. The understanding that the public good is always the primary and paramount consideration is also emphasized in the preamble multiple times. The first one, under the category of professional leadership principles in the Code, furthers the point by stating that “A computing professional, especially one acting as a leader, should ensure that the public good is the central concern during all professional computing work” [1]. Prior versions of the Code also stress that computing professionals should contribute to human well-being and welfare. The Pledge captures this spirit in its heart by acknowledging in line 5, “I shall always use my skills for the public good.”

The concise nature of the Pledge does not allow it to address specific elements of computing professionals’ responsibilities, such as building secure hardware and software systems, efficient information processing and transmission, etc. Therefore, the Pledge sets the context by explicitly stating in line 1 (“I am a Computing Professional”) that computing professionals should take the pledge.

The Pledge provides further context by capturing additional important elements of the ACM Code. The very need for an ethical code and professional conduct stems from the fact the computing profession changes the world and affects people’s lives. The preamble of the ACM Code starts with: “Computing professionals’ actions change the world. To act responsibly, they should reflect upon the wider impacts of their work, consistently supporting the public good.” [1] Such reflection reveals that responsibilities arise from the profession’s impact on the world and people. Line 2 (“My work as a Computing Professional affects people’s lives, both now and into the future.”) and line 3 (“As a result, I bear moral and ethical responsibilities to society”) of the Pledge capture these elements, justifying the Pledge. It may also be noted that taking the Pledge amounts to reflecting on the broad impact of the profession and its practitioners. It is worthy of note that the Pledge seems to recognize both that the impact of the profession on people’s lives can last long into the future and that the computing profession will continue to evolve and develop long into the future, thereby affecting people’s lives not just now but into the future as well.

In the Pledge, line 4 (“As a Computing Professional, I pledge to practice my profession with the highest level of integrity and competence”) is about integrity and competence. In the second category of the Code on professional responsibilities, principle 2.2 stresses the need for maintaining “high standards of professional competence” among others, with guidelines elaborating on the different aspects of competence (e.g., technical knowledge, communication, etc.) and the need for upgrading skills on an ongoing basis. Although the word “integrity,” as intended in the Pledge, is not explicitly mentioned in the latest version of the Code, some prior versions refer to the need for acting with integrity.

As indicated in the previous paragraph, to maintain professional competence, the guidelines in the Code note that upgrading skills should be an ongoing process with various avenues available for such pursuits and that employers, leaders, and professional organizations should facilitate such lifelong learning and professional development. Closely related to the need to keep up with evolving knowledge and new technological developments is the expectation that computing professionals perform work only in areas of their competence, which is a principle in the Code under the area of professional responsibilities. This requires them to be honest about their competence and candid about their limitations, a point stressed in the different versions of the Code. These ideas are captured in line 6 of the Pledge (“I shall be honest about my limitations, continuously seeking to improve my skills through lifelong learning”). Indeed, every individual needs to be aware and mindful of the need for lifelong learning. Thus, the importance of continuous professional development cannot be overstated in the computing disciplines, which are fraught with frequent technological developments. ABET accreditation criteria broadly recognize this aspect, as well.

In the category of general ethical principles, principle 1.3 of the Code states that a computing professional “should be honest and trustworthy” [1]. Prior versions of the Code include honesty and/or integrity as essential characteristics of a computing professional, either in the preamble, in the principles, or both. There are many dimensions to being honest and trustworthy, and the guidelines elaborate on the various aspects. For instance, the current version of the Code discusses examples such as being transparent about the capabilities and limitations of systems, avoiding false or misleading claims, avoiding giving or taking bribes, avoiding conflicts of interest, etc. Such principles are essentially captured in line 7 of the Pledge (“I shall engage only in honorable and upstanding endeavors”).

The Pledge concludes with line 8: “By my actions, I pledge to honor my chosen profession.” The actions of individuals belonging to an organization reflect on the organization, and a profession is no different. The preamble of the Code states that the Code “expresses the conscience of the profession” and that “the entire computing profession benefits when the ethical decision-making process is accountable to and transparent to all stakeholders.” Thus, it is only appropriate to cap off the Pledge by acknowledging this connection between the professional and the profession and the heavy burden it entails. Incidentally, the symbol of the Pledge of the Computing Professional is also about “honor” – a matrix with each letter of the word encoded in ASCII using 8-bit binary representation.

IV. THE PLEDGE AND THE ACM/IEEE-CS SOFTWARE ENGINEERING CODE

We consider here the latest version of the ACM/IEEE-Computer Society Software Engineering Code of Ethics and Professional Practice from 1997 [3] and refer to it as the Software Engineering (SE) Code. This Code applies primarily to software engineers and other software engineering professionals and practitioners, as described in the preamble to the Software Engineering Code. Besides the preamble, the SE Code includes eight broad principles. Five of the principles relate to different constituencies, such as the Public, the Client and Employer, the Profession, Colleagues, and the Self (the professional himself or herself). The remaining three principles relate to other factors, such as Product, Judgment, and Management. Each of the eight broad principles includes multiple clauses that describe more elaborate details.

As in Section 3, let us start with line 5 of the Pledge that relates to the public good. This is hinted at by the statement in the preamble to the Software Engineering Code that various obligations arise out of the ethically responsible relationships of professionals “are founded in [their] humanity” [3]. The preamble further asserts that “the ‘Public Interest’ is central to this Code.” Even more to the point is the fact that one of the five constituencies among eight broad principles relates to the “Public,” which clearly states that “Software engineers shall act consistently with the public interest” and exhorts them that they shall “moderate the interests of the software engineer, the employer, the client, and the users with the public good.” [3]

With line 1 of the Pledge being self-evident, as discussed in the previous section, let us turn to lines 2 and 3, which acknowledge that since the professionals’ work affects people’s lives, they bear moral and ethical responsibilities. As mentioned before, this idea would justify the Software Engineering Code to begin with. Not surprisingly, the entire first paragraph of the preamble to the SE Code articulates this line of reasoning as a motivation for the SE Code, considering the significant opportunities to both do good and cause harm.

Line 4 of the Pledge about practicing the profession with the highest level of integrity and competence is consistent broadly with the entire SE Code, since it deals with fairly serving the interests of the five different constituencies while moderating them with the public good and striving for high quality in relation to the other three factors. It is also consistent with several specific parts of the Software Engineering Code, as follows. For instance, the Product principle says that software engineers must ensure their products meet the highest professional standards. The Judgment principle requires that software engineers shall maintain integrity in their professional judgment. The principle of Self requires software engineers to participate in lifelong learning and promote an ethical approach to the profession.

The principle relating to dealing with the Client and Employer requires that software engineers act in the best interests of their client and employer (moderated with the public interest). The first clause elaborates on the principle that they shall “provide service in their areas of competence, being honest and forthright about any limitations of their experience and education” [3]. Consistent with this part of the Software

Engineering Code is line 6 of the Pledge, which is about being honest about one's limitations and continuously seeking to improve one's skills through lifelong learning. We have addressed the latter, namely lifelong learning, at the end of the previous paragraph.

Line 7 of the Pledge is about engaging only in honorable and upstanding endeavors. This line captures part of the essence of two specific principles. We have already mentioned that the one relating to Judgment makes maintaining integrity imperative; one of the associated clauses specifies that software engineers shall "not engage in deceptive financial practices such as bribery, double billing, or other improper financial practices" [3]. The Profession principle stresses integrity, with one of the associated clauses explicitly requiring one to "be accurate in stating the characteristics of software on which they work, avoiding not only false claims but also claims that might reasonably be supposed to be speculative, vacuous, deceptive, misleading, or doubtful" [3]. These clauses exemplify being honorable and upstanding.

The final line of the Pledge is about honoring one's profession by one's actions. As expected, the Profession principle speaks to this point by enjoining that "software engineers shall advance the integrity and reputation of the profession consistent with the public interest" [3]. The clauses associated with the principle identify various opportunities for doing so, thereby honoring the profession.

V. CURRENT ETHICAL CHALLENGES IN COMPUTING

Computing has seen numerous developments in the past few decades. These developments span and go beyond hardware, systems and communications, the Internet, the World Wide Web, information retrieval, bioinformatics, software technologies, programming languages, algorithmic developments, artificial intelligence, natural language technologies, quantum computing, etc. Some of the recent developments are particularly groundbreaking. Specifically, the pace and pervasiveness of significant advances in artificial intelligence have led to much excitement but have also raised concerns.

Large language models, such as ChatGPT [11], have garnered widespread attention due to their impressive performance in many contexts but can generate "hallucinations" – inaccurate unintended text [12]. Disinformation (whether intentional or unintentional) that looks credible and deepfakes that look real are also enabled by AI technologies and hold significant potential to alter public and political discourse. Such a prospect can have devastating consequences for democracy and the very notion of truth. For example, AI-based software used to assess the risk of recidivism can perpetuate racial bias even when race is not used as a factor [13]. Some of the issues stem from developers' inability to understand, predict, or explain the decision-making and outcomes of AI systems. Governments worldwide are paying close attention; for example, the US Office of Science and Technology Policy has released a blueprint of the "AI Bill of Rights" [14].

Against this backdrop, where ethics related to the profession have been at the center of public discourse, it is reasonable to question whether recent technical advances and their impacts on

society call for any necessary changes or critical updates to professional oaths. Such contemplation of changes is not commonplace. For example, the Obligation written in 1923 by Rudyard Kipling for the Canadian Ritual of the Calling of an Engineer has not changed since its first administration in 1925, nor is it likely to, given its literary significance [15]. Similarly, the Obligation associated with the Order of the Engineer has had minimal changes since its inception in 1970, with only the addition and subsequent removal of the phrase "in humility and with the need for Divine Guidance" and replacing "Mankind's" with "Humanity's" [16]. While being open to consideration of modifications flies in the face of tradition, it is through such openness that relevancy can be maintained through those ceremonies administering such oaths and obligations.

Given the broad language of the Pledge that foresees the impact of the computing professional's work into the future and its focus on the public good, the authors do not currently see the need for any immediate changes to the Pledge in response to recent advances in the use of AI software such as ChatGPT. However, we were curious whether ChatGPT might provide additional insights or identify potential shortcomings within the oath in light of said developments. The response suggested a slightly revised Pledge with no substantial shortcomings identified or addressed. However, we believe that it is more important than ever for the computing profession to promote an ethical code of conduct and keep it up to date as needed through discussions engaging the computing community regarding the societal impacts of new technologies such as AI-enhanced software development. It is expected that actively practicing and promoting relevant ethical codes and associated tools, such as the Pledge, can help minimize the likelihood of ethical issues and their negative impact.

VI. CONCLUSION

A close relationship has been established between the Pledge of the Computing Professional and both the ACM and ACM/IEEE-CS Software Engineering Codes, showing that the Pledge captures the essence of the two codes of ethics and, by implication, captures the "conscience" of the profession and the "humanity" of the professional. Further, it is hoped and expected that emphasizing this connection and promoting an ethical culture surrounding the Pledge can inspire students in all computing fields and help produce computing graduates with a well-rounded sense of ethics and professionalism. As students graduate, they take the Pledge and evolve into responsible citizens of the profession that can shape the future of the profession. With great computational power comes great ethical and professional responsibility, and the Pledge may be viewed as an introduction for the students to the profound impact and responsibilities they would have in society and as a medium to inspire them to reflect on its meaning. Computing ethics - and the organizations that support computing ethics - will continue to evolve to best serve society. Computing professionals should continually assess whether existing codes of ethics, and the Pledge in particular, may need to change in response to rapid advances in the discipline and their impact on society. Our work suggests that no changes to the Pledge are required, but we do not consider this as the last word on this subject in our ever-changing world.

Note: The authors can facilitate any readers interested in starting a chapter of the Pledge at their institution, including international readers interested in bringing the Pledge to their country (with possible translation of the Pledge oath). It would be an exciting prospect if the Pledge is brought outside of the US.

ACKNOWLEDGMENT

Venu G. Dasigi thanks Sourab Shaik for his assistance in relation to ethical challenges related to artificial intelligence in Section V.

REFERENCES

- [1] ACM COPE, "ACM Code of Ethics and Professional Conduct," 2018. [Online]. Available: <https://ethics.acm.org/>. [Accessed 26 Jul 2024].
- [2] ACM COPE, "Historical Archive of the ACM Code of Ethics," [Online]. Available: <https://ethics.acm.org/code-of-ethics/previous-versions/>. [Accessed 26 Jul 2024].
- [3] ACM COPE, "The Software Engineering Code of Ethics and Professional Practice," 1999. [Online]. Available: <https://ethics.acm.org/code-of-ethics/software-engineering-code/>. [Accessed 26 Jul 2024].
- [4] The Joint Taskforce of Computing Curricula, "Computing Curricula 2001: Computer Science," 15 Dec 2001. [Online]. Available: <https://www.acm.org/binaries/content/assets/education/curricula-recommendations/cc2001.pdf>. [Accessed 26 July 2024].
- [5] ACM, "Curricula Recommendations," [Online]. Available: <https://www.acm.org/education/curricula-recommendations>. [Accessed 26 Jul 2024].
- [6] ACM & IEEE-CS, "Computing Curricula 2020," 31 Dec 2020. [Online]. Available: <https://www.acm.org/binaries/content/assets/education/curricula-recommendations/cc2020.pdf>. [Accessed 26 Jul 2024].
- [7] ABET, "Criteria for Accrediting Computing Programs, 2024 – 2025," 3 Nov 2023. [Online]. Available: <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-computing-programs-2024-2025/>. [Accessed 26 Jul 2024].
- [8] J. K. Estell and K. Christensen, "The need for a new graduation rite of passage," *Commun. ACM*, vol. 54, no. 2, pp. 113-115, Feb 2011.
- [9] B. Albrecht, K. Christensen, V. Dasigi, J. Huggins and J. Paul, "The Pledge of the Computing Professional," *SIGCAS Comput. Soc.*, vol. 42, no. 1, pp. 6-8, Aug 2012.
- [10] The Pledge of the Computing Professional, "The Pledge of The Computing Professional," [Online]. Available: <http://pledge-of-the-computing-professional.org/>. [Accessed 26 Jul 2024].
- [11] OpenAI, "Introducing ChatGPT," 30 Nov 2022. [Online]. Available: <https://openai.com/index/chatgpt/>. [Accessed 26 Jul 2024].
- [12] Z. Ji et al., "Survey of Hallucination in Natural Language Generation," *ACM Computing Surveys*, vol. 55, no. 12, pp. 1-38, 3 Mar 2023.
- [13] J. Angwin, J. Larson, S. Mattu and L. Kirchner, "Machine Bias," *ProPublica*, 23 May 2016. [Online]. Available: <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>. [Accessed 26 Jul 2024].
- [14] The White House, "Blueprint for an AI Bill of Rights," [Online]. Available: <https://www.whitehouse.gov/ostp/ai-bill-of-rights/>. [Accessed 26 Jul 2024].
- [15] Corporation of the Seven Wardens, "Background: The Calling of an Engineer," [Online]. Available: <https://ironring.ca/background-en/>. [Accessed 26 Jul 2024].
- [16] K. A. Wedel, *The Obligation: A History of the Order of the Engineer*, 50th Anniversary Edition, Bloomington, IN: AuthorHouse, 2023.