



IEEE Standard for Ethical Considerations in Emulated Empathy in Autonomous and Intelligent Systems

IEEE Society for Social Implications of Technology

Developed by the
Standards Committee

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STANDARDS

IEEE Standard for Ethical Considerations in Emulated Empathy in Autonomous and Intelligent Systems

Developed by the

Standards Committee
of the
IEEE Society for Social Implications of Technology

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IEEE SA Standards Board

Abstract: Guidance and actions for the ethical development, deployment, or decommission of autonomous and intelligent systems that attempt to emulate aspects of human empathy are provided by this standard.

Keywords: affect, affective computing, AI, AI ethics, artificial intelligence, autonomous systems, emotion, emotion recognition, empathy, ethics, IEEE 7014™, intelligent systems, machine learning, software engineering

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Introduction

This introduction is not part of IEEE Std 7014-2024, IEEE Standard for Ethical Considerations in Emulated Empathy in Autonomous and Intelligent Systems.

This standard addresses the ethics of those autonomous and intelligent systems that attempt to emulate aspects of human empathy, such as estimating a person’s mood or simulating an emotional state. Emotions and cognitive states are closely related to decision-making, health, and general wellbeing. Thus, as these “empathic” autonomous and intelligent systems (EA/IS) become increasingly prevalent, advanced, and affordable, they present significant potential for improved products and services with both social and economic benefits, and also a risk of bias, exploitation, invasion of privacy and other potential harms, for both individuals and groups.

A standard for the ethics of EA/IS was envisaged to provide guidance on ethically aligned development, deployment or decommission of such systems, which aim to facilitate positive outcomes for users and other people, and contribute to human flourishing, while mitigating potential negative outcomes. However, it is important to recognize that ethical decisions and actions are not always simple and may not produce positive outcomes for some or all stakeholders.

This standard was developed following the creation of the IEEE 7000 series of standards, each addressing a different area of the ethics of autonomous and intelligent systems. Commencing in July 2019, this standard was drafted by a voluntary, global working group of independent individuals with backgrounds in academia, industry, policy, and other areas.

The standard is divided into three major sections, as shown in [Table 1](#).

Table 1—Major sections of this standard

Section	Content
Context	Narrative information to aid the developer (e.g., Overview, Scope, Conformance, Intended audience).
System life cycle processes	The normative statements (i.e., rules and guidelines) related to each process, which are required for conforming to the standard.
Annexes	Further informative materials.

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IEEE Standard for Ethical Considerations in Emulated Empathy in Autonomous and Intelligent Systems

1. Overview

1.1 Scope

This standard defines a model for ethical considerations and practices in the design, creation, and use of empathic technology, incorporating systems that have the capacity to identify, quantify, respond to, or simulate affective states, such as emotions and cognitive states. This includes coverage of “affective computing,” “emotion artificial intelligence,” and related fields.

1.2 Purpose

The purpose of this standard is to provide clear and practical guidance for the design and implementation of empathic systems that are prioritized to maximize human flourishing and protect users from bias, abuse, or exploitation.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).^{6,7}

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

⁶The use of the word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.

⁷The use of *will* is deprecated and cannot be used when stating mandatory requirements; *will* is only used in statements of fact.

1.4 Examples of potential risks and harms

Empathic autonomous and intelligent systems (EA/IS) have the potential to revolutionize the way people interact with machines, but there can be potential risks and harms associated with their use. The following are a few examples of what can happen with EA/IS:

- a) *Bias*: Unfair or discriminatory outcomes for certain individuals or groups may occur due to inherent biases in the EA/IS, such as inadequate data set(s) used in system training (e.g., images of faces from a narrow sample of ethnicities and genders) or a lack of proper data set screening.
- b) *Manipulation*: Upon establishing an emotional connection with an empathic system, users may be exploited to perform actions for which they might not otherwise provide consent (e.g., empathic chatbots could be used to convince users to purchase a product or service they may not actually need or normally afford or to provide sensitive personal information that leads to identity theft).
- c) *Invasiveness*: EA/IS may be able to read and interpret signals of human emotions and intentions without the user's prior informed consent or understanding. This can be seen as an invasion of privacy and could lead to further data exploitation or manipulation.
- d) *Overuse*: EA/IS can, by-design or unintentionally, engender affective responses in the user such that it generates an otherwise unnatural attachment to the system. This can lead to misuse, overuse, or overreliance on the technology or desensitize the user to real-life emotional experiences.
- e) *Misinterpretation*: A system may misinterpret or misdiagnose emotions, leading to incorrect conclusions or recommendations. This can be particularly harmful in the context of mental health diagnoses or treatment.
- f) *Dependence*: EA/IS can, by-design or unintentionally, isolate a user, resulting in the system becoming an otherwise unnaturally prominent source of emotional, intellectual, moral, romantic, or spiritual support for the user, with further potential for a resulting impairment to their social skills, or their ability to recognize and respond appropriately to real-life emotional experiences.

These issues are potentially increased for vulnerable parties, such as the young, the elderly, people with cognitive disabilities, and marginalized groups. Additional care is required for such vulnerable parties. For informative examples and use cases of EA/IS, see [Annex A](#).

1.5 Further explanation of scope

This standard applies to all systems that acquire visual, sonic, biometric, textual, or personal data of an individual or population, use that acquired data to compute inferences about the supposed affect of an individual or population, and then, either promptly or with delay, attempt to influence the affect of an individual or population. Influence may involve either simulated emotion by the system or stimulation of the subject's emotion. See [3.1](#) for definition of "subject."

Regardless of the developer's intention for the system, the system is EA/IS if it can reasonably be expected that the subject may interpret the following about the system:

- a) It gives a reasonably informed subject the illusion or impression of understanding or relationship at an affective level.
- b) It processes data semantically with respect to affect.
- c) It gives the subject the sense that they are being heard in an affective sense.

This standard addresses requirements, processes, and practices for any size of system or subsystem or any level of the developer's organization, from high-level policy to detailed operational procedures.

Some developers may already have ethical frameworks in place while others may not. Those with existing frameworks in place may benefit from a gap assessment to identify what they already have in place and what is needed to expand their frameworks to the context of empathic artificial intelligence (AI) to bring their frameworks into conformance with this standard. For informative examples and use cases of EA/IS, see [Annex A](#).

1.6 Digital/virtual domains, extended reality, and the “metaverse”

The concept of empathic AI—and, therefore, the scope of this standard—extends beyond uses on physical human subjects and applies to the digital property attributed to or owned by individuals (whether personal data, virtual avatars or digital twins, and Internet profiles). If a system performs affective inferences, or attempts to influence through affective computing, in a physical or digital domain, it shall be considered an EA/IS and, therefore, within the scope of this standard.

1.7 Out-of-scope artifacts

A device or system that was designed using AI principles to enhance stimulation or the simulation of emotion, but does not acquire data, can be considered an artifact, and is outside the scope of this document. Examples of such out-of-scope artifacts may include:

- a) An emotive toy that has no sensor inputs for affective data or does not adapt its behavior based on affective training
- b) Compelling media (e.g., video, music, or signage) that is designed to elicit mood in the subject but does not adapt to the subject’s estimated mood
- c) Environments with a persistent build that are designed to elicit a given “mood” in the subject

The intention or act of acquiring contemporaneous data about an interaction is one aspect that distinguishes an EA/IS from an artifact. Therefore, systems that acquire or process data after simulated emotion or stimulation would be in the scope of this document. Even if the data was acquired long after the original stimulus or simulation, the intention to acquire the data would have been contemporaneous with the creation of the system. Examples may include the affective steering of individuals or groups to specific political, financial, or societal ends.

1.8 Further explanation of purpose

As part of the IEEE Society for Social Implications of Technology (SSIT),⁸ the IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems (Global Initiative) and the IEEE 7000™ series of standards⁹, this standard is ethical in nature. Its orienting suite of fundamental ethics broadly come from the United Nations Universal Declaration of Human Rights [B46], the United Nations Convention on the Rights of the Child [B9], and values established in the wider IEEE Global Initiative, particularly the Global Initiative’s document, Ethically Aligned Design, First Edition [B14].¹⁰

The goal of this standard is to provide applied ethics that are important in the design, creation, and usage of empathic technologies. Overall, this standard promotes the development of empathic autonomous and intelligent systems (EA/IS) that are designed with an ethically aligned approach, and with the intention to be responsible, promote a high degree of agency for subjects of the system, and are focused on improving the user experience.

⁸More about the IEEE Society for Social Implications of Technology at: <https://sagroups.ieee.org/ssit/>

⁹More about the IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems (Global Initiative) and the IEEE 7000™ series of standards at: <https://standards.ieee.org/industry-connections/ec/autonomous-systems/>

¹⁰The numbers in brackets correspond to those of the bibliography in Annex D.

1.9 Need for this standard

While the technologies with which EA/IS are built and operated may not be unique, they are used to profile and interact with human subjectivity in novel ways. It is this use of data about human subjectivity for human-system interaction, in particular, that raises the need for a globally applicable set of ethical standards for the development, deployment, or decommissioning of these systems.

Human affect is closely related to decision-making, health, and general well-being. By interacting with humans at an emotional or cognitive level, ethically aligned EA/IS can contribute to healthier, happier, more satisfying lives for individuals, groups, and wider society.

However, EA/IS also carry the potential to manipulate people, whether individually, in groups and communities, or collectively, with particular and heightened risks for vulnerable parties such as the young, people with cognitive disabilities, and marginalized groups. As empathic technology becomes increasingly prevalent, advanced, and affordable, a widespread base of subjects are encountering systems that have the potential to monitor, measure, and interact with these subjects in highly intimate and personal ways. This creates the potential for exploitation of subjects through classification or manipulation of their emotions and cognitive states. Misuse of such systems can produce both predictable and unexpected harm for subjects as well as wider social consequences.

Creating a system with artificial affect (e.g., changing the emotional tone of a voice assistant's voice, or a chatbot using emojis) requires intentional consideration and care from the developer, as it can lead to deception, manipulation and potential psychological harm for the subject. EA/IS can create an interaction loop between system and subject that affects the subject (e.g., at an emotional or social level). Thus, the development, deployment, or decommissioning of such systems inherently entails ethical choices on the part of the developer.

1.10 Intended audience

The primary audience for this standard is EA/IS developers (see definition of developer in 3.1). However, secondary stakeholders (such as policymakers, assessors, end users, data subjects, and so forth) will also find this standard useful in their activities or engagement with EA/IS developers or in their interaction with EA/IS.

1.11 Structure

This standard enables the developer (i.e., the person or organization using this standard) to apply an ethical approach to the entire system life cycle. There are several frameworks for defining system life cycles, but this standard makes particular reference to the system life cycle standard ISO/IEC 5338, Information technology—Artificial intelligence—AI system life cycle processes [B27], which is in turn based on ISO/IEC/IEEE 12207-2017, Systems and software engineering—Software life cycle processes [B30] and ISO/IEC/IEEE 15288, First Edition 2015–05–15, Systems and software engineering—System life cycle processes [B31].

NOTE—ISO/IEC 5338 [B27] was still in development and unpublished when it was reviewed for the development of this standard. Thus, ISO/IEC 5338 has only been used for informative purposes, it is not a normative reference.

Based on the processes of the above-mentioned system life cycle standards, this standard is broadly structured in a series of system life cycle processes that include “agency,” “transparency, interpretability, and explainability,” and others, as mentioned in Clause 4. These processes are further grouped into “high-level processes” in accordance with the above system life cycle standards, such as “Organizational project-enabling processes” and “Technical management processes.”

Each process is divided into a structure that closely matches ISO/IEC 5338 [B27], namely the following:

- a) Purpose
- b) Activities and tasks
- c) EA/IS-specific particularities.

NOTE—Whereas ISO/IEC 5338 [B27] includes “AI-specific particularities,” for this standard, this has been changed to “EA/IS-specific particularities” to be specific EA/IS.

For convenience, the entire life cycle is sometimes abbreviated into the phases of “development, deployment, and decommission,” which are broadly chronological in order.

Some of the processes in this standard (e.g., risk, issue, and impact management) apply to multiple, or all, stages of the system life cycle. Any processes can be applied to any appropriate stages, in any order or repeated where appropriate. This standard does not prescribe a specific order in which each system life cycle process should be conducted. However, the processes below are presented in an order that is likely to be approximately chronological for the development, deployment, and decommission of the system.

At times, it may be appropriate for the developer to repeat a process due to a change in the system’s context (e.g., a change to the system design, a change in the policy environment, or discovery of new stakeholder insights).

1.12 Conformance

This standard contains statements that take the form of “shall,” “should” or “may” statements (see 1.3).

The normative statements (those with “shall”) and recommendations (those with “should” or “may”) in this standard are listed within the “System life cycle processes” (Clause 4), under subsections entitled “Activities and tasks.” Any text outside of those subsections that is presented as a recommendation, rule, guideline, etc. is not considered part of the normative requirements for conformance to this standard.

To conform to this standard, the developer is required to achieve all mandatory normative statements (those statements that use the word “shall”) and, where explicitly stated, publish evidence of their conformance (see 4.2.3.2 for details of publishing requirements, and Annex C for a complete list of required materials to be published). The developer is also required to publish a signed statement of conformance (see 4.2.3).

The developer may optionally act beyond these mandatory requirements (“shall” statements) by displaying conformance to recommended (“should,” “may,” or “can”) via published evidence.

In select contexts, normative statements only apply to “high-risk” EA/IS (see 4.2.2.1). If the developer, in their risk, issue, and impact management activities (see 4.2.2) assesses any aspect of the system to fall within a “high risk” (or an equivalent) category, they are thus subject to these selective normative statements.

Where this standard states that an activity (such as a risk assessment) shall be conducted, it does not prescribe specific models or processes to perform those activities. A suitable, recognized model or process is deemed sufficient, insofar as the developer publishes an explanation for their choice of model or process.

Conformance is required by any person or group responsible for the impacts of the system, who are collectively referred to as developers in this standard. This includes resellers, licensees, etc. See 3.1 for a definition of developer.

Where this standard requires the developer to “publish” (e.g., publish a risk assessment), there are requirements for publishing which are outlined in 4.2.3.