ROUTE
EDUCATIONAL & SOCIAL SCIENCE JOURNAL
ISSN: 2148-5518

Volume 12, Issue 5, September 2025, p. 34-47

Article Information

Article Type: *Research Article*

This article was checked by iThenticate.

Article History:
Received
19/07/2025
Received in revised form
27/07/2025
Available online
15/09/2025

VOICE, SPEECH, AND LINGUISTIC AI APPLICATIONS: HOW TO BALANCE AI APPLICATIONS WITH ETHICAL PRINCIPLES

Souad Kahoul [1]

Abstract

Artificial Intelligence (AI) is witnessing rapid acceleration. This rapidly evolving technology is posing new challenges in regulation and application. In this context, international organizations play a vital role in establishing global standards to ensure responsible AI use and protect society from its negative impacts. This paper examines the role of these organizations in setting AI governance standards, contributing to legal and ethical frameworks for responsible technology use. It highlights ethical principles rooted in human rights, categorized into five core principles: inclusive growth and sustainable development, human values and justice, transparency and explainability, robustness and safety, and accountability. The paper explores how these principles apply to AI applications in voice, speech, and language technologies, such as speech recognition, text-to-text speech, and translation.

Keywords: Voice, Speech, and Linguistic AI application, Ethical principles of AI use.

Introduction

The world witnesses in the field of Artificial Intelligence (AI) a rapid development, and this rapid advancement opens new horizons across fields like healthcare, education, industry and trade. As well as the field of Voice, Speech, and Language and its applications, which is the topic of this study. However, this progress raises many questions regarding ethical and legal aspects of using this technology, which is in continuous progress and which we may not be able to control in the future. This

[1] Lecturer. assist.prof. Department of speech therapy faculty of social science, University of Algiers 2, souad.kahoul@univ-alger2.dz.

makes us wonder and address these questions relating to ethics and laws of using AI, with a focus on the international framework and the organizations particularly concerned with voice, speech, and language technologies. This paper addresses key issues related to AI ethics, focusing on international frameworks and organizations shaping this domain.

So, how to balance AI applications in Voice, Speech, and Language with the ethical principles of AI use?

1. Modern AI (2000 to Present)

Since the year 2000, AI has advanced significantly in Natural Language Processing (NLP) and sentiment analysis. These technologies have helped AI understand human language and emotions, leading to applications like public opinion analysis and social guidance. AI has also entered new fields like neuroscience and the humanities, simulating human cognition to help us understand the brain and treat neurological disorders.

With the spread of AI in various fields, the need arose to deal with sensitive ethical issues following these changes such as privacy and bias in algorithms. Therefore, it has become necessary to develop ethical guidelines that ensure the responsible use of these technologies (Aziz, 2023). And institutions around the world have played an important role in setting ethical principles for artificial intelligence, which are:

2. Institutions that focus on the ethical principles of AI

There are several institutions that focus on the ethical principles of artificial intelligence, and these are the most prominent at the international and Arab levels, as they develop guiding principles and legislations that contribute to ensuring the responsible and optimal use of this technology, which are:

1- The United Nations (UN), 2- The Organisation for Economic Co-operation and Development (OECD), 3- The European Union (EU), 5- The Institute of Electrical and Electronics Engineers (IEEE), 6- The Word Economic Forum (WEF), 7- Partnership on AI (PAI) organization, 8- Digital Innovation Forum, 9- Arab AI Union, 10- UAE AI Council, 11- Saudi Arabia's Supreme Council for AI.

3. The Role of International Organizations in Setting and Applying Global Standards for AI

Artificial Intelligence is witnessing rapid development, which poses new challenges related to its regulation and application. In this context,

international organizations play a vital role in setting global standards that ensure the responsible use of AI and protect society from its negative effects.

Indeed, the role of International organizations in developing comprehensive legal frameworks for AI is multifaceted and includes the establishment of standards, governance, and ethical considerations. These organizations act as a platform for countries to cooperate on AI regulations, ensuring the representation of diverse interests while addressing the global challenges posed by AI technology.

The Establishment of Standards and Governance

- ✓ International organizations such as the UN and the OECD play a pivotal role in setting standards for AI governance and leveraging the impact of their specific treaties to address issues such as intellectual property and data transfer regulations (Tuson, 2023).
- ✓ It facilitates the discussion among member states and promotes consensus on standards for AI practices, which is of paramount importance for cross-border cooperation (Huang et al., 2024).
- ✓ A call has been made for the development of an international conceptual document that defines fundamental principles for regulating AI to achieve a balance between the interests of society and the state (Begishev, 2021).
- ✓ While international organizations play a significant role in shaping AI governance, Their effectiveness can be hindered by issues such as bureaucratic inefficiencies and lack of public accountability which raises questions about the legitimacy of their policy decisions (Tosun, 2023).

4. Ethics and Laws of AI Use: An Overview

4.1. Principles of AI Ethics: The rapid proliferation of AI systems has led to the growth of ethical and human rights-based frameworks aimed at guiding the development and use of these technologies. Despite the widespread dissemination of AI principles, academic focus on understanding these efforts, whether individually or within the context of a global landscape teeming with principles offering clear guidance, has remained limited.

To achieve this aim, this white paper and its associated data visualizations compare the contents of 36 prominent documents of AI principles side-by-side. This effort has revealed a growing consensus around eight key thematic trends: privacy, accountability, safety and

security, transparency and explainability, fairness and non-discrimination, human responsibility, and the promotion of human values. Building upon this normative core, an analysis examined 47 principles that constitute these axes, detailing the notable similarities and differences between the documents. And by sharing these observations, we hope that policymakers, advocates, scholars, and others working to maximize the benefits of AI and minimize its harms can better leverage existing efforts and propel the fragmented global dialogue on the future of AI towards consensus (Fjeld et al., 2020).

In a review of 84 AI ethical guidelines, 11 sets of principles were identified: transparency, fairness, equality and equity, non-maleficence, responsibility and accountability, privacy, beneficence, freedom and autonomy, trust, sustainability, dignity and social solidarity (Jobin et al., 2020).

Some governments and institutions are making efforts to establish legal and Regulatory Frameworks for the responsible and ethical development and use of artificial intelligence these entities have published numerous guidelines and ethical principles numbering 173 guidance documents while the majority of these guidelines share common high-level principles that vary from state to state and sector to sector they significantly contribute to laying the primary foundations for applying the ethics of artificial intelligence and offer useful recommendations for policymakers and implementers they address a wide range of issues and ethical challenges and provide insights into various aspects of the life cycle of building AI systems.

This guide focuses on five key principles for the ethics of artificial intelligence as outlined by the OECD organization for economic cooperation and development in 2019 and adopted by a global consensus of (42) States it also highlights the UNESCO United Nations educational scientific and cultural organization agreement on the ethics of artificial intelligence in 2021 which was endorsed by (193) States, including the Kingdom of Saudi Arabia.

These principles are reflected in the following:

4.2. The Five main principles:

1. Inclusive growth and Sustainable Development
2. Human Values and Justice
3. Transparency and Explainability
4. Robustness, Security, and Safety
5. Responsibility and Accountability (SDAIA, 2024).

These principles in their Essence align with the main Global principles however we also identified 11 principles within the main Global principles, and we obtain the following

4.3. The 11 principles

1. Inclusive Growth Sustainable Development and Well-being
2. Beneficence
3. Human Values and Fairness
4. Non-Maleficence
5. Transparency and Explainability
6. Trust
7. Privacy
8. Dignity
9. Robustness Security and Safety
10. Accountability and Oversight
11. Freedom and Autonomy

These principles are integrated within the five main principles resulting in
Inclusive Growth, Sustainable Development and Well-being: Integrated within it are Sustainability and Beneficence
Human Values and Fairness: Integrated within it are Fairness and Non-maleficence.
Transparency and explainability: Integrated within it are Transparency and Trust.
Robustness, Security and Safety: Integrated within it are Privacy and Dignity.
Accountability and Oversight: Integrated within it are Responsibility and Freedom and Autonomy.

Table 1: Principles of AI Ethics

Secondary Principles Underlying the Primary Principles	Primary Principle
Sustainability, Beneficence, Social Solidarity	Inclusive Growth, Sustainable Development, and Well-being
Justice and Equality, Non-Maleficence (Partial)	Human Values and Justice
Transparency, Trust	Transparency and Explainability
Privacy and Dignity	Robustness, Security, and Safety

Responsibility, Freedom, and Autonomy	Responsibility and Accountability

Within this framework, we will create a table that clarifies how the ethical principles of artificial intelligence are adapted in applications specific to Voice, Speech, and Language:

Table 2: Key International and Arab Institutions Responsible for Establishing AI Ethics Principles

Institution	Initiative/Directive	Importance	Source
United Nations (UN)	AI for Good Initiative	Promotes the use of AI to achieve Sustainable Development Goals (SDGs), emphasizing human rights and justice.	UN AI for Good
Organisation for Economic Co-operation and Development (OECD)	Ethical Principles for AI (2019)	Ensures transparency, accountability, and human rights protection in AI systems while preventing discrimination and bias.	OECD AI Principles
European Union (EU)	Ethics Guidelines for Trustworthy AI (2019)	Provides guidelines to ensure AI systems are safe, respect human rights, and remain accountable.	EU Ethics Guidelines
IEEE (Institute of Electrical and Electronics Engineers)	Ethically Aligned Design	Establishes ethical standards for AI design to uphold human values and reduce societal harm.	IEEE Ethically Aligned Design
World Economic Forum (WEF)	AI Governance Principles	Ensures AI respects human values, promotes fairness, and minimizes harm.	WEF AI Governance

Partnership on AI	Partnership for Responsible AI	Develops guidelines for responsible AI use and addresses ethical and social challenges.	Partnership on AI
)igital Innovation Forum	AI Workshops and Conferences	Discusses ethical dimensions of AI and alignment with human values.	Digital Innovation Forum
Arab AI Union	Ethical Guidelines for AI in the Arab World	Guides ethical AI integration in Arab nations, respecting human values.	Arab AI Union
UAE AI Council	National AI Strategy 2031	Integrates AI across sectors with ethical frameworks and transparency.	UAE AI Strategy 2031
Supreme AI Council (Saudi Arabia)	National AI Strategies	Advances AI adoption in Saudi Arabia with ethical considerations.	

5. **Applications of AI in Voice, Speech, and Language**

There are several applications specific to artificial intelligence related to Voice, Speech, and Language and this table represents applications of AI specific to Voice, Speech, and Language along with a clarification of the application area, the technology used, and how the application works.

Examples include Google Translate, Siri, Amazon Alexa, IBM Watson, and emotion recognition tools. These technologies enhance user experience in translation, voice interaction, and sentiment analysis.

Table 3: AI Applications in Sound, Speech, and Language

Number	Application	Usage Area	Technology Used	How It's Applied

1	Google Translate	Text and audio translation	AI, Natural Language Processing (NLP)	Real-time translation of texts and voice conversations.
2	Siri (Apple)	Voice-activated smart assistant	Speech Recognition, NLP	Executes voice commands (e.g., sending messages, setting reminders).
3	Google Assistant	Personalized voice assistant	Speech Recognition, NLP	Performs tasks like web searches or managing smart devices via voice commands.
4	Amazon Alexa	Smart home assistant	Speech Recognition, NLP	Controls music, home devices, and other IoT systems through voice interaction.
5	Dragon NaturallySpeaking	Speech-to-text conversion	Speech Recognition, Speech-to-Text	Accurately converts speech to text for professions like journalism and writing.
6	IBM Watson Speech to Text	Speech-to-text conversion	Speech Recognition, NLP	Transcribes conversations into text for customer service, research, and analysis.
7	Google Speech-to-Text	Speech-to-text conversion	Speech Recognition	Converts human speech into text for voice-enabled applications.
8	Nuance Voice Biometrics	Voice-based identity verification	Voice Biometrics	Securely authenticates users via unique voice patterns.
9	Emotion Recognition	Emotion analysis from voice	Speech Recognition, Sentiment Analysis	Detects emotions (e.g., sadness, anger) by analyzing vocal tone and pitch.
10	Microsoft Azure Speech	Audio conversion and analysis	Speech Recognition, Speech-to-Text	Provides real-time transcription, translation, and text extraction from audio.

11	Amazon Polly	Text-to-speech synthesis	AI-based Text-to-Speech (TTS)	Generates natural-sounding speech for interactive systems and voice assistants.
12	Google Text-to-Speech	Text-to-speech synthesis	Text-to-Speech (TTS)	Converts text into audible speech, aiding visually impaired users.
13	DeepL Translator	Multilingual text translation	AI, Machine Translation	Translates text across languages with high accuracy using neural networks.
14	IBM Watson Tone Analyzer	Text tone and emotion analysis	AI, Text Analysis	Analyzes written text to detect emotions (e.g., anger, calmness) and tone.
15	Speech Emotion Recognition	Emotion detection from speech	AI, Speech Recognition	Identifies human emotions by analyzing vocal stress, tone, and intonation.

All of these applications use artificial intelligence techniques to improve the user experience in many fields such as translation, voice interaction, sentiment analysis, and voice recognition.

6. Voice and Language Applications and their Uses within Ethical Principles.

Through this table we will show how the ethical principles specified in Table 1 are applied in the use of voice applications in Table 2.

Table 4: Integration of Audio/Language Applications with Ethical Principles

Ethical Principle	Audio/Language Application	Implementation Method
Sustainability	Google Translate, DeepL Translator, Microsoft Translator	Facilitates cross-cultural communication and global collaboration by breaking language barriers.
Beneficence	Google Text-to-Speech, Amazon Polly, Microsoft Azure Speech	Converts text to speech, enabling access to information for visually impaired individuals.

Justice and Equality	Google Speech-to-Text, DeepL Translator, Microsoft Translator	Trained on diverse linguistic datasets to avoid bias and ensure equitable service across languages/dialects.
Non-Maleficence	Nuance Voice Biometrics, Emotion Recognition, IBM Watson Speech to Text	Implements safeguards to prevent misuse of voice data (e.g., unauthorized access or harmful profiling).
Transparency	Google Translate, Siri, Dragon NaturallySpeaking	Clearly communicates how voice/text data is collected, stored, and used in processing.
Trust	Dragon NaturallySpeaking, IBM Watson Tone Analyzer, Google Speech-to-Text	Minimizes unnecessary data collection and ensures transparent user consent processes.
Privacy	Nuance Voice Biometrics, Google Assistant, Microsoft Azure Speech	Uses encryption and anonymization to protect sensitive voice data from breaches.
Dignity	Nuance Voice Biometrics, Speech Emotion Recognition, Amazon Polly	Avoids coercive interactions (e.g., forced voice authentication) and respects user consent.
Responsibility	Google Translate, IBM Watson Speech to Text, Amazon Polly	Provides user feedback mechanisms to report errors, with accountability for corrections and improvements.
Freedom and Autonomy	Google Assistant, Siri, Amazon Alexa	Allows users to customize voice interactions, delete data, and control privacy settings.

Discussion

Table explanation

Through this Table 4 we will be able to answer the question of how the balance is achieved between AI applications specific to Voice, Speech, and Language and the ethical principles for using artificial intelligence.

1. **Sustainability:**
    - **Voice and Language application**: Using artificial intelligence in education and translation to enhance cooperation between cultures and Nations.
    - **How it works:** These applications contribute to improving communication between different cultures, which enhances global cooperation.
    - **Technologies used**: Google Translate, DeepL Translator, Microsoft Translator.
2. **Beneficence:**
    - **Voice and Language application**: Improving access to information for people with disabilities using Text-To-Speech (TTS) technologies.
    - **How it Works**: Google TTS, Amazon Polly, Microsoft, Azure Speech: these systems permit people with disabilities to access information through their accessibility mode following TTS technologies.
    - **Technologies used**: Google Text-To-Speech (TTS).
3. **Fairness and Equality:**

- **Voice and Language Application:** Training systems on diverse data to represent different dialects and languages to avoid bias.
- **How it Works:** These systems require training on diverse data from different languages and dialects to ensure fair representation.
- **Technologies Used:** Google Speech-to-Text, DeepL Translator, Microsoft Translator.

4- Non-Maleficence:

- **Voice and Language Application:** Ensuring that systems like Voice Biometrics do not violate privacy or expose individuals to harmful biased algorithms.
- **How it Works:** These technologies must be used cautiously to ensure respect for identity data and avoid exposing individuals to harm.
- **Technologies Used**: Voice Biometrics, Emotion Recognition, IBM Watson Speech to Text.

5- Transparency:

- **Voice and Language Application**: Clarifying how voice and language data is collected and used in applications like Siri and Google Translate.
- **How it Works**: Data privacy policies should be clear and easy for users to understand, helping them comprehend how the technology works.
- **Technologies Used**: Google Translate, Siri, Dragon Naturally Speaking.

6- Accountability:

- **Voice and Language Application**: Having clear mechanisms for accountability in case of errors or biases in applications like Dragon NaturallySpeaking, IBM Watson Tone Analyzer, and Google Speech-to-Text.
- **How it Works**: Responsibilities must be clearly defined, and channels for reporting and addressing issues effectively should be provided.
- **Technologies Used**: Dragon NaturallySpeaking, IBM Watson Tone Analyzer, Google Speech-to-Text.

7- Privacy:

- **Voice and Language Application**: Applying strong encryption techniques to voice data in Nuance Voice Biometrics to ensure information is not leaked.
- **How it Works**: These applications rely on advanced techniques to protect voice data and ensure privacy.
- **Technologies Used:** Nuance Voice Biometrics, Google Assistant, Microsoft Azure Speech.

8- Dignity:

- **Voice and Language Application**: Ensuring that systems like Voice Biometrics are not used to force individuals to interact or investigate them in a degrading manner.
- **How it Works:** These systems include procedures to protect the dignity of individuals and avoid insulting them during interaction.
- **Technologies Used**: Voice Biometrics, Emotion Recognition, Amazon Polly.

9- Responsibility:

- **Voice and Language Application**: Providing mechanisms for users to report errors in the unit or when it stops working, and ensuring that there is a responsible party that evaluates errors and takes corrective actions.
- **How it Works:** These applications provide mechanisms for users to report errors, evaluate suggestions, and take necessary actions.
- **Technologies Used:** Google Text-to-Speech, IBM Watson Speech to Text, Amazon Polly.

10- Confidentiality and Autonomy:

- **Voice and Language Application**: Enabling users to have full control over their voice data and determine data sharing options.
- **How it Works:** These technologies allow users flexibility in customizing privacy settings and controlling their voice data.
- **Technologies Used:** Google Assistant, Apple Siri, Amazon Alexa.

Conclusion

Voice and language Artificial Intelligence applications are a powerful tool for improving interaction between humans and technology, but they pose significant ethical challenges that require the development of strict regulations to ensure the responsible and safe use of these technologies. Through cooperation between

international institutions and the application of ethical principles, it is possible to achieve a balance between voice and language artificial intelligence applications and the ethical principles for using artificial intelligence.

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